

Facility:	Three Mile Island	Scenario No.:	1	Op Test No.:	<u>TMI-2017-1</u>
Examiners:			Operators:		
Initial Conditions:	<ul style="list-style-type: none"> • 100% power, MOL • EG-Y-1A "A" Diesel Generator Out of Service 				
Turnover:	EG-Y-1A 7 day LCO has expired. Plant is beginning a shutdown. Directed rate of change of reactor power is 1%/minute				
Critical Tasks:	<ul style="list-style-type: none"> • Electrical Power Alignment (CT-8) • Natural Circulation RCS Flow (CT-12) 				
Event No.	Malf. No.	Event Type*	Event Description		
1		R CRS R URO	Shutdown reactor in 1102-4 (Allow power to lower >10%) (ICS in Auto, ULD in Hand)		
2		TS CRS	EF-P-1 oil bubbler empty, EF-P-1 inoperable		
3	RW02A	TS CRS C ARO	NR-P-1A Trips, NR-P-1B Fails to Auto-Start, entry into OP-TM-MAP-B0105, and OP-TM-MAP-B0205 (ARO: Starts NR-P-1B from CR)		
4	IC09 IC53	I CRS I URO I ARO	ICS Malfunction, entry into OP-TM-AOP-070 (Main Generator Megawatts fails to 50%, SASS fails to actuate)		
5	ED22C	I CRS I URO I ARO	Loss of ICS AUTO Subfeed Power (MU), entry into OP-TM-MAP-H0108 (URO: Operate MU-V-32 in HAND, ARO: Restore letdown)		
6	ED01	M CRS M URO M ARO	Loss of Offsite power with one Emergency Diesel available, Entry into OP-TM-AOP-020		
7	FW62C	C CRS C ARO	EF-P-2B trips, Entry into OP-TM-EOP-004, Lack of Heat Transfer		
8		C CRS C ARO	Places the SBO diesel on the 1D 4KV bus, starts EF-P-2A		
* (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor					

Three Mile Island NRC Scenario #1

Event #1: Diesel generator, EG-Y-1A, was out of service for a system outage. Due to complications, the outage lasted longer than 7 days, and the plant is commencing a shutdown in accordance with 1102-4, Power Operations. The Shift Manager has ordered a 1%/minute ULD load rate of change.

After the shutdown has commenced, the lead examiner can continue the scenario.

Event #2: When directed the booth operator will call the control room over the plant page. He will notify the CRO/CRS that EF-U-1 turbine oil bubbler is out of oil, and that there is oil on the floor in the EF-P-1 cubicle.

The CRS should declare EF-P-1 inoperable and order the MS-V-13A/B hand wheel closed and EF-P-1 tripped. The CRS should review TS 3.4.1.1.a.2:

With one EFW Pump or any EFW flowpath inoperable, restore the inoperable pump or flowpath to OPERABLE status within 72 hours or be in COLD SHUTDOWN within the next 12 hours.

Once the tech spec is declared, the scenario can continue.

Event #3: The Lead Examiner will cue the trip of the "A" Nuclear River Pump. "B" Nuclear River Pump fails to auto-start in standby, leaving only one (1) Nuclear River Pump running. One Nuclear River Pump may not be sufficient to cool both the Nuclear Service Closed Cooling System (NSCCW) and the Intermediate Closed Cooling System (ICCW).

It is considered a loss of NSCCW if NSCCW temperatures reach 100°F, 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 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

Scenario Set-up
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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.

It is considered a loss of ICCW if ICCW temperatures reach 120°F, 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 Intermediate Component Cooling:** The reactor is tripped in the event of loss of cooling to the CRD stators in order to prevent stator damage. Loss of CRD stator cooling would not prevent CRD insertion on RPS actuation. Maintaining reactor shutdown is not affected by loss of IC component cooling.

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 Intermediate Component Cooling:** One of two RCP seal cooling methods is lost. Loss of seal injection would require RCP shutdown. If SI is lost, overheating of RCP seals is likely. If seal injection maintained, solid operation may be required due to the loss of letdown.

The crew will diagnose the trip of NR-P-1A by an amber disagreement light on the NR-P-1A control switch and Annunciator alarms B-1-5 and B-2-5. The ARO will manually start "B" Nuclear River Pump to provide sufficient cooling for NSCCW and ICCW. The CRS will identify and declare the following Tech Spec: 3.3.2.

When NR-P-1B is running and the Tech Spec has been declared, the scenario can continue.

Event #4: When directed by the lead examiner, insert event #4 for and ICS Failure.

The MW Generated Input to ICS Fails to 0 Volts. A cross-limit may occur as a result of the feed flow reduction caused by the BTU limit. This transient could occur if an open circuit occurs in MW Generated input to the ICS.

The crew will enter OP-TM-AOP-070 and place ICS stations placed in manual as necessary. Plant will be stabilized at 100% power or hot shutdown.

The console left digital indicator will indicate 500 MWe. A large megawatt error signal will be developed which will be used for developing the header pressure modified setpoint and for developing the megawatt calibrating integral. The modified header pressure signal will cause the Turbine Control Valves to open and cause the Main Turbine to trip to manual. Steam Generator and Reactor Demand will both increase.

After the plan is stabilized, the scenario can continue.

Event #5: The Lead Examiner will cue the Loss of ICS AUTO Power (Makeup Subfeed only). The following Critical Safety Functions are affected by the Loss of ICS AUTO Makeup Subfeed:

CSF 2: Reactor Vessel Inventory Control: Provide the means to maintain the core covered with sub cooled water. **Loss of ATA or ICS auto power:** Letdown is isolated by closure of MU-V-3, MU-V-1A and MU-V-1B. Letdown can be recovered when resources are available. Lifted leads are required to remotely operate some Makeup Valves.

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 ATA or ICS auto power:** MU-V-32 transfers to hand control.

The crew will diagnose the loss of ICS Auto Power to the Makeup Subfeed by Annunciators H-1-8 and D-2-1 in alarm, multiple PPC points in alarm, and MU-V-3 and MU-V-5 indicating midscale.

The Loss of ICS MU Auto power will cause MU-V-5, LETDOWN FLOW CONTROL BYPASS VALVE, to fail to 50% open, which will raise letdown flow. Since the cooling water for letdown remains the same with increased letdown flow, MU-V-3, RCS LETDOWN RB ISOL VALVE, will close on High Temperature interlock, thereby creating an isolation of Letdown.

The URO will control Seal Injection flow with MU-V-32 in Hand. The ARO will restore letdown IAW OP-TM-211-950 (performing the appropriate portion of the procedure when restoring from isolation following a High Temperature isolation).

Once Letdown is restored, the scenario can continue.

Event #6/7/8: When directed by the lead examiner, initiate event #6 for the loss of offsite power and EF-P-2B breaker failing to close.

When offsite power is lost, all main feedwater pumps, condensate pumps, and condensate booster pumps are lost. Due to EF-P-1 (Steam Driven Emergency Feedwater Pump) being inoperable from earlier in the scenario, EF-P-2B (Motor driven emergency feedwater pump) breaker not closing, and the loss of 1D 4160V ES bus (due to EG-Y-1A being inoperable), the crew should enter OP-TM-EOP-004, LACK OF PRIMARY TO SECONDARY HEAT TRANSFER, based on incore temperatures rising and no feedwater available.

The crew will also enter OP-TM-AOP-020, LOSS OF STATION POWER. The crew will should initiate OP-TM-864-901, SBO DIESEL GENERATOR (EG-Y-4) OPERATIONS, and power the 1D 4160V bus from EG-Y-4.

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Once the SBO diesel, EG-Y-4, is powering the 1D 4160V ES bus, emergency feedwater pump, EF-P-2A can be started to provide cooling to both OTSG's.

Termination: Once EF-P-2A is running and feeding the both OTSG's the scenario can be terminated.

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)

Feedback:

- Auxiliary/emergency bus voltage normal

Scenario Set-up
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- Verbal indication by plant staff of auxiliary/emergency AC power equipment status

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 ΔT 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

Scenario Set-up
NRC Scenario 1

Event	Description	Procedure Support
	Initial setup	100% power, beginning plant shutdown, Enclosure 2A is complete, notifications and logs for shutdown are complete
1	Commence plant shutdown at 1%/min due	1102-4, Plant Operations
2	EF-P-1 oil leak	Technical Specification 3.4.1.1.a.2
3	NR-P-1C trips, NR-P-1B fails to auto start	MAP B, MAIN ANNUNCIATOR PANEL B
		B-1-5, 480V ES MOTOR TRIP
		B-2-5, 480V ES MOTOR OVERLOAD
4	ICS Malfunction – Generated MW goes to 0	OP-TM-AOP-070, PRIMARY TO SECONDARY HEAT TRANSFER UPSET
5	Loss of ICS AUTO Subfeed Power (MU)	OP-TM-AOP-027, LOSS OF ATA OR ICS AUTO POWER
		OP-TM-MAP-D0201, LETDOWN CLRS OUTLET TEMP HI
		OP-TM-MAP-H0108, ICS/NNI POWER LOST
		OP-TM-211-476, SEAL INJECTION CONTROL – MU-V-32 CONSOLE OPERATIONS
		OP-TM-211-950, RESTORATION OF LETDOWN FLOW
6	Loss of offsite power, Reactor Trip, Lack of Primary to Secondary Heat Transfer	OP-TM-AOP-020, LOSS OF STATON POWER
		OP-TM-EOP-001, REACTOR TRIP
		OP-TM-EOP-004, LACK OF PRIMARY TO SECODARY HEAT TRANSFER
7	Place SBO diesel on the 1D 4160V ES bus	OP-TM-864-901, SBO DIESEL GENERATOR (EG-Y-4) OPERATIONS
8	Restore heat transfer, start Emergency Feed Pump 2A	OP-TM-424-901, EMERGENCY FEEDWATER

Scenario Set-up
NRC Scenario 1

ACTION	COMMENTS / INSTRUCTIONS	DESCRIPTION
IC-241	Initial setup for shutdown	EG-Y-1A protected equipment
Malfunction EG01A	Value: Insert When: Immediately	EG-Y-1A will not start
Remote EGR28	Value: Insert When: Immediately	Trip EG-Y-1A fuel rack
Malfunction RW02A	Value: Insert When: Event # 3	NR-P-1A Trips
Override 03A6S25-ZDINRP1BT(3)	Value: Off When: Immediately	NR-P-1B fails to autostart
Malfunction IC09	Value: Insert When: Event # 4	Generated Megawatts to 500
Malfunction IC53	Value: Insert When: Event # 4	SASS fails to actuate
Malfunction ED22C	Value: Insert When: Event # 5	Loss of ICS Auto Power Makeup Subfeed
Malfunction ED01	Value: Insert When: Event # 6	Loss of offsite power
Malfunction FW62C	Value: Insert When: Event # 6	EF-P-2B breaker fails to close
Malfunction FWR78	Value: Manual When: Event # 10	MS-V-13A Local Manual Control
Malfunction FWR79	Value: 0 When: Event # 10	MS-V-13A position to 0
Malfunction FWR80	Value: Manual When: Event #11	MS-V-13B Local Manual Control
Malfunction FWR81	Value: 0 When: Event # 11	MS-V-13B position to 0
Malfunction FW17	Value: 0 When: Event # 12	Trips EF-P-1
Remote MUR59	Value: Lifted When: Event # 13	MU-V-1A/B HI TEMP INTERLOCK LIFTED LEAD
Remote MUR60	Value: Lifted When: Event # 14	MU-V-3 HI TEMP INTERLOCK LIFTED LEAD
Remote RWR12	Value: NR-P-1B When: Event # 15	NR-P-1B ES selected

Instructions:

1. Put G1-02 in PTL with info tag.
2. Place info tag on start PB for EG-Y-1

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Event Description: Normal reactor shutdown

Time	Position	Applicant's Actions or Behavior
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EXAMINER NOTE: There is no trigger for this event.**EXAMINER NOTE: This is a normal evolution to shutdown the reactor at the end of a 7 day LCO for EG-Y-1A inoperability.****EXAMINER NOTE: The crew may have briefed the shutdown prior to entering the simulator.**

	Crew	Conducts a shutdown brief.

1102-4, POWER OPERATIONS, Section 3.3

	URO	Step 3.b.1 – Ensures the ULD is in Hand

	URO	Step 3.b.2 – Sets the ULD Load rate of change to 1%/minute (which is at setting of 10 on the ULD load rate of change station)

	URO	Step 3.b.2 – Sets the ULD target load demand to the desired setpoint as ordered by the CRS

EXAMINER NOTE: The crew will perform actions from Enclosure 2A as time permits.**EXAMINER NOTE: Once sufficient power reduction is observed, go to event #2**

Op Test No.:	<u>NRC</u>	Scenario #	<u>1</u>	Event #	<u>2</u>	Page 11 of 26
Event Description:		EF-P-1 oil leak				
Time	Position	Applicant's Actions or Behavior				

BOOTH CUE:		When directed by the lead examiner call into the control room as the secondary operator. Inform them that there is oil on the floor in the EF-P-1 cubicle, and that it appears that EF-P-1 outboard bearing oil bubbler is empty.
EXAMINER NOTE:		The CRS should determine that EF-P-1 is inoperable and take step to ensure EF-P-1 does not automatically or manually start.
	CRS	<p>Declares tech spec 3.4.1.1.a.2</p> <p>Three EFW pumps, each capable of being powered from an OPERABLE emergency bus, and one EFW pump capable of being powered from two OPERABLE main steam supply paths:</p> <ul style="list-style-type: none"> With one EFW pump or any EFW flow path inoperable, restore the inoperable pump or flowpath to OPERABLE status within 72 hours or be in COLD SHUTDOWN within the next 12 hours.
BOOTH CUE:		<p>When ordered to place handwheel for MS-V-13A in the closed position, insert Event #10.</p> <p>When ordered to place the handwheel for MS-V-13B in the closed position, insert event #11</p> <p>If ordered to trip EF-P-1, insert event #12.</p>
EXAMINER NOTE:		Either or both methods (Tripping or closing the MS-V-13's) is an acceptable method of ensuring EF-P-1 doesn't start. The CRS may order the valves closed and EF-P-1 tripped, and then choose to follow up with an alternate form of configuration control.
	ARO	Dispatches an operator to close the handwheels for MS-V-13A/B, and to trip EF-P-1.
EXAMINER NOTE:		When the technical specification is declared and the steam supplies to EF-P-1 gagged closed (and/or EF-P-1 is tripped), go to Event #3.

Op Test No.: NRC Scenario # 1 Event # 3

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Event Description: NR-P-1A Trips, NR-P-1B Fails to Auto-Start

Time	Position	Applicant's Actions or Behavior

BOOTH CUE: When directed by the Lead Examiner INITIATE Event #3.

INDICATIONS AVAILABLE: MAP B-1-5 and B-2-5 in alarm, NR-P-1C amber disagreement light lit on CR, PPC alarm.		

EXAMINER NOTE:	Crew may decide to start NR-P-1B upon discovery of it not auto-starting IAW OS-24, Section 4.3.5.A: Any time an automatic control or interlock functions fails to perform as designed and there is no specific procedure direction, the reactor operator should take action to compensate directly for the failure. The Reactor Operator should verbalize the actions taken to inform the Control Room team of the condition and actions taken.

BOOTH CUE:	If directed, as an Auxiliary Operator and/or Maintenance, to investigate NR-P-1A and its breaker, acknowledge the order. Nothing will be found at the pump or breaker.

	CRS	Diagnose the trip of NR-P-1A and the failure of NR-P-1B to automatically start on standby and direct entry into OP-TM-MAP-B0105, 480V ES MOTOR TRIP

OP-TM-MAP-B0105, 480V ES MOTOR TRIP

EXAMINER NOTE:	OP-TM-MAP-B0105, Step 1 is an IAAT statement that is expected to remain N/A for the duration of the scenario.

	ARO	Step 2: Ensures the start of the standby pump as follows: <ul style="list-style-type: none"> Starts NR-P-1B by turning the Control Switch (CR) clockwise, observing red indicating light and normal running amps after initial start.

EXAMINER NOTE:	The crew may match flags for NR-P-1A (place pump in Off or Pull-to-Lock to clear overhead alarm.)

Op Test No.: NRC Scenario # 1 Event # 3

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Event Description: NR-P-1A Trips, NR-P-1B Fails to Auto-Start

Time	Position	Applicant's Actions or Behavior
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EXAMINER NOTE: OP-TM-MAP-B0105, Steps 3 and 4 are N/A		
	ARO	Step 5: Maintain Nuclear River header IAW OP-TM-541-461, "IC & NS Temperature Control".
OP-TM-541-461, IC & NS Temperature Control		
	ARO	<p>Step 3.2: Limitations.</p> <p>3.2.1 To prevent NR pump run-out if a NR pump trips when two NR pumps were operating, maintain NR-PI-217 pressure above the 2 PUMP OPERATION NOT PERMITTED region on Attachment 7.2.</p> <p>3.2.4 To avoid clogging of the NR strainers (i.e., keep strainer pressure > 20 psig), do not operate for extended periods (> 4 HRs) with NR-PI-217 pressure in the RESTRICTED REGION on Attachment 7.2.</p> <p>3.2.5 To prevent excessive pump wear or damage, do not operate NR pumps for extended (> 4 HRs) periods with NR-PI-217 pressure in the RESTRICTED REGION on Attachment 7.2.</p>
		Step 4.1.5: Verify NR PI-217 (CC) NR system pressure is within limits specified in Section 4.3.
		Step 4.2.7: Verify NR PI-217 (CC) NR system pressure is within the limits of Section 4.3.
EXAMINER NOTE: Nuclear River header pressure is expected to be in the proper range and therefore the steps listed to raise or lower are not scripted.		
		4.3.3 Maintain NR-PI-217 between the high and low pressure limits of Attachment 7.2...
EXAMINER NOTE: OP-TM-MAP-B0105, Step 6 is N/A		
	CRS	Step 7: Declares a 3.3.2 (72 Hour) Tech Spec clock.

Op Test No.: NRC Scenario # 1 Event # 3

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Event Description: NR-P-1A Trips, NR-P-1B Fails to Auto-Start

Time	Position	Applicant's Actions or Behavior
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EXAMINER NOTE: Tech Spec 3.3.2:

Maintenance or testing shall be allowed during reactor operation on any component(s) in the makeup and purification, decay heat, RB emergency cooling water, RB spray, BWST level instrumentation, or cooling water systems which will not remove more than one train of each system from service.

Components shall not be removed from service so that the affected system train is inoperable for more than 72 consecutive hours.

If the system is not restored to meet the requirements of Specification 3.3.1 within 72 hours, the reactor shall be placed in a HOT SHUTDOWN condition within six hours.*

EXAMINER NOTE:	The crew may choose to enter OP-TM-541-451, Remove NR-P-1A From Service, which provides direction to swap the power supply for NR-P-1B and ES select NR-P-1B on the 1R 480V ES bus and also to close NR-V-1A.
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EXAMINER NOTE:	Once the 72 hour tech spec is declared, go to Event #4.
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Op Test No.: NRC Scenario # 1 Event # 4

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Event Description: Generated Megawatts fail to 0 volts, Entry into OP-TM-AOP-070

Time	Position	Applicant's Actions or Behavior
BOOTH CUE:		When directed by the lead examiner, insert Event #4.
EXAMINER NOTE:		The console left digital indicator will indicate 500 MWe. A large megawatt error signal will be developed which will be used for developing the header pressure modified setpoint and for developing the megawatt calibrating integral. Rods withdrawal and pressure rises.
	Crew	Recognizes entry into OP-TM-AOP-070, PRIMARY TO SECONDARY HEAT TRANSFER UPSET
OP-TM-AOP-070, Section 2.0 Immediate Manual Actions		
	URO	Step 2.1: Ensures the diamond is in MAN and inserts control rods to match gross FW flow
	ARO	Step 2.2: Ensures both SG A & B FW Demand stations on in HAND and stabilizes Tavg at current temperature.
	ARO	Step 2.3: Verifies Turbine Header pressure between 835 and 935 psig
	URO	Step 2.4: Verifies RCS pressure is lowering or less than 2205 psig. RNO: Fully open RC-V-1 and return to Auto
OP-TM-AOP-070, Section 3.0 Follow-up actions		
	Crew	Step 3.1: IAAT if a reactor trip setpoint is reached, to trip the reactor
	CRS/URO	Step 3.2: IAAT for Makeup tank level, which is NA for this scenario.
	ARO	Step 3.3: Verifies the Main Turbine is RESET

Op Test No.: NRC Scenario # 1 Event # 4

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Event Description: Generated Megawatts fail to 0 volts, Entry into OP-TM-AOP-070

Time	Position	Applicant's Actions or Behavior
	CRS	Step 3.4: Assigns manual control bands: <ul style="list-style-type: none"> • Power within 1% of current power • Tave within 2 degrees F of current Tave • Turbine Header Pressure within 10 psig or current pressure.
	ARO	Step 3.5: Makes plant announcement for entry into OP-TM-AOP-070
	CRS	Step 3.6: N/A 1102-4 is already initiated
	CRS/URO	Step 3.7: Ensures the following stations in HAND: <ul style="list-style-type: none"> • SG/Reactor Demand • Reactor Demand • SG A/B Load Ratio • ULD
	ARO	Step 3.8: Verifies Main Feedwater Pump dP is greater than 30 psid.
EXAMINER NOTE:		Steps 3.9 and 3.10 are NA for this scenario
	ARO	Step 3.11: Adjusts FW flow to restore Tave to between 578F and 580F
	ARO	Step 3.12: Restores deltaTc to less than 5F
BOOTH CUE:		If the chooses to swap generated megawatt instruments, call in as SHIFT MANAGER, and report that the I&C supervisor reports that the plant must stay in manual to support troubleshooting. The plant shutdown can continue.
EXAMINER NOTE:		When the plant is stable, the scenario can continue.

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Event Description: Loss of ICS AUTO Power Makeup subfeed

Time	Position	Applicant's Actions or Behavior
BOOTH OPERATOR: When directed by the Lead Examiner, INITIATE Event 5.		
Indications Available: Annunciators H-1-8, D-2-1, D-2-2, D-3-3, and F-1-4 in alarm, various Makeup related instrumentation and controls fail midscale.		
BOOTH CUE: If directed, as an Auxiliary Operator and/or Maintenance, to investigate which ICS subfeed has been lost at the ICS Power Monitor Panel, report back that "the MU AUTO subfeed light is out, all other subfeed lights are lit".		
	Crew	Diagnoses a loss of MU AUTO Subfeed.
	CRS	Direct entry into OP-TM-MAP-H0108, ICS/NNI POWER LOST
		OP-TM-MAP-H0108, ICS/NNI POWER LOST
	CRS	Step 4.0: Goes to OP-TM-AOP-027, Loss of ATA or ICS AUTO Power
EXAMINER NOTE: OP-TM-AOP-027 is not entered in its entirety since the entry conditions are not fully met. It is used only as a reference for the affected subfeed. The CRS may also decide on using "approaching" criteria to enter MAP G-2-5 or D-2-3 for direction to restore letdown.		
		OP-TM-AOP-027, Loss of ATA or ICS AUTO Power
	ARO	Step 3.10: If MU-V-17 is in HAND, then INITIATE OP-TM-211-472 "Manual Pressurizer Level Control".
OP-TM-211-472, Manual Pressurizer Level Control		
	ARO	Step 4.2: If MU Hand Power is available, then manually control Pzr level as follows: 1. PLACE MU-V-17 in HAND by pressing White HAND PB 2. VERIFY White HAND light is Lit on (CC). 3. ADJUST Pressurizer level as required using toggle switch.

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Event Description: Loss of ICS AUTO Power Makeup subfeed

Time	Position	Applicant's Actions or Behavior
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OP-TM-AOP-027, Loss of ATA or ICS AUTO Power

	ARO	Step 3.11: Initiates OP-TM-211-950, "Restoration Of Letdown Flow".

OP-TM-211-950, RESTORATION OF LETDOWN FLOW

	ARO	Reviews Precautions, Limitations, and Prerequisites.

BOOTH CUE:: If directed as an Auxiliary Operator to report Local ICCW cooler outlet temperature, respond "Local ICCW cooler outlet temperature < 100°F". There is no Local ICCW Flow indicator, so if directed to report Local ICCW cooler outlet temperature, respond that you cannot find an indicator for ICCW flow.

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EXAMINER NOTE: OP-TM-211-950 Step 3.3.1 states to verify ICCW flow >550gpm. With ICS power to the indicator lost, the crew will need to display proper Engaged Thinking Skills to determine that flow has not changed (SOER 10-2)

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EXAMINER NOTE: OP-TM-211-950, Steps 4.1-4.3 are N/A.

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EXAMINER NOTE: Role Play as Shift Manager and give concurrence to restore letdown.

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	CRS	Step 4.4.1: Decides that ICS AUTO power is deenergized and obtains Shift Manager concurrence to lift leads.
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BOOTH CUE: When directed as an I&C Technician to disconnect lead 7-3-3-16 in the ICS/NNI cabinet, insert EVENT #13 and report back that lead 7-3-3-16 in the ICS/NNI cabinet is disconnected and, if applicable, that another I&C Technician has performed the Concurrent Verification.

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	ARO	Step 4.4.2: Directs an Auxiliary Operator to disconnect lead 7-3-3-16 in the ICS/NNI cabinet.
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Op Test No.: NRC Scenario # 1 Event # 5

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Event Description: Loss of ICS AUTO Power Makeup subfeed

Time	Position	Applicant's Actions or Behavior
EXAMINER NOTE: The crew may decide that Step 4.4.3 does not need to be performed because this partial loss of AUTO power has not affected MU-V-3 operations, and perform a Partial Performance of OP-TM-211-901.		
BOOTH CUE: If directed as an Auxiliary Operator (or I&C Technician) to disconnect lead 5-4-5-4 in the ICS/NNI cabinet, insert EVENT #11 and report back that lead 5-4-5-4 in the ICS/NNI cabinet is disconnected and, if applicable, that another Auxiliary Operator (or I&C Technician) has performed the Concurrent Verification.		
	ARO	Step 4.4.3: Directs an Auxiliary Operator to disconnect lead 5-4-5-4 in the ICS/NNI cabinet.
EXAMINER NOTE: OP-TM-211-950, Step 4.4.4 is N/A.		
	ARO	Step 4.5: Verifies MU-V-5 is closed by the Control Station demand indicator reading zero (CC), closes MU-V-3 and MU-V-4, verifying green closed lights lit and the red open lights not lit (CC).
EXAMINER NOTE: Step 4.6 is N/A.		
	ARO	Step 4.7: Verifies MU-V-1A and MU-V-1B are Open by the indicating lights for each being red (not green) (CC)
	ARO	Step 4.8.2: Ensures MU-V-2A and MU-V-2B are open by rotating the control switch for each valve (PCR) to Open, and verifying that the green light goes out and the red light is lit for each valve (CC and PCR).
BOOTH CUE: If directed as an Auxiliary Operator to throttle MU-V-98 one-quarter turn open, PLACE MUR54 to a value of 10 and then report back that MU-V-98 is one-quarter turn open (MU-V-98 is not modeled in the simulator).		

Op Test No.: NRC Scenario # 1 Event # 5

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Event Description: Loss of ICS AUTO Power Makeup subfeed

Time	Position	Applicant's Actions or Behavior
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	ARO	Step 4.9.2: Throttles MU-V-5 to 10% open by operating the dial on the MU-V-5 Control Station to the 10 position.
	ARO	Step 4.10: Determines MU-V-8 is aligned to the THRU position by the indication THRU TO FILTERS lit and BYPASS indication not lit (CC).
	ARO	Step 4.11.4: Opens MU-V-3 by pressing the open pushbutton until high letdown temperature alarm (D-2-1) clears, and observing the red open light lit and green closed light not lit (CC)
EXAMINER NOTE: OP-TM-211-950, Steps 4.12 and 4.13 require no action.		
OP-TM-AOP-027, Loss of ATA or ICS AUTO Power		
	URO	Step 3.12: If MU-V-32 is in HAND, then INITIATE OP-TM-211-476 "Seal Injection Control – MU-V-32 Console Operations".
OP-TM-211-476, Seal Injection Control - MU-V-32 Console Operations		
	URO	Step 4.2.1: Manually control SI flow using MU-V-32 H/A station as follows: PLACE MU-V-32 in HAND by pressing White HAND PB on the MU-V-32 Bailey Control Station (CC)
	URO	Step 4.2.2: Determines that the White HAND light is not Lit on the MU-V-32 Bailey Control Station (CC).
BOOTH CUE: If contacted as an Auxiliary Operator to determine Seal Injection flow locally, go to the a RCP screen on the simulator computer, read seal injection, then multiply by 4 to report total seal injection.		
	URO	Step 2.4.3: ADJUST Seal Injection Flow (MU42-FI1)(CC) using the toggle switch in the up and/or down directions, as necessary at the MU-V-32 Bailey Control Station (CC).
EXAMINER NOTE: Once letdown is being restored and Seal Injection is controlled properly, Go to Event 6.		

Op Test No.: NRC Scenario # 1 Event # 6/7/8

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Event Description: Loss of Offsite Power, Reactor Trip, Lack of Primary to Secondary Heat Transfer

Time	Position	Applicant's Actions or Behavior
BOOTH CUE: When directed by the lead examiner, insert event 6.		
EXAMINER NOTE: The crew will recognize we lost offsite power by the reactor trip, and the control room lights de-energizing. Since only ½ the lights will re-energize, the crew will recognize that the 1D 4160V bus did not repower because its associated diesel generator, EG-Y-1A is OOS.		
BOOTH CUE: After the reactor trip is announced, perform the OS-24 actions that the Auxiliary Operators would normally perform.		
	Crew	Recognizes and diagnoses a loss of offsite power and performs OP-TM-EOP-001 Immediate Actions.
OP-TM-EOP-001, Reactor Trip, Section 2.0 Immediate Actions		
	URO	Step 2.1: Presses both Reactor Trip and DSS pushbuttons
	URO	Step 2.2: Verifies the reactor is shutdown.
	URO	Step 2.3: Presses the turbine trip pushbutton
	URO	Step 2.4: Verifies the turbine stop valves are Closed.
OP-TM-EOP-001, Section 3.0 Vital System Status Verification (VSSV)		

Op Test No.: NRC Scenario # 1 Event # 6/7/8Page **22** of **26**

Event Description: Loss of Offsite Power, Reactor Trip, Lack of Primary to Secondary Heat Transfer

Time	Position	Applicant's Actions or Behavior
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EXAMINER NOTE: Entry into OP-TM-EOP-004, Lack of Primary to Secondary Heat Transfer is through the performance of a symptom check. The crew may choose to enter via the first performance, or through a subsequent symptom check based on incore temperature trends at the time of the check. Either option is acceptable.

EXAMINER NOTE: After recognition, the CRS should prioritize OP-TM-EOP-004, and OP-TM-AOP-020 actions to place the SBO diesel on the 1D 4160V ES bus. The crew may choose to attempt to start Emergency Feedwater Pump 2B, EF-P-2B. The breaker will not close due to malfunctions entered.

	ARO	Step 3.1: Performs a symptom check. Based on incore temperature rising, and no feedwater available, recognizes a lack of primary to secondary heat transfer is occurring.
OP-TM-EOP-004, Lack of Primary to Secondary Heat Transfer, Section 3.0		
	URO	Step 3.1: Ensure no more than 1 RCP running per loop. No action taken as the LOOP caused all RCP's to turn off.
	ARO	Step 3.2: Initiate OP-TM-424-901, "Emergency Feedwater".
	ARO	Step 3.3: Ensure reactor trip announcement.
	Crew	Step 3.4: IAAT time step for after primary to secondary transfer is established. This step will be used after the 1D 4160V ES bus is loaded onto the SBO diesel.
	Crew	Step 3.5: IAAT step to go to OP-TM-EOP-009, HPI Cooling if SCM approaches 25F. This step should be NA for this scenario.
	CRS/URO	Step 3.6: If RCS pressure approaches 2450 psig, and feedwater is available, the URO will ENSURE the PORV block valve is OPEN, then OPEN and deep seat the PORV.

Op Test No.:	<u>NRC</u>	Scenario #	<u>1</u>	Event #	<u>6/7/8</u>	Page 23 of 26
Event Description: Loss of Offsite Power, Reactor Trip, Lack of Primary to Secondary Heat Transfer						
Time	Position	Applicant's Actions or Behavior				

	Crew	Step 3.7: IAAT step for when FEEDWATER is available. This step will be applicable after EF-P-2A is started.
	Crew	Step 3.8: IAAT RCS pressure approaches 2450 psig and FEEDWATER is not available, GO TO OP-TM-EOP-009, "HPI Cooling". This step is expected to be N/A for this scenario
	Crew	Step 3.9: Condensate booster pump cooling is not an option for this scenario due to no condensate booster pumps or reactor coolant pumps running.
	Crew	Step 3.10: When FEEDWATER is available, then continue. This is a hold point until the 1D 4160V ES bus is loaded onto the SBO diesel and EF-P-2A is started.
OP-TM-AOP-020, Loss of Station Power, Section 3.0 Follow up actions		
	ARO	Step 3.1: Initiate OP-TM-424-901, "Emergency Feedwater"
	ARO	Step 3.2: Initiate both OP-TM-861-901 and OP-TM-861-902 for EG-Y-1A and EG-Y-1B Operations.
	ARO	Step 3.3: Verify 1D 4160V and 1E 4160V busses are energized – RNO <ul style="list-style-type: none"> Initiate OP-TM-864-901 "SBO Diesel Generator (EG-Y-4) Operations If either ES 4160V bus is available, then Continue
EXAMINER NOTE: The CRS should prioritize SBO diesel operations to power the 1D 4160V ES bus. Once the 1D 4160V ES bus is energized, EF-P-2A can be started and feedwater established.		
OP-TM-864-901, SBO Diesel Generator (EG-Y-1A) Operations		
	ARO	Verifies precautions, limitations, and prerequisites
	ARO	Step 4.1.1: Verify 1D 4160V bus is de-energized.

Op Test No.: NRC Scenario # 1 Event # 6/7/8Page **24** of **26**

Event Description: Loss of Offsite Power, Reactor Trip, Lack of Primary to Secondary Heat Transfer

Time	Position	Applicant's Actions or Behavior
CT-8	ARO	Step 4.1.2: The PPC is available, verify S2072, 4kV bus 1D overcurrent, is NORM.
CT-8	ARO	Step 4.1.3: Ensure 1SA-D2 and 1SB-D2 are OPEN
CT-8	ARO	Step 4.1.4: Ensure the following control switches are in PTL: A. BS-P-1A B. The ES selected MU pump: MU-P-1A or MU-P-1B-D C. DH-P-1A D. RR-P-1A E. EF-P-2A
CT-8	ARO	Step 4.1.5: PRESS and HOLD for approximately 8 seconds the START PB for the SBO Diesel Generator
CT-8	ARO	Step 4.1.6: Generator voltage will be between 4.1 and 4.3 kV. No action taken.
CT-8	ARO	Step 4.1.7: Generator frequency is between 59 and 61 Hz. No action taken.
CT-8	ARO	Step 4.1.8: ENSURE G1-02 is in PTL
CT-8	ARO	Step 4.1.9: Place T1-C2 in PTL.
CT-8	ARO	Step 4.1.10: Close G2-12 (EG-Y-4 output breaker)
CT-8	ARO	Step 4.1.11: Close T1-D2 (1F 4160V bus cross tie to 1D 4160V)
	ARO	Step 4.1.12: GO TO Section 4.4
EXAMINER NOTE: After the SBO is powering the 1D 4160V ES bus, the CRS and ARO should prioritize starting EF-P-2A to restore feedwater.		

Op Test No.: NRC Scenario # 1 Event # 6/7/8

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Event Description: Loss of Offsite Power, Reactor Trip, Lack of Primary to Secondary Heat Transfer

Time	Position	Applicant's Actions or Behavior
OP-TM-864-901, Section 4.4, While EG-Y-4 is loaded (UNIT Ops) on a 4160V bus		
	ARO	Step 4.4.1: To start EF-P-2A: <ol style="list-style-type: none"> 1. Verify ESAS is defeated or not actuated 2. Verify HSPS is defeated or not actuated 3. Start one large ES motor 4. Verify affected bus voltage is > 4100 volts
EXAMINER NOTE: Once EF-P-2A is started, the CRS should continue in OP-TM-EOP-004 and Rule 4 of OP-TM-EOP-010 to establish feeding and steaming of both OTSG's.		
OP-TM-EOP-004, Section 3.0		
	ARO	Step 3.11: IAAT OTSG pressure < 750 psig, then DEFEAT HSPS Lo-Lo Pressure MFW Isolation.
	URO	Step 3.12: IAAT all RCPs are off then INITIATE Guide 7, "RCP Restart"
	ARO	Step 3.14: 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. With EFW flow, RCS pressure should be lowering		
	ARO	Step 3.15: REDUCE OTSG Pressure so that the secondary Tsat is 90 to 100°F lower than incore thermocouple temperature.
	ARO	Step 3.16: RAISE OTSG level to 75 to 85% operating range with EFW.
	Crew	Step 3.17: ENSURE performance of an alarm review.
EXAMINER NOTE: If asked to evaluate EALs, acknowledge the order.		

Op Test No.: NRC Scenario # 1 Event # 6/7/8Page **26** of **26**

Event Description: Loss of Offsite Power, Reactor Trip, Lack of Primary to Secondary Heat Transfer

Time	Position	Applicant's Actions or Behavior
	CRS	Step 3.18: REQUEST SM evaluate Emergency Action Levels (EALs).
	Crew	Step 3.19: When primary to secondary heat transfer has been restored, then CONTINUE.
EXAMINER NOTE:		Primary to secondary heat transfer will be present after natural circulation is verified. OP-TM-EOP-004 steps to reduce OTSG pressure, and raise OTSG level are performed to establish and strengthen natural circulation. Natural Circulation may have been verified prior to this point.
OP-TM-EOP-010, Guide 10		
CT-12	URO	<p>Guide 10: If all of the following conditions exist, then adequate natural circulation is present:</p> <ul style="list-style-type: none"> – 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 > 25F.
EXAMINER NOTE:		Once natural circulation is verified, the scenario is can be terminated.

Facility: Three Mile Island Scenario No.: 2 Op Test No.: TMI-2017-1

Examiners: _____

Operators: _____

- Initial Conditions:
- 85% power, MOL, load following
 - EG-Y-1A is 2 days into a 6 day system outage

Turnover: Maintain 85% power

- Critical Tasks:
- Trip All Reactor Coolant Pumps (CT-1)
 - Reduce Steaming/Isolate Affected SGs (CT-22)

Event No.	Malf. No.	Event Type*	Event Description
1	ES08A	TS CRS I URO I ARO	Inadvertent 1600# ES actuation, "A" train, enter OP-TM-AOP-046 (URO: AOP-046 IMA's, ARO: Restores Letdown)
2	TH17A	TS CRS R URO	'A' OTSG Tube Leak, TS call, Reactivity manipulation (URO: Lowers power)
3	TH13C	C CRS C ARO	RC-P-1C High Vibrations (ARO: Secures RCP)
4	IC63	I CRS I URO I ARO	Feedwater fails to re-ratio on loss of RCP
5	TH16A	M CRS M URO M ARO	'A' OTSG tube rupture, requiring HPI initiation, entry into OP-TM-EOP-001
6	MU23A	C CRS C URO	MU-P-1A fails to start on ES (URO: Starts MU-P-1A)
7		C CRS C URO C ARO	Loss of SCM, entry into OP-TM-EOP-002, then return to OP-TM-EOP-005 (URO: Rule 1, ARO: Steams 'A' OTSG)

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

Three Mile Island NRC Scenario #2

Event #1: The Lead Examiner will cue the Inadvertent 1600# ESAS Signal. The crew must quickly recognize the condition and perform the required Immediate Manual Actions of OP-TM-AOP-046, INADVERTENT ESAS ACTUATION, to minimize the RCS pressure transient and pressurizer in-surge due to HPI. Additionally, while at power, immediately reducing HPI also minimizes the possibility of a reactor trip on high RCS pressure.

The crew will diagnose the Inadvertent "A" 1600# ESAS Signal by multiple annunciators in alarm, "A" Train components in their ES actuated state, and/or "A" EDG running, while all primary indications appear steady or rising (RCS pressure not at 500#).

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).

Once the plant is stabilized and Letdown is restored, the scenario can continue.

Event #2: The Lead Examiner will cue the 'A' OTSG Tube Leak. Any OTSG tube leak causes an abnormal increase in the release of radioactive materials to the environment. The most fundamental objective is to minimize this release. The prioritized objectives of this procedure are:

- Maintain core cooling.
- Minimize the activity release to the atmosphere (minimize release duration, rate and concentration of radioisotopes, particularly iodine)
- Minimize the integrated tube leakage

The crew will diagnose an OTSG tube leak based on RM-G-26, RM-A-5, and RM-A-15 indications (PR), Annunciator C-1-1 in alarm, and/or pressurizer level lowering (CC). The CRS will announce entry into OP-TM-EOP-005, OTSG TUBE LEAKAGE. This is a reactivity manipulation event. The URO will perform reactor shutdown with ICS in Auto. The ARO may lineup to feed to the RCS from the "B" RBCT for inventory control. The CRS will evaluate and declare Tech Spec 3.1.6.3

When sufficient reactivity manipulation has been observed, the scenario can continue.

Event #3/4: The lead examiner will cue the RC-P-1C high vibrations. Vibrations will slowly worsen until they the motor exceeds 7 mils and pump exceeds 20 mils.

The CRS will enter OP-TM-PPC-L3124, and request the Shift Manager establish a duty team call within 30 minutes.

Time compression will be used, and the Shift Manager will report that the duty team directed the crew to shutdown RC-P-1C in accordance with OP-TM-226-153.

Scenario Set-up
NRC Scenario 2

The crew will lower power to less than 75% and secure RC-P-1C. Upon securing RC-P-1C, feedwater will fail to re-ratio requiring ICS to be placed in manual in accordance with OP-TM-621-471, down to the feedwater loop masters.

When the crew has completed the re-ratio of feedwater the scenario can continue.

Event #5/6/7: The Lead Examiner will cue the "A" OTSG Tube leakrate rising to approximately 500 gpm. The CRS will direct the initiation of High Pressure Injection and will continue with the shutdown. If the level in the Pressurizer goes below 150", then the CRS will enter OP-TM-EOP-001 to direct the Immediate Manual Actions, and then continue in OP-TM-EOP-005, OTSG Tube Leak.

Makeup Pump, MU-P-1A will fail to start on the ES actuation. The URO must manually start MU-P-1A.

After the reactor trip, 25F subcooling margin will be lost and the crew will enter OP-TM-EOP-002, Loss of 25F subcooling margin. The crew will perform Rule 1 and initiate a cooldown in accordance with Guide 11.

When that is complete, the crew will return to OP-TM-EOP-005 for the OTSG 'A' tube leakage.

Termination: The scenario can be terminated when the crew has begun to preferentially steam the 'A' OTSG in OP-TM-EOP-005, OTSG TUBE LEAKAGE.

B&W Unit EOP Critical Task Description Document, 47-1229003-04:

CT-1 - Trip All RCPs - requires that the RCPs be tripped within 1 minute of Loss of Sub Cooling Margin, IAW OP-TM-102-106 reference FSAR 14.2.2.4.

Safety Significance: SBLOCA analyses were performed using conservative Appendix K assumptions with the objective of meeting 10 CFR50.46 criteria. These analyses predicted that continued RCP operation, during certain SBLOCAs, could lead to RCS void fractions of 70% if RCPs continued to operate longer than [1 or 2] minutes following initiation of the SBLOCA. The analyses predicted that if RCPs were tripped after these high void fractions occurred, the core would not be adequately covered and fuel clad failure would occur.

Cues:

1. SCM meter reading less than 25F
2. P-T Display and associated alarms
3. Low RCS Pressure alarms

Performance Indicators:

1. Operation of all console RCP trip devices

Feedback:

1. Report by the URO to the crew that RULE 1 has been completed

CT-22 – Reduce Steaming/Isolate Affected SGs (includes use of SG drains) –

Steam affected SGs to maintain level < [overfill setpoint]. If steaming alone cannot prevent SG fill, then use SG drains (if available) to maintain SG level below [overfill setpoint]. Isolate SG(s) if steaming and draining cannot prevent overfill and maintain RCS and isolated SG pressures < 1000 PSIG by use of [primary and secondary relief paths].

- Isolating Affected SGs outside of the following limits should be considered grounds for failure of the critical task:
 - Do not allow isolation to occur with RCS pressure > 1000 psig.

Safety Significance: The more probable tube rupture scenario is a tube leak in one SG with both SGs available. The preferred mitigation strategy is therefore isolation of the affected SG following the initial cooldown and depressurization to <1000 PSIG. This limits the radiological consequences of the event, but does require cooldown to DHRS operation using one SG.

Both SGs are always used in the initial cooldown and depressurization to < 1000 PSIG. Prevention of MSSV lift on the affected SG(s) is integral to the goal of minimizing off-site release, and assurance requires RCS temperatures at or below 500°F in order to maintain SCM when RCS pressure is < 1000 PSIG. Once this initial cooldown and RCS depressurization to <1000 PSIG is completed, then SG isolation can be considered.

There are limitations on continued steaming of a SG with a SGTR. These limitations consider the overriding concerns of SGTR transients that dictate the isolation of the SG(s) and initiation of HPI cooling, if necessary. These limits are based on integrated radiation dose reaching predetermined values and SG filling due to tube leakage despite steaming to achieve maximum allowable cooldown rate.

SGs isolated due to SG fill criteria pose concerns related to liquid passing through MSSVs. MSSVs should be prevented from passing liquid, since their failure to reseat becomes more probable. For this reason, RCS and SG pressures are maintained <1000 PSIG by use of [primary and secondary relief paths]. These relief paths may include such things as letdown, PZR vents, HPVs, the PORV, TBVs and ADVs.

Cues:

1. Rising OTSG level
2. Rad Monitor Alarms
3. Lowering Pressurizer level
4. Lowering RCS Pressure
5. Automatic initiation of HPI

Performance Indicators:

1. Operation of TBV/ADV controls

Feedback:

1. SG(s) level and pressure
2. RCS pressure
3. MFW/EFW flow
4. MFW/EFW pump and valve status indication
5. TBV/ADV status indication

Industry Experience:

- Indian Point 2 (2/15/00) – Steam Generator Tube Failure (380 litres per minute)
- Palo Verde 2 (3/14/93) – Steam Generator Tube Leak ranged between 11 and 39 litres per day, suddenly turned to 900 litres per minute tube rupture.

PRA

- Steam Generator Tube Rupture (Initiating Event)

Scenario Set-up
NRC Scenario 2

Event	Description	Procedure Support
	Initial Setup	85% Power, MOL
1	Inadvertent 1600# ESAS	OP-TM-AOP-046, Inadvertent ESAS Actuation
		Tech Spec 3.5.1.1
2	~30 gpm "B" OTSG Tube Leak	OP-TM-EOP-005, OTSG Tube Leak
		OP-TM-EOP-010, Emergency Procedure Rules, Guides and Graphs
		1102-4, Power Operations
3	RC-P-1C High Vibrations	OP-TM-PPC-3124, RC-P-1C HIGH VIBRATION
		1102-4, Power Operations
4	Feedwater fails to re-ratio	OP-TM-621-471, ICS MANUAL CONTROL
5	~500 gpm "B" OTSG Tube Rupture	OP-TM-EOP-001, Reactor Trip
		OP-TM-EOP-010, Emergency Procedure Rules, Guides and Graphs
		OP-TM-EOP-005, OTSG Tube Leak
6	Loss of 25F Subcooling Margin	OP-TM-EOP-002, Loss of 25F Subcooling Margin

Scenario Set-up
NRC Scenario 2

ACTION	COMMENTS / INSTRUCTIONS	DESCRIPTION
Initialization IC-242	85% HFP ICS in AUTO	Equilibrium XENON Tags and protected equipment for EG-Y-1A
Malfunction EG01A	Value: Insert When: Immediately	EG-Y-1A will not start
Malfunction EGR28	Value: Insert When: Immediately	Trip EG-Y-1A fuel rack
Malfunction ES07A	Value: Insert When: Event #1	Inadvertent 'A' side ESAS actuation
Trigger #10	Value: DMF ES07A When: dhndhp1a > 0.9	Removes Inadvertent 'A' ESAS actuation
Malfunction TH17A	Value: 0.2 When: Event #2	~ 30 GPM tube leak 'A' OTSG
Malfunction TH13C	Value: 40% over 120 sec When: Event #3	RC-P-1C High Vibrations
Malfunction IC63	Value: Insert When: Immediately	Feedwater fails to re-ratio
Malfunction TH16A	Value: 4.7 Ramp 180 secs When: EVENT 5	"A" OTSG Tube Rupture
Remote MSR66	Value: Insert When: EVENT 11	Initiate Aux Boilers
Remote FWR78	Value: MAN When: EVENT 12	MS-V-13B Manual Control
Remote FWR79	Value: 0 When: EVENT 12	MS-V-13B Closed Position
Trigger #20	When: ratpw < 20 Command: mmf TH16A 15 60	Modifies TH16A to lose subcooling margin after trip.
Malfunction MU23A	Value: Insert When: Immediately	MU-P-1A fails to start on ES.

Instructions:

1. Put G1-02 in PTL with info tag.
2. Place info tag on start PB for EG-Y-1A
3. Ensure LO-P-8A and 8B are running.

Op Test No.: NRC Scenario # 2 Event # 1

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Event Description: Inadvertent 'A' Train ES 1600# Actuation

Time	Position	Applicant's Actions or Behavior
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BOOTH OPERATOR: When directed by the Lead Examiner INITIATE EVENT 1.

Indications Available: Multiple Main Annunciator Panel Alarms illuminated, MU-P-1A running, ES positions indicated on PCR for "A" Train components.

	Crew	Diagnoses an Inadvertent ES Actuation, "A Train 1600#.
	CRS	Direct entry into OP-TM-AOP-046, Inadvertent ESAS Actuation.

OP-TM-AOP-046, Inadvertent ESAS Actuation

	URO/ARO	Step 2.1 (IMA): Defeats invalid ESAS signals by pressing "Defeat / Enable" pushbuttons for each of three channels, verifying that the amber "Defeat" light is lit for each channel and the blue Block load lights are not lit for each channel (PCR).
	URO	Step 2.2 (IMA): Determines that MU-P-1A is not required for seal injection and secures it by rotating the Control Switch in the counter-clockwise direction and verifying the green flag indicator is visible, and that the green Off light is lit and the red Running light is not lit.

EXAMINERS NOTE: Once MU-P-1A is secured, MU-V-16A and MU-V-16B will have flow based on MU-P-1B operating.

	URO	Step 2.3 (IMA): Throttles MU-V-16A / 16B with HPI flow to maintain MU-P-1B flow > 115 gpm.
	ARO	Step 3.1: Announces entry into OP-TM-AOP-046, "Inadvertent ESAS Actuation" over the plant page and radio.
	CRS	Step 3.2: IAAT for ICCW flow. NA for this scenario.

Op Test No.: NRC Scenario # 2 Event # 1

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Event Description: Inadvertent 'A' Train ES 1600# Actuation

Time	Position	Applicant's Actions or Behavior
	URO	Step 3.3: Ensures MU-V-36 is Open by pressing the open pushbutton and verifying the red open light is lit and the green closed light is not lit (CC). MU-V-37 is already open, evidenced by red open light lit and green closed light not lit (CC).
EXAMINERS NOTE: Steps 3.4 through 3.6 are N/A		
	URO	Step 3.7: Verifies MU-V-36 and MU-V-37 are Open.
	URO	Step 3.8: If MU-V-77A & 77B are OPEN, then perform the following: <ul style="list-style-type: none"> • ENSURE MU-V-16A is Closed • ENSURE MU-V-16B is Closed
EXAMINERS NOTE: Steps 3.9 and 3.10 are N/A		
	URO	Step 3.11: Ensures MU-V-14A is Closed by pressing the close pushbutton and verifying the green closed light is lit and the red open light is not lit (CC). MU-V-14B is already closed, evidenced by green closed light lit and red open light not lit (CC).
	CRS/URO	Step 3.12: IAAT step to ensure rods stay in desired bands. As scenario progresses, rods could pull and the URO could lower power and control rods with this step.
	ARO	Step 3.13: If at power, then ENSURE two Secondary River pumps are running.
	ARO	Step 3.14: INITIATE an alarm review.
	ARO	Step 3.15: Initiates OP-TM-211-950, "Restoration of Letdown Flow."
OP-TM-211-950, Restoration of Letdown Flow		

Op Test No.: NRC Scenario # 2 Event # 1

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Event Description: Inadvertent 'A' Train ES 1600# Actuation

Time	Position	Applicant's Actions or Behavior
	ARO	Section 3.0: Reviews Precautions, Limitations, and Prerequisites.
BOOTH CUE:		If contacted to verify integrity of Letdown Line, state "The integrity of the Letdown Line to MU-T-1 has been assessed and the Letdown line is intact".
EXAMINERS NOTE:		Steps 4.1 through 4.4 are N/A.
	ARO	Step 4.5: Ensures: <ul style="list-style-type: none"> • MU-V-3 is closed by observing green closed light lit, red open light not lit. • MU-V-4 is closed by pressing the green closed light, observing green closed light lit, red open light not lit. • MU-V-5 is closed by pressing the Control Station toggle switch in the downward direction, observing the carrot position indicator is pointing to zero.
EXAMINERS NOTE:		Step 4.6 is N/A
	ARO	Step 4.7: Verifies MU-V-1A and MU-V-1B are Open by the indicating lights for each being red (not green) (CC)
	ARO	Step 4.8: Opens MU-V-2A and MU-V-2B below:
	ARO	Step 4.8.2: Verifies MU-V-2A and MU-V-2B are Open by the indicating lights for each being red (not green) (CC)
	ARO	Step 4.9.2: Throttles MU-V-5 to 10% open by operating the dial on the MU-V-5 Control Station to the 10 position.
	ARO	Step 4.10: Verifies MU-V-8 is aligned to the Thru position by the indication Thru to filters lit and Bleed indication not lit (CC)
	ARO	Step 4.11: Opens MU-V-3 by pressing the open pushbutton and observing the red open light lit and the green closed light not lit (CC)

Op Test No.: NRC Scenario # 2 Event # 1

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Event Description: Inadvertent 'A' Train ES 1600# Actuation

Time	Position	Applicant's Actions or Behavior
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EXAMINERS NOTE: Step 4.12 for OP-TM-541-901 is a procedure that is always open in the CR. Step 4.13 Letdown temperature is maintained < 125F.		
	ARO	Step 4.14: Raises letdown flow at < 2.5 gpm/min to desired flow by operating the dial on the MU-V-5 Control Station in the clockwise direction to open MU-V-5 gradually.
OP-TM-AOP-046, Section 3.0		
EXAMINER NOTE: Step 3.16 is N/A		
	CRS	Step 3.17: Declares a 3.5.1.1 (72 Hours) Tech Spec LCO time clock.

Op Test No.: NRC Scenario # 2 Event # 1

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Event Description: Inadvertent 'A' Train ES 1600# Actuation

Time	Position	Applicant's Actions or Behavior
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EXAMINERS NOTE: Tech Spec 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.

**TABLE 3.5-1
INSTRUMENTS OPERATING CONDITIONS
C. Engineered Safety Features**

Functional Unit	(A) Minimum Operable Channels	(B) Minimum Degree of Redundancy	(C) Operational Action if Conditions of Column A and B Cannot Be Met
Engineered Safety Features: 1.c: Manual Pushbutton	2	N/A	(g)

(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.

2 If both manual actuation switches for that feature are inoperable, then place the reactor in **HOT SHUTDOWN** in 6 hours and **COLD SHUTDOWN** within the following 24 hours.

EXAMINERS NOTE: Once Letdown has been restored, Go to Event #2.

Op Test No.: NRC Scenario # 2 Event # 2

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Event Description: 'A' OTSG Tube Leak

Time	Position	Applicant's Actions or Behavior
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BOOTH CUE: When directed by the Lead Examiner INITIATE Event #2.**Indications Available: MAP Annunciator C-1-1 actuates, RM-A-5/15/RM-G-27 counts rise.**

	Crew	Diagnoses the "A" OTSG Tube leak.
	CRS	Announces entry into OP-TM-EOP-005, OTSG Tube leakage
OP-TM-EOP-005, OTSG Tube leakage		
	CRS	Step 3.1: NOTIFY "Shift Dose Assessor" to begin offsite dose assessment.
	ARO	Step 3.2: Announce OTSG TUBE LEAK.
	INFO	Step 3.3: INITIATE Guide 9, "RCS Inventory Control.
OP-TM-EOP-010, GUIDE 9, RCS Inventory Control		
	URO	Step C.1: Verify MU Pump is operating.
	URO	Step C.2: Verify MU-V-5 is closed.
	URO	Step C.3: Verify MU24-FI >20 gpm RNO: Ensure MU-V-18 is Open by pressing the Open Pushbutton (CC), verifying the valve open light is lit and the valve closed light is not lit.
	URO	Step C.4: Ensure MU-V-17 is open.
	URO	Step C.5: Verify Pressurizer level is being restored.

Op Test No.: NRC Scenario # 2 Event # 2

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Event Description: 'A' OTSG Tube Leak

Time	Position	Applicant's Actions or Behavior
OP-TM-EOP-005, OTSG Tube leakage		
BOOTH CUE: When directed to fire both Auxiliary Boilers, request the control room to open CO-V-14A (if they have not) and insert Event #11.		
	ARO	Step 3.4: INITIATE the following procedures to start both Auxiliary Boilers: <ul style="list-style-type: none"> - OP-TM-414-401, "Starting AS-B-1A". - OP-TM-414-402, "Starting AS-B-1B".
	CRS	Step 3.5: VERIFY the reactor is critical.
	N/A	Step 3.6: IAAT pressurizer level < 150 inches and reactor power > 25%, then perform the following: <ul style="list-style-type: none"> • INITIATE HPI. • TRIP the reactor. • GO TO EOP-001
	N/A	Step 3.7: IAAT the turbine trips, and reactor power > 15%, then perform the following: <ul style="list-style-type: none"> • TRIP the reactor • GO TO EOP-001
Procedure Note: 1102-4, "Power Operation" actions to perform plant power reduction should be completed as resources permit. The rate of power reduction should be selected to maintain control and avoid lifting MSSVs.		
	URO	Step 3.8: Verify SG/REACTOR DEMAND is in Auto, Ensures the ULD is HAND, sets the Load Rate of Change and then the ULD Target Load demand to 0%.
	ARO	Step 3.9: Place both FW-P-1A and FW-P-1B in Hand.
EXAMINERS NOTE: Acknowledge as the personnel listed in the next step, or acknowledge as Shift Manager to notify the personnel listed in the next step. Also acknowledge evaluating EAL's.		

Op Test No.: NRC Scenario # 2 Event # 2

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Event Description: 'A' OTSG Tube Leak

Time	Position	Applicant's Actions or Behavior
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OP-TM-EOP-005, OTSG Tube leakage

	CRS	Step 3.10: REQUEST SM to: <ul style="list-style-type: none"> - Evaluate Emergency Action Levels - NOTIFY Power Team - NOTIFY TSO - NOTIFY NDO.
	CRS	Step 3.11: IDENTIFY the affected OTSG: ('A' OTSG)
BOOTH CUE:		When directed to place the MS-V-13A handwheel in the closed position, insert Event #12 and then report the action complete.
	ARO	Step 3.12: IAAT all of the following conditions exist: <ul style="list-style-type: none"> - The affected OTSG is identified - EF-P-1 is not running - Either Motor Driven EFW Pump is Operable then Place the Handwheel of the affected MS-V-13, in the CLOSED position.
	CRS	Declares a 3.1.6.2 and 3.1.6.3 (24 hours) Tech Spec clock.
EXAMINERS NOTE:		Technical Specification 3.1.6.3 – If the primary-to-secondary leakage through any one (1) steam generator exceeds 150 GPD, the reactor shall be placed in hot shutdown within 6 hours, and in cold shutdown within 36 hours.
EXAMINERS NOTE:		After the Tech Spec call is made and sufficient reactivity manipulation has occurred, GO TO Event #3.

Op Test No.: NRC Scenario # 2 Event # 3/4

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Event Description: RC-P-1C High Vibrations, Feedwater fails to re-ratio

Time	Position	Applicant's Actions or Behavior
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BOOTH CUE: When directed by the Lead Examiner INITIATE Event #3.
Indications Available: PLF RCP Bentley Nevada Vibration Monitor, PPC Point L3124 RC-P-1C High Vibration

	Crew	Diagnoses the RC-P-1C has high pump and motor vibrations.
--	------	---

OP-TM-PPC-L3124, RC-P-1C High Vibrations

	ARO	Attempts to reset the alarm, alarm will not reset.
--	-----	--

EXAMINERS NOTE: The crew will evaluate the validity of the high vibration alarm. The alarm will exceed the threshold to perform a duty team call regarding securing the RC pump. The CRS will request a duty team call to evaluate the status.

EXAMINERS NOTE: After the CRS requests the duty team call, use time compression and notify the CRS that the duty determined that the pump needs to be secured as soon as power is less than 75%.

EXAMINERS NOTE: Due to the 'A' OTSG tube leakage, power may be below the 75% threshold.

OP-TM-226-153, SHUTDOWN RC-P-1C

	ARO	Reviews/Verifies Precautions, Limitations, and Prerequisites
--	-----	--

	CRS	Step 4.1: Evaluates the final RCP combination for effects of vibrations and procedural requirements.
--	-----	--

EXAMINERS NOTE: A 2/1 RCP combination with OTSG levels > LLL will require a re-ratio (~70% / 30%) of feedwater flow to A / B OTSG

	ARO	Step 4.2: Evaluates FW Flow requirements for new RCP combination to minimize effects on Delta Tc
--	-----	--

Op Test No.: NRC Scenario # 2 Event # 3/4

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Event Description: RC-P-1C High Vibrations, Feedwater fails to re-ratio

Time	Position	Applicant's Actions or Behavior
	CRS	Step 4.3: Notifies Electrical Maintenance to monitor RC-P-1C vibrations.
	ARO	Step 4.4: Places one of the following to Normal-After-Start: <ul style="list-style-type: none"> – RC-P-2C-2, Oil Lift Pump DC HP – RC-P-2C-1, Oil Lift Pump AC HP
	ARO	Step 4.5: Places RC-P-1C in Pull to Lock
EXAMINERS NOTE: At this point, the crew will diagnose that feedwater failed to re-ratio based on Delta Tc not recovering to ~0 and P-T plot indications.		
	Crew	Diagnoses feedwater re-ratio failure. Enters OP-TM-621-471, ICS MANUAL CONTROL to take control of feedwater.
OP-TM-621-471, ICS MANUAL CONTROL		
	CRS	Reviews limits, precautions, and prerequisites
	URO	Step 4.1: Ensures ULD is in HAND.
	URO	Step 4.2.1: Places SG/REACTOR DEMAND station in HAND.
	URO	Step 4.2.2: Ensures control rod position does not change.
	ARO	Step 4.2.3: Verifies alarm H-2-1 "ICS in Track" In.
	URO	Step 4.2.4: Description on how to change power with the SG/REACTOR DEMAND station. This will be used later to lower power due to the 'A' OTSG tube leak.
	ARO	Step 4.3: Manual feedwater control is needed.

Op Test No.: NRC Scenario # 2 Event # 3/4

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Event Description: RC-P-1C High Vibrations, Feedwater fails to re-ratio

Time	Position	Applicant's Actions or Behavior
	ARO	Step 4.4.1: Places the SG A/B LOAD RATIO station in HAND.
	ARO	Step 4.4.2: Places SG A FW DEMAND station in HAND.
	ARO	Step 4.4.3: Places SG B FW DEMAND station in HAND.
	ARO	Step 4.4.4: Adjusts SG A and/or B FW DEMAND to maintain Tavg, deltaTc, and OTSG level within limits.
EXAMINERS NOTE: When feedwater is re-ratioed correctly, the scenario can continue.		

Op Test No.: NRC Scenario # 2 Event # 5/6/7Page **20** of **25**

Event Description: OTSG Tube Rupture, Loss of Subcooling Margin, MU-P-1A fails to start on ES

Time	Position	Applicant's Actions or Behavior
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BOOTH CUE: When directed by the Lead Examiner INITIATE Event 5.

Indications Available: Pressurizer level lowering rapidly, RCS Pressure lowering rapidly, "A" OTSG level rising rapidly		
	URO	Continues in Guide 9
OP-TM-EOP-010, Guide 9, RCS Inventory Control		
	URO	Step C.8: Verify PZR level is NOT being restored by observing rising level on Pressurizer level indicators (CC) and/or the PPC. RNO: INITIATE HPI IAW OP-TM-211-901, "Emergency Injection HPI/LPI".
OP-TM-211-901, Emergency Injection (HPI/LPI)		
		Step 4.1.2: Verifies that ESAS Train A "Load Seq Block 4" lights (PCR) are not BLUE, and then presses the "A" Train 1600# ES Actuation Manual pushbutton (CC), verifying that block loading is occurring for the "A" Train of ES (PCR).
		Step 4.1.5: Verifies that ESAS Train B "Load Seq Block 4" lights (PCR) are not BLUE, and then presses the "B" Train 1600# ES Actuation Manual pushbutton (CR), verifying that block loading is occurring for the "B" Train of ES (PCR).
		Step 4.3.1: Monitors HPI IAW RULE 2 and throttles HPI IAW Attachment 7.3.
	Crew	Diagnoses the Pressurizer has gone below 150".
	URO	Observes MU-P-1A did not start. URO starts MU-P-1A (in accordance with OS-24) and notifies the CRS.

OP-TM-EOP-010, Guide 9, RCS Inventory Control

URO

Step C.8: Verify PZR level is NOT being restored by observing rising level on Pressurizer level indicators (CC) and/or the PPC.
RNO: INITIATE HPI IAW OP-TM-211-901, "Emergency Injection HPI/LPI".

OP-TM-211-901, Emergency Injection (HPI/LPI)

Step 4.1.2: Verifies that ESAS Train A "Load Seq Block 4" lights (PCR) are not BLUE, and then presses the "A" Train 1600# ES Actuation Manual pushbutton (CC), verifying that block loading is occurring for the "A" Train of ES (PCR).

Step 4.1.5: Verifies that ESAS Train B "Load Seq Block 4" lights (PCR) are not BLUE, and then presses the "B" Train 1600# ES Actuation Manual pushbutton (CR), verifying that block loading is occurring for the "B" Train of ES (PCR).

Step 4.3.1: Monitors HPI IAW RULE 2 and throttles HPI IAW Attachment 7.3.

Crew

Diagnoses the Pressurizer has gone below 150".

URO

Observes MU-P-1A did not start. URO starts MU-P-1A (in accordance with OS-24) and notifies the CRS.

Op Test No.: NRC Scenario # 2 Event # 5/6/7

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Event Description: OTSG Tube Rupture, Loss of Subcooling Margin, MU-P-1A fails to start on ES

Time	Position	Applicant's Actions or Behavior
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EXAMINERS NOTE: The CRS will direct the IMAs of OP-TM-EOP-001, Reactor Trip and following the Symptom Check he should re-enter OP-TM-EOP-005, OTSG Tube Leakage. Based on the reactor being tripped, previous actions have already been taken and the event picks up at step 3.24. The crew may or may not have made it through step 3.23, but those steps are not applicable once the reactor is tripped.

The URO will continue in Guide 9, RCS Inventory.

OP-TM-EOP-001, REACTOR TRIP

	URO	Step 2.1 (IMA): Presses Both Reactor Trip and DSS pushbuttons (CC).
	URO	Step 2.2 (IMA): Verifies that the reactor is shutdown by <u>one</u> of the following: <ol style="list-style-type: none"> 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, and identifies the "B" OTSG tube leak, and informs the CRS.
	URO	Diagnoses the "B" OTSG Tube leak rate increasing by lowering Pressurizer level and RCS pressure, and informs the CRS.

EXAMINERS NOTE: The CRS should continue in OP-TM-EOP-005. This event picks up at step 3.24. The crew may or may not have made it further.

Op Test No.: NRC Scenario # 2 Event # 5/6/7Page **22** of **25**

Event Description: OTSG Tube Rupture, Loss of Subcooling Margin, MU-P-1A fails to start on ES

Time	Position	Applicant's Actions or Behavior
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OP-TM-EOP-005, OTSG Tube Leakage.

	URO	Step 3.24: Verify control rod groups 1 through 7 are fully inserted.
	ARO	Step 3.26: Ensure announcement of reactor trip.
	ARO	Step 3.27: Dispatch an operator to check MSSV status.
	ARO	Step 3.28: Ensure performance of an alarm review.
	ARO	Step 3.29: IAAT OTSG A (B) pressure approaches, or is greater than 1000 psig, then perform the following: <ul style="list-style-type: none"> - ENSURE MS-V-2A (MS-V-2B) is Open. - OPEN MS-V-3D, E, F (MS-V-3A, B, C) to maintain OTSG pressure < 1000 psig.
EXAMINERS NOTE: Cooldown rate is 100°F/hr per Guide 11 until 10CFR 50.54x is invoked.		
CT-22	ARO	Step 3.30: IAAT OTSG level is rising due to tube leakage in an AVAILABLE OTSG, then preferentially STEAM to maintain OTSG level < 85% by adjusting the toggle switches for MS-V-3D, E, F (MS-V-3A, B, C) upward/downward as necessary.
Procedure Note: If exceeding RCS or Pressurizer Tech Spec cooldown rate limits is needed to permit isolation of an OTSG, then 10CFR 50.54x entry should be evaluated.		
EXAMINERS NOTE: The OTSG tube rupture will continue to get worse until 25F Subcooling Margin is lost, and OP-TM-EOP-002 is entered.		
OP-TM-EOP-002, LOSS OF 25F SUBCOOLING MARGIN		
	URO	Step 2.1 - PERFORM Rule 1, LSCM.

Op Test No.: NRC Scenario # 2 Event # 5/6/7

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Event Description: OTSG Tube Rupture, Loss of Subcooling Margin, MU-P-1A fails to start on ES

Time	Position	Applicant's Actions or Behavior
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OP-TM-EOP-010, Rule 1, Loss Of Subcooling Margin

	URO	Step 1 - VERIFY it has been more than two minutes since RCP start.
CT-1	URO	Step 2 - ENSURE <u>all</u> RCPs are shutdown within <u>one</u> minute by rotating the control switches (CC) counter-clockwise, observing red lights out, green lights lit, and no amps for each RCP.
	URO	Step 3 - INITIATE 4 # ESAS Actuation IAW OP-TM-642-902 4# ESAS Actuation by pressing the A and B train 4# manual ESAS actuation buttons (CC and CR) and observing 4# ES actuation on PCR. This step was completed in guide 9, and may or may not be performed again. The 'B' side still will not work.
	ARO	Step 4 - INITIATE OP-TM-424-901, "Emergency Feedwater" and FEED IAW Rule 4, Feedwater Control.

OP-TM-EOP-002, Section 3.0

	ARO	Step 3.1 - ENSURE announcement of reactor trip.
	CRS	Step 3.2 - IAAT LPI flow >1250 gpm in each line, then GO TO EOP-006.
	URO	Step 3.3: Verifies both LPI pumps are both operating.
	URO	Step 3.4 - VERIFY PORV is closed. (Tailpipe ΔP indicator, Alarm G-1-7, A0517).
	CRS	Step 3.5 - INITIATE Attachment 1 "Isolation of possible sources of leakage".

OP-TM-EOP-002, Attachment 1

Op Test No.: NRC Scenario # 2 Event # 5/6/7Page **24** of **25**

Event Description: OTSG Tube Rupture, Loss of Subcooling Margin, MU-P-1A fails to start on ES

Time	Position	Applicant's Actions or Behavior
		Ensures the following valves are closed:
	URO	<ul style="list-style-type: none"> RC-V-1 (Spray) by taking the "Auto-Manual" switch (CC) to "Manual" and, if the spray valve is open, pressing the closed pushbutton (CC), verifying the closed light is lit and the open light is not lit.
	URO	<ul style="list-style-type: none"> RC-V-3 (Spray Block) by pressing the closed pushbutton (CC), verifying the closed light is lit and the open light is not lit.
	URO	<ul style="list-style-type: none"> MU-V-3 (Letdown Block) by pressing the closed pushbutton (CC), verifying the closed light is lit and the open light is not lit.
	URO	<ul style="list-style-type: none"> MU-V-1A (Letdown Cooler Isolation) by pressing the closed pushbutton (CC), verifying the closed light is lit and the open light is not lit.
	URO	<ul style="list-style-type: none"> MU-V-1B (Letdown Cooler Isolation) by pressing the closed pushbutton (CC), verifying the closed light is lit and the open light is not lit.
OP-TM-EOP-002, LOSS OF 25F SUBCOOLING MARGIN		
	URO	Step 3.8 - VERIFY all RC pumps are shutdown.
	CRS	Step 3.10 - IAAT RCS > 25 °F superheat, then GO TO EOP-008.
	CRS	Step 3.11 - If primary to secondary heat transfer is excessive (XHT), then GO TO EOP-003.
	CRS	Step 3.12 - VERIFY cooldown rate > 40 °F/hr, or primary to secondary heat transfer (PSHT) exists.
	CRS	Step 3.13 - If OTSG TUBE LEAKAGE exists, then GO TO EOP-005.

Op Test No.: NRC Scenario # 2 Event # 5/6/7Page **25** of **25**

Event Description: OTSG Tube Rupture, Loss of Subcooling Margin, MU-P-1A fails to start on ES

Time	Position	Applicant's Actions or Behavior
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EXAMINERS NOTE: The scenario can be terminated when the crew re-enters OP-TM-EOP-005 and is preferentially steaming the 'A' OTSG. If isolation criteria has been met, the scenario can be ended when the 'A' OTSG isolated.		

Facility:	Three Mile Island	Scenario No.:	3	Op Test No.:	<u>TMI-2017-1</u>
Examiners:			Operators:		
Initial Conditions:	<ul style="list-style-type: none"> 100% power, MOL 				
Turnover:	Remain at 100% power				
Critical Tasks:	<ul style="list-style-type: none"> Natural Circulation RCS Flow (CT-12) Isolate Overcooling SG(s) (CT-17) 				
Event No.	Malf. No.	Event Type*	Event Description		
1	ZAOWDL LI806	TS CRS	RB Flood Level Instrument Fails High (TS)		
2	MS04	C CRS C URO C ARO	MSIV inadvertent closure, entry into OP-TM-PPC-L2204 (ATC: Lowers power < 90%), (BOP: Opens MS-V-1D)		
3	IC18	I CRS R URO	ULD fails @ 98% in auto (URO: Lowers power with SG/RX Demand to less than 98%)		
4	ED09C	TS CRS C ARO	Loss of Vital Bus "C" (ARO: RM-A-8G interlock to defeat)		
5	MS19A	C CRS C ARO	Isolable Steam Leak in Turbine Bldg, entry into OP-TM-AOP-051. 'B' OTSG (ARO: Isolate Steam Leak)		
6	TC01 RD28	I CRS I URO	Turbine Trips, Reactor fails to automatically trip (URO: IMA's)		
7	ED01	M CRS M URO M ARO	Loss of Offsite Power with both Emergency Diesel Generators available, entry into OP-TM-AOP-020.		
8	MS07B	C CRS C ARO	Stuck open MSSV's, entry into OP-TM-EOP-003. (ARO: Isolate "B" OTSG)		
* (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor					

Three Mile Island NRC Scenario #3

Event #1: The lead Examiner can cue the failure of LT-806 RB Flood Level Transmitter high. PRF1-4-6 alarm will be received. The CRS will declare a 30 day LCO Tech Spec (3.5.5.2).

IAW Tech Spec 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
POST ACCIDENT MONITORING INSTRUMENTATION

Instrument or Control Parameter	Required Number of Channels	Minimum Number of Channels
Containment Water Level Containment Flood (LT-806/807)	2	1

Action Statement: B. 1. With the number of OPERABLE accident monitoring instrumentation channels less than the Required Channels OPERABLE requirements, restore the inoperable channel(s) to OPERABLE status within 30 days or be in at least HOT SHUTDOWN within the next 12 hours.

Event #2/3: The lead examiner will cue the Closure of MS-V-1D. The crew will identify this by the green closed light lit, white test light lit (during travel) and the red open light not lit (after travel is complete) (CC). The crew will enter OP-TM-PPC-L2204, which will direct lowering power less than 90% and reopening MS-V1A.

At 95% power, the ULD will fail, and the power reduction will stop. The crew will take ICS to manual in accordance with OP-TM-621-471, ICS MANUAL CONTROL procedure and lower power with the SG/RX demand station.

When MS-V-1D has been opened, the scenario can continue.

Event #4: The lead examiner will cue the loss of Vital Bus 'C' (VBC).

The effects and compensatory actions of a loss of VBC which are significant for plant safety or operation are described in OP-TM-AOP-017.

This procedure stabilizes the plant and performs compensatory actions for equipment failures. The CRS will determine what tech specs we are in and brief the crew.

Once the brief is complete, the scenario can continue.

Event #5: The Lead Examiner will cue the Isolable Steam Leak in the Turbine Building.

Scenario Set-up
NRC Scenario 3

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.

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.

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 #6: The lead examiner will cue the turbine trip. The reactor will not automatically trip, and the CRS/URO will enter OP-TM-EOP-001, REACTOR TRIP and perform the IMA's.

After the immediate manual actions and symptom check are complete, 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 multiple Annunciators in alarm, PPC points in alarm, RCP's secured (CC), loss of half of the Control Room lighting.

The CRS will enter OP-TM-AOP-020, LOSS OF STATION POWER. Both diesel generators will start, and power the 1D and 1E 4kV busses.

Scenario Set-up
NRC Scenario 3

Two stuck open main steam safety valves on the "B" OTSG will cause conditions to be met for an Excessive Primary to Secondary Heat transfer. The CRS will announce transition into OP-TM-EOP-003, Excessive Primary to Secondary Heat Transfer. The ARO will perform Phase 1 and 2 isolation to secure emergency feedwater from the 'B' OTSG.

Termination: The scenario can be terminated when OTSG "B" has been isolated, Seal injection has been restored, and Natural Circulation has been established.

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 ΔT 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

CT-17 - Isolate Overcooling SGs - This is a critical task in that continued feeding of an OTSG with a steam break will continue to overcool the RCS, which could result in emptying the Pressurizer and causing a loss of subcooling margin. This would significantly change the mitigation strategy of the event.

- Critical task (CT-17) is to isolate the affected OTSG prior to emptying the, pressurizer. Alternately if HPI held pressurizer level, cooldown below 329°F with HPI on would violate TS. Either condition should be considered grounds for failing critical task.

Safety Significance: If the overcooling SG has been identified then that SG should be isolated, otherwise both SGs should be isolated. Isolating a SG means to stop all FW flow (MFW and AFW) and steam flow (e.g., close TBVs, ADVs, steam supply to FW pumps, MSIVs etc.). FW flow should be maintained to the unaffected SG and cooling stabilized using the unaffected SG.

Isolation of a SG or both SGs should always follow a logical progression of increasingly more drastic attempts to isolate the SG. For example, if the overcooling is not severe it may be possible to close both the TBVs and ADVs as well as the auxiliary steam valves thus isolating the SG. If this does not work, then for those plants which have main steam isolation valves, the main steam isolation valve should then be closed. For severe overcooling situations, [secondary plant protection system] will likely actuate.

Inappropriate mitigative actions can cause loss of both SGs even if only one SG is faulted; such a situation would cause degradation of the transient mitigation capability of the plant.

Cues:

1. SPDS displays and associated alarms
2. P-T display and associated alarms
3. Rising RB Pressure and Temperature
4. RB Fire/Heat alarms

Performance Indicators:

1. Operation of HIPI/MU pump start switches
2. Operation of associated FW pump and valve controls (affected OTSG)
3. Operation of associated steam valve (included TBVs/ADV's) controls (affected OTSG)
4. Operation of MSIV's (affected OTSG)

Feedback:

1. RC temperature and pressure
2. SG level and pressure
3. MSIV status indication
4. MFW/AFW pump and valve status indications

Scenario Set-up
NRC Scenario 3

Event	Description	Procedure Support
	Initial Setup	100% power, MOL
1	LT-806, RB Flood Level Instrument fails high	TS 3.5.5.2
		TS Table 3.5-3
		OP-TM-PRF1-0406, RB FLOOD LEVEL HI
2	MS-V-1D closes	OP-TM-PPC-L2207, MAIN STEAM ISOL MS-V-1D
		1102-4, POWER OPERATIONS
3	ULD fails to lower power in AUTO	OP-TM-621-471, ICS MANUAL OPERATION
4	Loss of Vital Bus 'C' (VBC)	OP-TM-AOP-017, LOSS OF VBC
		TS 3.1.6 and 3.5.1.9
5	Isolable Steam Leak in the Turbine Building	OP-TM-AOP-051, SECONDARY SIDE HIGH ENERGY LEAK
		TS 3.4.1.2.3
6	Turbine trip, Reactor fails to trip automatically	OP-TM-EOP-001, REACTOR TRIP
7	Loss of Offsite power	OP-TM-AOP-020, LOSS OF OFFSITE POWER
		OP-TM-EOP-010, EMERGENCY PROCEDURE RULES, GUIDES, AND GRAPHS
8	Stuck open Main Steam Safety Valves, Excessive Heat Transfer	OP-TM-EOP-003, EXCESSIVE PRIMARY TO SECONDARY HEAT TRANSFER

Scenario Set-up
NRC Scenario 3

ACTION	COMMENTS / INSTRUCTIONS	DESCRIPTION
IC-243	100% power, ICS in Auto	Equilibrium Xenon
I/O Override 02A3M27-ZAOWDLLI806	Value: 100 When: Event #1	LT-806 RB Flood Level Transmitter Fails High
I/O Override PRF1-4-6	Value: ON When: Event #1	PRF1-4-6 Alarms, RB Flood Level High
Event Trigger #1	Value: Command: SET PPA0449_V = 90.0	Sets PPC point A0449 to 90 inches to match Event #1
Monitor Point	Value: SET PPA0449_O =True When: Immediately	Enables PPC Point A0449 to be set by event trigger #1
Malfunction MSR04	Value: 0.000 When: Event #2	MS-V-1D closes
Event #2 Trigger	Value: ratpw < 98 Command: IMF IC18 84	ULD fails at ~98%
Malfunction ED09C	Value: Insert When: Event #4	Loss of Vital Bus 'C'
Malfunction MS19B	Value: 1 When: Event #5	Steam leak in the turbine building
Malfunction TC01	Value: Insert When: Event #6	Turbine Trip
Malfunction RD28	Value: Insert When: Immediately	Reactor auto trip block
Malfunction ED01	Value: On When: Event #7	Loss of Offsite Power
Malfunction MS05A	Value: 100 When: Event #7	MSSV on 'B' OTSG fails 100% open
Malfunction MS05B	Value: 100 When: Event #7	MSSV on 'B' OTSG fails 100% open
TRIGGER 10	Value: DRF MSR04 When: RATPW<92	Deletes MSIV Inadvertent Closure
Alarm PRF1-3-3	Value: ON When: Event #12	HSPS door opening when swapping instruments
REMOTE ICR32	Value: Def When: Event #13 w/ 30 sec TD	Clears SASS mismatch alarms in step 3.8
REMOTE HSR09	Value: 1046 When: Event #14 w/ 10 sec TD	Sets HSPS channel to 1046
REMOTE HSR10	Value: 1044 When: Event #14 w/ 20 sec TD	Sets HSPS channel to 1044
REMOTE HSR11	Value: 1054 When: Event #14 w/ 30 sec TD	Sets HSPS channel to 1054

Scenario Set-up
NRC Scenario 3

REMOTE HSR12	Value: 1052 When: Event #14 w/ 40 sec TD	Sets HSPS channel to 1052
REMOTE CHR04	Value: ON When: Event #15	Starts AH-E-26

Op Test No.: NRC Scenario # 3 Event # 1

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Event Description: LT-806 RB Flood Level Instrument Fails High

Time	Position	Applicant's Actions or Behavior
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BOOTH OPERATOR: When directed by the Lead Examiner INITIATE Event #1.**Indications Available: PRF1-4-6 Alarm and Containment Flood Level Indicator**

	CRS	Direct entry into OP-TM-PRF1-0406, RB Flood Level Hi
	ARO	ARO should diagnose the failure of the RB Flood Level instrument LT-806 based on other RB level instrumentation and RCS conditions.
	CRS	Reviews TS 3.5.5.2 and TS Table 3.5-3 for RB Flood Level Instrument requirements.

EXAMINER NOTE:

TS 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
POST ACCIDENT MONITORING INSTRUMENTATION**

Instrument or Control Parameter	Required Number of Channels	Minimum Number of Channels	Action
Containment Water Level Containment Flood (LT-806/807)	2	1	B

TS Table 3.5-3 ACTIONS – B.1: With the number of OPERABLE accident monitoring instrumentation channels less than the Required Channels OPERABLE requirements, restore the inoperable channel(s) to OPERABLE status within 30 days or be in at least HOT SHUTDOWN within the next 12 hours.

EXAMINER NOTE: Once the TS call is made, Go To Event 2.

Op Test No.: NRC Scenario # 3 Event # 2/3

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Event Description: MS-V-1D closure, ULD fails to lower power

Time	Position	Applicant's Actions or Behavior
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BOOTH OPERATOR: When directed by the Lead Examiner INITIATE Event #2.**Indications Available: PPC-L2207 in alarm, MS-V-1D indicates closed on CC, "B" OTSG Pressure/Level rise.**

BOOTH CUE:	If contacted as maintenance, inform the crew that "I see no damage to MS-V-1D and the valve may be reopened when Ops is ready to open it"
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CRS

Direct entry into OP-TM-PPC-L2207, MAIN STEAM ISOL MS-V1D.

EXAMINER NOTE: Step 4.1 is N/A.

PROCEDURE NOTE:	The following steps are designed to prevent an overpressure condition that could challenge the RC-RV-2 (PORV) and to prevent operation in an unbalanced steam flow condition.
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OP-TM-PPC-L2207, MAIN STEAM ISOL MS-V1D

CRS

Step 4.2: VALIDATE actual valve movement by rising RCS pressure and temperature or local valve position.

CRS

Step 4.3: REDUCE reactor power to less than 90% power IAW 1102-4, "Power Operation".

EXAMINER NOTE:	The CRS may perform either section 3.2 or 3.3 of 1102-4. The steps are similar and therefore, only section 3.3 is scripted.
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EXAMINER CUE:	If directed as Shift Manager to perform or initiate Enclosure 2A, acknowledge the direction.
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1102-4, POWER OPERATION

CRS

Step 3.3.2.A.1: PERFORM Enclosure 2A (for an emergency (forced) power reduction INITIATE Enclosure 2A).

Op Test No.: NRC Scenario # 3 Event # 2/3Page **12** of **29**

Event Description: MS-V-1D closure, ULD fails to lower power

Time	Position	Applicant's Actions or Behavior
EXAMINER CUE:		Acknowledge as the personnel listed in the next step, or acknowledge as Shift Manager to notify the personnel listed in the next step. Also acknowledge Logging the notifications.
	CRS	Step 3.3.2.A.2: If power change is greater than 10 MWe, then perform the following: a) NOTIFY the following: - Power Team - TSO - NDO b) LOG notifications to Power Team, TSO, and NDO in Control Room Log.
	ARO	Step 3.3.2.A.3.a: MAINTAIN Generator Reactive Load IAW OP-TM-301-472.
	URO	Step 3.3.2.A.3.b: If SG/REACTOR DEMAND is in AUTO, then REDUCE reactor power as follows: 1. ENSURE ULD is in HAND by observing White HAND light lit, red AUTO light not lit (CC).
EXAMINER NOTE:		The Load Rate of Change adjustment knob does not read in "%". If the CRS directs a 1%/Min load rate of change, the URO will dial the adjustment knob to 10. If the CRS directs a 3%/Min load rate of change, the URO will dial the adjustment knob to 30.
	URO	Step 3.3.2.A.3.b: If SG/REACTOR DEMAND is in AUTO, then REDUCE reactor power as follows: 2. SET ULD LOAD RATE OF CHANGE to ≤ 1 %/minute for PLANNED reductions or at a rate determined by CRS for Forced power reductions by changing the Load Rate of Change adjustment knob in the clockwise direction until the corresponding value is achieved.

Op Test No.: NRC Scenario # 3 Event # 2/3

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Event Description: MS-V-1D closure, ULD fails to lower power

Time	Position	Applicant's Actions or Behavior
EXAMINER NOTE: The URO will decide MWe corresponding to the power level directed by the CRS by looking at the placard next to the ULD.		
	URO	Step 3.3.2.A.3.b: If SG/REACTOR DEMAND is in AUTO, then REDUCE reactor power as follows: 3. SET ULD Target Load Demand to desired setpoint by placing the ULD Control Station toggle switch in the down direction until the target MWe is targeted by the indicator.
BOOTH NOTE: Ensure Event #3 is inserted at approximately 98% power.		
	URO	At ~ 95% power, the ULD will stop responding. This will be identified by the generated MWe output on the PPC not lowering any longer.
	CRS	Directs ICS to be put in manual in accordance with OP-TM-621-471, ICS MANUAL CONTROL to the SG/RX demand.
OP-TM-621-471, ICS MANUAL CONTROL		
	URO	Step 4.2.1 – Places the SG/Reactor Demand station in AUTO
	URO	Step 4.2.2 – Ensures control rod position does not change.
	ARO	Step 4.2.3 – Verifies alarm H-2-1 “ICS in Track” in
1102-4, POWER OPERATIONS		
	URO	Step 3.3.2.A.3.c – URO uses the SG/Reactor demand toggle switch to lower power.

Op Test No.: NRC Scenario # 3 Event # 2/3

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Event Description: MS-V-1D closure, ULD fails to lower power

Time	Position	Applicant's Actions or Behavior
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BOOTH NOTE: Ensure Event #10 is automatically entered at 92% power to remove the MSIV fault. If not, then remove Remote MSR04 prior to the crew attempting to open the MSIV.

EXAMINER NOTE: Once Reactor Power is below 90%, the CRS will continue in OP-TM-PPC-L2207, MAIN STEAM ISOL MS-V1D.

OP-TM-PPC-L2207, MAIN STEAM ISOL MS-V1D

	ARO	Step 4.4 RE-OPEN MSIV as soon as possible by pressing the red open pushbutton and observing all three lights lit during travel, and only the red open light lit (green and white lights not lit) at the end of valve travel.
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EXAMINER NOTE: Once MS-V-1D is open, go to Event #4.

Op Test No.: NRC Scenario # 3 Event # 4

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Event Description: Loss of Vital Bus 'C' (VBC)

Time	Position	Applicant's Actions or Behavior
BOOTH CUE: When directed by the Lead Examiner INITIATE Event #4.		
INDICATIONS AVAILABLE: Multiple Main Annunciator Panel Alarms illuminated, "C" RPS Cabinet deenergized, 1 of 2 Control Rod Position Indication Panels deenergized, 1 Row of HSPS lights lit.		
BOOTH CUE: If dispatched to investigate, report that the 'C' inverter AC and DC input supply breakers are open for not apparent cause.		
	Crew	Diagnosis a loss of Vital Bus "C".
	CRS	Direct entry into OP-TM-AOP-017, Loss of VBC.
OP-TM-AOP-017, LOSS OF VBC		
	ARO	Step 3.1 - Announces entry into OP-TM-AOP-017, "Loss of VBC," over the plant page and radio.
	CRS	Step 3.2 – Verifies PPC alarm L3461 "CRD AC Power Fault (B)" is clear
EXAMINER NOTE: If asked, notify the CRS that there are no fuel moves in progress in the spent fuel pool.		
	CRS	Step 3.3 – N/A no fuel move is in progress.
	ARO	Step 3.4 – Selects group 5-7 on CRD-FPM-B on the right side of the PI panel.
PROCEDURE NOTE: Loss of power to RM-A-8 trips AH-E-10, AH-E-11, and WDG-V-47.		

Op Test No.:	<u>NRC</u>	Scenario #	<u>3</u>	Event #	<u>4</u>	Page 16 of 29
Event Description: Loss of Vital Bus 'C' (VBC)						
Time	Position	Applicant's Actions or Behavior				

	ARO	Step 3.5 – Places RM-A-8G interlock switch in DEFEAT position.
	ARO	Step 3.6: Initiates 1104-15A to restore AUX and FHB ventilation.
EXAMINER NOTE: The CRS/ARO may prioritize initiate 1104-15A to restore ventilation. If so, the highlights are below.		
1104-15A, AUX AND FUEL HANDLING BUILDING SUPPLY AND EXHAUST SYSTEM, Section 4.3		
	ARO	Step 4.3.2.1 – Verify open / open AH-D-120, 121, 122, FH BLDG Isolation Dampers
	ARO	Step 4.3.2.2 – Starts AH-E-14 A/C or AH-E-14 B/D
	ARO	Step 4.3.2.3.A– Start AH-E-10
	ARO	Step 4.3.2.3.B– Start AH-E-11
BOOTH CUE: When directed to operate AH-E-26, use remote function on Event #15, CHR04 to ON and wait ~ 2 minutes and report status of AH-E-26. AH-E-21, 90 & 91 are not modeled. When directed to operate these fans; wait 1 minutes and report the following status: AH-E-90 and 91 are running		
	ARO	Step 4.3.2.34 – Restore control tower first floor ventilation by: <ol style="list-style-type: none"> 1. Press AH-D-28/617 Reset PB” and Start AH-E-20A or AH-E-20B 2. Verify open AH-D-28/617 on ESAS indication on PCR or the white light on H&V panel 3. Dispatches an operator to start AH-E-21 (Not modeled) 4. Dispatches an operator to secure AH-E-90 and 91 5. Dispatches an operator to start AH-E-26

Op Test No.: NRC Scenario # 3 Event # 4

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Event Description: Loss of Vital Bus 'C' (VBC)

Time	Position	Applicant's Actions or Behavior
OP-TM-AOP-017, Loss of VBC		
	ARO	Step 3.7 – Reviews Control room annunciators in alarm.
BOOTH CUE:		When dispatched to perform OP-TM-621-452, “Defeating SASS Mismatch ALARM inputs”, insert Event #13 and report back as complete after ~ 1 minute.
BOOTH CUE:		To acknowledge the SASS alarm locally, use ICR15.
EXAMINER CUE:		Swapping HSPS instruments is not necessary to move on in the scenario. Once the T.S. call is made, the scenario can continue.
	ARO	Step 3.8 – Dispatches an operator to perform “OP-TM-621-452 to defeat the SASS mismatch alarms for OTSG A & B SU LVL”
BOOTH CUE:		When directed to swap HSPS level inputs insert Event #12. This will simulator opening the HSPS doors (PRF1-3-3) and swap the instruments. When all of the instruments are swapped, change event #12 to OFF, to close the HSPS door. Notify the control room when completed.
	ARO	Step 3.9 – Dispatches an operator to swap to operable HSPS instruments for EF-V-30A and EF-V-30C control.
EXAMINER NOTE: The CRS will initiate the following Tech Specs:		
<ul style="list-style-type: none"> • 3.1.6.8 – When the reactor is critical above 2 percent, 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 not more than 72 hours provided a sample is taken of the Reactor Building atmosphere every 8 hours and analyzed for radioactivity and two other means are available to detect leakage. • Table 3.5-1, D – Channel III level signals – 2 min operable channels with 1 min degree of redundancy. Only 1 will be operable. 		
	CRS	Step 3.10 – Initiates TS timeclock 3.1.6 and 3.5.1.9

Op Test No.: NRC Scenario # 3 Event # 4Page **18** of **29**

Event Description: Loss of Vital Bus 'C' (VBC)

Time	Position	Applicant's Actions or Behavior
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	CRS	Step 3.11 – Notifies Rad Pro to obtain RB air sample within 8 hours.

EVALUATOR NOTE: When the Tech Specs are declared, go to Event #5.

Op Test No.: NRC Scenario # 3 Event # 5

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Event Description: Isolable steam leak in the Turbine Building

Time	Position	Applicant's Actions or Behavior
BOOTH CUE: When directed by the lead examiner, insert Event #5		
INDICATIONS AVAILABLE: Lowering Generated MWe, Lowering Tave, Reactor Power rising		
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 turbine building over the plant page and radio.
	URO	Step 3.2: MAINTAIN reactor power < 100%.
EXAMINER NOTE: Steps 3.3 through 3.6 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 3.7: REQUEST SM to evaluate EALs.

Op Test No.: NRC Scenario # 3 Event # 5

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Event Description: Isolable steam leak in the Turbine Building

Time	Position	Applicant's Actions or Behavior
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EXAMINER NOTE: Steps 3.8 through 3.9 are N/A.

	CRS	Step 3.10: If leak is in Turbine Building, then GO TO Section 6.0.

OP-TM-AOP-051, Section 6.0, TURBINE BUILDING

	CRS	Step 6.1: CONSIDER evacuating the following: <ul style="list-style-type: none"> - 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 steam leak will be isolated and step 6.2 will not be performed.

BOOTH CUE:		<p>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 NOT isolated."</p> <p>When requested by the Control Room to delete malfunction MS19B and report the status of the steam leak following closure of MS-V-5B, report "The steam leak IS isolated".</p>

	ARO	<p>Step 6.2: If power >40% or FW-P-1B is tripped, then determine if leak is downstream of MS-V-5A by performing the following:</p> <ul style="list-style-type: none"> - CLOSE MS-V-5A - If steam leak is isolated, the GO TO Section 7.0 (The steam leak is NOT isolated) - OPEN MS-V-5A

	ARO	<p>Step 6.3: If power >40% or FW-P-1B is tripped, then determine if leak is downstream of MS-V-5A by performing the following:</p> <ul style="list-style-type: none"> - CLOSE MS-V-5A - If steam leak is isolated, the GO TO Section 7.0 (The steam leak IS isolated)

Op Test No.: NRC Scenario # 3 Event # 5

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Event Description: Isolable steam leak in the Turbine Building

Time	Position	Applicant's Actions or Behavior
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EXAMINER NOTE: Once the leak is isolated and plant is stable, then GO TO Event #6.		

Op Test No.: NRC Scenario # 3 Event # 6Page **22** of **29**

Event Description: Turbine Trips, Reactor does not trip automatically, Entry into OP-TM-EOP-001, Reactor Trip

Time	Position	Applicant's Actions or Behavior
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BOOTH CUE:		When directed by the lead examiner, insert EVENT #6
INDICATIONS AVAILABLE: Turbine Trip alarm, generated megawatts go to zero, RCS pressure rises.		
EXAMINER NOTE:		The reactor will not automatically trip, the URO will have to trip the reactor from the console during the OP-TM-EOP-001 Immediate actions.
EXAMINER NOTE:		Due to loss of Vital Bus 'C' the normal stop valve indication on console left is not available. The crew may use other redundant indications to verify the stop valves are closed.
	Crew	Recognizes the turbine trip, and that the reactor did not trip.
	URO	Performs OP-TM-EOP-001 Reactor Trip IMA's
OP-TM-EOP-001, REACTOR TRIP		
	URO	Step 2.1: (IMA) : Presses Both Reactor Trip and DSS pushbuttons (CC).
	URO	Step 2.2: (IMA) : Verifies that the reactor is shutdown by one of the following: <ul style="list-style-type: none"> • 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.

Op Test No.: NRC Scenario # 3 Event # 6

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Event Description: Turbine Trips, Reactor does not trip automatically, Entry into OP-TM-EOP-001,
Reactor Trip

Time	Position	Applicant's Actions or Behavior
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EXAMINER'S NOTE: Once the Reactor Trip IMA's are complete, the ARO will perform a symptom check. At the end of the symptom check, go to the Event #7.

Op Test No.: NRC Scenario # 1 Event # 7/8

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Event Description: Loss of Offsite Power, Stuck open MSSV's

Time	Position	Applicant's Actions or Behavior
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BOOTH OPERATOR: When directed by the Lead Examiner INITIATE Event 7.

INDICATIONS AVAILABLE: Loss of all Control Room lighting, RCP's secured, loss of power to non-vital powered equipment.

EXAMINER NOTE: After the loss of offsite power, the crew will perform a symptom check, at which time they will identify an excessive heat transfer from the 'B' OTSG. This portion will be written that the URO restores SI, and the ARO isolates 'B' OTSG. After both are accomplished, the scenario can be terminated.

BOOTH CUE: Two minutes after the reactor trip announcement, inform the control room that 2 MSSV's are stuck open.

	Crew	Diagnoses Loss of Offsite Power.
	CRS	Announces entry into OP-TM-AOP-020, Loss of Station Power.

OP-TM-AOP-020, LOSS OF STATION POWER

	ARO	Step 3.1: Initiates Emergency Feedwater
	ARO	Step 3.2: Initiates OP-TM-861-901, "EG-Y-1A Emergency Operations" and OP-TM-861-902, "EG-Y-1B Emergency Operations".
	CRS	Step 3.3: Verifies 1D 4160V and 1E 4160V busses are energized
	CRS	Steps 3.4: Verifies IC-P-1B is running.

Op Test No.: NRC Scenario # 1 Event # 7/8

Page 25 of 29

Event Description: Loss of Offsite Power, Stuck open MSSV's

Time	Position	Applicant's Actions or Behavior
	ARO	Step 3.5: Announces entry into AOP-020, breaking vacuum, and venting generator hydrogen over the RED plant page and radio.
	URO	Step 3.6: SI is not > 22 gpm, RNO: Initiates OP-TM-AOP-041 for loss of Seal Injection.
	ARO	Step 3.7 Initiate OP-TM-EOP-010 Guide 10, "Natural Circulation".
OP-TM-EOP-010 Guide 10, "Natural Circulation"		
CT-12	ALL	<p>IAAT all RCPs are off, then</p> <p>A If all of the following conditions exist, then adequate natural circulation is present:</p> <ul style="list-style-type: none"> - 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-AOP-041, LOSS OF SEAL INJECTION		
EXAMINER NOTE: Steps 3.1 and 3.2 are N/A for this scenario		
	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.
	CRS	Step 3.4: 1D and 1E 4160V busses are both energized.

Op Test No.: NRC Scenario # 1 Event # 7/8Page **26** of **29**

Event Description: Loss of Offsite Power, Stuck open MSSV's

Time	Position	Applicant's Actions or Behavior
	URO	Step 3.5: Determines that a Makeup Pump is not running and IAW the RNO, performs the following: <ol style="list-style-type: none"> 1. 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). 2. Dials MU-V-17 to full closed (CC).
	CRS	Step 3.5, RNO 4: Goes to Section 4.0.
OP-TM-AOP-041, LOSS OF SEAL INJECTION, SECTION 4.0		
EXAMINERS NOTE: Step 4.0 is N/A for this scenario		
	URO	Step 4.1: Verifies MU-P-1A is ES selected.
	URO	Step 4.2: Verifies that MU-V-36 and 37 are open.
	URO	Step 4.3: Starts DR-P-1A and DC-P-1A
	URO	Step 4.4: Starts MU-P-1A.
	URO	Step 4.5: MU-V-77A & B are Open, go to step 3.5
EXAMINER NOTE: The stuck open MSSV's on the "B" OTSG will cause conditions to be met for an Excessive Primary to Secondary Heat Transfer condition.		
	Crew	Diagnoses Excessive Heat Transfer and enters OP-TM-EOP-003, Excessive Primary To Secondary Heat Transfer.
OP-TM-EOP-003, EXCESSIVE PRIMARY TO SECONDARY HEAT TRANSFER		

Op Test No.: NRC Scenario # 1 Event # 7/8

Page 27 of 29

Event Description: Loss of Offsite Power, Stuck open MSSV's

Time	Position	Applicant's Actions or Behavior
	ARO	Step 3.1: Perform Rule 3, XHT
OP-TM-EOP-010, RULE 3 EXCESSIVE HEAT TRANSFER		
	ARO	Step 1: Verifies OTSG level <97.5%.
	ARO	Step 2: Verifies that primary to secondary heat transfer is excessive.
CT-17	ARO	Step 3: Performs Phase 1 isolation of "B" OSTG by: <ul style="list-style-type: none"> - Closing MS-V-1C by pushing the Close pushbutton and observing the Close light lit and the Open and Test lights not lit (CC).
CT-17	ARO	Step 3: Performs Phase 1 isolation of "B" OSTG by: <ul style="list-style-type: none"> - Closing MS-V-1D by pushing the Close pushbutton and observing the Close light lit and the Open and Test lights not lit (CC).
CT-17	ARO	Step 3: Performs Phase 1 isolation of "B" OSTG by: <ul style="list-style-type: none"> - Closing FW-V-17B by pushing the Close pushbutton and observing the Close light lit and the Open not lit (CC).
CT-17	ARO	Step 3: Performs Phase 1 isolation of "B" OSTG by: <ul style="list-style-type: none"> - Closing FW-V-16B by pushing the Close pushbutton and observing the Close light lit and the Open not lit (CC).
CT-17	ARO	Step 3: Performs Phase 1 isolation of "B" OSTG by: <ul style="list-style-type: none"> - Closing FW-V-5B by pushing the Close pushbutton and observing the Close light lit and the Open not lit (CC).

Op Test No.: NRC Scenario # 1 Event # 7/8Page **28** of **29**

Event Description: Loss of Offsite Power, Stuck open MSSV's

Time	Position	Applicant's Actions or Behavior
CT-17	ARO	Step 3: Performs Phase 1 isolation of "B" OSTG by: <ul style="list-style-type: none"> - Closing FW-V-92B by pushing the Close pushbutton and observing the Close light lit and the Open not lit (CC).
CT-17	ARO	Step 3: Performs Phase 1 isolation of "B" OSTG by: <ul style="list-style-type: none"> - Verifying MS-V-3A, MS-V-3B, and MS-V-C are closed by verifying green indicating light is present on CC.
CT-17	ARO	Step 3: Performs Phase 1 isolation of "B" OSTG by: <ul style="list-style-type: none"> - Closes MS-V-4B by directing ensuring the indicating light on CC is green.
	ARO	Step 4: Verifies the steam leak is not in the RB or Intermediate Building.
	ARO	Step 5: Throttles EFW IAW Rule 4, "Feedwater Control".
	ARO	Step 6: Verifies that OTSG level and pressure are NOT stabilized, RNO: Performs Phase 2 isolation of the 'B' OTSG
	ARO	Step 6: Performs Phase 2 isolation of the "B" OTSG by: <ul style="list-style-type: none"> - Closes EF-V-30B by taking the EFW controller to manual and pinning the toggle switch to the left (CC)
	ARO	Step 6: Performs Phase 2 isolation of the "B" OTSG by: <ul style="list-style-type: none"> - Closes EF-V-30C by taking the EFW controller to manual and pinning the toggle switch to the left (CC)

Op Test No.: NRC Scenario # 1 Event # 7/8

Page 29 of 29

Event Description: Loss of Offsite Power, Stuck open MSSV's

Time	Position	Applicant's Actions or Behavior
	ARO	Step 6: Performs Phase 2 isolation of the "B" OTSG by: <ul style="list-style-type: none"> - Closes MS-V-2B pressing the green closed pushbutton on console center.
OP-TM-EOP-010, RULE 4, FEEDWATER CONTROL		
	ARO	Steps 1-3: Verifies two or more EFW pumps are running, SCM is greater than 25°F, and that the "A" OTSG is not dry.
	ARO	Step 4: Verifies that there is not a RCP running and that the "A" OTSG level is at 50% or approaching 50%
EXAMINER NOTE: Scenario can be terminated when OTSG "B" has been isolated, Seal Injection has been restored, and Natural Circulation has been established.		

Facility: THREE MILE ISLAND Task No.: 62201020

Task Title: Shutdown Margin for Low Temperature Conditions JPM No.: ILT 16-01 NRC JPM RA1-1

K/A Reference: 2.1.43 (4.1/4.3) New 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:

- RCS temperature 350°F at 1300 on 6/30/17, which coincides with 20 hours after shutdown from 100%.
- Previous power change was refueling outage 16 months ago.
- 600 EFPD
- Boron Concentration is 220 ppm
- Boron Depletion factor from the PPC is .8006
- Xenon Reactivity Worth from the PPC is -2.638 %Δk/k
- The Control Rod in location 5-9 is stuck, fully withdrawn

Task Standard: Calculate shutdown margin for this low temperature situation, and determine that the SDM will not be more negative than -1 %Δk/k

Required Materials:

- OP-TM-300-000, REACTIVITY AND POWER DISTRIBUTION CALCULATIONS, Rev 8
- OP-TM-300-206, SHUTDOWN MARGIN FOR LOW TEMPERATURE CONDITIONS, Rev 3
- OP-TM-300-401, INOPERABLE ROD WORTH, Rev 1
- Calculator
- Ruler

- General References:
- OP-TM-300-000, REACTIVITY AND POWER DISTRIBUTION CALCULATIONS, Rev 8
 - OP-TM-300-206, SHUTDOWN MARGIN FOR LOW TEMPERATURE CONDITIONS, Rev 3
 - OP-TM-300-401, INOPERABLE ROD WORTH, Rev 1

Initiating Cue: The CRS has directed you to perform OP-TM-300-206, SHUTDOWN MARGIN FOR LOW TEMPERATURE CONDITIONS for an RCS temperature of 350°F

Time Critical Task: No

Validation Time:

PAPERWORK SETUP

1. Print copies of:
 - A. OP-TM-300-000, REACTIVITY AND POWER DISTRIBUTION CALCULATIONS
 - B. OP-TM-300-205, SHUTDOWN MARGIN FOR LOW TEMPERATURE
 - i. Sign off Prerequisites
 - C. OP-TM-300-401, INOPERABLE ROD WORTH

PERFORMANCE INFORMATION

(Denote Critical Steps with a check mark)

START TIME: _____

EVALUATORS CUE: Direct the examinee to calculate shutdown margin, IAW OP-TM-300-206 for a temperature of 350 °F, and the parameters provided in the cue sheet.

OP-TM-300-206, Precautions, Limitations, and Prerequisites

Performance Step: 1 Examinee reviews precautions, limitations, and prerequisites

Standard: Examinee reviews section 3.0 of OP-TM-300-206

Comment:

OP-TM-300-206, Section 4.0 NOTE

Performance Step: 2 Examinee reviews the note.

Standard: Examinee determines that they will have to use flowchart 2 in OP-TM-300-000 to determine if a quantitative or qualitative assessment is required.

Comment:

OP-TM-300-206, Step 4.1

Performance Step: 3 DETERMINE whether a qualitative or quantitative assessment of Shutdown Margin is desired.

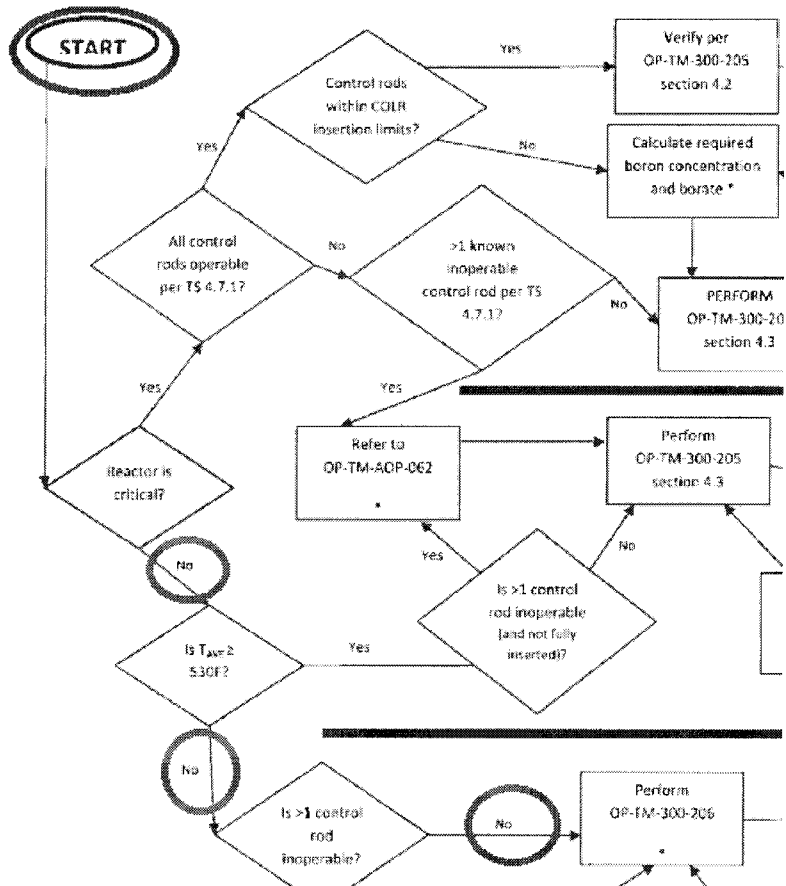
Standard:

Comment:

PERFORMANCE INFORMATION

OP-TM-300-000, Flowchart 2 flowpath

Performance Step: 4



Standard:

Examinee follows the above flowpath and determines that OP-TM-300-206 is the correct procedure, and since the CRS wants a value for Shutdown Margin, the quantitative assessment is complete.

Comment:

OP-TM-300-206, Step 4.1.1

Performance Step: 5

If a qualitative assessment of Shutdown Margin is desired, the DETERMINE Shutdown margin IAW section 4.2.

Standard:

Examinee determines a qualitative assessment of Shutdown Margin is not desired, and N/A's the step.

Comment:

PERFORMANCE INFORMATION

OP-TM-300-206, Step 4.1.2

Performance Step: 6 If a quantitative assessment of Shutdown Margin is desired, the DETERMINE Shutdown margin IAW section 4.3.

Standard: Examinee determines a quantitative assessment of Shutdown Margin is desired, signs off the step. The examinee will go to section 4.3

Comment:

EXAMINER NOTE: If the examinee asks, there is no Reactor Engineer or DTSQA-approved software available.

OP-TM-300-206, Step 4.3.1

Performance Step: 7 PERFORM calculation per Attachment 7.3 and instructions in Attachment 7.4 or DTSQA-approved software.

Standard:

Comment:

OP-TM-300-206, Attachment 7.3

Performance Step: 8 CALCULATION FOR A SDM AT: DATE TIME

Standard: Examinee fills in 06/30/17 and 1300 from the cue sheet.

Comment:

OP-TM-300-206, Attachment 7.3, Step 1

Performance Step: 9 Tave (<530 °F)

Standard: Examinee fills in 350 °F from the cue sheet.

Comment:

PERFORMANCE INFORMATION

OP-TM-300-206, Attachment 7.3, Step 2**Performance Step: 10** Cycle burnup**Standard:** Examinee fills in 600 EFPD from the cue sheet.**Comment:*****OP-TM-300-206, Attachment 7.3, Step 3a*****Performance Step: 11** Measured Boron Concentration**Standard:** Examinee fills in 220 ppm from the cue sheet.**Comment:*****OP-TM-300-206, Attachment 7.3, Step 3b*****Performance Step: 12** Boron Depletion Correction Factor**Standard:** Examinee fills in .8006 from the cue sheet**Comment:**√ ***OP-TM-300-206, Attachment 7.3, Step 3c*****Performance Step: 13** Corrected Boron Concentration (3a X 3b) =**Standard:** Examinee divides 220 ppm X .8006 = 176.13 ppm**Comment:*****OP-TM-300-206, Attachment 7.3, Step 4*****Performance Step: 14** Excess Reactivity (Fig 1.)√ **Standard:** Examinee uses figure 1 of OP-TM-300-000 and gets a value of ~.6 %Δk/k (Band: .5 to .7%Δk/k)**Comment:**

PERFORMANCE INFORMATION

OP-TM-300-206, Attachment 7.3, Step 5

Performance Step: 15 Xenon Reactivity Worth (PPC, Reactor Engr.)

Standard: Examinee fills in $-2.638\% \Delta k/k$ from the cue sheet.

Comment:

OP-TM-300-206, Attachment 7.3, Step 6a

Performance Step: 16 Samarium and Plutonium Buildup Reactivity Worth (Fig 15):
Time since shutdown ___ hrs

Standard: Examinee fills in 20 hours from the cue sheet.

Comment:

OP-TM-300-206, Attachment 7.3, Step 6b

Performance Step: 17 Samarium and Plutonium Buildup Reactivity Worth (Fig 15):
Reactivity due to samarium and plutonium buildup.

✓ **Standard:** Examinee uses OP-TM-300-000, Figure 15 and fills in $-0.055\% \Delta k/k$. (Band: -0.05 to $-0.06\% \Delta k/k$)

Comment:

OP-TM-300-206, Attachment 7.3, Step 7a

Performance Step: 18 Inoperable Control Rods:
No. of known inoperable rods ($>0\%WD$)

Standard: Examinee fills in 1 from the cue sheet.

Comment:

PERFORMANCE INFORMATION

OP-TM-300-206, Attachment 7.3, Step 7b

Performance Step: 19 Inoperable Control Rods:
Total inoperable rod worth (OP-TM-300-401)

- ✓ **Standard:** Examinee performs OP-TM-300-401 section 1. Examinee identifies that the rod in location 5-9 is fully withdrawn and uses attachment 7.3 of OP-TM-300-000 to determine the worth of the control rod in that position is 0.851% Δ k/k. Examinee fills in line 7b with 0.851% Δ k/k and attaches Attachment 7.1 of OP-TM-300-401 to OP-TM-300-206.

Comment:

OP-TM-300-206, Attachment 7.3, Step 8

Performance Step: 20 Reactivity Addition Due to Reduced Tave (Fig. 17)

- ✓ **Standard:** Examinee uses OP-TM-300-000, Figure 17 and fills in 3.8% Δ k/k. (BAND: 3.7 to 3.9% Δ k/k)

Comment:

✓ **OP-TM-300-206, Attachment 7.3, Step 9a**

Performance Step: 21 Boron Reactivity Worth at Reduced Tave:
Reduced temperature Inverse Boron Worth (Fig. 7)

Standard: Examinee uses OP-TM-300-000, Figure 7 and fills in a value of 104 ppmB/% Δ k/k (BAND: 102 to 106 ppmB/% Δ k/k)

Comment:

OP-TM-300-206, Attachment 7.3, Step 9b

Performance Step: 22 Total Worth (3c/9a) x (-1) =

- ✓ **Standard:** Total Worth (176.13 / 104) x (-1) = - 1.69% Δ k/k
Examinee may have different numbers based on bands.

Comment:

PERFORMANCE INFORMATION

OP-TM-300-206, Attachment 7.3, Step 10

Performance Step: 23 Shutdown Margin $(4 + 5 + 6b + 7b + 8 + 9b) =$

✓ **Standard:** Shutdown Margin $(0.6 + (-2.638) + (-0.055) + 0.851 + 3.8 + (-1.69) = 0.868\% \Delta k/k$

Comment:

OP-TM-300-206, Attachment 7.3, Acceptance Criteria

Performance Step: 24 Examinee determines that the calculated SDM does not meet the acceptance criteria, and notifies the examiner.

Standard: Examinee determines that the calculated SDM does not meet the acceptance criteria, and notifies the examiner.

Comment:

Terminating Cue: This JPM can be terminated after the examinee completes the calculation and determines that SDM is NOT satisfied.

STOP TIME: _____

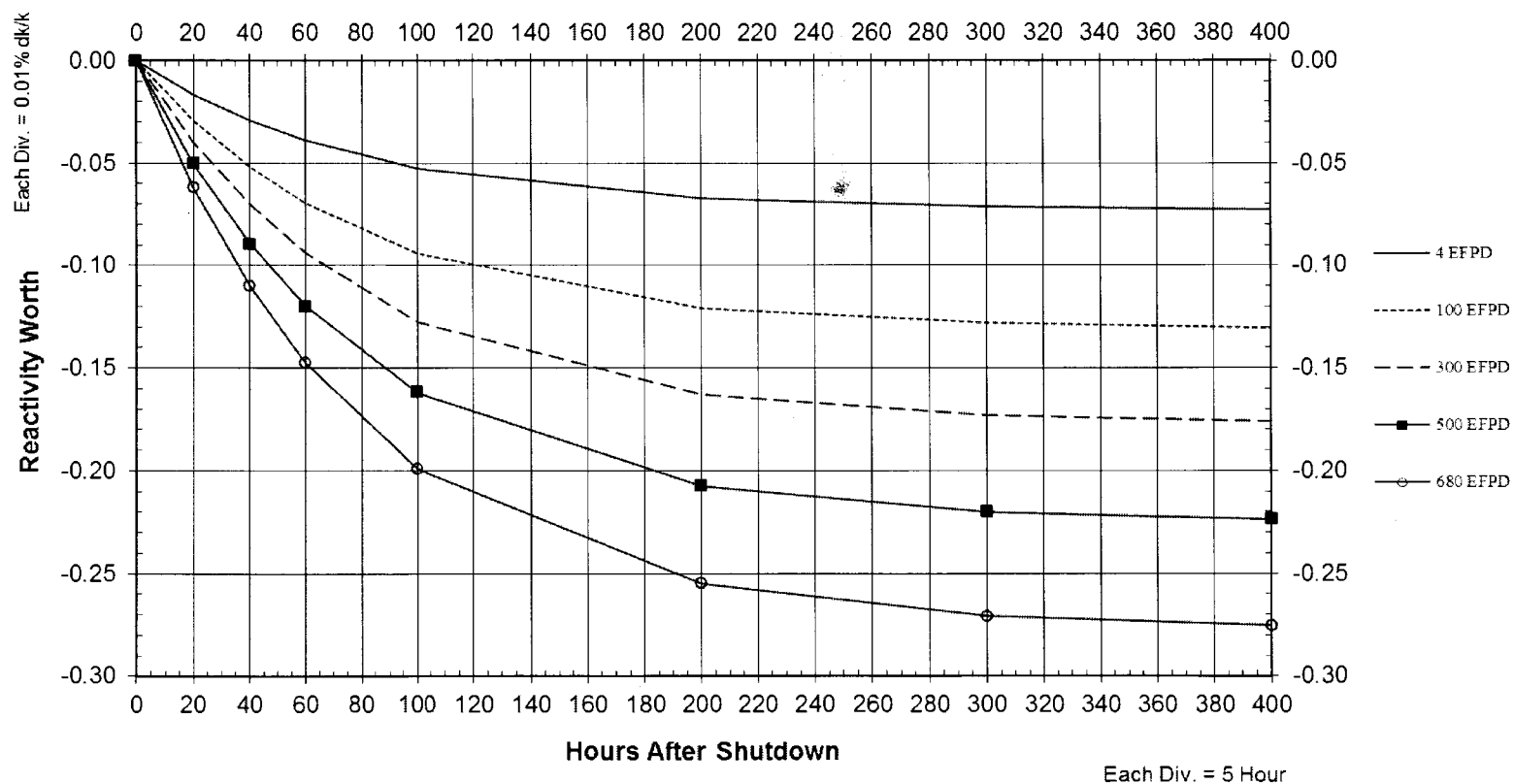
TIME CRITICAL STOP TIME: N

ATTACHMENT 7.27
Figure 15
Cycle 21 Samarium and Plutonium Buildup Following Reactor Shutdown
Page 1 of 1

NOTE: Linearly interpolate between EFPD.

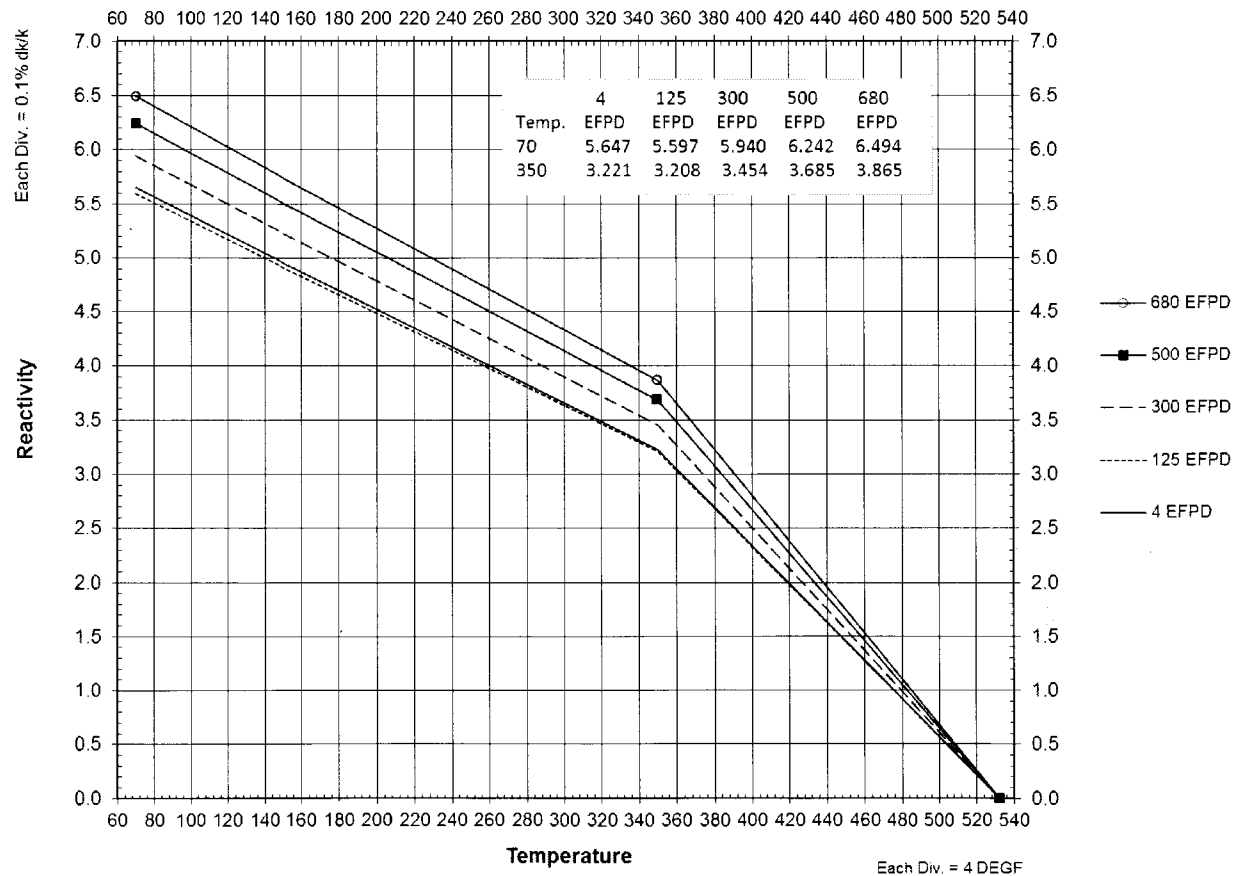
If startup at any time during the cycle is within 5 days of a previous startup, contact Reactor Engineering for the appropriate reactivity worth.

For use with OP-TM-300-205, OP-TM-300-206, OP-TM-300-402, and OP-TM-300-403.



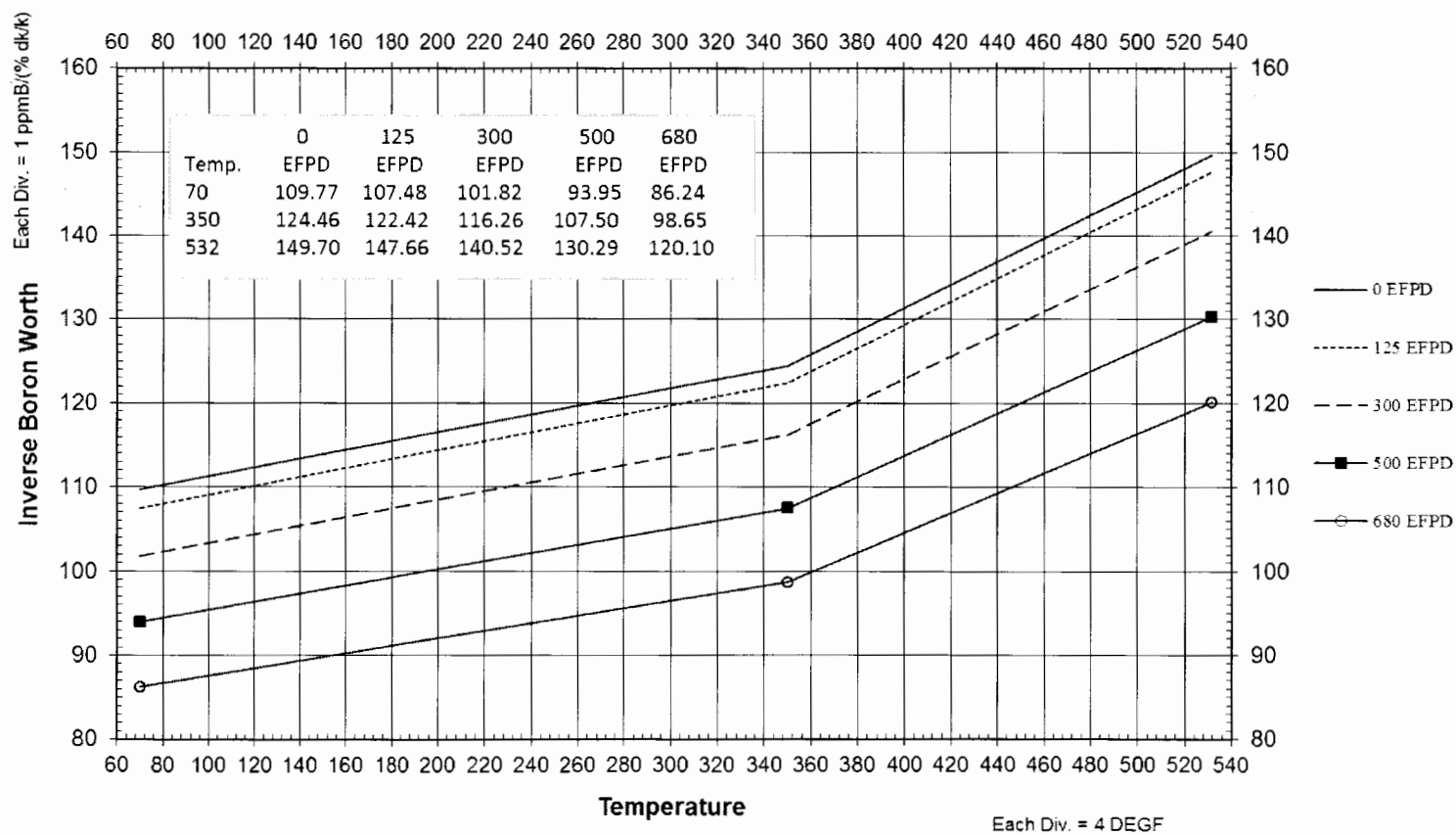
ATTACHMENT 7.29
Figure 17
Cycle 21 Reactivity Addition for $T_{ave} < 530^{\circ}\text{F}$
Page 1 of 1

NOTE: Linearly interpolate between EFPD curves.
For use with OP-TM-300-206.



ATTACHMENT 7.18
Figure 7
Cycle 21 Inverse Boron Worth vs. RCS T_{AVE}
Page 1 of 1

NOTE: Linearly interpolate between EFPD curves.
For use with OP-TM-300-206.



SHUTDOWN MARGIN FOR LOW TEMPERATURE CONDITIONS**1.0 PURPOSE**

- 1.1 This procedure is used to determine the amount of reactivity by which the reactor could be subcritical. A Shutdown Margin of $> 1\% \Delta k/k$ must be maintained at all times (T.S. 3.5.2.1). This procedure assumes that RCS T_{AVE} is $< 530^{\circ}\text{F}$. Shutdown Margin for temperatures $\geq 530^{\circ}\text{F}$ is determined in OP-TM-300-205.

2.0 MATERIAL AND SPECIAL EQUIPMENT

None

3.0 PRECAUTIONS, LIMITATIONS, AND PREREQUISITES**3.1 Precautions**

None

3.2 Limitations

None

3.3 Prerequisites

- 3.3.1 **VERIFY** all data sources (OP-TM-300-000 attachments, Reactivity Datasheet, AREVA Physics Data Manual) are for the current fuel cycle. _____

- 3.3.2 **VERIFY** RCS T_{AVE} is $< 530^{\circ}\text{F}$ _____

4.0 **MAIN BODY**

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

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

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

4.1 **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. _____

4.2 **Qualitative Assessment of Shutdown Margin**

4.2.1 **PERFORM** assessment per Attachment 7.1 and instructions in Attachment 7.2. _____

4.2.2 If Shutdown Margin **cannot** be qualitatively assessed, **then DETERMINE** Shutdown Margin IAW Section 4.3. _____

4.2.3 If Shutdown Margin can be qualitatively assessed per Step 4.2.1, **then COMPLETE** Section 2.0 of Attachment 7.1, Acceptance Criteria. _____

4.2.4 **ENSURE** SRO review of Acceptance Criteria. _____

4.2.5 **SEND** a copy of the completed Attachment 7.1 to Reactor Engineering. _____

4.3 Quantitative Assessment of Shutdown Margin

4.3.1 **PERFORM** calculation per Attachment 7.3 and instructions in Attachment 7.4 or DTSQA-approved software. _____

4.3.2 If Shutdown Margin is **not** more negative than $-1\% \Delta k/k$, **then**

1. **RE-VERIFY** the calculation. _____

2. **INFORM** the Shift Manager. _____

3. **NOTIFY** Reactor Engineering. _____

4. **TAKE** action to satisfy T.S. 3.5.2.1 and 3.5.2.5. _____

– **REFER** to the following procedures for guidance:

– OP-TM-AOP-062, Inoperable Rod, to address inoperable control rods

– OP-TM-EOP-010, Emergency Procedure Rules, Guides, and Graphs, for Emergency Boration guidance

4.3.3 **ENSURE** an SRO reviews calculations and Acceptance Criteria. _____

4.3.4 **SEND** a copy of the completed calculation to Reactor Engineering _____

5.0 RETURN TO NORMAL

None

6.0 REFERENCES

6.1 Developmental References

6.1.1 BWFC Operating Guidelines 64-1234740-00

6.1.2 TMI-1 Technical Specifications

6.1.3 1103-15A, Shutdown Margin and Reactivity Balance (superseded)

6.2 Implementing References

6.2.1 OP-TM-300-000, Reactivity Management and Power Distribution Calculations

6.2.2 OP-TM-300-401, Inoperable Rod Worth

6.2.3 Physics Data Manual (current cycle)

7.0 ATTACHMENTS

7.1 Shutdown Margin at Low Temperature – Qualitative Assessment

7.2 Shutdown Margin at Low Temperature – Qualitative Assessment Instruction Sheet

7.3 Shutdown Margin at Low Temperature Calculation Data Sheet

7.4 Shutdown Margin at Low Temperature Calculation Instruction Sheet

ATTACHMENT 7.1
Shutdown Margin at Low Temperature – Qualitative Assessment
Page 1 of 1

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

1.0 ASSESSMENT IS FOR A SDM AT: DATE _____ TIME _____

1. T_{AVE} _____ °F
2. Cycle burnup _____ EFPD
3. Plant condition

☐ $\geq 350^{\circ}\text{F}$ Shutdown, CRG 1-7 at 0% WD, ≤ 1 Control Rod Stuck Out

☐ $\geq 70^{\circ}\text{F}$ Flooded Nozzle, CRG 1-7 at 0% WD, ≤ 1 Control Rod Stuck Out

☐ $\geq 70^{\circ}\text{F}$ Cold Shutdown, CRG 1-4 at 100% WD, CRG 5-7 at 0%WD

☐ Other (specify) _____

NOTE: For 350°F assessments, no Xenon credit per OP-TM-300-411 may be taken. Reactivity Datasheet values INCLUDE adjustment for actual B-10 depletion.

4. Shutdown concentration corresponding to the condition checked above per Table 6 or Figure 10 or Reactivity Datasheet, including any adjustment for actual B-10 depletion (OP-TM-300-410) and/or Xenon (OP-TM-300-411).

_____ ppmB

5. Current RCS Boron concentration (CHEMISTRY)

_____ ppmB

6. **VERIFY** the current RCS boron concentration (1.5) is greater than or equal to the required shutdown concentration. (Circle one) Yes / No

7. If the answer is "No", then RETURN to Step 4.2.2 in the main body.

2.0 ACCEPTANCE CRITERIA

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

ASSESSED BY _____ DATE/TIME _____

APPROVED BY (SRO) _____ DATE/TIME _____

ATTACHMENT 7.2
Shutdown Margin at Low Temperature – Qualitative Assessment Instruction Sheet
Page 1 of 1

NOTE: Figure numbers refer to attachments in OP-TM-300-000.

- 1.3 The 350°F shutdown concentration includes a credit for Xenon equivalent to the 80%FP equilibrium Xenon reactivity worth.
- 1.4 Value for Reactivity Datasheet is already adjusted for B-10 depletion. The values in Table 6 and Figure 10 were developed assuming maximum B-10 depletion of RCS boron, combined with a boron source at nominal B-10 abundance.
- 1.7 If Shutdown Margin **cannot** be assessed qualitatively, the procedure directs the user to determine it quantitatively.

ATTACHMENT 7.3
Shutdown Margin at Low Temperature 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 an "Independent Verification".

- 1.0 CALCULATION IS FOR A SDM AT: DATE _____ TIME _____
1. T_{AVE} (< 530°F) _____ °F
 2. Cycle burnup _____ EFPD
 3. a. Measured Boron Concentration _____ ppmB
 - b. Boron Depletion Correction Factor _____
(PPC, Control Room Log, Reactor Engineering, Reactivity Datasheet)
 - c. Corrected Boron Concentration (3a x 3b) = _____ ppmB
 4. Excess Reactivity (FIG. 1) _____ % $\Delta k/k$
 5. Xenon Reactivity Worth (PPC, Reactor Engr.) _____ % $\Delta k/k$
 6. Samarium and Plutonium Buildup Reactivity Worth (FIG. 15)
 - 6a. Time since last shutdown _____ HRS
 - 6b. Reactivity due to samarium and plutonium buildup _____ % $\Delta k/k$
 7. Inoperable Control Rods
 - 7a. No. of known inoperable rods (>0%WD) _____
 - 7b. Total inoperable rod worth (OP-TM-300-401) = _____ % $\Delta k/k$
(In addition to the stuck rod required by T.S. included in Line 5)
 8. Reactivity Addition Due to Reduced T_{AVE} (FIG. 17) _____ % $\Delta k/k$
 9. Boron Reactivity Worth at Reduced T_{AVE}
 - 9a. Reduced temperature Inverse Boron Worth (FIG. 7) _____ ppmB/% $\Delta k/k$
 - 9b. Total worth (3c / 9a) x (-1) = _____ % $\Delta k/k$
 10. Shutdown Margin (4 + 5 + 6b + 7b + 8 + 9b) = _____ % $\Delta k/k$

CAUTION

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

2.0 ACCEPTANCE CRITERIA

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

CALCULATED BY _____ DATE/TIME _____

APPROVED BY (SRO) _____ DATE/TIME _____

ATTACHMENT 7.4
Shutdown Margin at Low Temperature Calculation Instructions

Page 1 of 1

NOTE: Figure numbers refer to attachments in OP-TM-300-000
Data also may be obtained from approved references, e.g., current cycle Physics Data Manual or Reactivity Datasheet.

1. Average RCS Temperature:
With RCP's running or verified natural circulation,
if $\geq 525^{\circ}\text{F}$, use RC-12-TA1 (Center Console T_{AVE});
if $< 525^{\circ}\text{F}$, use average of T_{hot} and T_{cold} .
2. Cycle Burnup: From FIDMS Display 1 or the Hourly Log.
- 3a. Measured Boron Concentration: Obtain the latest measured boron concentration from RCS chemistry analysis, and check the Control Room Log to verify that no major boron concentration changes have been made since the analysis. If major boron concentration changes have been made, request a new RCS boron measurement. Until the new measurement is available, use OP-TM-300-407 or 409 to estimate the current boron concentration to calculate a preliminary shutdown margin.
- 3b. Boron Depletion Correction Factor: From PPC, Control Room Log, or Reactor Engineering or Reactivity Datasheet.
- 3c. Corrected Boron Concentration: Adjust the measured boron concentration to account for boron-10 depletion by multiplying the measured Boron Concentration by the Boron Depletion Correction Factor.
4. Excess Reactivity: From Figure 1.
5. Xenon Reactivity Worth: Obtain xenon worth using the PPC, FIDMS Display 22, or program XENC# (where # equals the current cycle number). Figure 12 may be used if the PPC and Reactor Engineering are unavailable, provided that power has been constant ($\pm 2\%\text{FP}$) for at least 40 hours. For steady state operations, use the current xenon value from FIDMS. For power reductions, xenon reactivity worth will peak (become more negative) and then become less negative over time. Therefore, the xenon contribution to SDM will decrease. To provide a conservative xenon value, use the minimum expected xenon worth value between the time of the current calculation and the time of the next planned SDM calculation. A new SDM calculation should be performed prior to xenon worth becoming less negative than the value assumed in the calculation. For power increases, use the current xenon value from the FIDMS.
6. Samarium and Plutonium Buildup Reactivity Worth: If at power, use 0 Sm and Pu worth. If shutdown, record the number of hours since 0% FP and obtain Sm and Pu worth per Figure 15. If startup at any time during the cycle is within 5 days of a previous startup, contact Reactor Engineering for the appropriate reactivity worth.
7. Inoperable Control Rods that are not Fully Inserted: If a control rod is known to be inoperable, a penalty is applied. This is in addition to the stuck rod penalty included in Excess Reactivity (Line 5). If the known inoperable rod is fully inserted, no inoperable rod penalty should be applied. If an inoperable rod is partially inserted, contact Reactor Engineering for possible credit for rod worth. If one or more rods are inoperable, OP-TM-300-401 should be used to determine the inoperable rod worth.
8. Reactivity Addition due to reduced T_{AVE} : From Figure 17.
9. Boron Reactivity worth at reduced T_{AVE} : Divide the Corrected Boron Concentration by the reduced temperature Inverse Boron Worth (Figure 7) and multiply by -1.

INOPERABLE ROD WORTH

1.0 PURPOSE

- 1.1 This procedure is used to determine the penalty associated with known inoperable rods. This supports Shutdown Margin calculations in OP-TM-300-205 and OP-TM-300-206.

2.0 MATERIAL AND SPECIAL EQUIPMENT

None

3.0 PRECAUTIONS, LIMITATIONS, AND PREREQUISITES

3.1 Precautions

None

3.2 Limitations

None

3.3 Prerequisites

- 3.3.1 **VERIFY** a known inoperable rod exists in a safety or regulating group. _____

4.0 MAIN BODY

- 4.1 **PERFORM** calculation of inoperable rod worth per Attachment 7.1. _____

- 4.2 **ATTACH** the calculation to the Shutdown Margin determination. _____

5.0 RETURN TO NORMAL

None

6.0 REFERENCES

6.1 Developmental References

6.1.1 1103-15A, Shutdown Margin and Reactivity Balance (superseded)

6.2 Implementing References

6.2.1 OP-TM-300-000, Reactivity Management and Power Distribution Calculations

6.2.2 OP-TM-300-205, Shutdown Margin for Hot Shutdown Conditions

6.2.3 OP-TM-300-206, Shutdown Margin for Low Temperature Conditions

7.0 ATTACHMENTS

7.1 Determination of Inoperable Rod Worth

ATTACHMENT 7.1
Determination of Inoperable Rod Worth
Page 1 of 1

NOTE: Data may be entered in any sequence. Sign-off verifies all data entered as required. Approval signature indicates an "Independent Verification".

Use the Date, Time, and EFPD from the Shutdown Margin determination.

CALCULATION IS FOR: DATE _____ TIME _____ EFPD _____

To be used with Attachment 7.1 of (circle one): OP-TM-300-205 OP-TM-300-206

1. IDENTIFIED INOPERABLE RODS:

If the identity of an inoperable rod is known, use the inoperable rod worth provided in OP-TM-300-000 Attachment 7.3 for each inoperable rod.

1a. Identified Inoperable Rod Location(s) _____

1b. Summation of Identified Inoperable Rod Worth(s) _____ %Δk/k

2. UNIDENTIFIED INOPERABLE RODS: If one or more control rods are known to be inoperable, but the identity of the rod(s) is not known, complete the following:

2a. Unidentified Inoperable Rod Worth (Figure 4) _____ %Δk/k

2b. No. of Inoperable Rods (>0% WD) _____

2c. Total Unidentified Inoperable Rod Worth (2a x 2b) = _____ %Δk/k

3. TOTAL INOPERABLE ROD WORTH (1b + 2c) = _____ %Δk/k

4. **RECORD** total inoperable rod worth on OP-TM-300-205 Attachment 7.1 or on OP-TM-300-206 Attachment 7.1, at the requested step as applicable. Attach to the applicable attachment.

RECORDED BY _____ DATE/TIME _____

APPROVED BY (SRO) _____ DATE/TIME _____

ATTACHMENT 7.3
Table 1
Cycle 21 Known Inoperable Rod Worth
Page 1 of 1

NOTE: For use with OP-TM-300-401.

Cycle 21 Group # - Rod # (1/8th Core Symm. Loc.)	4 - <125 EFPD %Δk/k	125 - <500 EFPD %Δk/k	500 - 680 EFPD %Δk/k
6-1, 6-3, 6-5, 6-7 (H-14)	0.262	0.422	0.308
7-1, 7-3, 7-5, 7-7 (H-12)	0.271	0.316	0.302
2-1, 2-3, 2-5, 2-7 (H-10)	0.100	0.100	0.100
7-9 (H-8)	0.100	0.100	0.100
5-1, 5-3, 5-4, 5-6, 5-7, 5-9, 5-10, 5-12 (K-13)	0.893	0.964	0.851
4-1, 4-2, 4-3, 4-4, 4-5, 4-6, 4-7, 4-8 (K-11)	0.334	0.339	0.339
2-2, 2-4, 2-6, 2-8 (K-9)	0.100	0.100	0.100
1-1, 1-2, 1-3, 1-4, 1-5, 1-6, 1-7, 1-8 (L-14)	1.364	1.451	1.495
6-2, 6-4, 6-6, 6-8 (L-10)	0.331	0.249	0.222
3-1, 3-2, 3-3, 3-4, 3-5, 3-6, 3-7, 3-8 (M-13)	1.618	1.618	1.724
5-2, 5-5, 5-8, 5-11 (M-11)	1.144	0.929	0.682
7-2, 7-4, 7-6, 7-8 (N-12)	1.618	1.618	1.724

Cycle Physics Manual Table A-4

Facility: THREE MILE ISLAND Task No.: 22001027

Task Title: PERFORM A TRANSIENT LEAK RATE CALCULATION JPM No.: ILT 16-01 NRC JPM RA1-2

K/A Reference: 2.1.23 4.3 / 4.4 Bank JPM: TQ-TM-104-ADM-OS24-J102

Examinee: NRC Examiner:

Facility Evaluator: Date:

Method of testing:

Simulated Performance: _____ Actual Performance: X

Classroom X Simulator _____ Plant _____

READ TO THE EXAMINEE

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

- Initial Conditions:
- 100% power
 - You have been assigned the duties of the Unit Reactor Operator (URO)
 - The examiner will act as the Control Room Supervisor (CRS)

Task Standard: Calculate a leak rate of between 80 and 81 gpm.

- Required Materials:
- OS-24, CONDUCT OF OPERATIONS DURING ABNORMAL AND EMERGENCY EVENTS, Rev. 28
 - Calculator

- General References:
- OS-24, CONDUCT OF OPERATIONS DURING ABNORMAL AND EMERGENCY EVENTS, Rev. 28

Initiating Cue: The following data has been obtained from console indications and the plant computer:

DATA RECORDING TIME	0300	0303	0310
PRESSURIZER LEVEL (RC-LI-777A / PPC C4017)	220 inches	220 inches	210 inches
MAKEUP TANK LEVEL (MU-LI-778A / PPC A0498)	86 inches	84 inches	80 inches
RCS T _{ave} (RC12-TIA / PPC A5066)	579.3°F	579.2°F	578.8°F
Total Water Added to the Makeup Tank from 0300	N/A	60 gal	420 gal

- A step change in leakage is suspected at 0303 and the feed rate was raised on the batch controller as a result.
- The CRS has directed you to perform a Transient RCS Leakrate Calculation IAW OS-24, Attachment F, that will most accurately determine **CURRENT** leak rate.

Time Critical Task: No

Validation Time: 10 minutes

PERFORMANCE INFORMATION

(Denote Critical Steps with a check mark)

START TIME: _____

EVALUATORS CUE: Role Play as CRS: When the examinee has requested a copy of the appropriate procedure, **HAND** a copy of OS-24, Attachment F to the examinee.

EVALUTORS NOTE: The longer the time interval between collecting data points, the more reliable the leakrate estimate will be. At a minimum leak rates should not be calculated for time intervals of < 5 minutes.

Performance Step: 1 Obtain copy of appropriate procedures.
Standard: Examinee will request a copy of OS-24, Attachment F.

Comment:

Performance Step: 2 Determine sets of data to use

- ✓ **Standard:**
- Examinee determines that from 0300-0303 is less than 5 minutes and therefore not accurate.
 - Examinee determines that a step rise in leak rate occurred at 0303, and therefore going from 0300-0310 will not be the most accurate leak rate calculated.
 - Examinee determines that a larger leak rate is occurring in the 7 minute timeframe between 0303 and 0310, and uses those data points.

Comment:

PERFORMANCE INFORMATION

- √ **Performance Step: 3** Determine Pressurizer level change.
 $(\Delta PL) * (12) =$
 $(220 - 210)(12) = 120$
- Standard:** Examinee calculates Pressurizer level change over the time period given by;
- Pressurizer level initial = 220"
- Pressurizer level final = 210"
- Examinee determines the level change in inches (10) and multiplies this number by 12.
120
- Comment:**
- √ **Performance Step: 4** Determine Makeup Tank level change
 $(\Delta MTL) * (30) =$
 $(84 - 80)(30) = 120$
- Standard:** Examinee calculates Makeup Tank level change over the time period given by:
- Makeup Tank level initial = 84"
- Makeup Tank level final = 80"
- Examinee then records this level change (4) in inches and multiplies this number by 30.
120
- Comment:**

PERFORMANCE INFORMATION

- ✓ **Performance Step: 5** Determine RCS T_{ave} temperature change.
 $(\Delta T_{avg}) * (COEFF) =$
 $(579.2 - 578.8)(95) = 38$
- Standard:** Examinee calculates RCS T_{ave} change over the time period given by:
 $RCS T_{ave} \text{ initial} - RCS T_{ave} \text{ final}$
Examinee then records this temperature change in $(0.4)^{\circ}F$ and multiply this number by a coefficient from the Table on the bottom of Attachment F. (94 Gal/ $^{\circ}F$)
38
- Comment:**
- Performance Step: 6** Determine the number of gallons added to the MU/RCS systems.
Total Gallons added – gallons added during 1st 3 minutes =
360 Gallons
- Standard:** Examinee during the period of time the calculation is in progress observes and records ALL inventory added to the RCS.

Then records this makeup to the RCS in gallons
360
- Comment:**
- Performance Step: 7** Determine the total time period between the start and finish of the Leak Rate determination.
TIME final – TIME initial.
0310 – 0303 = 7 minutes
- Standard:** Examinee calculates the time period for the Leak Rate determination by;

Then records this time change in minutes
7
- Comment:**

PERFORMANCE INFORMATION

✓ **Performance Step: 8** Determine the transient RCS Leak Rate.
Standard: Examinee calculates TOTAL RCS Leak Rate using Attachment F formula;
80.3 gpm. (80-81 gpm)

Comment:

EVALUATOR NOTE: When the examinee has finished the calculation and is reporting the Total Leak Rate to the CRS, respond with "I understand you have calculated Total RCS Leak Rate at (whatever number the examinee uses) gpm."

Terminating Cue: When the Total RCS Leak Rate number is delivered to the CRS, this JPM may be terminated.

STOP TIME: _____ **TIME CRITICAL STOP TIME:** N

EVALUATION NOTE:

- If the student incorrectly uses the data for 0300 and 0303, they will come up with 36.3 GPM
- If the student incorrectly uses the data for 0300 and 0310, they will come up with 67.2 GPM
- Calculated Leak Rate is 80.3 gpm. (0303 to 0310)
$$\text{Leak Rate} = [(\Delta\text{PL}) \cdot (12) + (\Delta\text{MTL}) \cdot (30) - (\Delta\text{Tavg}) \cdot (\text{COEFF}) + \text{GAL ADD}] / \Delta\text{TIME}$$
$$\text{Leak Rate} = ((10 \times 12) + (4 \times 30) - (0.4 \times 95) + 360) / 7$$
$$\text{Leak Rate} = (120 + 120 - 38 + 360) / 7$$
$$\text{Leak Rate} = 562 / 7$$
$$\text{Leak Rate} = 80.28 \text{ gpm}$$

VERIFICATION OF COMPLETION

Job Performance Measure No.: ILT 16-01 Cert JPM

Examinee's Name:

Date Performed:

Facility Evaluator:

Number of Attempts:

Time to Complete:

Question Documentation:

Question:

Response:

Result: SAT _____ UNSAT _____

Examiner's Signature: _____ Date: _____

INITIAL CONDITIONS:

- 100% power
- You have been assigned the duties of the Unit Reactor Operator (URO)
- The examiner will act as the Control Room Supervisor (CRS)

INITIATING CUE:

The following data has been obtained from console indications and the plant computer:

DATA RECORDING TIME	0300	0303	0310
PRESSURIZER LEVEL (RC-LI-777A / PPC C4017)	220 inches	220 inches	210 inches
MAKEUP TANK LEVEL (MU-LI-778A / PPC A0498)	86 inches	84 inches	80 inches
RCS T_{ave} (RC12-TIA / PPC A5066)	579.3°F	579.2°F	578.8°F
Total Water Added to the Makeup Tank from 0300	N/A	60 gal	420 gal

- A step change in leakage is suspected at 0303 and the feed rate was raised on the batch controller as a result.
- The CRS has directed you to perform a Transient RCS Leakrate Calculation IAW OS-24, Attachment F, that will most accurately determine **CURRENT** leak rate.

TIME CRITICAL:

No

	TMI - Unit 1 Operations Department Administrative Procedure	Number OS-24
Title Conduct of Operations During Abnormal and Emergency Events	Revision No. 28	

ATTACHMENT F

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PPC Tools for estimating RCS leakrate and the limitations of these tools

1. "FLOBAL" (C4054) AND "MASBAL" (C4053)

- Calculation is updated each minute based on data from last 5 or 6 minutes.
- Feed or bleed operations are not accounted for in either the MASBAL or FLOBAL calculation.
- Flow inputs for each HPI line flow will be zero GPM if flow is < 65 GPM.
- Reference: PPC Guide Section 27.0.

C4053 and C4054 are set to BAD (no value displayed) if any of the following conditions exist:

- Cooldown rate (5 min avg) > 100°F /HR
- SCM < 25°F
- RCS pressure < 350 psig
- Reactor power Δ > 25% in 5 minutes

ECCS Reactor Building Sump In-Leakage Rate (C4038)

- Calculated every 60 seconds, using the average of the two ECCS RB Sump Level indications (A0447 and A0448). Point is only valid if level is 3" – 90".
- Calculated using the following:

3" – 10":	102.85 gal/inch
10" – 24":	143.97 gal/inch
24" – 68":	102.85 gal/inch
68" – 90":	112.20 gal/inch

3. Normal RB Sump Inleakage (C4232)

Calculated every 15 minutes using C4235 Average Normal RB Sump Level.
The calculation uses 9.35 Gal/Inch
It will indicate invalid if <3.5 inches in the sump or if sump level is lowering.

4. Primary Secondary Leakrate (C4042)

- 10 minute average of calculation based on current RM-A-5 counts and previous chemistry analysis of RCS and OFF-Gas activity.
- Reference: PPC Guide Section 16.2.15

	TMI - Unit 1 Operations Department Administrative Procedure	Number OS-24
Title		Revision No. 28
Conduct of Operations During Abnormal and Emergency Events		

ATTACHMENT F

Page 3 of 3

PPC Tools for estimating RCS leakrate and the limitations of these tools

C4042 will not be calculated if:

- RM-L-1 Lo (C4022) changes by 100% from value when last correction factor was entered
- RM-A-5 < 200 CPM
- Correction factor is older than 7 days
- Condenser vacuum < 23 "Hg Vac

	TMI - Unit 1 Operations Department Administrative Procedure	Number OS-24
Title	Conduct of Operations During Abnormal and Emergency Events	Revision No. 28

ATTACHMENT F

Page 1 of 3

Transient RCS Leakrate Calculation Methodology

- This method should not be relied upon for leakrate determinations at < 5 GPM. The uncertainty in the result will vary greatly based on the stability of RCS conditions.
- The longer the time interval between collecting data points, the more reliable the leakrate estimate will be. At a minimum leak rates should not be calculated for time intervals of < 5 minutes.
- In order to collect data points at the same time, the required plant parameters should be put on the same computer group so they can be printed out and then used in the calculation.

RCS leakrate (GPM) =

$$[(\Delta PL) * (12) + (\Delta MTL) * (30) - (\Delta T_{avg}) * (COEFF) + GAL ADD] / \Delta TIME$$

ΔPL = change in Pressurizer Level (Computer Point C4017) (initial - final inches)

ΔMTL = change in Makeup Tank Level (Computer Point A0498) (initial - final inches)

ΔT_{avg} = change in RCS Average Temperature (Computer Point A5066) (initial - final °F)

GAL ADD = gallons added to the MU/RCS systems during the observation period

$\Delta TIME$ = change in time (final - initial minutes)

COEFF = 95 gal/°F if T_{avg} is 579 °F otherwise use the table below

Average RCS temperature over period of evaluation	COEFF (GAL/°F)
579	95
555	90
532	84
510	78
485	72
450	66
385	54
350	48
305	42
270	38

Facility: Three Mile Island Task No.: COO0028

Task Title: Perform the "SHIFTLY CHECKS"
IAW 1301-1, DATA SHEET 1 JPM No.: ILT 16-01 NRC JPM
RA2

K/A Reference: 2.2.12 (3.7) Bank JPM: TMI09 CERT JPM RO
A2

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:

- Operating at Full Power
- No evolutions in progress

Task Standard: Shift and Daily logs completed with out of specification readings identified.

Required Materials: Frozen Simulator @ Normal Power Ops

General References: 1301-1, SHIFT AND DAILY CHECKS, Revision 176

Handout: 1301-1, Sections 1.0 thru 9.0 and DATA SHEET 1, Sections A.6 thru A.22 (only)

Initiating Cue: It is night shift you are the 3rd CRO. The Control Room Supervisor has directed you to perform 1301-1, SHIFT AND DAILY CHECKS, DATA SHEET 1, Sections A.6 thru A.22, to verify the current status. **For the purpose of this JPM, the simulator is FROZEN.**

Time Critical Task: No

Validation Time: 15 minutes

SIMULATOR SETUP

- IC 016 (or Temporary IC 55)
- Malfunctions
 - MS02A set to 1% severity
 - NN-2-7 Annunciator window input fails set to off.
- Overrides
 - 02A3M08-ZAOMU17PIPRS MU-17PI set to 33
 - 06A3A6-ZAOTI978 TMP TI978 set to 12.2
 - 06A3A5-ZAOTI977 TMP TI977 set to 10.3
- Once RB building pressure is greater than 2.0 psig, Freeze the simulator.
- Freeze the simulator for the duration of this ADMIN JPM.

VERIFICATION OF COMPLETION

(Denote Critical Steps with a check mark)

START TIME: _____

Initiating Cue: It is night shift you are the 3rd CRO. The Control Room Supervisor has directed you to perform 1301-1, SHIFT AND DAILY CHECKS, DATA SHEET 1, Sections A.6 thru A.22, to verify the current status. For the purpose of this JPM, the simulator is FROZEN.

EVALUATORS NOTE: The examinee may choose to print the logs from the PPC.

Performance Step: 1 Locate/review procedure.

Standard: Reviews Sections 1.0 through 9.0

Evaluator CUE: Provide JPM handout and state "the handout contains only those sections of 1301-1 that apply to the task".

Comment:

1301-1 DATA Sheet 1, A.6

Performance Step: 2 **RPS T HOT**
Compare: RC4A-TE2 (A0590) with RC4A-TE3 (A0592) and
RC4B-TE2 (A0591) with RC4B-TE3 (A0593)

- Does each comparison agree within $\pm 1.75^{\circ}\text{F}$?

Standard: Circles Y

Comment:

1301-1 DATA Sheet 1, A.7

Performance Step: 3 **RPS IMBALANCE**
• Do NI-5 (A0626), NI-6 (A0627), NI-7 (A0628) and NI-8 (A0629)
values all agree within 2.5%?

Standard: Circles Y

Comment:

VERIFICATION OF COMPLETION

1301-1 DATA Sheet 1, A.8**Performance Step: 4 RPS TOTAL RCS FLOW**

- Do RC14-DPT1 (A0602), RC14-DPT2 (A0603), RC14-DPT3 (A0604), RC14-DPT4 (A0605) values all agree within 7.2 MLB/hr?

Standard: Circles Y

Comment:

1301-1 DATA Sheet 1, A.9**Performance Step: 5 INTERMEDIATE RANGE FLUX**

- Do NI-3 (A0576) and NI-4 (A0577) values agree within one-half log amp?

Standard: Circles Y

Comment:

1301-1 DATA Sheet 1, A.9**Performance Step: 6 INTERMEDIATE RANGE FLUX**

- Do NI-3 (A0580) and NI-4 (A0581) SUR values agree within one-half DPM?

Standard: Circles Y

Comment:

1301-1 DATA Sheet 1, A.10**Performance Step: 7 ES WIDE RANGE RCS PRESSURE**

- Do RC3A-PT-3 (A0505), RC3A-PT4 (A0506), RC3B-PT3 (A0507) values agree within 50 psi?

Standard: Circles Y

Comment:

1301-1 DATA Sheet 1, A.11**Performance Step: 8 ES RB PRESSURE**

- Do BS-PT-282 (A0101), BS-PT-285 (A0102) & BS-PT-288 (A0103) values agree within 0.5 psi?

Standard: Circles Y

Comment:

VERIFICATION OF COMPLETION

1301-1 DATA Sheet 1, A.12

- ✓ **Performance Step: 9** **REACTOR BUILDING**
- Is Reactor Building pressure greater than 1.0 psi vacuum and less than 2.0 psig?

Standard: Circles N

Comment:

1301-1 DATA Sheet 1, A.13

- Performance Step: 10** **REACTOR BUILDING 4# ESAS ACTUATION**
- Are all blue lights for channels RB1, 2 & 3 A&B (groups 1, 2, & 3) de-energized?

Standard: Circles Y

Comment:

1301-1 DATA Sheet 1, A.13

- Performance Step: 11** **REACTOR BUILDING 4# ESAS ACTUATION**
- Are ESAS actuation channels RB1, 2 & 3 A&B all enabled?

Standard: Circles Y

Comment:

1301-1 DATA Sheet 1, A.14

- Performance Step: 12** **REACTOR COOLANT SYSTEM 1600# ESAS ACTUATION**
- Are all blue lights for channels RC1, 2 & 3 A&B (groups 1 & 2) de-energized?

Standard: Circles Y

Comment:

1301-1 DATA Sheet 1, A.14

- Performance Step: 13** **REACTOR COOLANT SYSTEM 1600# ESAS ACTUATION**
- Are ESAS actuation channels RC1, 2 & 3 A&B all enabled?

Standard: Circles Y

Comment:

VERIFICATION OF COMPLETION

1301-1 DATA Sheet 1, A.15**Performance Step: 14 REACTOR COOLANT SYSTEM 500# ESAS ACTUATION**

- Are ESAS actuation channels RC4, 5 & 6 A&B all enabled?

Standard: Circles Y

Comment:

1301-1 DATA Sheet 1, A.16**Performance Step: 15 REACTOR BUILDING 30# ESAS ISOLATION**

- Are all blue lights for channels RB4, 5 & 6 A&B de-energized?

Standard: Circles Y

Comment:

1301-1 DATA Sheet 1, A.16**Performance Step: 16 REACTOR BUILDING 30# ESAS ISOLATION**

- Are ESAS actuation channels RB4, 5 & 6 A&B all reset?

Standard: Circles Y

Comment:

1301-1 DATA Sheet 1, A.17**Performance Step: 17 REACTOR TRIP CONTAINMENT ISOLATION**

- Are RTI actuation channels RT1, 2 & 3 A&B all enabled?

Standard: Circles Y

Comment:

VERIFICATION OF COMPLETION

1301-1 DATA Sheet 1, A.18**Performance Step: 18****CORE FLOODING SYSTEM/CORE FLOOD TANK LEVEL**

Using the operable instruments only: (Circle Y/N for each)

- Is CF2-LI1 (A0480) and CF2-LI2 (A0481) ≥ 11.29 and ≤ 11.87 ft?
- Is A0476 and A0477 ≥ 585 psig and ≤ 615 psig?
- Is CF-V-1A open?
- Is CF2-LI3 (A0482) and CF2-LI4 (A0483) ≥ 11.29 and ≤ 11.87 ft?
- Is A0478 and A0479 ≥ 585 psig and ≤ 615 psig?
- Is CF-V-1B open?

Standard:

Circles Y for all

Comment:**1301-1 DATA Sheet 1, A.18****Performance Step: 19****CORE FLOODING SYSTEM/CORE FLOOD TANK LEVEL**

Is CF-T-1A boron concentration between 2317 and 2850 PPM?

Standard:

Circles Y

CUE:**When requested, CF-T-1A boron Concentration is 2400 PPM****Comment:****1301-1 DATA Sheet 1, A.18****Performance Step: 20****CORE FLOODING SYSTEM/CORE FLOOD TANK LEVEL**

Is CF-T-1B boron concentration between 2317 and 2850 PPM?

Standard:

Circles Y

CUE:**When requested, CF-T-1B boron Concentration is 2450 PPM****Comment:**

VERIFICATION OF COMPLETION

1301-1 DATA Sheet 1, A.19**Performance Step: 21 MAKEUP TANK LEVEL & PRESSURE**

- Do CPT #A0498 and A0426 agree within 2 inches and MU14/RC1-LR CH1 & MU-LI-778A agree within 3 inches?

Standard: Circles Y

Comment:

1301-1 DATA Sheet 1, A.19**√ Performance Step: 22 MAKEUP TANK LEVEL & PRESSURE**

- Record local MU tank pressure indication, MU-PI-1752.

Standard: Records MU tank pressure indication, MU-PI-1752.

CUE: When requested, local MU tank pressure is 26.5 psig

Comment:

√ 1301-1 DATA Sheet 1, A.19**Performance Step: 23 MAKEUP TANK LEVEL & PRESSURE**

- Do A1028 and MU17-PI agree with the local MU Tank pressure indication (MU-PI-1752) within 3 psi?

Standard: Circles N

Comment:

1301-1 DATA Sheet 1, A.20**Performance Step: 24 PRESSURIZER LEVEL**

- Do RC-LT-777 (A1029), RC1-LT1 (C1720) and RC1-LT3 (C1722) values agree within 12 inches? (Circle Y/N)

Standard: Circles Y

Comment:

1301-1 DATA Sheet 1, A.20**Performance Step: 25 PRESSURIZER LEVEL**

- Do MU14/RC1-LR CH2 (LT1 or LT3) and its corresponding XMTR on the PPC (C1720 or C1722) agree within 10"?

Standard: Circles Y

Comment:

VERIFICATION OF COMPLETION

1301-1 DATA Sheet 1, A.20**Performance Step: 26 PRESSURIZER LEVEL**

- Do RC-LI-777A and PPC point A1029 agree within 10"?

Standard: Circles Y

Comment:

1301-1 DATA Sheet 1, A.20**Performance Step: 27 PRESSURIZER LEVEL**

- Is pressurizer level between 80 to 385 inches?

Standard: Circles Y

Comment:

1301-1 DATA Sheet 1, A.21**Performance Step: 28 PRESSURIZER TEMPERATURE**

- Record Pressurizer temp RC2-TI (CC)

Standard: Records Pressurizer temp RC2-TI (CC)

Comment:

1301-1 DATA Sheet 1, A.21**Performance Step: 29 PRESSURIZER TEMPERATURE****NOTE**

PPC A0504 is the non-selected pwr temperature instrument.

- Do RC2-TE1 & RC2-TE2 values agree within 20° F?

Standard: Circles Y

Comment:

1301-1 DATA Sheet 1, A.22**Performance Step: 30 SATURATION MARGIN MONITOR**

- Record RCS Loop A sat margin RC-TI-977 (PCL)

Standard: Records RCS Loop A sat margin RC-TI-977 (PCL)

Comment:

VERIFICATION OF COMPLETION

1301-1 DATA Sheet 1, A.22**Performance Step: 31 SATURATION MARGIN MONITOR**

- Record RCS Loop B sat margin RC-TI-978 (PCL)

Standard: Records RCS Loop B sat margin RC-TI-978 (PCL)

Comment:

1301-1 DATA Sheet 1, A.22**√ Performance Step: 32 SATURATION MARGIN MONITOR**

- Do RC-TI-978, CPT #A0406, RC-TI-977, & CPT #A0938 all agree within 6.5°F?

Standard: Circles N

Comment:

Terminating Cue: When DATA SHEET 1, A.6 THRU A.22 have been returned to the CRS: Evaluation on this JPM is complete.

Time: _____

Job Performance Measure No.: ILT 16-01 NRC JPM RA2

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:

- Operating at Full Power
- No evolutions in progress

INITIATING CUE:

It is night shift you are the 3rd CRO. The Control Room Supervisor has directed you to perform 1301-1, SHIFT AND DAILY CHECKS, DATA SHEET 1, Sections A.6 thru A.22, to verify the current status. **For the purpose of this JPM, the simulator is FROZEN.**

TIME CRITICAL:

No

DATA SHEET 1
"Checks Applicable at >Hot Shutdown Through Power Operations"

SECTION A
Shiftly Checks to Be Made At 2100 and 0900 ± 1 Hour (Frequency per T.S. Table 1.2)

	<u>2100 ± 1</u>	<u>0900 ± 1</u>
A.6 <u>RPS T HOT</u> Tech. Spec. 4.1-1.7 and 3.5-1A.5 Compare: RC4A-TE2 (A0590) with RC4A-TE3 (A0592) and RC4B-TE2 (A0591) with RC4B-TE3 (A0593) Does each comparison agree within ± 1.75°F? (Circle Y/N)	<u>Y / N</u>	<u>Y / N</u>
A.7 <u>RPS IMBALANCE</u> Tech. Spec. 4.1-1.4 and 3.5-1A.7 when >15% power. Do NI-5 (A0626), NI-6 (A0627), NI-7 (A0628) and NI-8 (A0629) ΔΦ values all agree within 2.5%? (Circle Y/N/NA)	<u>Y / N / NA</u>	<u>Y / N / NA</u>
A.8 <u>RPS TOTAL RCS FLOW</u> Tech. Spec. 4.1-1.10 and 3.5-1A.7 Do RC14-DPT1 (A0602), RC14-DPT2 (A0603), RC14-DPT3 (A0604), RC14-DPT4 (A0605) values all agree within 7.2 MLB/hr? (Circle Y/N)	<u>Y / N</u>	<u>Y / N</u>
A.9 <u>INTERMEDIATE RANGE FLUX</u> Tech. Spec. 4.1-1.5 and 3.5-1A.3 Do NI-3 (A0576) and NI-4 (A0577) values agree within one-half log amp? (Circle Y/N)	<u>Y / N</u>	<u>Y / N</u>
	<u>Y / N</u>	<u>Y / N</u>
A.10 <u>ES WIDE RANGE RCS PRESSURE</u> Tech. Spec. 4.1-1.15/17, 3.5-1C.1.a/2.a/2.c, and 3.5-1C.3.e Do RC3A-PT-3 (A0505), RC3A-PT4 (A0506), RC3B-PT3 (A0507) values agree within 50 psi? (Circle Y/N)	<u>Y / N</u>	<u>Y / N</u>
A.11 <u>ES RB PRESSURE</u> Tech. Spec. 4.1-1.19a, 3.5-1C.1b/2.b, and 3.5-1C.3.a Do BS-PT-282 (A0101), BS-PT-285 (A0102) & BS-PT-288 (A0103) values agree within 0.5 psi? (Circle Y/N)	<u>Y / N</u>	<u>Y / N</u>
A.12 <u>REACTOR BUILDING</u> Tech. Spec. 3.6.4 Is Reactor Building pressure greater than 1.0 psi vacuum and less than 2.0 psig? (Preferred instruments: BS-PI-982B, BS-PI-1186)	<u>Y / N</u>	<u>Y / N</u>
A.13 <u>REACTOR BUILDING 4# ESAS ACTUATION</u> Tech. Spec. 3.5-1C.1.b/2.b/3.a, 4.1-1.19a Are all blue lights for channels RB1, 2 & 3 A&B (groups 1, 2, & 3) de-energized? (Circle Y/N)	<u>Y / N</u>	<u>Y / N</u>
	<u>Y / N</u>	<u>Y / N</u>

DATA SHEET 1
"Checks Applicable at >Hot Shutdown Through Power Operations"

SECTION A
Shiftly Checks to Be Made At 2100 and 0900 ± 1 Hour (Frequency per T.S. Table 1.2)

	<u>2100 ± 1</u>	<u>0900 ± 1</u>
A.14 <u>REACTOR COOLANT SYSTEM 1600# ESAS ACTUATION</u> Tech. Spec. 3.5-1C.1.a/3e, 4.1-1.19b		
Are all blue lights for channels RC1, 2 & 3 A&B (groups 1 & 2) de-energized? (Circle Y/N)	<u>Y / N</u>	<u>Y / N</u>
Are ESAS actuation channels RC1, 2 & 3 A&B all enabled? (Circle Y/N)	<u>Y / N</u>	<u>Y / N</u>
A.15 <u>REACTOR COOLANT SYSTEM 500# ESAS ACTUATION</u> Tech. Spec. 3.5-1C.2.a		
Are ESAS actuation channels RC4, 5 & 6 A&B all enabled? (Circle Y/N)	<u>Y / N</u>	<u>Y / N</u>
A.16 <u>REACTOR BUILDING 30# ESAS ISOLATION</u> Tech. Spec. 3.5-1C.3.d, 4.1-1.19d		
Are all blue lights for channels RB4, 5 & 6 A&B de-energized? (Circle Y/N)	<u>Y / N</u>	<u>Y / N</u>
Are ESAS actuation channels RB4, 5 & 6 A&B all reset? (Circle Y/N)	<u>Y / N</u>	<u>Y / N</u>
A.17 <u>REACTOR TRIP CONTAINMENT ISOLATION</u>		
Are RTI actuation channels RT1, 2 & 3 A&B all enabled? (Circle Y/N)	<u>Y / N</u>	<u>Y / N</u>
A.18 <u>CORE FLOODING SYSTEM/CORE FLOOD TANK LEVEL</u> Tech. Spec. 3.3.1.2.a, 4.1-5		
Using the operable instruments only: (Circle Y/N for each)		
Is CF2-LI1 (A0480) and CF2-LI2 (A0481) ≥ 11.29 and ≤ 11.87 ft?	<u>Y / N</u>	<u>Y / N</u>
Is A0476 and A0477 ≥ 585 psig and ≤ 615 psig?	<u>Y / N</u>	<u>Y / N</u>
Is CF-V-1A open?	<u>Y / N</u>	<u>Y / N</u>
Is CF2-LI3 (A0482) and CF2-LI4 (A0483) ≥ 11.29 and ≤ 11.87 ft?	<u>Y / N</u>	<u>Y / N</u>
Is A0478 and A0479 ≥ 585 psig and ≤ 615 psig?	<u>Y / N</u>	<u>Y / N</u>
Is CF-V-1B open?	<u>Y / N</u>	<u>Y / N</u>
Is CF-T-1A boron concentration between 2317 (Tech. Spec. 3.3.1.2.b) and 2850 PPM?	<u>Y / N</u>	<u>Y / N</u>
Is CF-T-1B boron concentration between 2317 (Tech. Spec. 3.3.1.2.b) and 2850 PPM?	<u>Y / N</u>	<u>Y / N</u>

DATA SHEET 1
"Checks Applicable at >Hot Shutdown Through Power Operations"

SECTION A
Shiftly Checks to Be Made At 2100 and 0900 ± 1 Hour (Frequency per T.S. Table 1.2)

	<u>2100 ± 1</u>	<u>0900 ± 1</u>
A.19 <u>MAKEUP TANK LEVEL & PRESSURE</u> Tech. Spec. 4.1-1.27		
Do CPT #A0498 and A0426 agree within 2 inches and MU14/RC1-LR CH1 & MU-LI-778A agree within 3 inches? (Circle Y/N)	<u>Y / N</u>	<u>Y / N</u>
Record local MU tank pressure indication, MU-PI-1752.	_____	_____
Do A1028 and MU17-PI agree with the local MU Tank pressure indication (MU-PI-1752) within 3 psi? (Circle Y/N)	<u>Y / N</u>	<u>Y / N</u>
A.20 <u>PRESSURIZER LEVEL</u> Tech. Spec. 4.1-1.26, 3.1.3 and Table 3.5-2		
Do RC-LT-777 (A1029), RC1-LT1 (C1720) and RC1-LT3 (C1722) values agree within 12 inches? (Circle Y/N)	<u>Y / N</u>	<u>Y / N</u>
Do MU14/RC1-LR CH2 (LT1 or LT3) and its corresponding XMTR on the PPC (C1720 or C1722) agree within 10"? (Circle Y/N)	<u>Y / N</u>	<u>Y / N</u>
Do RC-LI-777A and PPC point A1029 agree within 10"? (Circle Y/N)	<u>Y / N</u>	<u>Y / N</u>
Is pressurizer level between 80 to 385 inches? (Circle Y/N)	<u>Y / N</u>	<u>Y / N</u>
A.21 <u>PRESSURIZER TEMPERATURE</u> Tech. Spec. 4.1-1.22		
Record Pressurizer temp RC2-TI (CC)	_____	_____
<p>NOTE</p> <p>PPC A0504 is the non-selected pZR temperature instrument.</p>		
Do RC2-TE1 & RC2-TE2 values agree within 20°F? (Circle Y/N)	<u>Y / N</u>	<u>Y / N</u>
A.22 <u>SATURATION MARGIN MONITOR</u> Tech. Spec. 4.1-1.49 and Table 3.5-2		
Record RCS Loop A sat margin RC-TI-977 (PCL)	_____	_____
Record RCS Loop B sat margin RC-TI-978 (PCL)	_____	_____
Do RC-TI-978, CPT #A0406, RC-TI-977, & CPT #A0938 all agree within 6.5°F? (Circle Y/N)	<u>Y / N</u>	<u>Y / N</u>

Facility:	Three Mile Island	Task No.:	OF010009
Task Title:	<u>ERO Notification</u>	JPM No.:	<u>ILT 16-01 NRC JPM RA4</u>
K/A Reference:	2.4.39 (3.9)	Previous NRC Exam:	ILT 12-01

Examinee:	NRC Examiner:				
Facility Examiner:	Date:				
<u>Method of testing:</u>					
Simulated Performance:	<u>X</u>	Actual Performance:	<u> </u>		
Classroom	<u> </u>	Simulator	<u>X</u>	Plant	<u> </u>

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.
- A General Emergency has been declared.

Task Standard: All notifications made satisfactorily.

Required Materials: None

General References: EP-AA-112-100-F-06, ERO NOTIFICATION OR AUGMENTATION, Revision V.

Handouts: EP-AA-112-100-F-06, ERO NOTIFICATION OR AUGMENTATION, Revision V.

Initiating Cue: You are directed to call out the Three Mile Island Emergency Response Organization IAW EP-AA-112-100-F-06, ERO Notification or Augmentation.

Time Critical Task: No

Validation Time: 15 minutes

SIMULATOR SETUP

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

Procedure: EP-AA-112-100-F-06 ERO Notification or Augmentation

1. Page 1:
 - a. Circle the Number "1.1"
 - b. Circle: "TMI", "threemileisland3" and "simulator10#"
2. Page 2:
 - a. Section 1.2: Circle "1.2" and "Block 01"

(Denote Critical Steps with an asterisk)

Start Time _____

EXAMINER CUE: Direct the examinee to make the appropriate notifications per EP-AA-112-100-F-06, ERO Notification or Augmentation. Provide the Examinee a copy of EP-AA-112-100-F-06

PROCEDURE NOTE: The automated system will initiate the call out of management and bargaining unit personnel required to meet the ERO staffing requirements. Additional staffing of personnel shall be the responsibility of the individual Managers and Directors in the TSC / OSC / EOF / ENC / JIC following initial activation of those facilities.

Section 1 - Initiate Activation / Termination of Notification System using World Wide Web

Section 2 - Initiate Activation / Termination of Notification System using live Everbridge Agent

Section 3 - Initiate Activation / Termination of Notification System using a Standard Phone

EP-AA-112-100-F-06, Step 1.3

Performance Step: 1 OPEN (double-click) the Everbridge Aware shortcut icon from your desktop computer. If shortcut Icon is not available or does not open, then ACCESS the World Wide Web and go to <https://manager.everbridge.net/login>

Standard: Examinee opens the Everbridge Aware shortcut from the desktop computer.

Comment:

EP-AA-112-100-F-06, Step 1.4

Performance Step: 2 **ENTER** the appropriate station specific User name and Password from Step 1.1 **and SELECT** (click) "Sign In."

Standard:

- Examinee enters TMI as Station
- Examinee enters threemileisland3 as User Name
- Examinee enters simulator10# as Password

Comment:

EP-AA-112-100-F-06, Step 1.5

Performance Step: 3 **VERIFY** the appropriate Station Name is displayed, **SELECT** (click) "Proceed".

Standard: Examinee verifies TMI is displayed

Comment:

EP-AA-112-100-F-06, Step 1.6

Performance Step: 4 **SELECT** (click) the +Launch Incident button.

Standard: Examinee clicks on+ Launch Incident button.

Comment:

EP-AA-112-100-F-06, Step 1.7

Performance Step: 5 **SELECT** (Click) on the appropriate Scenario from Step 1.2..

Standard: Examinee selects Scenario 1

Comment:

EP-AA-112-100-F-06, Step 1.8

Performance Step: 6 VERIFY the appropriate scenario is displayed.

Standard: Examinee verifies Scenario 1 is displayed.

Comment:

EXAMINER NOTE: Step 1.09 is N/A.

EP-AA-112-100-F-06, Step 1.10

Performance Step: 7 If the scenario displayed is correct, **then SELECT** (click) "Send x template(s) Now".

Standard: Examinee determines that the scenario displayed is correct and selects "Send x template(s) Now".

Comment:

EP-AA-112-100-F-06, Step 1.11

Performance Step: 8 On **the** next screen, **VALIDATE** there is a date and time stamp for each notification listed.

RECORD Time _____

Standard: Examinee validates "date and time stamp" for each notification and records time.

Comment:

EP-AA-112-100-F-06, Step 1.12

Performance Step: 9 SELECT "Log Out" to exit the Everbridge Aware Notification program.

Standard: Examinee selects "Log Out".

Comment:

EXAMINER CUE: State: "Two minutes has elapsed and no call to the Control Room has been received".

EP-AA-112-100-F-06, Step 1.13

Performance Step: 10 **VERIFY** that a call to the Control Room from the ERO notification system is received within 2 minutes after the system was initiated..

Standard: Examinee recognizes that a confirmation call has not been received.

Comment:

EXAMINER NOTE: Step 1.14 is N/A

EP-AA-112-100-F-06, Step 1.15

Performance Step: 11 If a confirmation call is not received in the Control Room within 2 minutes confirming scenario activation, then proceed to Section 2, Initiate Activation / Termination of Notification System Using Live Everbridge Agent.

Standard: Examinee recognizes that a confirmation call has not been received and goes to Section 2.

Comment:

EP-AA-112-100-F-06, Step 2.1

Performance Step: 12 CIRCLE the appropriate station specific Account Name, Organization Name, First Name, Last Name, and Response to Hint Question from the table below.

Standard: Examinee circles the following:

- Exelon – TMI under Organization Name
- TMI under first name
- ERONS Activator under last name
- Exelon under Response to Hint Question

Comment:

EP-AA-112-100-F-06, Step 2.2

Performance Step: 13 **CIRCLE** the appropriate Activation Scenario Number for the event from the table below..

Standard:

Examinee circles the following:

- Scenario 1 - Actual Event Respond to Facility - For Alert, Site Area, or General Emergency, or Security Events with On Site ERO reporting.

Comment:**EXAMINER CUE:**

State: "You hear a busy signal" when the examinee attempts to make a phone call in the next step and after the 2nd attempt.

EP-AA-112-100-F-06, Step 2.3

Performance Step: 14 **DIAL** the ERO Notification System Activation phone number: 1-877-220- 4911.

Standard:

Examinee dials 1-877-220-4911, recognizes that there is a busy signal, and continues on.

Comment:***EP-AA-112-100-F-06, Step 2.4***

Performance Step: 15 If the number is busy or does not answer after a 2nd attempt, then **PROCEED** to Section 3 Initiate Activation / Termination of Notification System Using Standard Phone.

Standard:

Examinee goes to Section 3.

Comment:

EP-AA-112-100-F-06, Step 3.1

Performance Step: 16 CIRCLE the appropriate station specific User ID, Station Password number and Organization ID from the table below.

Standard: Examinee circles the following:

- TMI under Station
- 730145# under User ID
- 143311# under Password
- 730145# under Organization ID

Comment:

EP-AA-112-100-F-06, Step 3.2

Performance Step: 17 CIRCLE the appropriate Activation / Termination Scenario Number for the event from the table below.

Standard: Examinee circles the following:

- Scenario 1 - Actual Event Respond to Facility - For Alert, Site Area, or General Emergency, or Security Events with On Site ERO reporting.

Comment:

EXAMINER CUE: When the examinee attempts to make a phone call in the next step, state: "Welcome to EverBridge Aware. Please enter use5 ID followed by the pound SIGN".

EP-AA-112-100-F-06, Step 3.3

Performance Step: 18 DIAL the Everbridge AWARE system activation phone number - 1-857-444-0443

✓ **Standard:** Examinee dials 1-857-444-0443.

Comment:

EXAMINER NOTE: Steps 3.4 and 3.5 are N/A.

EXAMINER CUE: If the examinee enters a number other than 730145#, then state: "Number not recognized".

EP-AA-112-100-F-06, Step 3.6

Performance Step: 19 When the System prompts "Enter your USER ID followed by the # sign", then **ENTER** the User ID provided in step 3.1.

√ **Standard:** Examinee enters 730145#

Comment:

EXAMINER CUE: State: "Please enter your password followed by the pound BUTTON".

EP-AA-112-100-F-06, Step 3.7

Performance Step: 20 When the system prompts "Enter your Password followed by the # sign" then **ENTER** the Password provided in step 3.1..

√ **Standard:** Examinee enters 143311#

Comment:

EXAMINER CUE: State: "Please enter your organization ID followed by the Pound BUTTON".

EP-AA-112-100-F-06, Step 3.8

Performance Step: 21 When the system prompts "Enter your Organization ID followed by the # sign", then **ENTER** the Organization ID provided in step 3.1.

√ **Standard:** Examinee enters 730145#

Comment:

EXAMINER CUE: State: "Select a template or scenario".

EP-AA-112-100-F-06, Step 3.9

Performance Step: 22 When prompted, "To select a template or scenario, Enter the ID followed by the # sign", then **ENTER** the ID provided in step 3.2.

For "Actual Event with Respond to Facility" **PRESS 1** Then #

√ **Standard:** Examinee presses 1 then #

Comment:

EXAMINER CUE: State: "Actual Event Respond to Facility, Press 1 to send the message now, or press 2 to select a different scenario".

EP-AA-112-100-F-06, Step 3.10

Performance Step: 23

The System will state the name of the scenario. To select this scenario press 1 to send the message now or 2 to select a different scenario.

If the event name is correct, then PRESS 1.

Standard:

√ Examinee presses 1.

Comment:

EXAMINER CUE: State: "Your message has been sent"

Terminating Cue: When the time of the scenario broadcast has been sent.

STOP TIME: _____

Job Performance Measure No.: ILT 16-01 NRC JPM RA4

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:

- You are the Third Reactor Operator on shift.
- A General Emergency has been declared.

INITIATING CUE:

You are directed to call out the Three Mile Island Emergency Response Organization IAW EP-AA-112-100-F-06, ERO Notification or Augmentation.

TIME CRITICAL: No

ERO NOTIFICATION OR AUGMENTATION

The automated system will initiate the call out of management and bargaining unit personnel required to meet the ERO staffing requirements. Additional staffing of personnel shall be the responsibility of the individual Managers and Directors in the TSC / OSC / EOF / ENC / JIC following initial activation of those facilities.

Section 1 – Initiate Activation / Termination of Notification System using World Wide Web

Section 2 – Initiate Activation / Termination of Notification System using live Everbridge Agent

Section 3 – Initiate Activation / Termination of Notification System using a Standard Phone

Section 4 – Initiate Activation of Alternate Notification System using World Wide Web

Section 5 – Initiate Activation of Alternate Notification System using a Standard Phone

Section 6 – Initiate Activation / Termination of Notification System using Station-applicable Call Trees

1.	<u>INITIATE ACTIVATION / TERMINATION OF NOTIFICATION SYSTEM USING THE WORLD WIDE WEB</u>			
1.1	CIRCLE the appropriate station specific User Name and Station Password number from the table below.			<input type="checkbox"/>
	Station	User Name	Password	
	Braidwood	braidwood3	simulator01#	
	Byron	blackhawk3	simulator02#	
	Clinton	clinton3	simulator03#	
	Dresden	dresden3	simulator04#	
	LaSalle	lasalle3	simulator05#	
	Limerick	limerick3	simulator06#	
	Oyster Creek	oystercreek3	simulator07#	
	Peach Bottom	peachbottom3	simulator08#	
	Quad Cities	quadcities3	simulator09#	
	TMI	threemileisland3	simulator10#	

ERO NOTIFICATION OR AUGMENTATION

1.2.	CIRCLE the appropriate Activation / Termination Scenario event from the table below.	<input type="checkbox"/>			
01 - Actual Event Respond to Facility For Alert, Site Area, or General Emergency, or Security Events with On Site ERO reporting *Optional for all other unusual Events	02 -Unusual Event Unusual Events excluding Security Events (HU1) CM-1	03 - Actual Event Alternative Facility Response For Events with Off Site ERO reporting location requirements as determined by the Emergency Director	04 - Event Termination Notification to all ERO Members, Station Management and EOF Responders that event has been terminated.	05 - Activation Cancellation Notification to all ERO Members, Station Management and EOF Responders that activation has been cancelled.	

ERO NOTIFICATION OR AUGMENTATION

1.3.	OPEN (double-click) the Everbridge shortcut icon from your desktop computer. If shortcut Icon is not available or is not functioning, then OPEN a web browser, then TYPE https://manager.everbridge.net/login . A. If internet is not available, then GO TO Step 2.	<input type="checkbox"/>
NOTE: User Name and Passwords are case sensitive and will lock out after four (4) failed attempts.		
1.4.	ENTER the appropriate station specific User name and Password from Step 1.1 and SELECT (click) "Sign In".	<input type="checkbox"/>
1.5.	VERIFY the appropriate Station Name is displayed, SELECT (click) "Proceed".	<input type="checkbox"/>
1.6.	SELECT (click) the +Launch Incident button.	<input type="checkbox"/>
1.7.	SELECT (Click) on the appropriate Scenario from Step 1.2.	
1.8.	VERIFY the appropriate Scenario is displayed.	<input type="checkbox"/>
1.9.	If the scenario displayed is not correct, then SELECT (click) correct scenario from list and RETURN to Step 1.8.	<input type="checkbox"/>
1.10.	If the scenario displayed is correct, then SELECT (click) "Send x template(s) Now".	<input type="checkbox"/>
1.11.	On the next screen, VALIDATE there is a date and time stamp for each notification listed. RECORD Time _____	<input type="checkbox"/>
1.12.	SELECT "Log Out" to exit the Everbridge Notification program.	<input type="checkbox"/>
1.13.	VERIFY that a call to the Control Room from the ERO notification system is received within 2 minutes after the system was initiated.	<input type="checkbox"/>
1.14.	RECORD time of the confirmation call to the Control Room_____.	<input type="checkbox"/>
1.15.	If a confirmation call is not received in the Control Room within 2 minutes confirming scenario activation, then PROCEED to Section 2, Initiate Activation / Termination of Notification System Using Live Everbridge Agent.	<input type="checkbox"/>
1.16.	INFORM the Shift Emergency Director of the status of the ERO Notification System Initiation and EXIT this procedure.	<input type="checkbox"/>

ERO NOTIFICATION OR AUGMENTATION**2. INITIATE ACTIVATION / TERMINATION OF NOTIFICATION SYSTEM USING LIVE EVERBRIDGE AGENT**

2.1. **CIRCLE** the appropriate station specific Account Name, Organization Name, First name, Last name and response to Hint Question from the table below.



Account Name	Organization Name (Station)	First Name	Last name	Response to Hint Question
Exelon Generation Company LLC NOTE: Everbridge will then ask for your organization. Provide your station name for your response.	Braidwood	Braidwood	ERONS Activator	Exelon
	Byron	Byron	ERONS Activator	Exelon
	Clinton	Clinton	ERONS Activator	Exelon
	Dresden	Dresden	ERONS Activator	Exelon
	LaSalle	LaSalle	ERONS Activator	Exelon
	Limerick	Limerick	ERONS Activator	Exelon
	Oyster Creek	Oyster Creek	ERONS Activator	Exelon
	Peach Bottom	Peach Bottom	ERONS Activator	Exelon
	Quad Cities	Quad Cities	ERONS Activator	Exelon
	TMI	TMI	ERONS Activator	Exelon

ERO NOTIFICATION OR AUGMENTATION

2.2. CIRCLE the appropriate Activation Scenario Number for the event from the table below.					<input type="checkbox"/>
01 - Actual Event Respond to Facility For Alert, Site Area, or General Emergency, or Security Events with On Site ERO reporting *Optional for all other unusual Events	02 - Unusual Event Unusual Events excluding Security Events (HU1) CM-1	03 - Actual Event Alternative Facility Response For Events with Off Site ERO reporting location requirements as determined by the Emergency Director	04 - Event Termination Notification to all ERO Members, Station Management and EOF Responders that event has been terminated.	05 - Activation Cancellation Notification to all ERO Members, Station Management and EOF Responders that activation has been cancelled.	

ERO NOTIFICATION OR AUGMENTATION

2.3.	DIAL the ERO Notification System Activation phone number: 1-877-220-4911 .	<input type="checkbox"/>
2.4.	If the number is busy or does not answer after a 2 nd attempt, then PROCEED to Section 3 Initiate Activation / Termination of Notification System Using Standard Phone.	<input type="checkbox"/>
2.5.	When asked for your Everbridge Account Name, Organization Name, First name, Last Name and Hint question, then PROVIDE the appropriate information from step 2.1.	<input type="checkbox"/>
2.6.	ASK the Live Everbridge Agent if there is a current "Incident" Broadcast running for your station.	<input type="checkbox"/>
2.7.	If the Live Everbridge Agent confirms the appropriate scenario has been activated, then STOP here and do not proceed with steps 2.8 to 2.16 below.	<input type="checkbox"/>
2.8.	If the Live Everbridge Agent confirms that the appropriate scenario has not been activated, then PROCEED to step 2.9.	<input type="checkbox"/>
2.9.	INFORM the Everbridge Agent that you would like to Launch a Scenario.	<input type="checkbox"/>
2.10.	When asked for the Scenario number, then STATE the appropriate Scenario number followed by the corresponding name of the Scenario you wish to launch. PROVIDE the appropriate information from step 2.2.	<input type="checkbox"/>
2.11.	When asked by the Everbridge Agent "Would you like me to send this scenario (message) now?", then REPLY Yes.	<input type="checkbox"/>
2.12.	VERIFY with the Everbridge Agent that the ERO Activation scenario has been successfully initiated.	<input type="checkbox"/>
	A. If Everbridge Agent indicates that ERO Activation scenario was unsuccessful or that there is a problem with the Everbridge system and cannot successfully activate the scenario, then PROCEED to Section 4, Initiate Activation of Alternate Notification System using the World Wide Web.	<input type="checkbox"/>

ERO NOTIFICATION OR AUGMENTATION

2.13.	RECORD the Broadcast ID number _____ time _____	<input type="checkbox"/>
2.14.	VERIFY that a call to the Control Room from the ERO notification system is received within 2 minutes after the system was initiated.	<input type="checkbox"/>
2.15.	RECORD time of the confirmation call to the Control Room _____.	<input type="checkbox"/>
2.16.	If a confirmation call is not received in the Control Room within 2 minutes confirming scenario activation, then PROCEED to Section 3, Initiate Activation / Termination of Notification System Using Standard Phone.	<input type="checkbox"/>
2.17.	INFORM the Shift Emergency Director of the status of the ERO Notification System Initiation and EXIT this procedure.	<input type="checkbox"/>

ERO NOTIFICATION OR AUGMENTATION

3. <u>INITIATE ACTIVATION / TERMINATION OF NOTIFICATION SYSTEM USING STANDARD PHONE</u>					<input type="checkbox"/>
3.1. CIRCLE the appropriate station specific User ID, Station Password number and Organization ID from the table below.					<input type="checkbox"/>
Station	User ID	Password	Organization ID		
Braidwood	728993#	993661#	728993#		
Byron	828536#	536611#	828536#		
Clinton	728994#	993691#	728994#		
Dresden	729007#	007971#	729007#		
LaSalle	729008#	008001#	729008#		
Limerick	730135#	135761#	730135#		
Oyster Creek	730189#	189741#	730189#		
Peach Bottom	730144#	143281#	730144#		
Quad Cities	729009#	008031#	729009#		
TMI	730145#	143311#	730145#		
3.2. CIRCLE the appropriate Activation / Termination Scenario Number for the event from the table below.					<input type="checkbox"/>
1 - Actual Event Respond to Facility For Alert, Site Area, or General Emergency, or Security Events with On Site ERO reporting	2 - Unusual Event Unusual Events excluding Security Events (HU1) CM-1	3 - Actual Event Alternative Facility Response For Events with Off Site ERO reporting location requirements as determined by the Emergency Director	4 - Event Termination Notification to all ERO Members, Station Management and EOF Responders that event has been terminated.	5 - Activation Cancellation Notification to all ERO Members, Station Management and EOF Responders that activation has been cancelled.	
3.3. DIAL the Everbridge system activation phone number – 1-857-444-0443.					<input type="checkbox"/>
3.4. If the number is busy or does not answer after a 2 nd attempt, then DIAL the					<input type="checkbox"/>

ERO NOTIFICATION OR AUGMENTATION

	ERO Notification System Activation Alternate phone number 800-971-5015 .	
3.5.	If the alternate phone number is busy or does not answer after a 2 nd attempt, then PROCEED to Section 4, Initiate Activation of Alternate Notification System using the World Wide Web.	<input type="checkbox"/>
3.6.	When the System prompts "Enter your USER ID followed by the # sign", then ENTER the User ID provided in step 3.1.	<input type="checkbox"/>
3.7.	When the system prompts "Enter your Password followed by the # sign" then ENTER the Password provided in step 3.1.	<input type="checkbox"/>
3.8.	When the system prompts "Enter your Organization ID followed by the # sign", then ENTER the Organization ID provided in step 3.1.	<input type="checkbox"/>
3.9.	When prompted, "To select a template or scenario, Enter the ID followed by the # sign", then ENTER the ID provided in step 3.2.	<input type="checkbox"/>
	A. For "Actual Event with Respond to Facility" PRESS 1 Then #	<input type="checkbox"/>
	B. For "Unusual Event" PRESS 2 Then #	<input type="checkbox"/>
	C. For "Actual Event Alternative Facility Response" PRESS 3 Then #	<input type="checkbox"/>
	D. For "Event Termination" PRESS 4 Then #	<input type="checkbox"/>
	E. For "Activation Cancellation" PRESS 5 Then #	<input type="checkbox"/>
3.10.	The System will state the name of the scenario. To select this scenario press 1 to send the message now or 2 to select a different scenario.	<input type="checkbox"/>
	A. If the event name is correct, then PRESS 1 .	<input type="checkbox"/>
	B. If event name is not correct, then PRESS 2 and RETURN to step 3.9.	<input type="checkbox"/>

ERO NOTIFICATION OR AUGMENTATION

3.11.	When the activation is complete and the System states "Your message has been sent", then HANG UP the phone.	<input type="checkbox"/>
3.12.	RECORD the time of the scenario broadcast _____	<input type="checkbox"/>
3.13.	VERIFY that a call to the Control Room from the ERO notification system is received within 2 minutes after the system was initiated.	<input type="checkbox"/>
3.14.	RECORD time of the confirmation call to the Control Room_____.	<input type="checkbox"/>
3.15.	If a confirmation call is not received in the Control Room within 2 minutes confirming scenario activation, then PROCEED to Section 4, Initiate Activation of Alternate Notification System using the World Wide Web.	<input type="checkbox"/>
3.16.	INFORM the Shift Emergency Director of the status of the ERO Notification System Initiation and EXIT this procedure.	<input type="checkbox"/>

ERO NOTIFICATION OR AUGMENTATION**4. INITIATE ACTIVATION OF ALTERNATE NOTIFICATION SYSTEM USING THE WORLD WIDE WEB****4.1. CIRCLE** the appropriate station from the table below. ☐

Station	User ID	Password
Braidwood	010101	010101
Byron	020202	020202
Clinton	050505	050505
Dresden	070707	070707
LaSalle	090909	090909
Limerick	101010	101010
Oyster Creek	121212	121212
Peach Bottom	131313	131313
Quad Cities	141414	141414
TMI	151515	151515

4.2. CIRCLE the appropriate Activation for the event from the table below. ☐

01 - Actual Event Respond to Facility For Alert, Site Area, or General Emergency. *Optional for Unusual Event.	03 - Actual Event Alternative Facility Response For Security events or other events as determined by the Emergency Director.
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ERO NOTIFICATION OR AUGMENTATION

4.3. OPEN a web browser and TYPE: https://myportal.opentext.com/ in the address bar. A. IF the internet is not available, then GO to Section 5.	<input type="checkbox"/>
4.4. ENTER the appropriate station specific Username and Password from Step 4.1 and SELECT "Sign In".	<input type="checkbox"/>
4.5. CLICK on the arrow in the Create/Send Job bar, then CLICK on Mixed Media.	<input type="checkbox"/>
4.6. SELECT the appropriate template from the drop down from step 4.2.	<input type="checkbox"/>
4.7. VERIFY the appropriate template is displayed.	<input type="checkbox"/>
4.8. If template displayed is not correct, then PROCEED to Section 5, Initiate Activation of Alternate Notification System using telephone activation.	<input type="checkbox"/>
4.9. IF the template displayed is correct, then CLICK Review & Send. A. VERIFY the appropriate information is displayed. B. CLICK on "Submit".	<input type="checkbox"/>
4.10. On the next screen, VALIDATE that the message sent by receiving a green box with the message job number. Record Job No _____ Record Time _____	<input type="checkbox"/>
4.11. If a green confirmation box is not displayed, then PROCEED to Section 5, Initiate Activation of Alternate Notification System using telephone activation.	<input type="checkbox"/>
4.12. CLICK the 'x' in the green box.	<input type="checkbox"/>
4.13. SELECT 'Sign Out' to Exit the Easylink Notification program.	<input type="checkbox"/>
4.14. INFORM the Shift Emergency Director of the status of the Alternate ERO Notification System Initiation and EXIT this procedure.	<input type="checkbox"/>

ERO NOTIFICATION OR AUGMENTATION**5. INITIATE ACTIVATION OF ALTERNATE NOTIFICATION SYSTEM USING A STANDARD PHONE****5.1. CIRCLE** the appropriate station from the table below.

Station	User ID	Password	Distribution List Number
Braidwood	010101	010101	010101
Byron	020202	020202	020202
Clinton	050505	050505	050505
Dresden	070707	070707	070707
LaSalle	090909	090909	090909
Limerick	101010	101010	101010
Oyster Creek	121212	121212	121212
Peach Bottom	131313	131313	131313
Quad Cities	141414	141414	141414
TMI	151515	151515	151515

ERO NOTIFICATION OR AUGMENTATION

<p>5.2. CIRCLE the appropriate Activation Script for the event from the table below.</p> <table border="1" data-bbox="211 352 941 682"> <tr> <td data-bbox="211 352 578 682"> <p>01 - Actual Event Respond to Facility</p> <p>For Alert, Site Area, or General Emergency.</p> <p>*Optional for Unusual Event.</p> </td> <td data-bbox="578 352 941 682"> <p>03 - Actual Event Alternative Facility Response</p> <p>For Security events or other events as determined by the Emergency Director.</p> </td> </tr> </table>	<p>01 - Actual Event Respond to Facility</p> <p>For Alert, Site Area, or General Emergency.</p> <p>*Optional for Unusual Event.</p>	<p>03 - Actual Event Alternative Facility Response</p> <p>For Security events or other events as determined by the Emergency Director.</p>	<input type="checkbox"/>
<p>01 - Actual Event Respond to Facility</p> <p>For Alert, Site Area, or General Emergency.</p> <p>*Optional for Unusual Event.</p>	<p>03 - Actual Event Alternative Facility Response</p> <p>For Security events or other events as determined by the Emergency Director.</p>		
<p>5.3. DIAL the Easylink toll free number 1-866-515-0663.</p>	<input type="checkbox"/>		
<p>5.4. When the System prompts "Enter your USER ID, # sign, then your Password, # sign", then ENTER the User ID and Password provided in step 5.1.</p>	<input type="checkbox"/>		
<p>NOTE: You will be prompted to "Wait while we verify your ID and password"</p>			
<p>5.5. When the System prompts "To create a message, Press 1", then ENTER 1.</p>	<input type="checkbox"/>		
<p>5.6. When the System prompts "To enter a distribution list, Press 1", then ENTER 1.</p>	<input type="checkbox"/>		
<p>5.7. When the System prompts "Enter your distribution list followed by the # key, then ENTER the list number provided in step 5.1.</p>	<input type="checkbox"/>		
<p>5.8. When the System prompts "To confirm Press 1, to reenter your list number Press #", then ENTER 1 to confirm or # to reenter the number.</p>	<input type="checkbox"/>		

ERO NOTIFICATION OR AUGMENTATION

NOTE: Step 5.10 through 5.12 applies to stations that are supported by the Emergency Operations Facilities at Cantera or Coatesville. All other stations can move to step 5.13.			<input type="checkbox"/>
5.9. When the system prompts "Press 1 to enter a second distribution list number" then PRESS 1.			
5.10. When the system prompts "Enter the distribution list number followed by the # sign", then ENTER the appropriate distribution number provided below:			<input type="checkbox"/>
Stations	Emergency Operations Facility	Distribution List Number	
Braidwood Byron Clinton Dresden LaSalle Quad Cities	Cantera	040404	
Limerick Peach Bottom Three Mile Island	Coatesville	060606	
5.11. When the System prompts "To confirm Press 1, to reenter your list number Press #", then ENTER 1 to confirm or # to reenter the number.			<input type="checkbox"/>
5.12. When the system prompts "Press 2 to Record Your Message" then PRESS 2.			<input type="checkbox"/>
5.13. When the system prompts, "Press # to play the same message for both live and answering machine recipients", then PRESS #.			<input type="checkbox"/>
5.14. When the system prompts, "Press 2 to Select a Script", then PRESS 2.			<input type="checkbox"/>
5.15. When the system prompts, "Press 1 to Enter a Script Number", then PRESS 1.			<input type="checkbox"/>
5.16. When the system prompts, "Enter Script Number", the ENTER the script number provided in step 5.2.			<input type="checkbox"/>
5.17. When the system prompts, "Press 1 to Confirm Script Number", then PRESS 1.			<input type="checkbox"/>
5.18. When the system prompts, "For Immediately Delivery Press 1" then PRESS 1.			<input type="checkbox"/>

ERO NOTIFICATION OR AUGMENTATION

5.19. RECORD the job number provided by the system. Record Job No _____ Record Time _____	<input type="checkbox"/>
5.20. When the system prompts, "Press 9 to end the call" then PRESS 9.	<input type="checkbox"/>
5.21. IF you do not receive a job number, then PROCEED to Section 6, Initiate Activation/Termination of Notification System Using Station-Applicable Call Trees.	<input type="checkbox"/>
5.22. INFORM the Shift Emergency Director of the station of the ERO Notification System Initiation and EXIT this procedure.	<input type="checkbox"/>

6. <u>INITIATE ACTIVATION/TERMINATION OF NOTIFICATION SYSTEM USING STATION-APPLICABLE CALL TREES</u>	
6.1. NOTIFY or AUGMENT ERO by using station-applicable call tree located on the station EP website.	<input type="checkbox"/>

7. **REFERENCES**

7.1. Commitment

CM-1: Regulatory Commitment Number 5 identified in Attachment 11 of Letter to NRC dated Aug 17, 2005, (RS-05-101). (Steps 1.2, 2.2, 3.2)

Facility: Three Mile Island Task No.: OF1000005

Task Title: Maintain Minimum Shift Staffing,
Control Overtime JPM No.: ILT 16-01 NRC JPM
SA1-1

K/A Reference: 2.1.5 (3.9) Previous Exam: ILT 14-01 NRC

Examinee: NRC Examiner:

Facility Evaluator: Date:

Method of testing:

Simulated Performance: _____ Actual Performance: X

Classroom X Simulator _____ Plant _____

READ TO THE EXAMINEE

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

- Initial Conditions:
- 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. 10
 - Tech Spec 6.2.2 and Table 6.2-1, Amendment 219
 - LS-AA-119, Overtime Controls, Rev. 12
 - 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. 10
 - LS-AA-119, Overtime Controls, Rev. 12
 - 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

PERFORMANCE INFORMATION

(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 INFORMATION

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.

PERFORMANCE INFORMATION

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:

PERFORMANCE INFORMATION

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:

PERFORMANCE INFORMATION

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.: ILT 16-01 NRC JPM SA1-1

Examinee's Name:

Date Performed:

Facility Evaluator:

Number of Attempts:

Time to Complete:

Question Documentation:

Question:

Response:

Result: SAT _____ UNSAT _____

Examiner's Signature: _____ Date: _____

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	Anders, D	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

SHIFT STAFFING REQUIREMENTS

1.0 PURPOSE

This purpose of this procedure is to:

- Provide required information for shift staffing to meet Technical Specification requirements, Emergency Plan requirements and Fire Brigade requirements.
- Provide reference material for proper LMS qualification codes for the required positions (Attachment 2).
- Provide instructions on how to verify LMS qualifications.

NOTE: This document does not specify new requirements, but references the base documentation for the requirements.

2.0 TERMS AND DEFINITIONS

- 2.1 **SRO** – Senior Reactor Operator holding an “Active” NRC license as defined in 10 CFR 55.
- 2.2 **CRO** – Reactor Operator holding an “Active” NRC license as defined in 10 CFR 55.
- 2.3 **URO** – Unit Reactor Operator, the CRO required to be present in the Control Room.
- 2.4 **ARO** – Assistant Reactor Operator, the second on shift CRO.
- 2.5 **RO-3** – Third Reactor Operator, the third on shift CRO.

3.0 RESPONSIBILITIES

- 3.1 It is the responsibility of the Shift Manager on duty to ensure these manning requirements are met at all times.

4.0 **MAIN BODY**

NOTE: Specific permission must be granted by the Plant Manager and the Site Vice President to deviate from the below listed requirements.

- 4.1 Per TMI Tech Specs Section 6, Table 6.2-1, the minimum shift operations manning requirements must consist of the following:

Plant > 200°F RCS Temperature	Plant < 200°F RCS Temperature
1 Shift Manager (SM)	1 Shift Manager (SM)
1 Control Room Supervisor (SRO)	1 Control Room Supervisor*
3 Control Room Operators*** (at least 2 RO)	2 Control Room Operators (at least 1 RO)
4 Auxiliary Operators**	4 Auxiliary Operators
1 Shift Technical Advisor (STA)	

* May be waived by the Senior Manager, Operations. Either a qualified SRO, Shift Manager, or Control Room Supervisor must be on shift at all times when below 200°F.

** The minimum shift crew composition of 4 Auxiliary Operators assumes 4 qualified operators.

- a. Two of the Auxiliary Operators must meet the requirements to be designated as Fire Brigade members.
- b. Two of the Auxiliary Operators must meet the requirements to be assigned as personnel designated to facilitate the safe shutdown of the Unit.

*** Except for the Shift Manager, 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 of Table 6.2-1. This provision does not permit any shift crew position to be unmanned upon shift change due to an incoming shift crewman being late or absent.

- 4.1.1 A minimum of 1 SRO and 1 RO must be in the Control Room at all times when RCS temperature is >200°F.

- 4.1.2 At least 1 SRO **or** 1 RO must be in the Control Room at all times when RCS temperature is <200°F.

Facility: THREE MILE ISLAND Task No.: GOP002003

Task Title: PERFORM AN ESTIMATED CRITICAL ROD POSITION CALCULATION JPM No.: ILT 16-01 NRC JPM SA1-2

K/A Reference: 2.1.43 (4.1/4.3) Bank JPM: TQ-TM-104-ADM-403-J100

Examinee: NRC Examiner:

Facility Evaluator: Date:

Method of testing:

Simulated Performance: _____ Actual Performance: X

Classroom X Simulator _____ Plant _____

READ TO THE EXAMINEE

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

- Initial Conditions:
- A sequential trip of both feedwater pumps and reactor trip 72 hours ago
 - 100% power for 150 days prior to the trip
 - Cycle Burnup is 300 EFPD from hourly log
 - Tave = 532 °F
 - Final critical boron concentration = 1469 ppm
 - FINAL MIXED BORON DEPLETION CORRECTION FACTOR in the control room log is 0.95
 - The Plant Process Computer is not available.
 - No reactor engineering personnel are on site.

Task Standard: Identify all errors with the ECP. Calculate and approve an ECP.

- Required Materials:
- OP-TM-300-000, REACTIVITY AND POWER DISTRIBUTION CALCULATIONS, Rev 8
 - OP-TM-300-403, ESTIMATED CRITICAL ROD POSITION, Rev 5
 - Ruler
 - Calculator

- General References:
- OP-TM-300-000, REACTIVITY AND POWER DISTRIBUTION CALCULATIONS, Rev 8
 - OP-TM-300-403, ESTIMATED CRITICAL ROD POSITION, Rev 5

Initiating Cue: Perform a review and approval of an Estimated Critical Rod Position calculation. Make any corrections, if required.

Time Critical Task: No

Validation Time:

PERFORMANCE INFORMATION

(Denote Critical Steps with a check mark)

START TIME: _____

EVALUATOR NOTE: This JPM may be administered without direct interaction between the examiner and examinee. Once the calculation has been completed, review the calculation for accuracy.

EVALUATORS CUE: Role play as SM and direct the Examinee to calculate, review, and approve an ECP for current plant conditions IAW OP-TM-300-403
Provide a copy of OP-TM-300-000 Reactivity and Power Distribution Calculations and OP-TM-300-403 Attachment 7.1 and Attachment 7.2. (Last two pages of JPM)

OP-TM-300-403, Attachment 7.1

Performance Step: 1 Calculation is for an ECP at Date/Time

Standard: Examinee verifies the current date and time on Attachment 7.1.

Comment:

OP-TM-300-403, Attachment 7.1, Step 1

Performance Step: 2 Enter the average reactor coolant temperature, TAVE, from the Initial Conditions

Standard: Examinee verifies 532F on Line 1.

Comment:

OP-TM-300-403, Attachment 7.1, Step 2

Performance Step: 3 **OBTAIN** the cycle burn-up from the Initial Condition Sheet.

Standard: Examinee verifies 300 EFPD on Line 2

Comment:

PERFORMANCE INFORMATION

OP-TM-300-403, Attachment 7.1, Step 3a

Performance Step: 4 **OBTAIN** the Final Measured Boron Concentration, Initial Conditions.

Standard: Examinee verifies 1469 ppmB on Line 3a

Comment:

EXAMINER NOTE: If the Examinee states that he/she is complete with the review, inform the examinee to perform the entire calculation.

OP-TM-300-403, Attachment 7.1, Step 3b

✓ **Performance Step: 5** Obtain the Boron Depletion Correction Factor from Initial Conditions.

Standard: Examinee finds 1.0
Examinee verifies 0.95 on line 3b.

Comment:

OP-TM-300-403, Attachment 7.1, Step 3c

✓ **Performance Step: 6** Calculate the Final Corrected Boron Correction.

Standard: Examinee finds 1469
Examinee verifies: $1469 \times 0.95 = \underline{1396}$ ppmB on Line 3c

Comment:

OP-TM-300-403, Attachment 7.1, Step 4

Performance Step: 7 **DETERMINE** the fuel excess reactivity per Figure 2.

Standard: Examinee verifies 11.4 on Line 4.
(Between 11.2 and 11.4% $\Delta k/k$)

Comment:

OP-TM-300-403, Attachment 7.1, Step 5a

Performance Step: 8 **DETERMINE** the Inverse Boron Worth from Figure 8.

Standard: Examinee verifies **140.5** on Line 5a
(between: 140 and 141 ppmB /%Δk/k)

Comment:

OP-TM-300-403, Attachment 7.1, Step 5b

✓ **Performance Step: 9** **DETERMINE** the Boron reactivity Worth by dividing the current concentration (Step 3c) by the HZP Inverse Boron Worth (Step 5a) X (-1).

Standard: Examinee finds **-10.46** on Line 5b.
Examinee calculates **-9.94**
(between -9.91 and -9.95 %Δk/k)

Comment:

OP-TM-300-403, Attachment 7.1, Step 6

Performance Step: 10 **OBTAIN** the xenon worth from Figure 13

Standard: Examinee verifies **-0.1** on Line 6.
(between -0.05 and -0.15 %Δk/k)

Comment:

PERFORMANCE INFORMATION

OP-TM-300-403, Attachment 7.1, Step 7

Performance Step: 11 Obtain the Samarium and Plutonium Buildup after shutdown by using Figure 15.

Standard: Examinee verifies time since last S/D on Line 7

72 hours

Examinee verifies **-0.10** on Line 7

(between -0.09 and -0.11 % Δ k/k)

Comment:

OP-TM-300-403, Attachment 7.1, Step 8

✓ **Performance Step: 12** **DETERMINE** the inserted CRG 5-7 worth required for Criticality

Standard: Examinee finds **-0.74** on Line 8

Examinee calculates **-1.26**

(Between -1.5 and -1.6 % Δ k/k)

Comment:

EXAMINER NOTE: The Rod Tolerance and Rod Index bands are **CRITICAL, NOT** the value associated with the reactivity values.

OP-TM-300-403, Attachment 7.1, Step 9

✓ **Performance Step: 13** **DETERMINE** the Estimated Critical Rod Position from Figure 5a.

Standard: Examinee finds **236%**

Examinee determines **175%** on line 9.

(between 165 and 185% Rod Index)

Comment:

PERFORMANCE INFORMATION

OP-TM-300-403, Attachment 7.1, Step 10

- ✓ **Performance Step: 14** **DETERMINE** the Critical Rod Position Tolerance Band from Figure 5A.
- Circle 0.5% $\Delta k/k$
- Determine Minimum Rod Withdrawal Limit using Fig 5a
- Determine the Maximum Rod Withdrawal Limit Fig 5a
- Standard:** Examinee verifies that the Steady State condition adjustments need to be made and 0.5% delta K/K is circled in Line 10a.
- Examinee finds -1.24 and 183%
- Examinee determines -1.76 $\Delta k/k$ for a Rod Index of 118% on Line 10b for Minimum
- Examinee finds -0.24 and 284%
- Examinee determines -0.76% $\Delta k/k$ for a Rod Index of 235% on Line 10c for Maximum :
- (minimum between 110 and 130% and maximum between 225 and 245%)

Comment:

OP-TM-300-403, Attachment 7.1, Step 11

- Performance Step: 15** If this is a Transient Xenon Startup, then record the interval that ECP is valid.
- Standard:** Examinee verifies Step 11 is N/A

Comment:

OP-TM-300-403, Attachment 7.1, Approval

- Performance Step: 16** **Note** that an anomaly exists between the two calculations
- Standard:** Examinee notifies the Shift Manager about the discrepancies.

Comment:

PERFORMANCE INFORMATION

Terminating Cue:

When examinee has notified the Shift Manager of an anomaly with the calculations, this JPM may be terminated.

STOP TIME: _____

TIME CRITICAL STOP TIME: _____

VERIFICATION OF COMPLETION

Job Performance Measure No.: ILT 16-01 NRC JPM SA1-2

Examinee's Name:

Date Performed:

Facility Evaluator:

Number of Attempts:

Time to Complete:

Question Documentation:

Question:

Response:

Result: SAT _____ UNSAT _____

Examiner's Signature: _____ Date: _____

INITIAL CONDITIONS:

- A sequential trip of both feedwater pumps and reactor trip 72 hours ago
- 100% power for 150 days prior to the trip
- Cycle Burnup is 300 EFPD from hourly log
- Tave = 532 °F
- Final critical boron concentration = 1469 ppm
- FINAL MIXED BORON DEPLETION CORRECTION FACTOR in the control room log is 0.95
- The Plant Process Computer is not available.
- No reactor engineering personnel are on site.

INITIATING CUE:

Perform a review and approval of an Estimated Critical Rod Position calculation. Make any corrections, if required.

TIME CRITICAL:

No

ATTACHMENT 7.1
Estimated Critical Position Calculation Data Sheet

Page 1 of 1

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

CALCULATION IS FOR AN ECP AT

DATE/TIME Today / Now

1. T_{AVE} (Assume $T_{AVE} = 532 \pm 2^\circ\text{F}$) 532 °F
2. CYCLE BURNUP 300 EFPD
3. 3a. FINAL MEASURED BORON CONCENTRATION 1469 ppmB
- 3b. BORON DEPLETION CORRECTION FACTOR 1.0
(PPC, Control Room Log, Reactor Engineering, Reactivity Datasheet)
- 3c. FINAL CORRECTED BORON CONCENTRATION (3.a) X (3.b) = 1469 ppmB
4. FUEL EXCESS REACTIVITY (FIG 2) 11.4 % $\Delta k/k$
5. 5a. INVERSE BORON WORTH (FIG 8) 140.5 ppmB/% $\Delta k/k$
- 5b. BORON REACTIVITY WORTH (3c / 5a) x (-1) = -10.46 % $\Delta k/k$
6. XENON REACTIVITY WORTH (PPC, REACTOR ENGR., FIG 13) -0.1 % $\Delta k/k$
7. SAMARIUM AND PLUTONIUM BUILDUP (FIG 15)
 - TIME SINCE LAST SHUTDOWN 72 HRS
 - REACTIVITY DUE TO BUILDUP -0.10 % $\Delta k/k$
8. INSERTED CRG 5-7 WORTH REQUIRED FOR CRITICALITY (IRW)
(4 + 5b + 6 + 7) x (-1) = -0.74 % $\Delta k/k$
9. ESTIMATED CRITICAL ROD POSITION (FIG 5A) 236 % ROD INDEX
10. CRITICAL ROD POSITION TOLERANCE BAND (FIG 5A)
 - 10a. Circle One: 0.5% $\Delta k/k$ 0.8% $\Delta k/k$
 Use 0.5% $\Delta k/k$ for Steady State conditions if xenon (6) is 0.0 to -0.5%
 Use 0.8% $\Delta k/k$ for Transient conditions if xenon (6) is more negative than -0.5% $\Delta k/k$
 - 10b. MINIMUM ROD WITHDRAWAL LIMIT
 (8 - 10a) = -1.24 % $\Delta k/k$ \Rightarrow 183 %ROD INDEX (FIG 5a)
 - 10c. MAXIMUM ROD WITHDRAWAL LIMIT
 (8 + 10a) = -0.24 % $\Delta k/k$ \Rightarrow 284 %ROD INDEX (FIG 5a)
11. If this is a transient Xenon startup, then record the interval that ECP is valid
 From: Date/Time N/A To: Date/Time N/A

CALCULATED BY: RO #1 DATE/TIME Today / Now

APPROVED BY (SRO): _____ DATE/TIME _____

ATTACHMENT 7.2
Estimated Critical Position Calculation Instructions
Page 1 of 1

NOTE: Figure numbers refer to attachments in OP-TM-300-000.

Data may also be obtained from approved references, e.g., current cycle Physics Data Manual or Reactivity Datasheet.

1. T_{AVE} : The reactor coolant temperature is assumed to be $532 \pm 2^\circ\text{F}$
2. Cycle Burnup: From FIDMS Display 1 or the Hourly Log
- 3a. Measured Boron Concentration: Obtain the latest measured boron concentration from the RCS chemistry analysis, and check the Control Room log to verify that no major boron concentration changes have been made since the analysis. If major boron concentration changes have been made since the latest sample, request a new RCS boron concentration measurement. Until the new boron concentration is available, use OP-TM-300-409, Final RCS Boron Concentration Estimate Following RCS Feed and Bleed, to estimate the current boron concentration to calculate a preliminary ECB.
- 3b. Boron Depletion Correction Factor: From PPC, Control Room Log, or Reactor Engineering.
- 3c. Final Corrected Boron Concentration: Adjust the measured boron concentration to account for boron-10 depletion by multiplying the Measured Boron Concentration by the Boron Depletion Correction Factor.
3. Fuel Excess Reactivity: From Figure 2.
- 5a. Inverse Boron Worth: From Figure 8
- 5b. Boron Reactivity Worth: Quotient of 3c and 5a.
6. Xenon Reactivity Worth: Obtain xenon worth using the PPC, FIDMS Display 22 or from program XENC# (where # is the current cycle number). Figure 13 may be used if the PPC and Reactor Engineering are unavailable, provided that power prior to shutdown was constant ($\pm 2\%\text{FP}$) for at least 40 hours.
7. Samarium and Plutonium Buildup Reactivity Worth: Record the number of hours since 0% FP and obtain Sm and Pu worth per Figure 15. If startup at any time during the cycle is within 5 days of a previous startup, contact Reactor Engineering for the appropriate reactivity worth.
8. Inserted CRG 5-7 Worth Required for Criticality: Add reactivity contributions from Lines 4 through 7.
9. Estimated Critical Rod Position: Rod position from Figure 5A corresponding to the reactivity value from Line 8.
10. Critical Rod Position Tolerance Band: As noted on the Calculation Data Sheet. Combine the reactivity value from Line 8 with the tolerance value from Line 10a and find the corresponding rod positions on Figure 5A.
11. For the purposes of this procedure, "Transient Xenon" conditions exist when the pre-critical Xe concentration is more negative than $-0.5\% \Delta k/k$. Use the Xe value from Line 6 and a plot or table of Xe behavior with time. Estimate when Xe worth will be more or less negative than the value in Line 6 by $0.5\% \Delta k/k$.

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

SA1-2 ANSWER KEY
DO NOT GIVE TO EXAMINEE

CALCULATION IS FOR AN ECP AT

DATE/TIME Today / Now

1. T_{AVE} (Assume $T_{AVE} = 532 \pm 2^\circ\text{F}$) 532 °F
2. CYCLE BURNUP 300 EFPD
3. 3a. FINAL MEASURED BORON CONCENTRATION 1469 ppmB
- 3b. BORON DEPLETION CORRECTION FACTOR 0.95
(PPC, Control Room Log, Reactor Engineering, Reactivity Datasheet)
- 3c. FINAL CORRECTED BORON CONCENTRATION (3.a) X (3.b) = 1396 ppmB
4. FUEL EXCESS REACTIVITY (FIG 2) 11.4 % $\Delta k/k$
5. 5a. INVERSE BORON WORTH (FIG 8) 140.5 ppmB/% $\Delta k/k$
- 5b. BORON REACTIVITY WORTH (3c / 5a) x (-1) = -9.94 % $\Delta k/k$
6. XENON REACTIVITY WORTH (PPC, REACTOR ENGR., FIG 13) -0.1 % $\Delta k/k$
7. SAMARIUM AND PLUTONIUM BUILDUP (FIG 15)
 - TIME SINCE LAST SHUTDOWN 72 HRS
 - REACTIVITY DUE TO BUILDUP -0.10 % $\Delta k/k$
8. INSERTED CRG 5-7 WORTH REQUIRED FOR CRITICALITY (IRW)
(4 + 5b + 6 + 7) x (-1) = -1.26 % $\Delta k/k$
9. ESTIMATED CRITICAL ROD POSITION (FIG 5A) 175 % ROD INDEX
10. CRITICAL ROD POSITION TOLERANCE BAND (FIG 5A)
 - 10a. Circle One: 0.5% $\Delta k/k$ 0.8% $\Delta k/k$
 Use 0.5% $\Delta k/k$ for Steady State conditions if xenon (6) is 0.0 to -0.5%
 Use 0.8% $\Delta k/k$ for Transient conditions if xenon (6) is more negative than -0.5% $\Delta k/k$
 - 10b. MINIMUM ROD WITHDRAWAL LIMIT
 (8 - 10a) = -1.76 % $\Delta k/k$ \Rightarrow 118 %ROD INDEX (FIG 5a)
 - 10c. MAXIMUM ROD WITHDRAWAL LIMIT
 (8 + 10a) = -0.76 % $\Delta k/k$ \Rightarrow 235 %ROD INDEX (FIG 5a)
11. If this is a transient Xenon startup, then record the interval that ECP is valid
 From: Date/Time N/A To: Date/Time N/A

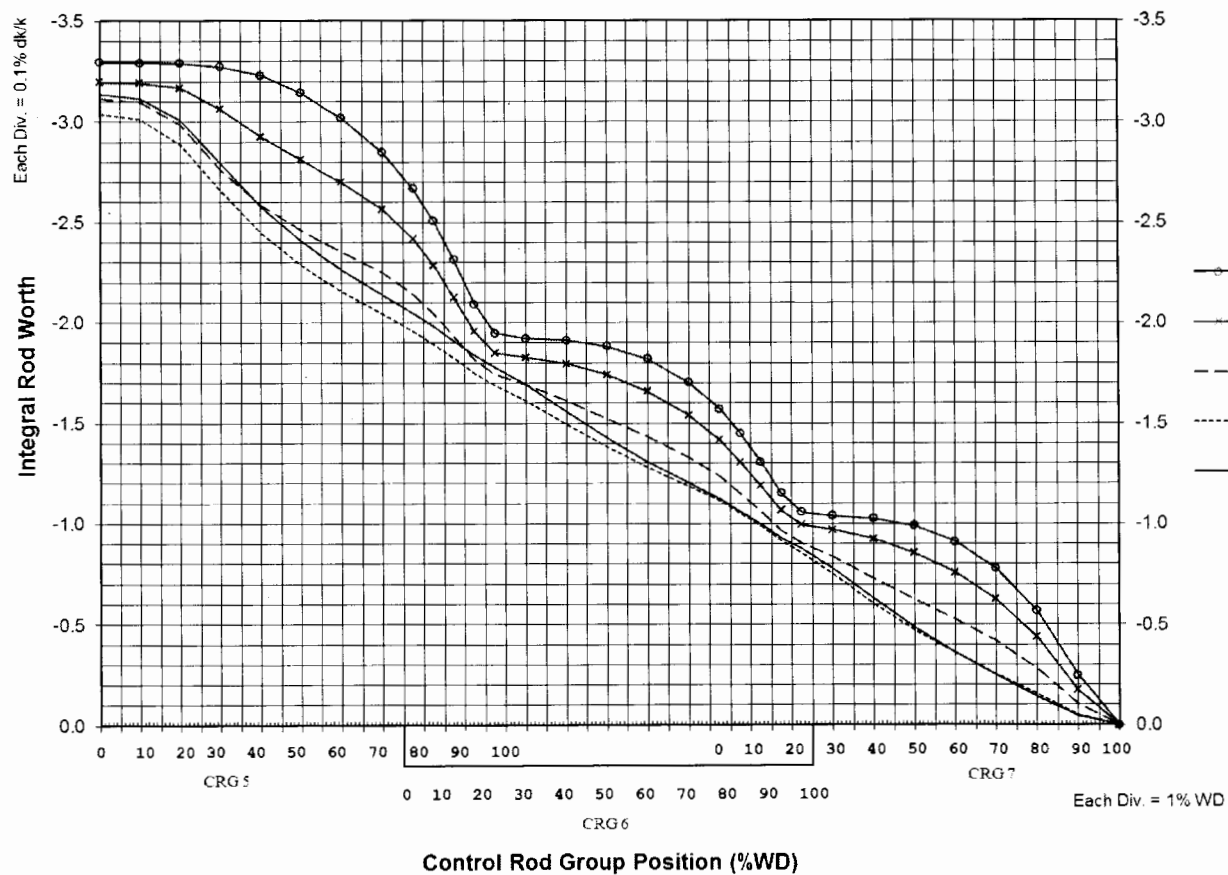
CALCULATED BY: RO #1 DATE/TIME Today / Now

APPROVED BY (SRO): _____ DATE/TIME _____

ATTACHMENT 7.13
Figure 5A
Cycle 21 Integral Rod Worth – HZP, No Xenon
Page 1 of 1

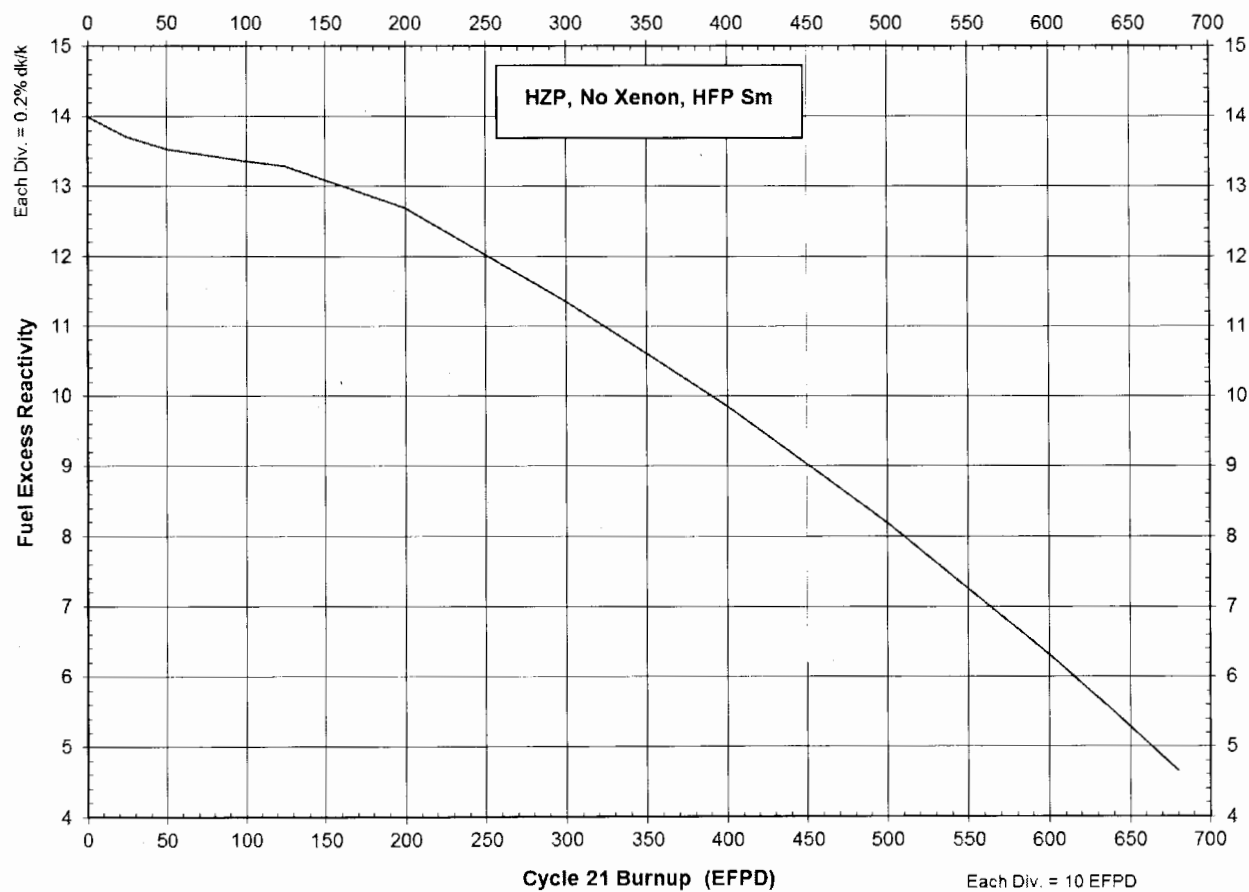
NOTE: Linearly interpolate between EFPD curves.

For use with OP-TM-300-402, OP-TM-300-403, and OP-TM-300-404.



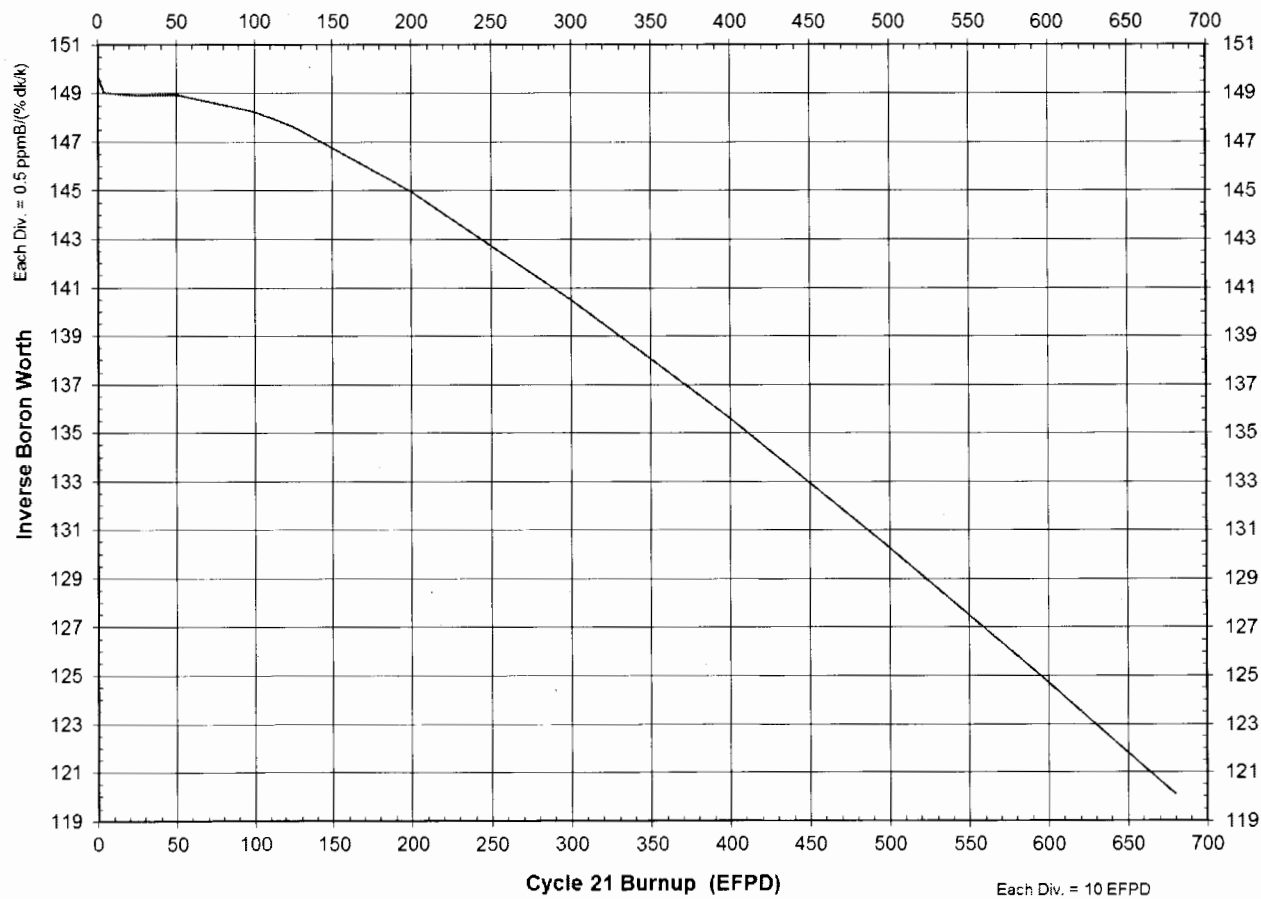
ATTACHMENT 7.10
Figure 2
Cycle 21 Fuel Excess Reactivity (HZP)
Page 1 of 1

NOTE: For use with OP-TM-300-402 and OP-TM-300-403.



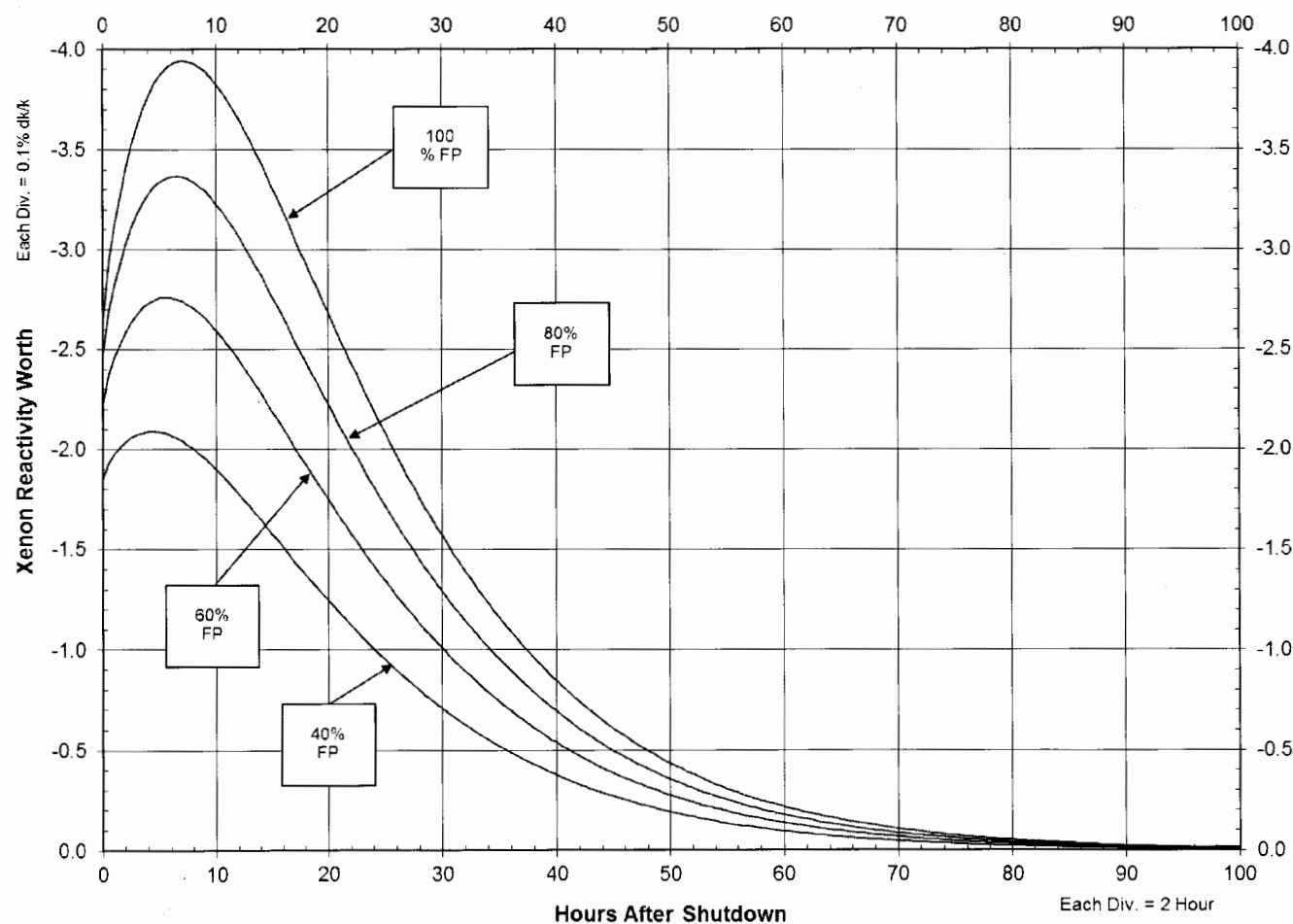
ATTACHMENT 7.19
Figure 8
Cycle 21 HZP Inverse Boron Worth
Page 1 of 1

NOTE: For use with OP-TM-300-205, OP-TM-300-402, and OP-TM-300-403.



ATTACHMENT 7.25
Figure 13
Cycle 21 Transient Xenon Reactivity Worth
Page 1 of 1

NOTE: For use with OP-TM-300-402, OP-TM-300-403, and OP-TM-300-411.



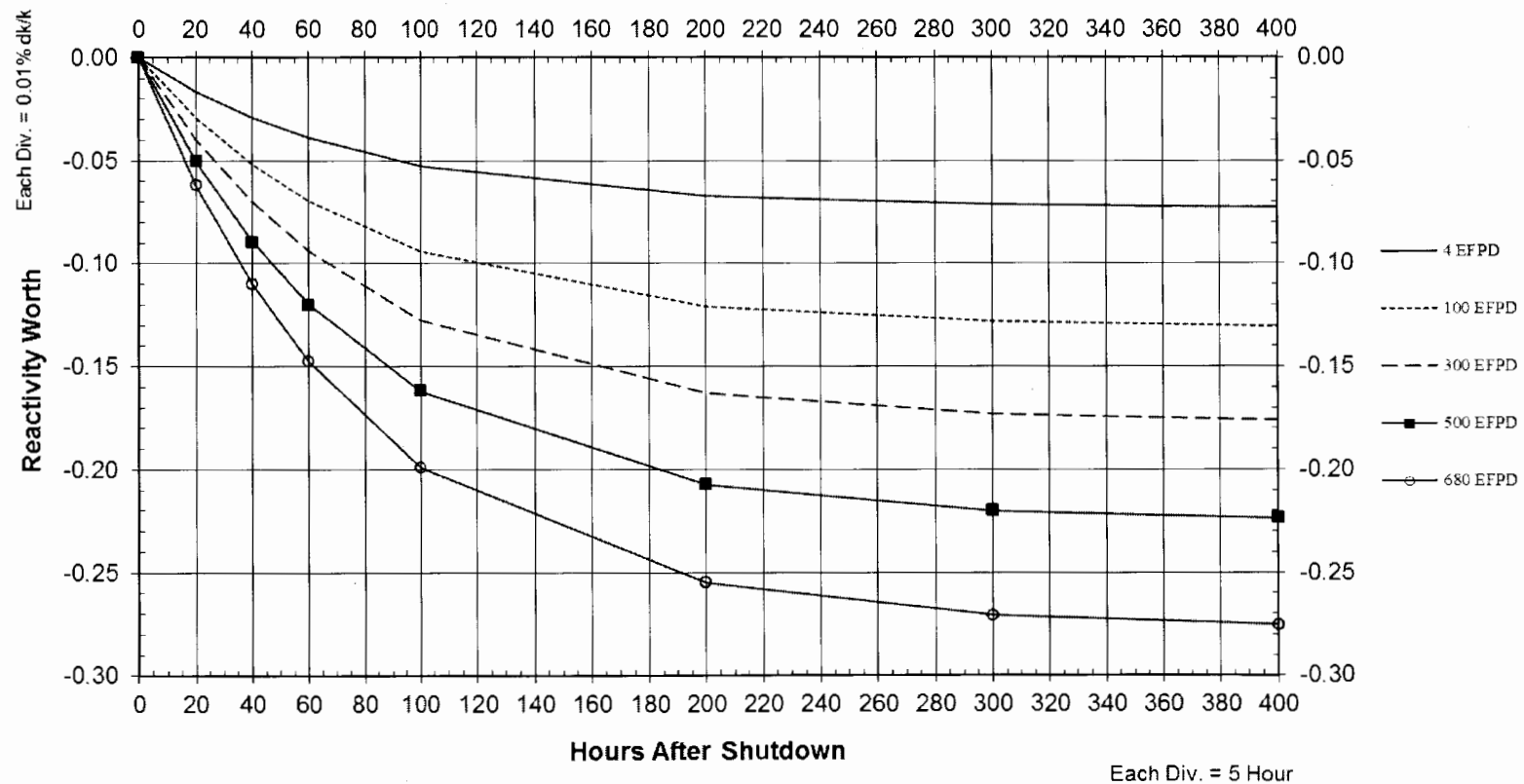
Cycle Physics Manual Table A-5 and Program XENCXX

ATTACHMENT 7.27
Figure 15
Cycle 21 Samarium and Plutonium Buildup Following Reactor Shutdown
Page 1 of 1

NOTE: Linearly interpolate between EFPD.

If startup at any time during the cycle is within 5 days of a previous startup, contact Reactor Engineering for the appropriate reactivity worth.

For use with OP-TM-300-205, OP-TM-300-206, OP-TM-300-402, and OP-TM-300-403.



ESTIMATED CRITICAL ROD POSITION

1.0 PURPOSE

- 1.1 This procedure is used to calculate the Estimated Critical Position (ECP) and associated positions in which the reactor is expected to go critical. This calculation will typically be performed after the final RCS boron concentration has been established.

2.0 MATERIAL AND SPECIAL EQUIPMENT

None

3.0 PRECAUTIONS, LIMITATIONS, AND PREREQUISITES

3.1 Precautions

None

3.2 Limitations

- 3.2.1 For transient Xenon conditions (Xe worth more negative than $-0.5\% \Delta k/k$), the ECP is only valid while Xe worth is within $0.5\% \Delta k/k$ of the value used in the calculation.

3.3 Prerequisites

- 3.3.1 **VERIFY** all data sources (OP-TM-300-000 attachments, Areva Physics Data Manual, Reactivity Datasheet, etc.) are for the current cycle.

4.0 MAIN BODY

4.1 **PERFORM** calculations per Attachment 7.1 or DTSQA-approved software. _____

4.2 **SEND** a copy of the completed calculation data sheet to Reactor Engineering. _____

5.0 RETURN TO NORMAL

None

6.0 REFERENCES

6.1 Developmental References

6.1.1 OP-TM-300-000, Reactivity and Power Distribution Calculations

6.1.2 BWFC Operating Guidelines 64-1234740-00 Reactivity Balance

6.1.3 1103-15B, Estimated Critical Conditions (superseded)

6.2 Implementing References

6.2.1 Physics Data Manual (current cycle)

7.0 ATTACHMENTS

7.1 Estimated Critical Position Calculation Data Sheet

7.2 Estimated Critical Position Calculation Instructions

ATTACHMENT 7.1
Estimated Critical Position Calculation Data Sheet
Page 1 of 1

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

CALCULATION IS FOR AN ECP AT

DATE/TIME _____

1. T_{AVE} (Assume $T_{AVE} = 532 \pm 2^\circ\text{F}$) _____ 532°F
2. CYCLE BURNUP _____ EFPD
3. 3a. FINAL MEASURED BORON CONCENTRATION _____ ppmB
- 3b. BORON DEPLETION CORRECTION FACTOR _____
(PPC, Control Room Log, Reactor Engineering, Reactivity Datasheet)
- 3c. FINAL CORRECTED BORON CONCENTRATION (3.a) X (3.b) = _____ ppmB
4. FUEL EXCESS REACTIVITY (FIG 2) _____ % $\Delta k/k$
5. 5a. INVERSE BORON WORTH (FIG 8) _____ ppmB/% $\Delta k/k$
- 5b. BORON REACTIVITY WORTH (3c / 5a) x (-1) = _____ % $\Delta k/k$
6. XENON REACTIVITY WORTH (PPC, REACTOR ENGR., FIG 13) _____ % $\Delta k/k$
7. SAMARIUM AND PLUTONIUM BUILDUP (FIG 15)
 - TIME SINCE LAST SHUTDOWN _____ HRS
 - REACTIVITY DUE TO BUILDUP _____ % $\Delta k/k$
8. INSERTED CRG 5-7 WORTH REQUIRED FOR CRITICALITY (IRW)
(4 + 5b + 6 + 7) x (-1) = _____ % $\Delta k/k$
9. ESTIMATED CRITICAL ROD POSITION (FIG 5A) _____ % ROD INDEX
10. CRITICAL ROD POSITION TOLERANCE BAND (FIG 5A)
 - 10a. Circle One: 0.5% $\Delta k/k$ 0.8% $\Delta k/k$
Use 0.5% $\Delta k/k$ for Steady State conditions if xenon (6) is 0.0 to -0.5%
Use 0.8% $\Delta k/k$ for Transient conditions if xenon (6) is more negative than -0.5% $\Delta k/k$
 - 10b. MINIMUM ROD WITHDRAWAL LIMIT
(8 - 10a) = _____ % $\Delta k/k$ \Rightarrow _____ % ROD INDEX (FIG 5a)
 - 10c. MAXIMUM ROD WITHDRAWAL LIMIT
(8 + 10a) = _____ % $\Delta k/k$ \Rightarrow _____ % ROD INDEX (FIG 5a)
11. If this is a transient Xenon startup, then record the interval that ECP is valid
From: Date/Time _____ To: Date/Time _____

CALCULATED BY: _____ DATE/TIME _____

APPROVED BY (SRO): _____ DATE/TIME _____

ATTACHMENT 7.2
Estimated Critical Position Calculation Instructions
Page 1 of 1

NOTE: Figure numbers refer to attachments in OP-TM-300-000.

Data may also be obtained from approved references, e.g., current cycle Physics Data Manual or Reactivity Datasheet.

1. T_{AVE} : The reactor coolant temperature is assumed to be $532 \pm 2^{\circ}\text{F}$
2. Cycle Burnup: From FIDMS Display 1 or the Hourly Log
- 3a. Measured Boron Concentration: Obtain the latest measured boron concentration from the RCS chemistry analysis, and check the Control Room log to verify that no major boron concentration changes have been made since the analysis. If major boron concentration changes have been made since the latest sample, request a new RCS boron concentration measurement. Until the new boron concentration is available, use OP-TM-300-409, Final RCS Boron Concentration Estimate Following RCS Feed and Bleed, to estimate the current boron concentration to calculate a preliminary ECB.
- 3b. Boron Depletion Correction Factor: From PPC, Control Room Log, or Reactor Engineering.
- 3c. Final Corrected Boron Concentration: Adjust the measured boron concentration to account for boron-10 depletion by multiplying the Measured Boron Concentration by the Boron Depletion Correction Factor.
4. Fuel Excess Reactivity: From Figure 2.
- 5a. Inverse Boron Worth: From Figure 8.
- 5b. Boron Reactivity Worth: Quotient of 3c and 5a.
6. Xenon Reactivity Worth: Obtain xenon worth using the PPC, FIDMS Display 22 or from program XENC# (where # is the current cycle number). Figure 13 may be used if the PPC and Reactor Engineering are unavailable, provided that power prior to shutdown was constant ($\pm 2\%\text{FP}$) for at least 40 hours.
7. Samarium and Plutonium Buildup Reactivity Worth: Record the number of hours since 0% FP and obtain Sm and Pu worth per Figure 15. If startup at any time during the cycle is within 5 days of a previous startup, contact Reactor Engineering for the appropriate reactivity worth.
8. Inserted CRG 5-7 Worth Required for Criticality: Add reactivity contributions from Lines 4 through 7.
9. Estimated Critical Rod Position: Rod position from Figure 5A corresponding to the reactivity value from Line 8.
10. Critical Rod Position Tolerance Band: As noted on the Calculation Data Sheet. Combine the reactivity value from Line 8 with the tolerance value from Line 10a and find the corresponding rod positions on Figure 5A.
11. For the purposes of this procedure, "Transient Xenon" conditions exist when the pre-critical Xe concentration is more negative than $-0.5\% \Delta k/k$. Use the Xe value from Line 6 and a plot or table of Xe behavior with time. Estimate when Xe worth will be more or less negative than the value in Line 6 by $0.5\% \Delta k/k$.

Facility: THREE MILE ISLAND UNIT 1

Task No.:

Task Title: Use Station Drawing to Predict
Impact of Component Failure and
Evaluate Technical Specification
ImplicationsJPM No.: ILT 16-01 NRC JPM
SA2

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

Bank JPM: TMI08 NRC JPM A2
SRO

Examinee:

NRC Examiner:

Facility Evaluator:

Date:

Method of testing:

Simulated Performance:

Classroom

X

Simulator

Actual Performance:

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 CRS

Plant is at 100% power

Electricians have reported a broken cam connecting rod on G11-02 EG-Y-1B output breaker.

Electricians have provided a copy of 208-164.

Only contacts associated with 52 MOC(2) are affected (Grid A-7)

Task Standard:

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

Required Materials:

Copies of site 208 and 209 electrical diagram books.

General References:

208-314 1S 480 Volt Swgr, 208-316 1T 480 Volt Swgr., 208-169 Bus 1E UV and Potential Indicating Circuits, 208-300 Bus 1T UV Lock-out Relays, 208-318 Bus 1S UV Lock-out Relays
Tech Spec 3.7.2.c and 3.7.2.f

Handout:

- 208-164, G11-02

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

Time Critical Task: No

Validation Time: 20 Minutes

SIMULATOR SETUP

N/A

PERFORMANCE INFORMATION

(Denote Critical Steps with a check mark)

START TIME: _____

EXAMINER CUE: Direct the examinee to determine the impact of operations based on the failure. Hand the examinee the 208-164 drawing.

EXAMINER NOTE: A 208 and 209 will be used for the examinee to find the drawings.

Performance Step: 1 Obtains 208-164 G11-02 Elementary Electrical Diagram
Standard: Drawing obtained.
Comment:

Performance Step: 2 52 MOC(2) located on drawing at grid A-7 (52 MOC(2))
Standard: Contacts located.
Comment:

Performance Step: 3 Refers to sheet 314 or 316 to determine contact effect.
Standard: 208-314 or 208-316 referred to

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

Comment:

PERFORMANCE INFORMATION

- ✓ **Performance Step: 4** **Determines from 208-314 or 316 that 52/G11-02 contact remaining open will prevent 27/86 actuation for bus 1S or 1T, dependent on sheet 314 or 316 respectively.**
- Standard:** Examinee verbalizes 27/86 for bus 1S or 1T will not work for the condition of diesel breaker closed with ESAS actuated.
- Comment:**
-
- ✓ **Performance Step: 5** **Determines from 208-314 or 316 (which ever was not evaluated in previous step) that 52/G11-02 contact remaining open will prevent 27/86 actuation for bus 1S or 1T, dependent on sheet 314 or 316 respectively.**
- Standard:** Examinee verbalizes 27/86 for bus 1S or 1T will not work for the condition of diesel breaker closed with ESAS actuated.
- Comment:**
-
- ✓ **Performance Step: 6** **Determines 3.7.2.f and 3.7.2.c of Technical Specifications apply due to the failed load shedding ability and declares a 7 day timeclock to repair.**
- Standard:** Declares a 7 day timeclock IAW 3.7.2.c due to the failed load shedding ability.
- Comment:**
-
- Terminating Cue:** **When Tech Specs have been addressed this JPM may be terminated.**

STOP TIME: _____

TIME CRITICAL STOP TIME: N/A _____

VERIFICATION OF COMPLETION

Job Performance Measure No.: ILT 16-01 NRC JPM SA2

Examinee's Name:

Date Performed:

Facility Evaluator:

Number of Attempts:

Time to Complete:

Question Documentation:

Question:

Response:

Result: SAT _____ UNSAT _____

Examiner's Signature: _____ Date: _____

INITIAL CONDITIONS:

You are the CRS

Plant is at 100% power

Electricians have reported a broken cam connecting rod on G11-02 EG-Y-1B output breaker.

Electricians have provided a copy of 208-164.

Only contacts associated with 52 MOC(2) are affected: (Grid A-7)

INITIATING CUE:

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

3.7 UNIT ELECTRIC POWER SYSTEM

Applicability

Applies to the availability of electrical power for operation of the unit auxiliaries.

Objective

To define those conditions of electrical power availability necessary to ensure:

- a. Safe unit operation
- b. Continuous availability of engineered safeguards

Specification

3.7.1 The reactor shall not be made critical unless all of the following requirements are satisfied:

- a. All engineered safeguards buses, engineered safeguards switchgear, and engineered safeguards load shedding systems are operable.
- b. One 7200 volt bus is energized.
- c. Two 230 kV lines are in service.
- d. One 230 kV bus is in service.
- e. Engineered safeguards diesel generators are operable and at least 25,000 gallons of fuel oil are available in the storage tank.
- f. Station batteries are charged and in service. Two battery chargers per battery are in service.

3.7.2 The reactor shall not remain critical unless all of the following requirements are satisfied:

- a. Offsite Sources:
 - (i.) Two 230 kV lines are in service to provide auxiliary power to Unit 1, except as specified in Specification 3.7.2e below.
 - (ii.) The voltage on the 230 kV grid is sufficient to power the safety related ES loads, except as specified in Specification 3.7.2.h below.
- b. Both 230/4.16 kV unit auxiliary transformers shall be in operation except that within a period not to exceed eight hours in duration from and after the time one Unit 1 auxiliary transformer is made or found inoperable, two diesel generators shall be operable, and one of the operable diesel generator will be started and run continuously until both unit auxiliary transformers are in operation. This mode of operation may continue for a period not exceeding 30 days.

- 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.

In the event two diesel generators are inoperable, the unit shall be placed in HOT SHUTDOWN in 12 hours. If one diesel is not operable within an additional 24 hour period the plant shall be placed in COLD SHUTDOWN within an additional 24 hours thereafter.

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.

- d. If one Unit Auxiliary Transformer is inoperable and a diesel generator becomes inoperable, the unit will be placed in HOT SHUTDOWN within 12 hours. If one of the above sources of power is not made operable within an additional 24 hours the unit shall be placed in COLD SHUTDOWN within an additional 24 hours thereafter.
- e. If Unit 1 is separated from the system while carrying its own auxiliaries, or if only one 230 kV line is in service, continued reactor operation is permissible provided one emergency diesel generator shall be started and run continuously until two transmission lines are restored.
- f. The engineered safeguards electrical bus, switchgear, load shedding, and automatic diesel start systems shall be operable except as provided in Specification 3.7.2c above and as required for testing.
- g. One station battery may be removed from service for not more than eight hours.
- h. If it is determined that a trip of the Unit 1 generator, in conjunction with LOCA loading, will result in a loss of offsite power to Engineered Safeguards buses, the plant shall begin a power reduction within 24 hours and be in HOT SHUTDOWN in an additional 6 hours, except as provided in Specification 3.7.2.e above.

Bases

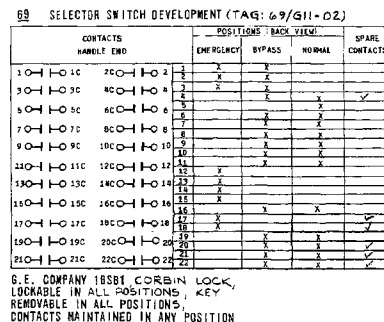
The Unit Electric Power System is designed to provide a reliable source of power for balance of plant auxiliaries and a continuously available power supply for the engineered safeguards equipment. The availability of the various components of the Unit Electric Power System dictates the operating mode for the station.

Verification of emergency diesel generator and station battery operability normally consists of verifying that the surveillance is current, and that other available information does not indicate inoperability.

It is recognized that while testing the redundant emergency diesel generator (EDG) in accordance with surveillance requirement 4.6.1.a, the EDG will not respond to an automatic initiation signal. In this situation, the 12 hour time clock will not be entered per the provisions of section 3.7.2.f. due to the low probability of an event occurring while the EDG is being tested.

Trip of TMI-1 could result in a change in the 230 kV system (Grid) voltage at the TMI substation. The predicted voltage following a loss of the unit is referred to as the Post-Contingency voltage for trip of TMI-1. The transmission system operator monitors 230 kV system conditions for Post Contingency voltages. If the Post-Contingency voltage is less than the value required to support safety related ES loads, the transmission system operator will notify the TMI Unit 1 control room. The required voltage setpoint values for dual or single auxiliary transformer operation are specified by degraded grid calculations. The appropriate setpoint for the current plant condition(s) is provided to the Grid operator. The required voltage setpoint is based on the Large Break LOCA loading which results in the greatest ES loads.

Upon receipt of a valid Post-Contingency voltage Alarm for Loss of TMI-1, TMI will implement the Low System (Grid) Voltage Procedure. An allowed action time of 24 hours provides the transmission system operator time to take actions to reconfigure the 230 kV system for improved voltage support. The time allowed has been evaluated for the level of risk associated with the increased reliance on use of the onsite sources.



ELECTRICAL ELEMENTARY DIAGRAMS	CP. DFN. JCG
480V. SWITCHGEAR (E.S.) (1S-1R)	ENG. <i>H. F. Saylor</i> 12-12-70

<div style="text-align: center;"> Exelon. Nuclear </div>				
13	REVISED TO INCORPORATE ECR 16-00060 REV.0			
	RJW	YJ	JDL	2/2/16
REV	DRAFT	CHECK	APPROVED	DATE
REVISION				

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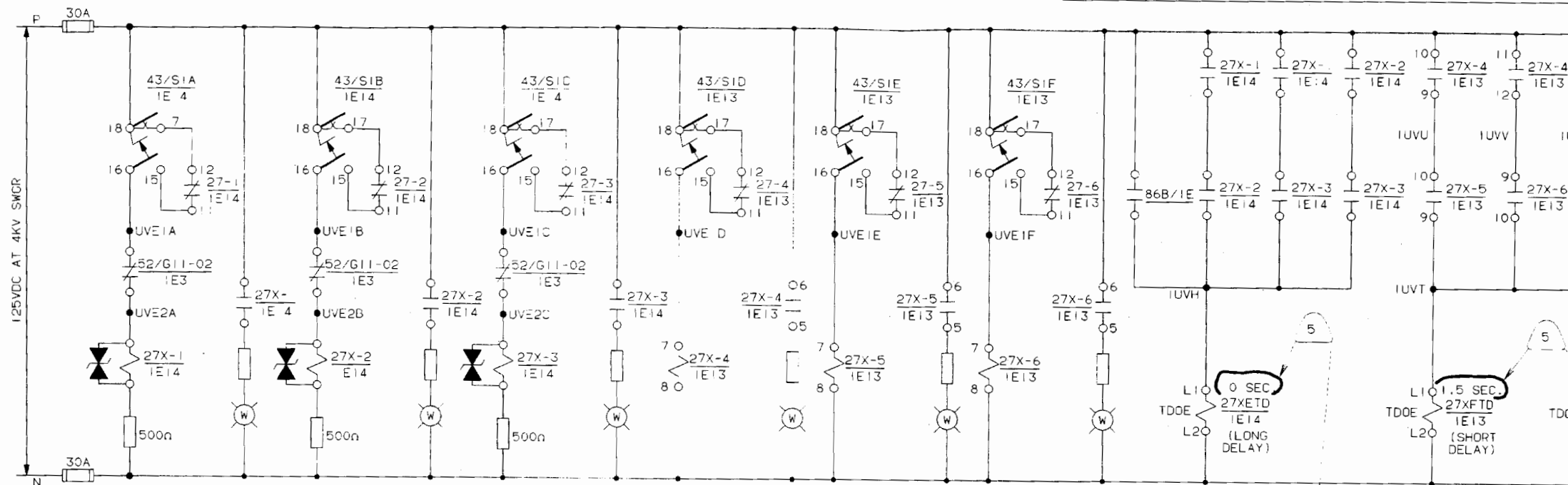
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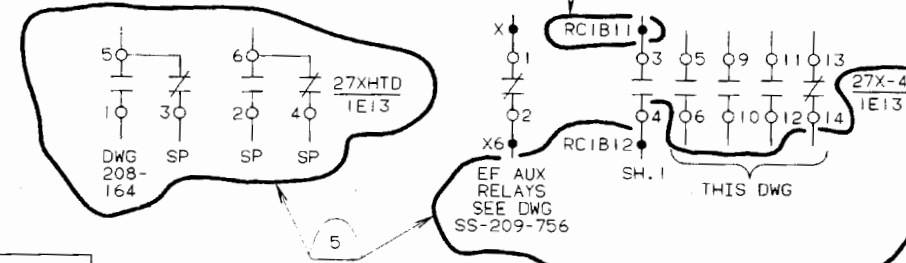
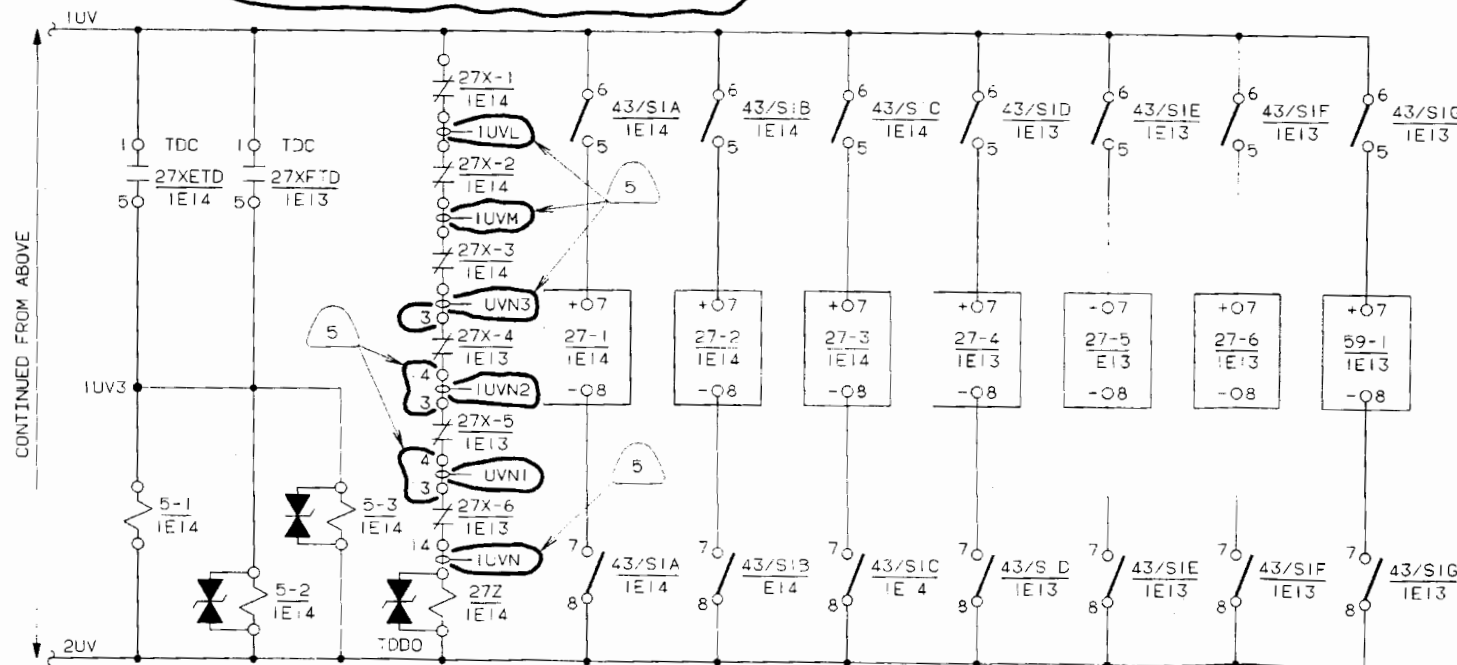
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NOTES:

1. FOR GENERAL NOTES AND LEGEND, SEE SHEET 1.
2. U/V RELAYS 27-1, 2, 3 AND 27-4, 5, 6 CONTACTS (TERMINALS 1 & 12) ARE SHOWN FOR BUS VOLTAGES BELOW RESPECTIVE DROPOUT SETTINGS AND WITH NORMAL CONTROL POWER VOLTAGE.
3. ALL RELAY CONTACTS ARE SHOWN ON 208-169 SHTS & 2 EXCEPT AS NOTED ON CONTACT DEVELOPMENTS.



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THIS IS A COMPUTER GENERATED DWG. DO NOT REVISE IT MANUALLY

NUCLEAR SAFETY RELAT

S.G. MILLER 09/18/96		GPU NUCLEAR / GAI	
DRAWN	DATE	ELECTRICAL ELEMENT,	
30/01/97	2/3/97	4160V SWITCHGEAR	
CHECKED	DATE	E.S. BUS 1E UNDERVOLTAGE & POTEN	
DESIGN LEADER	DATE		
ENGINEER	DATE		
MANAGER APPROVAL	DATE		
		TMI UNIT 1	DWG. NO. 208-169
		SCALE: NONE	

SHEET 001 - LEGEND
 27/86A & B - G E CO. 12 HEA 63G - SHOWN RESET.
 (REF GEK-1277).
 27/86AX & BX - G.E. CO. HGA33B - 0.25 SEC TDOD

Exelon

Nuclear

6

REVISED TO INCORPORATE
ECR 14-00480, REV. 0

TVG	RJW	MC	7-6-15
REV	DRAFT	CHECK	APPROVED
			DATE
REVISION			

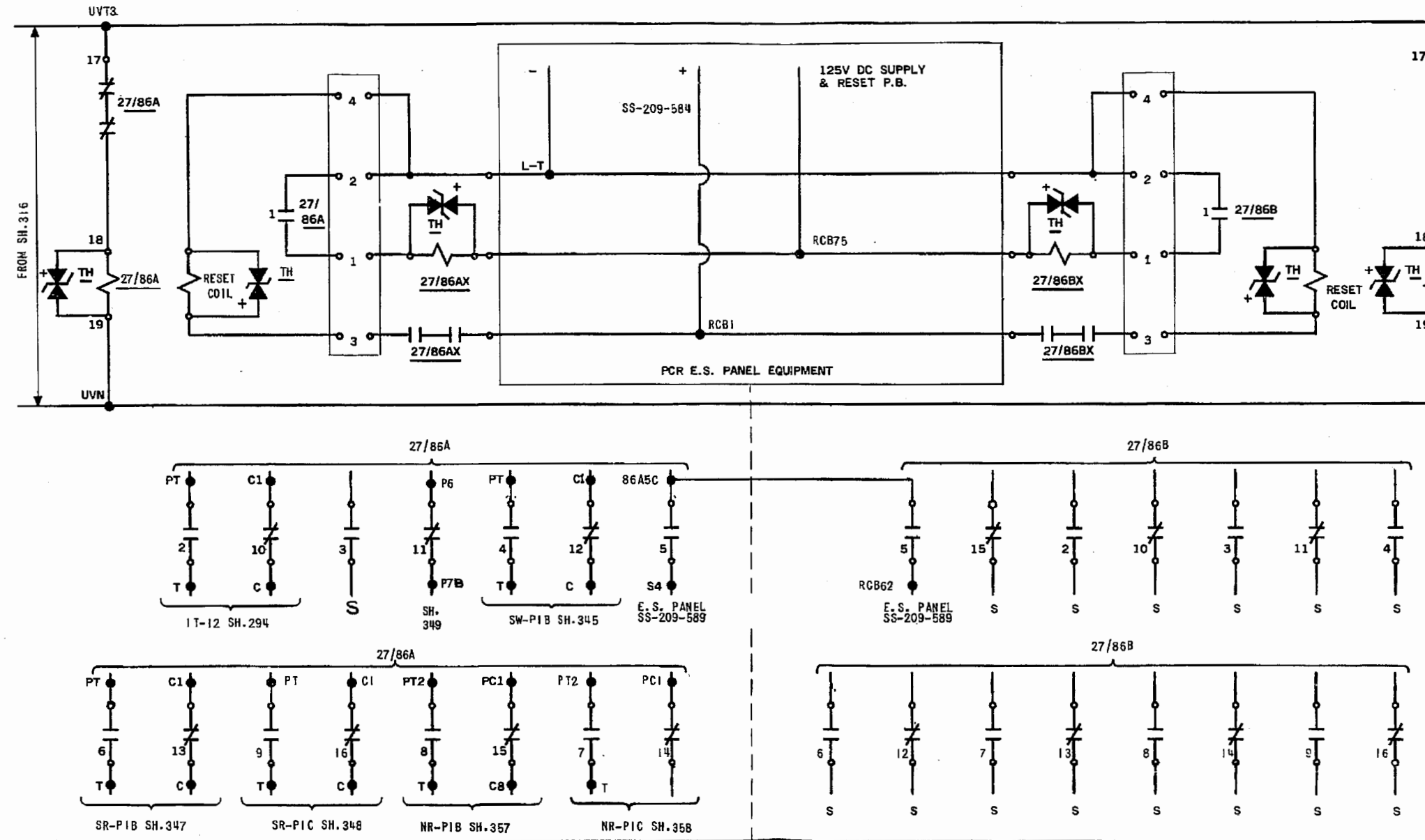
METROPOLITAN EDISON COMPANY
 THREE MILE ISLAND NUCLEAR STATION UNIT #1
 ELECTRICAL ELEMENTARY DIAGRAMS
 480V. SWITCHGEAR (E.S.) (IT-IR)

MADE RP	GILBERT ASSOCIATES
CHK'D. FB	ENGINEERS AND CONSULTANTS
SQ. CF. GC	READING, PENNA.
CF. DFN. JWH	4192 SS-208-3
ENG. 8-5-70	WORK ORDER
REV. CH. APP. DATE	SIZE
1-MP-FB 11-30-70	9-22-71

BUS IT UV LOCK-OUT RELAYS

CAD FILE: 208300_R6
 THIS IS A COMPUTER GENERATED
 DO NOT REVISE IT MANUALLY.

ENGR.
DATE
RELEASED FOR
BIDDING PURPOSES ONLY
CONSTRUCTION



SHEET 001 - LEGEND
27/86A & B, - G.E. CO. 12HEA63G - SHOWN RESET

27/86AX & BX - G.E. CO. HGA33B - 0.25 SEC TDOD

Exelon
Nuclear

6	REVISED TO INCORPORATE ECR 14-00480, REV. 0			
TVG	RW	SLC	7-6-15	
REV	DRAFT	CHECK	APPROVED	DATE
REVISION				

METROPOLITAN EDISON COMPANY
THREE MILE ISLAND NUCLEAR STATION UNIT #1

ELECTRICAL ELEMENTARY DIAGRAMS

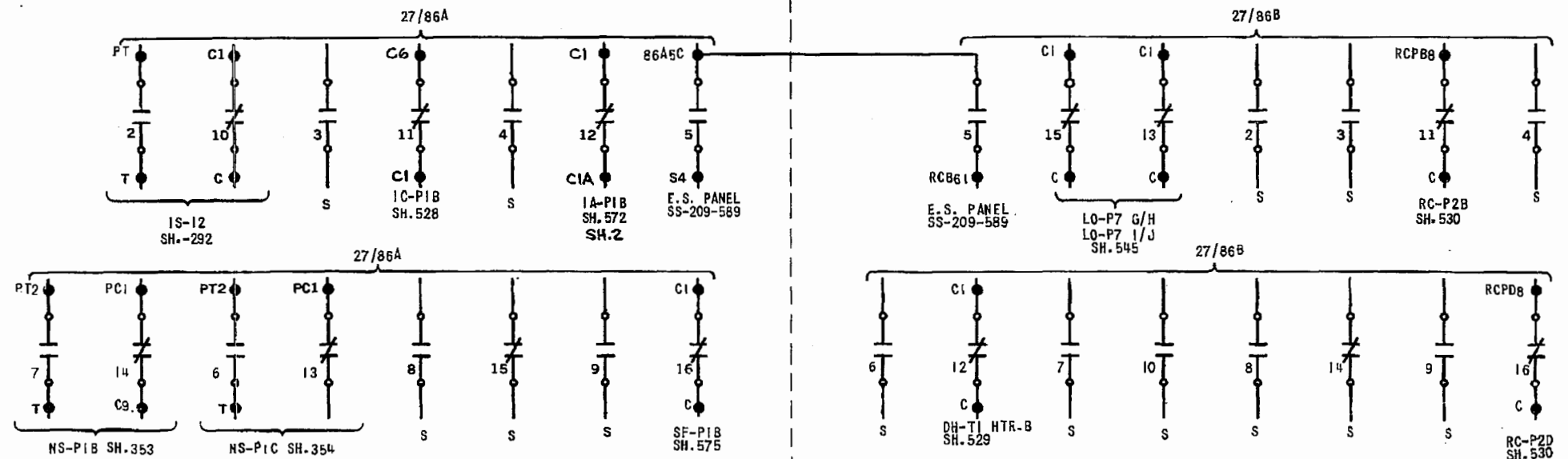
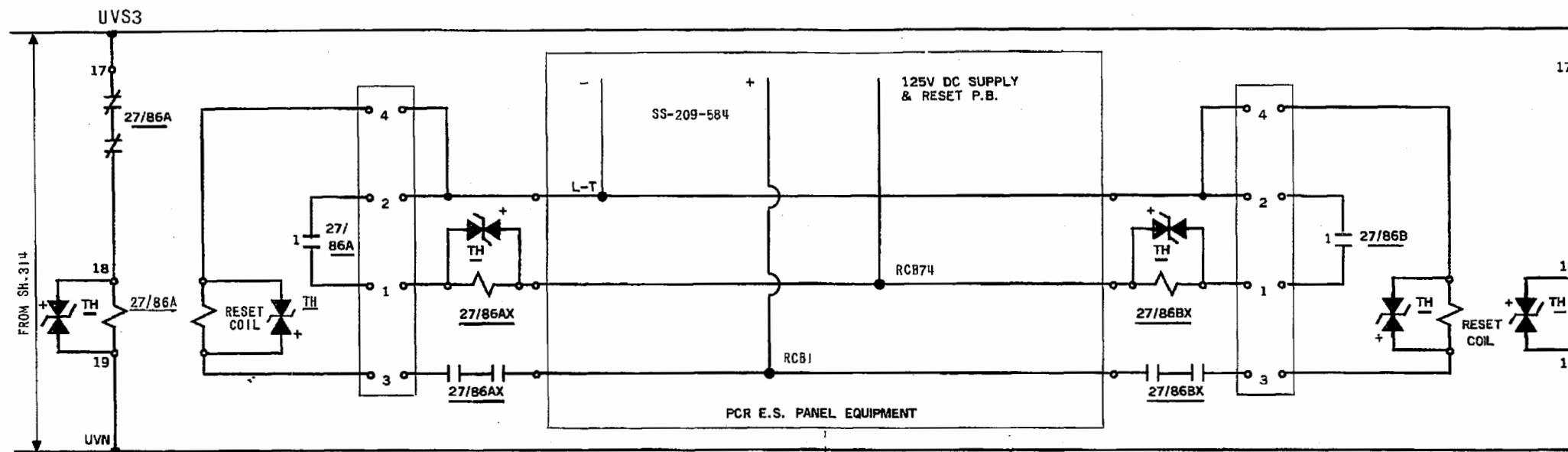
480V. SWITCHGEAR (E.S.) (IS-IR)

MADE	RP	GILBERT ASSOCIATES ENGINEERS AND CON READING, PENN	
CHK'D.	FB		
SQ. CF.	GC	4192	SS-208-
CP. DFN.	JWH	WORK ORDER	SIZE DRA
ENG. % F. S. 100%	8-7-70	2MP-FB. % F. S. 3-16-71	3-KG
REV. CH. APP. DATE	1-MP-FB. 10-2-71		

BUS IS UV LOCKOUT RELAYS

CAD FILE: 208318_R6
THIS IS A COMPUTER GENERATED
DO NOT REVISE IT MANUALLY.

CONSTRUCTION BIDDING PURPOSES ONLY	ENGR.
RELEASED FOR	
DATE	



Facility: Three Mile Island Task No.: ADM08016
Task Title: REVIEW RB ENTRY SURVEY LOG JPM No.: ILT 16-01 NRC JPM
SA3
K/A Reference: 2.3.13 (3.8) Bank JPM: 2011 CERT SRO A3

Examinee: NRC Examiner:

Facility Evaluator: Date:

Method of testing:

Simulated Performance: _____ Actual Performance: X
Classroom X Simulator _____ Plant _____

Task Standard: Faults identified, survey not approved.

Required Materials:

- RP-TM-460-1007 Rev 8, Access to TMI-1 Reactor Building
- A current copy of a Radiation Work Permit for the Reactor Building that does NOT include respiratory protection requirements
- Attachment#1 of RP-TM-460-1007 Rev 8, filled out per the setup on the next page.

General References:

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

Handouts: RP-TM-460-1007 Access to TMI-1 Reactor Building, including a completed Attachment#1 of RP-TM-460-1007 and RWP #00305 Containment Work at Power.

Validation Time: 10 minutes.

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 6 months.
- Neither the Kidney Filter System nor RB Purge System has been operated.

Initiating Cue: You are the Shift Manager on duty. Review a RB Entry Survey Log IAW RP-TM-460-1007, Access to TMI-1 Reactor Building, for a routine Reactor Building entry that is scheduled within the next 2 Hours. Verify the lab results are within allowable range to allow RB entry using RWP # 00305.

Time Critical Task: N/A

Validation Time: 15 Minutes

SIMULATOR SETUP**N/A**Attachment 1
Reactor Building Entry Survey Log
Setup

RM-A- Sample Lab Results

			Air Sample Log#
Particulate:	3E-8 $\mu\text{Ci/cc}$	0.5 DAC Fraction	A161012-0001
Iodine:	0.7E-8 $\mu\text{Ci/cc}$	0.28 DAC Fraction	A161012-0001
Gas:	2.31E-5 $\mu\text{Ci/cc}$	0.62 DAC Fraction	A161012-0002
Tritium (H3):	7.51E-6 $\mu\text{Ci/cc}$	0.38 DAC Fraction	A161012-0003
Oxygen (O2)	18.9	% on Gas Partitioner	
Explosive Gas	<0.05	% on Gas Partitioner	
Carbon Monoxide	60	(ppm)	

(Denote Critical Steps with a check)

Evaluator Cue: Provide a completed Attachment#1 of RP-TM-460-1007 and a copy of same procedure and RWP#00305 Containment Work at Power

√ **Performance Step: 1** Examinee reviews RM-A-2 sample results for Particulate.

Standard: Examinee verifies Particulate is **NOT** below 30% DAC as determined by RM-A-2 reading and identifies that respiratory protection is required for RB entry per section 3.2.

Comment: **If Examinee calls Rad Con to verify RWP does NOT include any respiratory protection, confirm that it does not require respiratory protection.**
If examinee wants to stop review, inform him/her to review all data on the Survey Log.

Performance Step: 2 Examinee reviews RM-A-2 sample results for Iodine.

Standard: Examinee verifies Iodine is below 30% DAC as determined by RM-A-2 reading.

Comment:

Performance Step: 3 Examinee reviews RM-A-2 sample results for Gas.

Standard: Examinee verifies Gas is below 1 DAC as determined by RM-A-2 reading.

Comment:

Performance Step: 4 Examinee reviews RM-A-2 sample results for Tritium.

Standard: Examinee verifies Tritium is below 1 DAC as determined by RM-A-2 reading.

Comment:

Performance Step: 5 Examinee reviews RM-A-2 sample results for Explosive Gas.

Standard: Examinee verifies Explosive Gas is below 0.4% as determined by RM-A-2 reading.

Comment:

-
- √ **Performance Step: 6** Examinee reviews RM-A-2 sample results for Oxygen.
- Standard:** Examinee verifies Oxygen is below 19.5% as determined by RM-A-2 reading and notifies Occupational Safety and the Control Room of the result.
- Comment:**
- √ **Performance Step: 7** Examinee may sign the RB Survey Log but
- Standard:** Examinee does **NOT** approve RB entry due to:
- Respiratory protection is required per RP-TM-460-1007, but not specified on the RWP.
- Comment:**
- Terminating Cue:** When examinee has completed the paperwork and hand it in the JPM is terminated.

Job Performance Measure No.: ILT 16-01 NRC JPM SA3

Examinee's Name:

Date Performed:

Facility Evaluator:

Number of Attempts:

Time to Complete:

Question Documentation:

Question:

Response:

Result: SAT _____ UNSAT _____

Examiner's Signature: _____ Date: _____

INITIAL CONDITIONS:

- The plant has been steady at full power for 6 months.
- Neither the Kidney Filter System nor RB Purge System has been operated.

INITIATING CUE:

You are the Shift Manager on duty. Review a RB Entry Survey Log IAW RP-TM-460-1007, Access to TMI-1 Reactor Building, for a routine Reactor Building entry that is scheduled within the next 2 Hours.

Verify the lab results are within allowable range to allow RB entry using RWP # 00305.

Reactor Building Entry Survey Log

TECHNICIAN: RP Tech / Rp Tech
Print/Sign

PARTICULATE	<u>3.0E-8</u>	μCi/cc	<u>0.5</u>	DAC FRACTION	<u>A161012-0001</u>
IODINE	<u>0.7E-8</u>	μCi/cc	<u>0.28</u>	DAC FRACTION	<u>A161012-0001</u>
GAS	<u>2.31E-5</u>	μCi/cc	<u>0.62</u>	DAC FRACTION	<u>A161012-0002</u>
TRITIUM (H3)	<u>7.51E-6</u>	μCi/cc	<u>0.38</u>	DAC FRACTION	<u>A161012-0003</u>
OXYGEN (O2)	<u>18.9</u>	% on Gas Partitioner			
EXPLOSIVE GAS	<u><0.05</u>	% on Gas Partitioner			
CARBON MONOXIDE	<u>60</u>	(ppm)			

DAC Fraction	Air Sample Log #
1	1
2	2
3	3
4	4
5	5
6	6
7	7
8	8
9	9
10	10
11	11
12	12
13	13
14	14
15	15
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100	100

Particulate	_____	μCi/cc (Gross βγ)	_____	_____
Gaseous	_____	μCi/cc	_____	_____
Iodine	_____	μCi/cc	_____	_____
Tritium (H ³)	_____	μCi/cc	_____	_____
Oxygen (O ₂)	_____	% CG/O ₂ Meter	_____	_____
	_____	% on Gas Partitioner	_____	_____
Explosive Gas (H ₂)	_____	% CG/O ₂ Meter	_____	_____
	_____	% on Gas Partitioner	_____	_____
Carbon Monoxide	_____	(ppm)	_____	_____

See Attached HPGe Scan Results

- ☐ Reactor Bldg. Purged Prior to Entry
- ☐ Kidney Filter System Operated Prior to Entry
- ☐ Iodines and Particulates < 30% DAC

COMMENTS: *NONE*

REVIEWED BY: _____ Shift Manager
Print/Sign

Manager/Supervisor

Radiation Protection

Print/Sign

RADIATION WORK PERMIT

FACILITY: TM 1 YEAR: -1..§ RWP NUMBER: 00305 REVISION: QQ TYPE: AST

LOCATION: 1RB308100 ELEVATION: _____ ROOM: _____ AREA: _____

TITLE: CONTAINMENT WORK AT POWER

NO ENTRY INSIDE (D-RING, IMB, BIO-SHIELD) ON THIS RWP

INITIATED: 11/30/15 SCHEDULED START: 01/01/16 EXPECTED COMPLETE: 01/01/17
ALARA CATEGORY : 0

PROTECTIVE CLOTHING AND RESPIRATORY PROTECTION REQUIREMENTS

		ALL PC'S PER RP	X		

DOSIMETRY REQUIREMENTS

EXTREMITY - HANDS : MULTIPLE DOSIMETRY:
EXTREMITY - FEET - RELOCATE DOSIMETRY: ION CHAMBER .
ALARMING DOSIMETER: Y SET TO ALARM AT: 25 MREM OR AT: 1000 MREM/HR

ADMINISTRATIVE / EXPOSURE CONTROL REQUIREMENTS

MINIMUM TEDE BALANCE OF 325 MREM REQUIRED FOR ENTRY
PRE-JOB MEETING REQUIRED N AUTO ENTRY/EXIT PERMITTED x
WORK ORDER NUMBER REQUIRED: N SIGNATURE CHECK AT SIGN-IN: x

HEALTH PHYSICS COVERAGE AND MONITORING PERIOD

SURVEY FREQ: 1 ROUTINE SURVE
HP COVERAGE: INTERMITTENT

SPECIAL INSTRUCTIONS / REMARKS

- 1) THIS RWP ALLOWS HIGH RADIATION AREA AND LOCKED HIGH RADIATION AREA ACCESS: A SPECIFIC HRA BRIEFING IS REQUIRED TO ENTER AREAS POSTED AS HRA OR LHRA.
 - 2) EACH WORKER SIGNING ON THIS RWP MUST REVIEW THE ALARA PLAN OR MICRO ALARA PLAN (MAP) FOR INSTRUCTIONS PERTAINING TO HIS/HER JOB OR SPECIFIC EVOLUTION, AS APPLICABLE.
 - 3) NO ENTRY INSIDE D-RINGS ON THIS RWP.
 - 4) HAND HELD RADIO IS REQUIRED TO BE TAKEN INTO THE RB TO COMMUNICATE WITH THE LHRA ACCESS CONTROL RCT.
 - 5) PREREQUISITES AND PRECAUTIONS AS OUTLINED IN RAD PRO PROCEDURE RP-TM-460-1007 AS TO BE FOLLOWED.
 - 6) FACE SHIELD REQUIRED WHEN GAS CONCENTRATIONS EXCEED ONE DAC.
 - 7) NO ENTRY ONTO 346' ELEVATION WITHOUT RP SUPERVISION APPROVAL.
- (SPECIAL INSTRUCTIONS ARE CONTINUED ON NEXT PAGE)

APPROVALS / TERMINATION

	Name	Date	Signatures
PREPARED BY	<u>JAMES HOGAN</u>	<u>11/30/15</u>	
WORK SUPERVISOR:	<u>JAMES D SHRUM</u>	<u>12/21/15</u>	
HP SUPERVISOR	<u>JAMES D SHRUM</u>	<u>12/21/15</u>	
TERMINATED BY	_____	_____	_____
POST JOB REVIEW:	_____	_____	_____

RADIATION WORK PERMIT

FACILITY: TM 1 YEAR: -1.5 RWP NUMBER: 00305 REVISION: QQ TYPE: AST

LOCATION: 1RB308100 ELEVATION: ROOM: AREA:

TITLE: CONTAINMENT WORK AT POWER

NO ENTRY INSIDE (D-RING, IMB, BIO-SHIELD) ON THIS RWP

SPECIAL INSTRUCTIONS / REMARKS

8) COMPLY WITH RP-AA-302 FOR ALPHA MONITORING

9) COMPLY WITH RP-AA-300-1002 FOR AREAS POSTED FOR ELECTRON CAPTURE (EC).

10 CHANGES TO PC REQUIREMENTS ARE TO BE IN ACCORDANCE WITH RP-AA-410, SECT.4.1

11) RWP DOSE SET POINTS LIMITS BASED ON 1:1 RATIO NEUTRON TO GAMMA WHICH

EQUATES TO 50 MR TOTAL DOSE

12) NEUTRON DOSE ESTIMATION TO BE COMPLETED PER RP-AA-210.

** NO YEARLY INFORMATION FOUND **

ACCESS TO TMI-1 REACTOR BUILDING

1. **PURPOSE**

This Training and Reference Material describes sampling, equipment and conditional requirements needed prior to entry into the TMI-1 Reactor Building.

2. **TERMS AND DEFINITIONS**

2.1. Hazards - Possible hazards which may exist in Reactor Building include gamma and neutron radiation (reactor critical), airborne radioactive contamination, and explosive or oxygen-deficient atmosphere.

2.2. Containment Integrity

2.2.1. Established when the equipment hatch is bolted in place and both doors of the personnel airlock and emergency airlock are closed and sealed.

2.2.2. As established by 1101-3, Containment Integrity and Access Limits.

2.2.3. One door of the personnel airlock or emergency airlock may be open for refueling, or personnel passage, or up to 24 hours for maintenance, provided the other door is closed.

2.2.4. Containment integrity must be in effect when the following conditions exist:

1. Reactor coolant pressure 300 psig or greater, and
2. Reactor coolant temperature 200°F or greater, and
3. Nuclear fuel in the core.

3. **MAIN BODY**

NOTE: This T&RM is written to establish the requirements to support completion of discrete activities. The use of individual applicable sections to complete a discrete activity is allowable. However, completion of all steps within the section(s) used is required unless otherwise specified in the step.

3.1. Equipment (not all of which may be required for each entry)

- Combustible Gas and Oxygen Meter (CG/O₂ meter)
- Establish FME Log in accordance with MA-AA-716-008 (FME Program)

- Beta-Gamma or Gamma dose rate meter
- Neutron dose rate meter (ASP-1/NRD or equivalent).
- Appropriate Air Sampler
- Tritium Sampler
- Personnel dosimetry as specified on RWP
- Gas Sampling Apparatus
- Protective clothing and respiratory protection as specified on RWP
- Gas partitioner
- RM-A2
- Door Keys
- HpGe System

3.2. Prerequisites

- Reactor Building purged per Procedure OP-TM-823-406, OP-TM-823-408 and CY-TM-170-2012 or
- Kidney Filter System operated for at least four (4) hours per OP-TM-823-404 or
- Ensure that particulate/radioiodine airborne activity inside containment is below 30% DAC as determined by analysis of air samples or RM-A2 reading (See Attachment 4 for using RM-A2 readings) or
- Make entry with respiratory protection or per TEDE ALARA Evaluation as specified on RWP. Guidance for airborne iodine activity actions are provided in Attachment 7.
- If noble gas in excess of 1 DAC and has increased by X3 over previous sample, contact Rad. Engineering.

NOTE:

When particulate/iodine airborne activity exceeds 0.1 DAC the Kidney Filter System will be operated (if operating conditions permit) until particulate/iodine airborne activity falls below 0.1 DAC. Appropriate respiratory protection will apply for all entries.

- A meter capable of monitoring for CO (Carbon Monoxide) is required for entering into the Reactor Building unless an alternate means of sampling has been performed.

- Ensure non-radiological samples are taken or will be taken as stated below and any time explosive gas buildup or oxygen deficiency is probable. Contact Occupational Safety and the Control Room if the sample results are either of the following:
 - a. More than 0.4 percent hydrogen (RM-A2 samples) or combustible gas meter alarms (by CG/O₂ meter inside RB)
 - b. Oxygen levels are less than 19.5%.
- If containment integrity exists and the RB hasn't been purging for 12 hours or more, non-radiological samples should be:
 - a. Performed weekly,
 - b. Taken within 24 hours before RB entries or taken by portable combustible CG/O₂ meter during initial entry, and
 - c. Required every 24 (+/- 12) hours during RB entries.

NOTE: Normal or emergency entry monitoring inside the reactor building may be performed by any personnel trained in the use of the CG/O₂ meter. There is a CG/O₂ meter located in the Unit 1 RP Field Operations office.

- Ensure applicable Section of Attachment 1 has been completed and reviewed whenever non-radiological samples are taken.

3.3. Precautions

- All Reactor Building initial entries will be made in accordance with the TMI Two-Man Rule unless otherwise approved by RPM or designee.
- All Reactor Building initial entries will be made in accordance with a valid RWP except Emergency Entries. (See para. 3.5)
- All entries into the Reactor Building while the reactor is critical are to be reviewed with RP Field Ops prior to entry. Items to be discussed in this review include, but are not limited to: work to be performed, area work is to be performed in, routes taken to access area, anticipated time in the area, expected radiological conditions and applicable ALARA Review requirements. Based on the above, RP will determine whether RP Technician coverage is necessary.
 - a. The following areas may be entered without a technician escort provided Rad Protection Supervisor (RPS) concurrence has been obtained:
 - 279' elevation, all areas outside the secondary shield and specified boundary inside the Letdown Cooler Room.

- 308' elevation, all areas outside the secondary shield.
 - 346' elevation, all areas outside posted neutron high radiation areas.
- b. RP Technician coverage is required for entry into areas on top of D-Rings, on the operating floor, and inside the secondary shield. This requirement may be waived provided adequate radiological survey information is available per RP-AA-300, approval is granted by Rad Engineering and the RPS, and is noted in the TMI Radiation Protection Log.
- c. The most recent radiological survey data should be available at the control point.
- d. When entries are made into areas on top of D-Rings, on the operating floor, and inside the secondary shield a neutron rem instrument shall be used during the entry except as authorized by the RP Supervisor.
- e. Neutron Dose Estimate is performed per RP-AA-210.
- f. When pre-entry surveys don't exist then use a Neutron to Gamma ratio of:
 - 1 for areas outside the posted high neutron area and for areas inside the D-rings.
 - 10 for all other areas inside the posted high neutron area, or
 - as determined by an ALARA Plan per RP-AA-401.
- g. All entrances to the secondary shield will be locked per RP-AA-460 as determined by RP during power operation (≥ 1 percent).
- When the reactor is critical or at power, neutron dosimetry is required for entry.
- 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 (including the reactor head area and along the east and west walkways adjacent to 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. Each individual will sign Attachment 6 (Approval for D-Ring Entries at Power) or give permission via telephone. The completed form will be filed with the original ALARA plan.

WARNING

Reactor power level must not be increased without the permission of the Shift Manager, Plant Manager and Radiation Protection Manager or designees, while personnel are in these areas.

- Reactor Building entry personnel should review their lighting requirements prior to entry into the R.B. Attachment 5 provides directions for RB lighting controls. It is the responsibility of the RB entry team to de-energize the RB lighting after completion of their work activities if lighting is no longer required.
 - a. Reactor Building lighting normally energized for general RB entries:
 - If needed, RB operating floor dome lights are energized by closing D-14 #2 breaker (308' RB, north of the elevator) for RB lighting panel CV-3 (346' RB, next to the elevator).
 - #2 on D-14 for RB Ltg Pnl CV-3 (346 RB elevator).
 - If needed, RB Emergency Lighting (i.e., personnel airlock and RB stairwell lights) are operated by using the on/off switch located in the personnel airlock.
 - If needed, RB 308' and RB 333' area lighting are operated by using the on/off switch located on the D-Ring wall straight in from the personnel airlock.
 - If needed, RB 281' area lighting is energized from Power Panel CV-1 (breakers 1 through 7) located on the north wall of the elevator on 281' RB.
 - b. Additional Reactor Building lighting may be energized as noted on Attachment 5.
- Notify Security prior to entering the Reactor Building and after leaving the Reactor Building unless other arrangements have been made with Security Supervisor.
- Entries into the Reactor Building when containment integrity is in effect, requires Control Room Notification unless directed otherwise by Shift Manager or Control Room Supervisor. Exception: Control Room notification not required when personnel are stationed in the airlock to operate the doors.

NOTE: Routine Reactor Building entries for operator surveillance will be made as defined by the Plant Operations Director. To the extent practical, routine preventive and corrective maintenance should be coordinated with this periodic entry in order to minimize RB entries with plant conditions above 200°F and 300 psig. Priority corrective maintenance and operational inspections required by the current conditions of the unit, as defined by Operations or Work Management Supervision, can be accomplished in the RB without waiting for the scheduled RB entry.

- Entries into the Reactor Building when the Reactor is critical require the Plant Operations Director approval if a Reactor Building Purge must be initiated prior to and/or during the entry.

3.4. Surveys

- Perform radiological/non-radiological surveys in the area of interest for routine inspections at power. Air sampling from RM-A2 if required, shall be in accordance with CY-TM-661-852, Sampling of Reactor Building Air.
 - a. All job specific surveys should include measurements of beta radiation. When high noble gas concentrations exist, ionization chambers may be wrapped to minimize noble gas infiltration.
 - b. General area beta measurements do not need to be performed for every routine survey in the Reactor Building at power. They should, however, be performed periodically to identify changing conditions. The frequency and performance of these periodic surveys will be in accordance with the routine survey status system approved by the Radiation Protection Manager, or designee.
- For extended shutdowns, perform radiological surveys per RP-AA-300 and RP-AA-301 within 24 hours after Reactor shutdown (reactor subcritical) or as specified by the Radiation Protection Manager/RPS.

NOTE: Post and barricade areas as necessary per RP-AA-376-1001.

NOTE: During extended shutdown periods certain air survey requirements may be exempted by Radiological Engineering.

3.5. Urgent Unplanned Entrance to Reactor Building.

- Urgent unplanned emergency entrance into the Reactor Building will be made in accordance with RP-AA-460-003, "Access to HRAs/LHRAs/VHRAs and Contaminated Areas in Response to a Potential or Actual Emergency".
- A minimum of two persons, at least one of whom shall be qualified RP Technician/RPS, shall make such entries.

- The Shift Manager shall submit a "Reactor Building Emergency Entrance Report" (Attachment 2) to the Plant Manager, with a copy to the Radiation Protection Manager after each such entry.
- RP shall ensure a RWP is processed to document the emergency entry, to record personnel involved and their exposures.

3.6. Planned Reactor Building Entry

- Two procedures have been created to enhance FME requirements for Reactor Building entry when containment is required.
 - MA-TM-460-001 describes Rad Pro briefing expectations.
 - MA-TM-460-002 is a checklist with sign-off steps designed to enhance human performance. Rad Pro has a sign-off section on this form.
- Refer to Maintenance procedure for planned containment entries and use the form provided in MA-TM-460-002 to record completion of the required briefing.

4. **DOCUMENTATION**

- 4.1. Retain completed Attachment 1 and 2 in accordance with the provisions of the station records management program.
- 4.2. Retain Attachment 6 with the original ALARA plan.

5. **REFERENCES**

- 5.1. OP-TM-823-406, RB Purge – Containment Closed
- 5.2. OP-TM-823-408, RB Purge – RB Doors And/Or Equipment Hatch Open
- 5.3. 1101-3, Containment Integrity and Access Limits
- 5.4. OP-TM-823-404, Placing Kidney Filter System In Operation
- 5.5. CY-TM-170-2012, Releasing Radioactive Gaseous Effluents Reactor Building Purges – TMI-1
- 5.6. RP-AA-300, Radiological Survey Program
- 5.7. RP-AA-301, Radiological Air Sampling Program
- 5.8. RP-AA-460, Controls for High and Locked High Radiation Areas

- 5.9. CY-TM-661-852, Sampling of Reactor Building Air
- 5.10. RP-AA-376-1001, Radiological Posting, Labeling, and Marking Standard
- 5.11. 6610-ADM-4250.10, Radiation Protection/Chemistry Actions When RMS Malfunctions
- 5.12. RP-AA-210, Dosimetry Issue, Usage, and Control
- 5.13. RP-AA-401, Operational ALARA Planning and Controls
- 5.14. MA-AA-716-008, Foreign Material Exclusion Program
- 5.15. RP-AA-460-003, Access to HRAs/LHRAs/VHRAs and Contaminated Areas in Response to a Potential or Actual Emergency

6. **ATTACHMENTS**

Attachment 1 - Reactor Building Entry Survey Log

Attachment 2 - Reactor Building Emergency Entrance Log

Attachment 3 - Operator Aids

Attachment 4 - Estimating RB Airborne Radioactivity From RM-A2 Readings

Attachment 5 - Reactor Building Lighting Controls

Attachment 6 - Approval for D-Ring Entries at Power

Attachment 7 – Airborne Iodine Action Levels

ATTACHMENT 1
Page 1 of 1
(Example)
Reactor Building Entry Survey Log

DATE: _____

REACTOR POWER: _____ %

START TIME: _____

TECHNICIAN: _____

Print/Sign

1. RM-A2 SAMPLE LAB RESULTS

				Air Sample Log #
PARTICULATE	_____ $\mu\text{Ci/cc}$	_____	DAC FRACTION	_____
IODINE	_____ $\mu\text{Ci/cc}$	_____	DAC FRACTION	_____
GAS	_____ $\mu\text{Ci/cc}$	_____	DAC FRACTION	_____
TRITIUM (H3)	_____ $\mu\text{Ci/cc}$	_____	DAC FRACTION	_____
OXYGEN (O2)	_____ % on Gas Partitioner			
EXPLOSIVE GAS	_____ % on Gas Partitioner			
CARBON MONOXIDE	_____ (ppm)			

2. Readings from inside Reactor Building (If Required)

Log #			DAC Fraction	Air Sample
Particulate	_____ $\mu\text{Ci/cc}$ (Gross $\beta\gamma$)	_____	_____	_____
Gaseous	_____ $\mu\text{Ci/cc}$	_____	_____	_____
Iodine	_____ $\mu\text{Ci/cc}$	_____	_____	_____
Tritium (H ³)	_____ $\mu\text{Ci/cc}$	_____	_____	_____
Oxygen (O ₂)	_____ % CG/O ₂ Meter			
	_____ % on Gas Partitioner			
Explosive Gas (H ₂)	_____ % CG/O ₂ Meter			
	_____ % on Gas Partitioner			
Carbon Monoxide	_____ (ppm)			

See Attached HPGe Scan Results

- ☐ Reactor Bldg. Purged Prior to Entry
- ☐ Kidney Filter System Operated Prior to Entry
- ☐ Iodines and Particulates < 30% DAC

COMMENTS: _____

REVIEWED BY: _____ Shift Manager
Print/Sign

Manager/Supervisor _____ Radiation Protection
Print/Sign

ATTACHMENT 2
Page 1 of 1
(Example)
Reactor Building Emergency Entrance Log

Date _____ RWP # _____

Time _____

Entry Time _____ Exit Time _____

Why Entry was made _____

Personnel Involved

Name	Exposure Received
_____	_____
_____	_____
_____	_____
_____	_____

Work and/or action completed _____

Shift Manager _____
Print/Sign

Plant Manager _____
Print/Sign

cc: Radiation Protection Manager
RWP File

ATTACHMENT 3

Page 1 of 2

(Example)

Operator Aids

Located on the Reactor Building Personnel Hatch

REACTOR BUILDING
PERSONNEL HATCH LIGHTS

DURING ENTRY INTO REACTOR BUILDING - Before
closing the outside hatch door, energize the RB
Emergency Lighting System using the light switch
located inside the personnel hatch.

WHEN EXITING THE REACTOR BUILDING - Open the
outer personnel hatch door BEFORE using the light
switch located inside the personnel hatch to de-energize
the RB Emergency Lighting.

ATTACHMENT 3

Page 2 of 2
(Example)

Located inside Reactor Building Personnel Hatch near light switch.

RB LIGHTING CONTROLS

☐ Operating Floor Dome and Crane Lighting

Operating floor dome lighting is energized from D-14 #2 breaker (308' RB, north of elevator) and polar crane lighting is energized from D-9 #1 breaker (308' RB, next to elevator). The operating floor dome lighting is powered locally from Power Panel CV-3. CV-3 is located at elevation 346 ft. of the Reactor Building, near the elevator. Reactor Building Crane lighting is powered locally from Power Panel D-9. D-9 is located at elevation 308' of the Reactor Building, north of the RB elevator.

☐ Emergency Lighting (RB Stairwells)

Reactor Building emergency lighting is controlled from an on/off switch located in the personnel access hatch near the page phone (Refer to Gilberts Dwg. 220-051). The emergency lighting, located on elevations 346 ft., 308 ft., 281 ft., and stairway areas, is powered from power panel CV-E. CV-E is located at elevation 308 ft. of the Reactor Building, on the south side of the elevator.

☐ Elevation 308' and 333' Lighting (Outside D-Rings)

Elevation 308 ft. and Mezzanine lights can be energized from an on/off switch located in the Reactor Building at Elevation 308 ft. near (across from) the personnel access hatch. Elevation 308 ft. and Mezzanine lighting is powered from Panel CV-2 which is located at elevation 346 ft. of the Reactor Building, near the elevator.

☐ Basement Lighting (Outside D-Rings)

Basement area lighting, elevation 281 ft., area lighting is powered and controlled from Power Panel CV-1 (breakers 1 through 7). CV-1 is located at elevation 281 ft. of Reactor Building on the north wall of the elevator.

☐ D-Ring Lighting

The D-Ring lights can be controlled from two on/off switch locations, one in the D-Ring entrance hallway elevation 281 ft., and at D-Ring NE platform elevation 365 ft. (Refer to Gilberts Dwg. No. 220-236, No. 220-237, and No. 220-238). D-Ring lighting is powered from Power Panel CV-2. CV-2 is located at elevation 346 ft. of the Reactor Building, near the elevator.

ATTACHMENT 4

Page 1 of 1
(Example)

Estimating RB Airborne Radioactivity from RM-A2 Readings

Particulate

(RM-A2 Particulate Reading - RM-A2 Particulate Reading during last RB grab sample) x 2E-5 DAC/cpm +
Particulate DAC value during last sample = _____ DAC

Example: RM-A2 Particulate reads 10,000 cpm. On the last sample RM-A2 read 4000 cpm and a DAC value of 0.1 DAC. This equates to:

$$(10,000 - 4000) \text{ cpm} \times 2\text{E-}5 \text{ DAC/cpm} + 0.1 \text{ DAC} = 0.2 \text{ DAC}$$

Basis: RM-A2 sensitivity based on Cs-137. The last RM-A2 reading during a sample and sample results compensate for short lived radionuclide concentrations in the RB.

Iodine

Determine the count rate rise over a time period in hours from the chart.

RM-A2 Count Rate Rise/Time (Hrs) x 3.42E-4 DAC-Hr/cpm = _____ DAC

Example: RM-A2 Iodine channel read 100 cpm at 01:00. Then
RM-A2 Iodine channel read 2100 cpm at 03:00 then:

$$(2100 - 100) \text{ cpm} / 2 \text{ Hr} \times 3.42\text{E-}4 \text{ DAC-Hr/cpm} = 0.34 \text{ DAC}$$

Basis: RM-A2 sensitivity based on I-131.

Gaseous

(RM-A2 Gas Reading - RM-A2 Gas Reading during last RB Grab Sample) x 2.53E-4 DAC/cpm +
Gas DAC Value during Last Sample = _____ DAC

Example: RM-A2 Gas Reading 10,000 cpm. On the last sample RM-A2 read 4000 cpm and had a DAC Value of 0.4 DAC.

$$(10,000 - 4000) \text{ cpm} \times 2.53\text{E-}4 \text{ DAC/cpm} + 0.04 \text{ DAC} = 1.9 \text{ DAC}$$

Basis: RM-A2 sensitivity based on Xe-133.

ATTACHMENT 5
Page 1 of 2
(Example)
Reactor Building Lighting Controls

Operating Floor Dome and Crane Lighting

Operating floor dome lighting is energized from D-14 #2 breaker (308' RB, north of elevator) and polar crane lighting is energized from D-9 #1 breaker (308' RB, next to elevator). D-14 480V Distribution panel is located at elevation 308 of the Reactor Building north of the elevator.

The operating floor dome lighting is powered locally from Power Panel CV-3. CV-3 is located at elevation 346 ft. of the Reactor Building, near the elevator. Reactor Building Crane lighting is powered locally from Power Panel D-9. D-9 is located at elevation 308' of the Reactor Building, north of the RB elevator.

Emergency Lighting (RB Stairwells)

Reactor Building emergency lighting is controlled from an on/off switch located in the personnel access hatch near the page phone (Refer to Gilberts Dwg. 220-051). The emergency lighting, located on elevations 346 ft., 308 ft., 281 ft., and stairway areas, is powered from power panel CV-E. CV-E is located at elevation 308 ft. of the Reactor Building, on the south side of the elevator.

Elevation 308' and 333' Lighting (Outside D-Rings)

Elevation 308 ft. and Mezzanine lights can be energized from an on/off switch located in the Reactor Building at Elevation 308 ft. near (across from) the personnel access hatch. Elevation 308 ft. and Mezzanine lighting is powered from Panel CV-2 which is located at elevation 346 ft. of the Reactor Building, near the elevator.

Basement Lighting (Outside D-Rings)

Basement area lighting, elevation 281 ft., area lighting is powered and controlled from Power Panel CV-1 (breakers 1 through 7). CV-1 is located at elevation 281 ft. of Reactor Building on the north wall of the elevator.

Elevator Access at Elevation 365 and Platform Elevation 382

Lighting at the elevator access area of elevation 365 ft. and the platform above elevator at elevation 382 ft. is controlled from a local on/off switch on wall north of the elevator door on elevation 365 ft. (Refer to Gilberts Dwg. 220-081).

D-Ring Area Lighting

The D-Ring lights can be controlled from two on/off switch locations, one in the D-Ring entrance hallway elevation 281 ft., and at D-Ring NE platform elevation 365 ft. (Refer to Gilberts Dwg. No. 220-236, No. 220-237, and No. 220-238). D-Ring lighting is powered from Power Panel CV-2. CV-2 is located at elevation 346 ft. of the Reactor Building, near the elevator.

ATTACHMENT 5

Page 2 of 2
(Example)

References

1. TMI-1 Operating Procedure No. 1107-1, Normal Electrical System
2. Gilberts Drawing No. 220-021, Lighting Layout, Reactor Containment Basement Floor
3. Gilberts Drawing No. 220-051, Lighting Layout, Reactor Containment Mezzanine Floor
4. Gilberts Drawing No. 220-081, Lighting Layout, Reactor Containment Operating Floor
5. Gilberts Drawing No. 220-222, Lighting Layout, Electrical Panel Wiring Diagram
6. Gilberts Drawing No. 220-236, Lighting Layout, Inside Secondary Shield Walls, EL 281
7. Gilberts Drawing No. 220-237, Lighting Layout, Inside Secondary Shield Walls, EL 306
8. Gilberts Drawing No. 220-238, Lighting Layout, Inside Secondary Shield Walls, EL 336 and EL 347' 7" including Miscellaneous Elevations

ATTACHMENT 6

Page 1 of 1
(Example)

Approval for D-Ring Entries at Power

Entry Purpose: _____

Entry Date: _____

WARNING

Reactor power level must not be increased without the permission of the Shift Manager, Plant Manager and Radiation Protection Manager or designees, while personnel are in these areas.

Approvals:

Shift Manager: _____ /
Signature Date

Radiation Protection Manager: _____ /
Signature Date

Plant Manager: _____ /
Signature Date

File the completed form with the original ALARA plan.

ALARA Plan _____

ATTACHMENT 7
Page 1 of 2
Airborne Iodine Action Levels

Iodine actions apply to any airborne iodine area at TMI

If the airborne iodine level is < 0.1 DAC, no special actions are required.

If the airborne iodine level is ≥ 0.1 but < 0.3 DAC:

- Evaluate use of recognized risk contamination provisions in RP-AA-401 for all entries.
- Discuss need to track and/or assign DAC hours with Radiological Engineering; implement tracking and assigning process for all entries.
- Brief individuals prior to entry on potential for anticipated personnel contamination.
- Monitor for skin contamination from airborne iodine and prescribe hoods if required to minimize occurrence.

If the airborne iodine level is ≥ 0.3 but < 1 DAC, in addition to above:

- Post as Airborne Radioactivity Area.
- Notify Outage Management that iodine related contaminations are likely, which will impact RCA exit procedures.
- Hoods required for entry. Ensure all hair is under protective clothing is possible.
- Consider using facial PCs.

If the airborne iodine level is ≥ 1 but < 5 DAC, in addition to above:

- Clear the affected area of non-essential personnel as determined by outage management.
- Facial PCs should be used for all but the most stressful tasks.
- Perform TEDE ALARA determination and assign respiratory protection as appropriate to reduce total dose to individuals.

ATTACHMENT 7
Page 2 of 2

If the airborne iodine level is ≥ 5 DAC, in addition to above:

- Entry into affected area shall be limited to critical outage or operational activities as determined by Outage Manager and Radiation Protection Manager.
- Facial PCs required as a minimum.
- Respiratory protection should be utilized unless TEDE ALARA benefit without respirators exceeds 10 mRem.

Facility: Three Mile Island Task No.: OF010009

Task Title: Given a set of conditions, determine the Emergency Action Level (EAL) and make a Protective Action Recommendation (PAR) IAW the facility Emergency Plan. JPM No.: ILT 16-01 NRC JPM SA4

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= 0 minutes:
 - Plant is at 100% Power.
 - Weather: Breezy. Temp: 60°F. Wind: from 291° at 8 mph.
 - AH-E-1C is out of service.
 - A loss of the '8' bus occurs and EG-Y-1B fails to power on the 1E 4160V bus
 - T= 10 minutes:
 - Seismic motion is felt, PRF-1-3 alarm is in
 - RCS pressure starts dropping, the reactor operator trips the reactor and the crew performs the Immediate Manual Actions of OP-TM-EOP-001.
 - UNISOLABLE RCS leakage exists at 500 gpm.
 - T= 12 minutes:
 - Reactor Building pressure peaks at 31 psig, then drops rapidly to 0 psig
 - RM-G-23 reads 1.96 E+03 R/hr
 - The Maintenance Supervisor has informed you that, EG-Y-1B is inoperable and will take 10 hours to repair.

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 W
- EP-AA-112-F-09, EMERGENCY PUBLIC ADDRESS ANNOUNCEMENTS, Revision E
- EP-MA-114-100-F-01, STATE/LOCAL EVENT NOTIFICATION FORM, Revision P
- EP-AA-1009 Addendum 3 EXELON NUCLEAR EMERGENCY ACTION LEVELS FOR THREE MILE ISLAND (TMI) STATION, Revision 2
- EP-AA-112-100-F-06 ERO NOTIFICATION OR AUGMENTATION Revision V
- EP-AA-114-F-01 PWR RELEASE IN PROGRESS DETERMINATION GUIDANCE, Revision E
- EP-MA-114-100, MID-ATLANTIC STATE/LOCAL NOTIFICATIONS, Revision 23

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 UNISOLABLE RCS leakage is present at 500 GPM.
- Reactor Building pressure peaks at 31 psig, then drops rapidly to 0 psig
- RM-G-23 reads 1.96 E+03 R/hr

The examinee should declare FG1

Comment:

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

EP-AA-112-100-F-01

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

Standard:

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

Comment:

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

#1 Time Critical Stop Time: _____

#2 Time Critical Start Time: _____
(This is the same time as #1 Stop Time)

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

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

✓ **Standard:** Examinee announces FG1 based on RCS leakage > 150 gpm, reactor building pressure rapidly dropping, and RM-G-23 reading greater than 1.96 E+03 R/hr

Comment:

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

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

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

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

Standard: Examinee records EAL FG1 on EP-AA-112-100-F01.

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

Comment:

EVALUATOR NOTE: Step 1.4C and 1.4D are N/A.

EVALUATOR CUE: Repeat Back any direction given to you with regards to EP-AA-112-F-09. (Tab #1)

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

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: Description: Loss of Fission Product Barriers / Words to that effect.

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

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

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. (Tab #2)

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

Comment:

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.G

- Performance Step: 7** Determine the PAR per the Emergency Classification and Protective Action Recommendations procedure.
- Emergency Classification and PAR Procedure: EP-AA-111 (Tab 6)
 - Plant Based PAR Flowchart: EP-AA-111-F-09 (Tab 7)

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

- Initial PAR after GE declared – **Yes**
- Any Loss of Containment? – **Yes**
- 1. Loss of Primary Containment: **Yes**
AND EITHER:
2. Containment Rad Monitors $\geq 4.40\text{E}+3$ R/Hr? **NO**
OR
EAL RG1 been met? **NO**
- Is there a Hostile Action event in Progress?– **No**
- Is this PAR from the Control Room?– **Yes**

- √ **Standard:** Examinee determines the following actions are required:
- Evacuate 2-mile radius, AND
 - Evacuate 2-5 miles in the following downwind sectors:
 - NE / ENE / E / ESE / SE / SSE / S

Comment:

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

EVALUATOR CUE: If asked, radioactive liquid is not expected to be transported beyond the protected area boundary, liquid effluent radiation monitors are reading normal, and no abnormal radioactivity has been detected beyond the protected area boundary.

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

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: FG1
 - Block 8: B – Fission Product Barrier Degradation
 - Block 9: B – AIRBORNE radiological release in progress
 - Block 10: 291 (degrees) / 8 (miles per hour)
 - Block 11: B-
 - Ⓔ 360 DEGREES FROM 0 MILES (SITE BOUNDARY) TO 2 MILES
 - AND
 - THE FOLLOWING SECTORS FROM 2 MILES TO 5 MILES:
 - Ⓔ NE / ENE / E / ESE / SE / SSE / S
 - THIS PARIS 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= **(#2 Critical Stop Time)** _____
 (# 2Critical Start Time) - _____
 = _____ mins

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

Job Performance Measure No.: ILT 16-01 NRC JPM SA4

Examinee's Name:

Date Performed:

Facility Evaluator:

Number of Attempts:

Time to Complete:

Question Documentation:

Question:

Response:

Result: SAT _____ UNSAT _____

Examiner's Signature: _____ Date: _____

Initial Conditions:

- T= 0 minutes:
 - Plant is at 100% Power.
 - Weather: Breezy. Temp: 60°F. Wind: from 291° at 8 mph.
 - AH-E-1C is out of service.
 - A loss of the '8' bus occurs and EG-Y-1B fails to power on the 1E 4160V bus
- T= 10 minutes:
 - Seismic motion is felt, PRF-1-3 alarm is in
 - RCS pressure starts dropping, the reactor operator trips the reactor and the crew performs the Immediate Manual Actions of OP-TM-EOP-001.
 - UNISOLABLE RCS leakage exists at 500 gpm.
- T= 12 minutes:
 - Reactor Building pressure peaks at 31 psig, then drops rapidly to 0 psig
 - RM-G-23 reads 1.96 E+03 R/hr
 - The Maintenance Supervisor has informed you that, EG-Y-1B is inoperable and will take 10 hours to repair.

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

TABLE TMI 2-1: Emergency Action Level (EAL) Matrix

Fission Product Barrier Matrix

Hot Matrix

GENERAL EMERGENCY			SITE AREA EMERGENCY		ALERT									
FG1 Loss of any two barriers AND Loss or Potential Loss of third barrier. 1234			FS1 Loss or Potential Loss of ANY two barriers. 1234		FA1 ANY Loss or ANY Potential Loss of either Fuel Clad or RCS 1234									
Sub-Category	FC – Fuel Clad		RC – Reactor Coolant System		CT - Containment									
	Loss	Potential Loss	Loss	Potential Loss	Loss	Potential Loss								
1. RCS or SG Tube Leakage	None	1. RCITS hot leg instruments indicate 0 inches after lowering trend. AND 2. In-core thermocouples are unavailable. AND 3. ALL RCP's are secured.	1. RCS leakage results in <25° Sub Cooling Margin OR 2. Steam Generator tube RUPTURE that requires/ results in an ESAS actuation.	3. UNISOLABLE RCS leakage > 150gpm. OR 4. a. RCS Pressure > 2450 psig. AND b. RCS Pressure not lowering.	1. SG tube leakage > 150gpm AND 2. UNISOLABLE steam release from affected S/G to the environment	None								
2. Inadequate Heat Removal	1. T _{clad} > 1400°F	2. > 25°F Superheat OR 3. HPI-PORV Cooling in effect.	None	HPI-PORV Cooling in effect.	None	1. T _{clad} ≥ 1800°F. AND 2. EOP Restoration procedures <u>not</u> effective in < 15 minutes.								
3. Containment Radiation / RCS Activity	1. Containment radiation monitor (RM-G-22 or RM-G-23) reading > 1.95E+03 R/hr. OR 2. Coolant activity > 300uCi/gm Dose Equivalent I-131	None	Containment radiation monitor (RM-G-22 or RM-G-23) reading > 25 R/hr.	None	None	Containment radiation monitor (RM-G-22 or RM-G-23) reading > 4.40E+03 R/hr.								
4. Containment Integrity or Bypass	None	None	None	None	1. Containment isolation is required and ANY of the following: a. UNPLANNED lowering in containment pressure following initial pressure rise OR b. Containment pressure or water level response <u>not</u> consistent with LOCA conditions. OR c. UNISOLABLE pathway from containment to the environment exists. OR 2. Indication of RCS leakage outside of containment.	3. Reactor Building Pressure > 55 psig and rising. OR 4. Hydrogen Concentration in Containment ≥ 4%. OR 5. a. Reactor Building pressure > 30 psig AND b. Reactor Building Emergency cooling is less than ANY one of the following conditions: <table><tr><th>SPRAY</th><th>COOLERS</th></tr><tr><td>2</td><td>0</td></tr><tr><td>0</td><td>3</td></tr><tr><td>1</td><td>1</td></tr></table>	SPRAY	COOLERS	2	0	0	3	1	1
SPRAY	COOLERS													
2	0													
0	3													
1	1													
5. Emergency Director Judgment	1. Any Condition in the opinion of the Emergency Director that indicates Loss of the Fuel Clad Barrier.	2. Any Condition in the opinion of the Emergency Director that indicates Potential Loss of the Fuel Clad Barrier.	1. Any Condition in the opinion of the Emergency Director that indicates Loss of the RCS Barrier.	2. Any Condition in the opinion of the Emergency Director that indicates Potential Loss of the RCS Barrier.	1. Any Condition in the opinion of the Emergency Director that indicates Loss of the Containment Barrier.	2. Any Condition in the opinion of the Emergency Director that indicates Potential Loss of the Containment Barrier.								

Mode: 1 – Power Operations 2 – Startup 3 – Hot Standby 4 – Hot Shutdown 5 – Cold Shutdown 6 – Refueling D – Defueled

**Level 2 - Reference Use****SHIFT EMERGENCY DIRECTOR CHECKLIST**

Section 1, Initial Actions

- 1.1, Unusual Event
- 1.2, Alert
- 1.3, Site Area Emergency
- 1.4, General Emergency
- 1.5, Dose Assessment
- 1.6, SAFER Response Plan Activation
(Only applicable to Units that have implemented FLEX)

Section 2, Ongoing Actions with Command and Control in Control Room

Section 3, Ongoing Actions after Transfer of Command and Control

Section 4, Closeout Actions

NOTES: Steps in each section of this checklist may be performed in an order other than listed or they may be omitted if not applicable

1. INITIAL ACTIONS

1.1. If the event is classified as an Unusual Event, **then PERFORM** the following:

- A. **ANNOUNCE** the event classification, possible escalation paths, and declaration time to the Control Room staff.
- B. **RECORD** the EAL, threshold(s) (as applicable) and declaration time.



EAL

EAL Threshold(s)
(as applicable)

Declaration Time

SHIFT EMERGENCY DIRECTOR CHECKLIST

NOTE: ERO activation is optional for non-security threat Unusual Event classifications.

C. **If** the event is a Security Event, Unusual Event, **then** **PERFORM** the following:

1) **If** the Security Event information was received by a source other than the NRC, **then** **ENSURE** expedited NRC notification is made within 15 minutes of receiving the threat using appropriate station procedures.

2) **DIRECT** activation of the ERO using Scenario 3, "Actual Event Alternative Facility Response," per EP-AA-112-100-F-06.

3) **USE** site-specific Operations/Security procedures for announcements for Security events **and** **CONSIDER** limitations on personnel movement prior to sounding alarms or making announcements.

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

Time: _____

E. **If** optional facility staffing is required, **then** **DIRECT** activation of the ERO Notification using Scenario 1, "Actual Event Respond to Facility," per EP-AA-112-100-F-06.

Time: _____

F. **If** the ERO has **not** been activated, **then** **DIRECT** activation of the ERO Notification using Scenario 2, "Unusual Event," per EP-AA-112-100-F-06.

Time: _____



Tab 2



Tab 1



Tab 2



Tab 2

SHIFT EMERGENCY DIRECTOR CHECKLIST

NOTE: If a higher classification is made prior to transmitting an event notification, the notification for the higher classification can supersede the previous event notification, provided that it can be performed within the 15 minute timeframe of the previous event

If the notification of a higher classification **cannot** be performed within the 15 minute timeframe of the previous event, the previous event notification is required within its 15 minute timeframe, and the subsequent event notification is required within its 15 minute timeframe.

- G. **DIRECT** performance of State/Local notifications within 15 minutes of the event classification as required per the Notifications procedure.

☐

Notification Procedure: **Tab 3**

Notification form: **Tab 4**

Release In Progress Determination Guidance **Tab 21**

- H. **DIRECT** performance of required NRC notifications immediately following notification of the appropriate State and local agencies but **not** later than (1) hour after the time of classification per the Notifications procedure.

☐

Notification Procedure: **Tab 20**

Notification form: **Tab 10**

- I. **GO TO** step 1.5 of this Checklist.

☐

- 1.2. **If** the event is classified as an Alert, **then PERFORM** the following:

- A. **ANNOUNCE** the event classification, possible escalation paths, and declaration time to the Control Room staff.

☐

- B. **RECORD** the EAL, threshold(s) (as applicable) and declaration time.

EAL

EAL Threshold(s) (as applicable)

Declaration Time

SHIFT EMERGENCY DIRECTOR CHECKLIST

C. For Security events:

- 1) **If** the Security Event information was received by a source other than the NRC, then **ENSURE** expedited NRC notification is made within 15 minutes of receiving the threat using appropriate station procedures.
- 2) **USE** site-specific Operations/Security procedures for announcements **and** **CONSIDER** the limitations the threat poses on personnel movement with Security prior to sounding alarms or making announcements.



- D. **SELECT** the Emergency Public Address Announcements from the form **and** **DIRECT** performance of the public address announcement within 15 minutes of event classification.



Tab 1

Time:

- E. **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 Alternative Facility Response," as appropriate, per EP-AA-112-100-F-06.



Tab 2

Time:

NOTE: If a higher classification is made prior to transmitting an event notification, notification for the higher classification can supersede the previous event notification, provided that it can be performed within the 15 minute timeframe of the previous event

If the notification of a higher classification **cannot** be performed within the 15 minute timeframe of the previous event, the previous event notification is required within its 15 minute timeframe, and the subsequent event notification is required within its 15 minute timeframe.

- F. **DIRECT** performance of State/Local notifications within 15 minutes of the event classification as required per the Notifications procedure.



Notification Procedure: Tab 3

Notification form: Tab 4

Release In Progress Determination Guidance: Tab 21

SHIFT EMERGENCY DIRECTOR CHECKLIST

- G. **DIRECT** performance of required NRC notifications immediately following notification of the appropriate State and local agencies but **not** later than (1) hour after the time of classification per the Notifications procedure.

☐Notification Procedure: **Tab 20**Notification form: **Tab 10**

- H. **GO TO** step 1.5 of this Checklist.

☐

- 1.3. **If** the event is classified as a Site Area Emergency, **then PERFORM** the following:

- A. **ANNOUNCE** the event classification, possible escalation paths, and declaration time to the Control Room staff.
- B. **RECORD** the EAL, threshold(s) (as applicable) and declaration time.

☐

EAL

EAL Threshold(s) (as applicable)

Declaration Time

- C. For Security events:

- 1) **If** the Security Event information was received by a source other than the NRC, then **ENSURE** expedited NRC notification is made within 15 minutes of receiving the threat using appropriate station procedures.
- 2) **USE** site-specific Operations/Security procedures for announcements **and CONSIDER** the limitations the threat poses on personnel movement with Security prior to sounding alarms or making announcements.

☐☐

- D. **SELECT** the Emergency Public Address Announcements from the form **and DIRECT** performance of the public address announcement within 15 minutes of event classification.

☐**Tab 1**

Time:

- E. **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 Alternative Facility Response," as appropriate, per EP-AA-112-100-F-06.

☐**Tab 2**

Time:

SHIFT EMERGENCY DIRECTOR CHECKLIST

NOTE: If a higher classification is made prior to transmitting an event notification, notification for the higher classification can supersede the previous event notification, provided that it can be performed within the 15 minute timeframe of the previous event

If the notification of a higher classification **cannot** be performed within the 15 minute timeframe of the previous event, the previous event notification is required within its 15 minute timeframe, and the subsequent event notification is required within its 15 minute timeframe.

- F. **DIRECT** performance of State/Local notifications within 15 minutes of the event classification as required per the Notifications procedure.

Notification Procedure:

Notification form:

Release In Progress Determination Guidance:

- G. **If** the event is based on a Security Threat **or** other hazardous condition (i.e. hazardous condition from a nearby industrial facility, radiological, or severe weather conditions), **then CONSIDER** the limitations on performing (or **not** performing) accountability and/or evacuation.

- H. **DIRECT** Accountability per the Assembly / Site Evacuation Procedure **and DISPATCH** personnel with bullhorns to make announcements should plant PA fail.

RECORD time of Alarm / PA Announcement:

RECORD time Accountability Completed:

RECORD Number of persons "Unaccounted For":

- I. **DIRECT** performance of required NRC notifications immediately following notification of the appropriate State and local agencies but **not** later than (1) hour after the time of classification per the Notifications procedure.

Notification Procedure:

Notification form:

- J. **GO TO** step 1.5 of this Checklist.



Tab 3

Tab 4

Tab 21



Tab 5

Tab 22 (Mid-Atlantic only)



Tab 20

Tab 10



SHIFT EMERGENCY DIRECTOR CHECKLIST

1.4. If the event is classified as a General Emergency, then **PERFORM** the following:

A. **ANNOUNCE** the event classification, possible escalation paths, and declaration time to the Control Room staff.

☐

B. **RECORD** the EAL, threshold(s) (as applicable) and declaration time.

EAL

EAL Threshold(s) (as applicable)

Declaration Time

C. For Security events:

1) If the Security Event information was received by a source other than the NRC, then **ENSURE** expedited NRC notification is made within 15 minutes of receiving the threat using appropriate station procedures.

☐

2) **USE** site-specific Operations/Security procedures for announcements and **CONSIDER** the limitations the threat poses on personnel movement with Security prior to sounding alarms or making announcements.

☐

D. For Security events **USE** site-specific Operations/Security procedures for announcements and **CONSIDER** the limitations the threat poses on personnel movement with Security prior to sounding alarms or making announcements.

☐

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

☐

Tab 1

Time:

F. 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 Alternative Facility Response," as appropriate, per EP-AA-112-100-F-06.

☐

Tab 2

Time:

SHIFT EMERGENCY DIRECTOR CHECKLIST

- G. **DETERMINE** the PAR per the Emergency Classification and Protective Action Recommendations procedure.



Emergency Classification and PAR Procedure:

Tab 6

PAR Flowchart:

Tab 7

NOTE: If a higher classification is made prior to transmitting an event notification, notification for the higher classification can supersede the previous event notification, provided that it can be performed within the 15 minute timeframe of the previous event

If the notification of a higher classification **cannot** be performed within the 15-minute timeframe of the previous event, the previous event notification is required within its 15 minute timeframe, and the subsequent event notification is required within its 15-minute timeframe.

- H. **DIRECT** performance of State/Local notifications within 15 minutes of the event classification as required per the Notifications procedure.



Notification Procedure:

Tab 3

Notification form:

Tab 4

Release In Progress Determination Guidance:

Tab 21

- I. If the event is based on a Security Threat **or** other hazardous condition (i.e. hazardous condition from a nearby industrial facility, radiological, or severe weather conditions), **then CONSIDER** the limitations on performing (or **not** performing) accountability and/or evacuation.



- J. If accountability **or** site evacuation has **not** been performed **then DIRECT** Accountability per the Assembly / Site Evacuation Procedure **and DISPATCH** personnel with bullhorns to make announcements should plant PA fail.



Tab 5

Tab 22 (Mid-Atlantic only)

RECORD time of Alarm / PA Announcement:

RECORD time Accountability Completed at (time):

RECORD the Number of persons "Unaccounted For":

EMERGENCY PUBLIC ADDRESS ANNOUNCEMENTS**4. GENERAL EMERGENCY****OYSTER CREEK / PEACH BOTTOM / TMI**

- 4.1. **SOUND** the Station Emergency Alarm or equivalent prior to making announcements.

(Ini.)

- 4.2. **PERFORM** one of the following **and IMPLEMENT** PA speaker compensatory actions for the affected areas:

- A. **If** facility staffing has **not** been initiated and Accountability has **not** occurred, **then MAKE** the following Public Address system announcements:

"Attention ALL personnel. A General Emergency has been declared due to

(Brief Description)

Emergency Response Organization members report to your respective emergency response facilities. Other station personnel, contractors and visitors standby to implement personnel accountability instructions."

(Ini.)

REPEAT the announcement.

OR

(Time)

(step continued on next page)

**ERO NOTIFICATION OR AUGMENTATION**

The automated system will initiate the call out of management and bargaining unit personnel required to meet the ERO staffing requirements. Additional staffing of personnel shall be the responsibility of the individual Managers and Directors in the TSC / OSC / EOF / ENC / JIC following initial activation of those facilities.

Section 1 – Initiate Activation / Termination of Notification System using World Wide Web

Section 2 – Initiate Activation / Termination of Notification System using live Everbridge Agent

Section 3 – Initiate Activation / Termination of Notification System using a Standard Phone

Section 4 – Initiate Activation of Alternate Notification System using World Wide Web

Section 5 – Initiate Activation of Alternate Notification System using a Standard Phone

Section 6 – Initiate Activation / Termination of Notification System using Station-applicable Call Trees

1. **INITIATE ACTIVATION / TERMINATION OF NOTIFICATION SYSTEM
USING THE WORLD WIDE WEB**

1.1. **CIRCLE** the appropriate station specific User Name and Station Password number from the table below.



Station	User Name	Password
Braidwood	braidwood3	simulator01#
Byron	blackhawk3	simulator02#
Clinton	clinton3	simulator03#
Dresden	dresden3	simulator04#
LaSalle	lasalle3	simulator05#
Limerick	limerick3	simulator06#
Oyster Creek	oystercreek3	simulator07#
Peach Bottom	peachbottom3	simulator08#
Quad Cities	quadcities3	simulator09#
TMI	threemileisland3	simulator10#

ERO NOTIFICATION OR AUGMENTATION

1.2. CIRCLE the appropriate Activation / Termination Scenario event from the table below.					<input type="checkbox"/>
01 - Actual Event Respond to Facility For Alert, Site Area, or General Emergency, or Security Events with On Site ERO reporting *Optional for all other unusual Events	02 -Unusual Event Unusual Events excluding Security Events (HU1) CM-1	03 - Actual Event Alternative Facility Response For Events with Off Site ERO reporting location requirements as determined by the Emergency Director	04 - Event Termination Notification to all ERO Members, Station Management and EOF Responders that event has been terminated.	05 - Activation Cancellation Notification to all ERO Members, Station Management and EOF Responders that activation has been cancelled.	

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Page 1
Initial Protective Action Recommendation ONLY

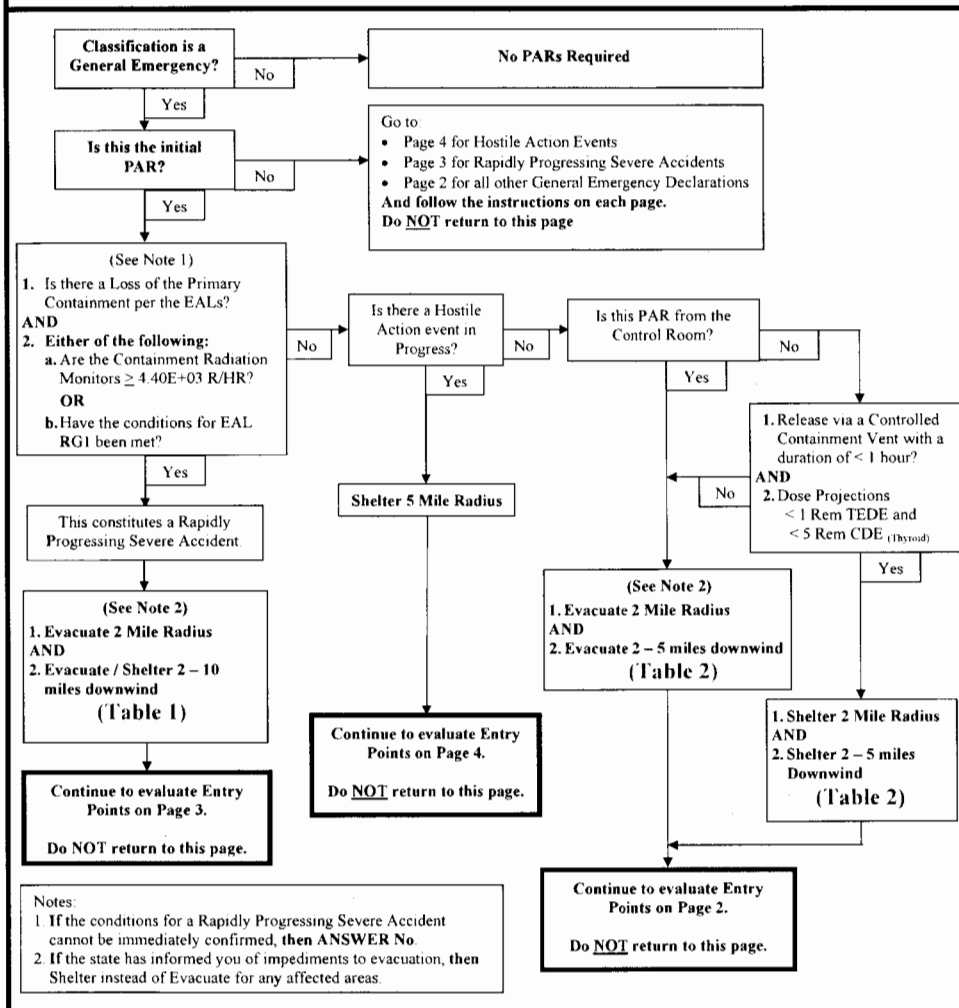


Table 1

WD From			Evacuate 2 – 5 Miles	Shelter 2 – 5 Miles	Shelter 5 – 10 Miles
350°	to	011°	ESE / SE / SSE / S / SSW / SW / WSW		ESE / SE / SSE / S / SSW / SW / WSW
012°	to	034°	SE / SSE / S / SSW / SW / WSW	W	SE / SSE / S / SSW / SW / WSW / W
035°	to	056°	SSE / S / SSW / SW / WSW	W / WNW	SSE / S / SSW / SW / WSW / W / WNW
057°	to	079°	S / SSW / SW / WSW	W / WNW / NW	S / SSW / SW / WSW / W / WNW / NW
080°	to	101°	SSW / SW / WSW	W / WNW / NW / NNW	SSW / SW / WSW / W / WNW / NW / NNW
102°	to	124°	SW / WSW / N	W / WNW / NW / NNW	SW / WSW / W / WNW / NW / NNW / N
125°	to	146°	WSW / N / NNE	W / WNW / NW / NNW	WSW / W / WNW / NW / NNW / N / NNE
147°	to	169°	N / NNE / NE	W / WNW / NW / NNW	W / WNW / NW / NNW / N / NNE / NE
170°	to	191°	N / NNE / NE / ENE	WNW / NW / NNW	WNW / NW / NNW / N / NNE / NE / ENE
192°	to	214°	N / NNE / NE / ENE / E	NW / NNW	NW / NNW / N / NNE / NE / ENE / E
215°	to	237°	N / NNE / NE / ENE / E / ESE	NNW	NNW / N / NNE / NE / ENE / E / ESE
238°	to	259°	N / NNE / NE / ENE / E / ESE / SE		N / NNE / NE / ENE / E / ESE / SE
260°	to	281°	NNE / NE / ENE / E / ESE / SE / SSE		NNE / NE / ENE / E / ESE / SE / SSE
282°	to	304°	NE / ENE / E / ESE / SE / SSE / S		NE / ENE / E / ESE / SE / SSE / S
305°	to	326°	ENE / E / ESE / SE / SSE / S / SSW		ENE / E / ESE / SE / SSE / S / SSW
327°	to	349°	E / ESE / SE / SSE / S / SSW / SW		E / ESE / SE / SSE / S / SSW / SW

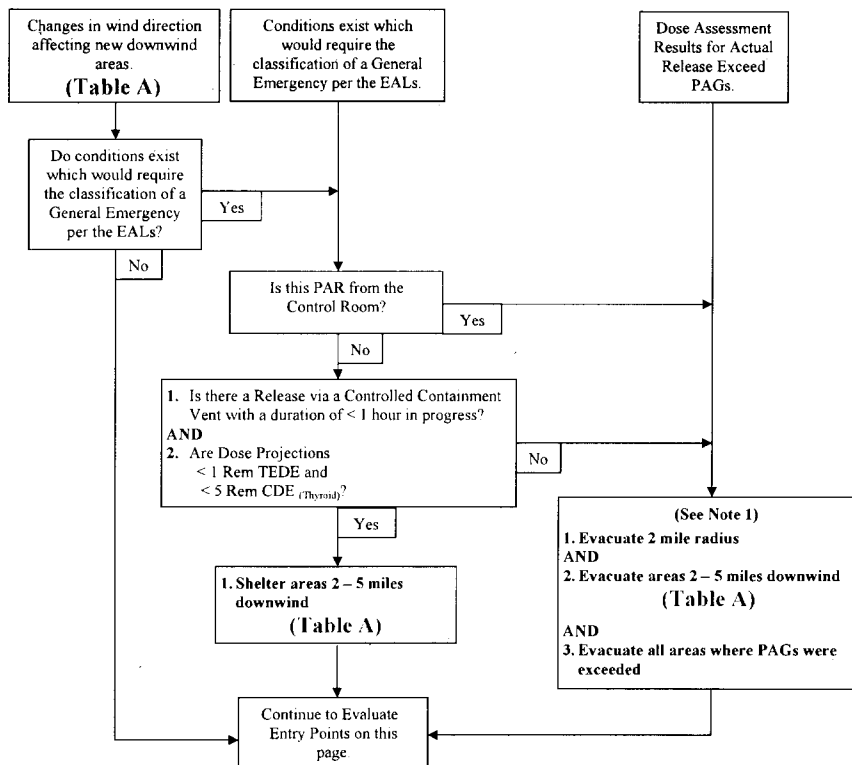
Table 2

WD From			Sectors
350°	to	011°	ESE / SE / SSE / S / SSW / SW / WSW
012°	to	034°	SE / SSE / S / SSW / SW / WSW / W
035°	to	056°	SSE / S / SSW / SW / WSW / W / WNW
057°	to	079°	S / SSW / SW / WSW / W / WNW / NW
080°	to	101°	SSW / SW / WSW / W / WNW / NW / NNW
102°	to	124°	SW / WSW / W / WNW / NW / NNW / N
125°	to	146°	WSW / W / WNW / NW / NNW / N / NNE
147°	to	169°	W / WNW / NW / NNW / N / NNE / NE
170°	to	191°	WNW / NW / NNW / N / NNE / NE / ENE
192°	to	214°	NW / NNW / N / NNE / NE / ENE / E
215°	to	237°	NNW / N / NNE / NE / ENE / E / ESE
238°	to	259°	N / NNE / NE / ENE / E / ESE / SE
260°	to	281°	NNE / NE / ENE / E / ESE / SE / SSE
282°	to	304°	NE / ENE / E / ESE / SE / SSE / S
305°	to	326°	ENE / E / ESE / SE / SSE / S / SSW
327°	to	349°	E / ESE / SE / SSE / S / SSW / SW

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Page 2
All Other General Emergencies



- Notes:
- If the state has informed you of impediments to evacuation, then:
 - Shelter instead of Evacuate for any **newly** affected area
 - Maintain sheltering for all currently sheltered areas.
 - Do NOT reduce any previously evacuated areas to shelter.

Table A

WD (from)			Sectors
350°	to	011°	SSE / S / SSW
012°	to	034°	S / SSW / SW
035°	to	056°	SSW / SW / WSW
057°	to	079°	SW / WSW / W
080°	to	101°	WSW / W / WNW
102°	to	124°	W / WNW / NW
125°	to	146°	WNW / NW / NNW
147°	to	169°	NW / NNW / N
170°	to	191°	NNW / N / NNE
192°	to	214°	N / NNE / NE
215°	to	237°	NNE / NE / ENE
238°	to	259°	NE / ENE / E
260°	to	281°	ENE / E / ESE
282°	to	304°	E / ESE / SE
305°	to	326°	ESE / SE / SSE
327°	to	349°	SE / SSE / S

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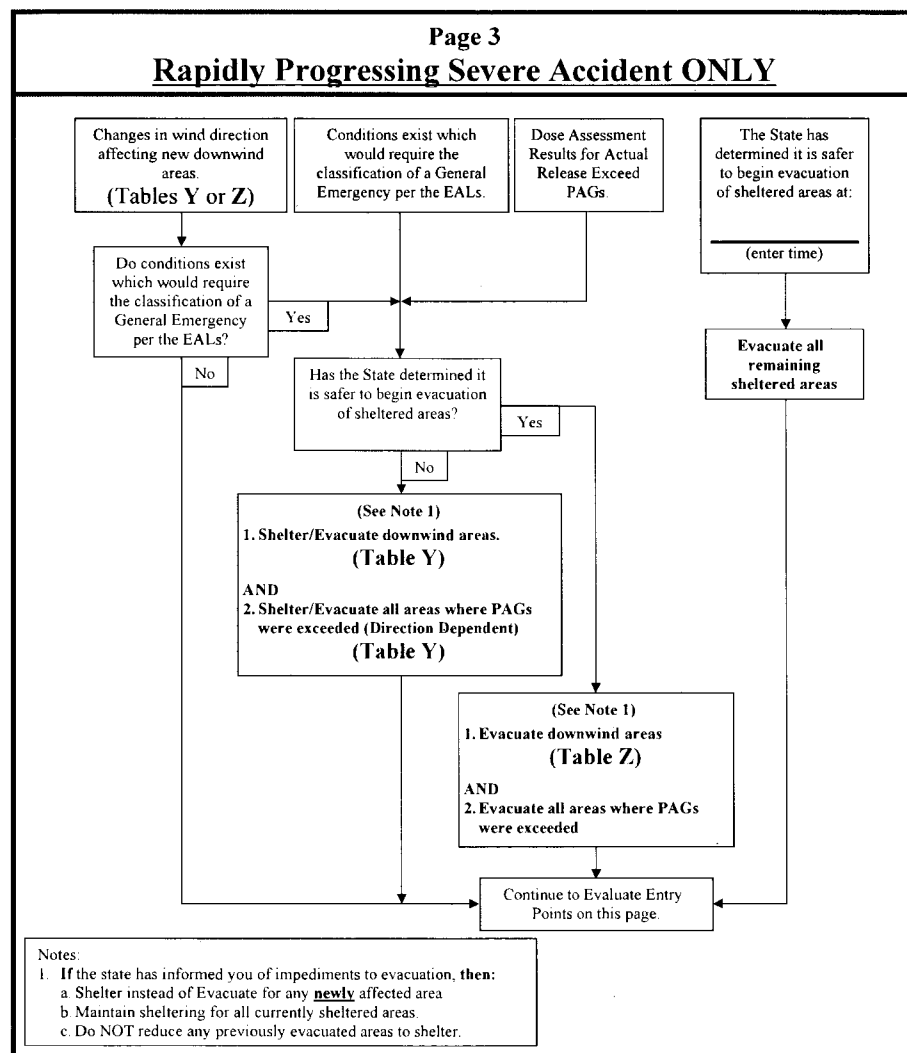
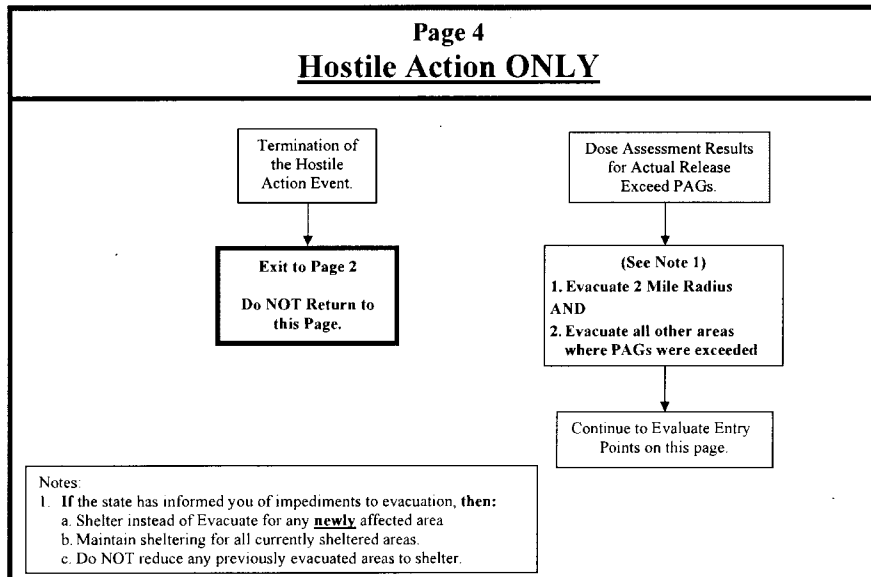


Table Y
State HAS NOT Determined it is Safer to Begin Evacuation of Sheltered Areas

WD From			Evacuate 2 – 5 Miles	Shelter 2 – 5 Miles	Shelter 5 – 10 Miles
350°	to	011°	SSE / S / SSW		SSE / S / SSW
012°	to	034°	S / SSW / SW		S / SSW / SW
035°	to	056°	SSW / SW / WSW		SSW / SW / WSW
057°	to	079°	SW / WSW / W	W	SW / WSW / W
080°	to	101°	WSW	W / WNW	WSW / W / WNW
102°	to	124°		W / WNW / NW	W / WNW / NW
125°	to	146°		WNW / NW / NNW	WNW / NW / NNW
147°	to	169°	N	NW / NNW	NW / NNW / N
170°	to	191°	N / NNE	NNW	NNW / N / NNE
192°	to	214°	N / NNE / NE		N / NNE / NE
215°	to	237°	NNE / NE / ENE		NNE / NE / ENE
238°	to	259°	NE / ENE / E		NE / ENE / E
260°	to	281°	ENE / E / ESE		ENE / E / ESE
282°	to	304°	E / ESE / SE		E / ESE / SE
305°	to	326°	ESE / SE / SSE		ESE / SE / SSE
327°	to	349°	SE / SSE / S		SE / SSE / S

Table Z
State HAS Determined it is Safer to Begin Evacuation of Sheltered Areas

WD From			Evacuate 2 – 10 miles
350°	to	011°	SSE / S / SSW
012°	to	034°	S / SSW / SW
035°	to	056°	SSW / SW / WSW
057°	to	079°	SW / WSW / W
080°	to	101°	WSW / W / WNW
102°	to	124°	W / WNW / NW
125°	to	146°	WNW / NW / NNW
147°	to	169°	NW / NNW / N
170°	to	191°	NNW / N / NNE
192°	to	214°	N / NNE / NE
215°	to	237°	NNE / NE / ENE
238°	to	259°	NE / ENE / E
260°	to	281°	ENE / E / ESE
282°	to	304°	E / ESE / SE
305°	to	326°	ESE / SE / SSE
327°	to	349°	SE / SSE / S





STATE/LOCAL EVENT NOTIFICATION FORM

(OR ELECTRONIC FACSIMILE)

UTILITY MESSAGE NO. _____ EMERGENCY DIRECTOR APPROVAL: _____

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

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

STATE/LOCAL EVENT NOTIFICATION FORM**Block 11: PROTECTIVE ACTION RECOMMENDATION:**☐ A- NONE (Proceed to Box 12)

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

☐ B- The PROTECTIVE ACTION RECOMMENDATION (PAR) from the utility is:**S = Shelter E = Evacuate**[S / E] 360 DEGREES FROM 0 MILES (SITE BOUNDARY) TO 2 MILES**AND**THE FOLLOWING SECTORS FROM 2 MILES TO 5 MILES:

[S / E] N	[S / E] E	[S / E] S	[S / E] W
[S / E] NNE	[S / E] ESE	[S / E] SSW	[S / E] WNW
[S / E] NE	[S / E] SE	[S / E] SW	[S / E] NW
[S / E] ENE	[S / E] SSE	[S / E] WSW	[S / E] NNW

ANDTHE FOLLOWING SECTORS FROM 5 MILES TO 10 MILES:

[S / E] N	[S / E] E	[S / E] S	[S / E] W
[S / E] NNE	[S / E] ESE	[S / E] SSW	[S / E] WNW
[S / E] NE	[S / E] SE	[S / E] SW	[S / E] NW
[S / E] ENE	[S / E] SSE	[S / E] WSW	[S / E] NNW

AND

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

ANDThis Protective Action Recommendation **[IS]** **[IS NOT]** the result of a Rapidly Progressing Severe Accident**Block 12: CONCLUSION**

The current Time is _____. Date: _____

Block 13: COMMUNICATOR INFORMATION☐ This is a DRILL☐ This is an ACTUAL EVENT

NAME: _____

CALL BACK NUMBER _____

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

"15 Minute Notifications"
PEACH BOTTOM (833)

"Notification Line": Dial "833" for conference call. Stay on the line until agencies come on

"3 Digit Extensions": Make these calls from 3-digit lines.

"Commercial # From PBAPS": Make these calls from a 4-digit line. Dial "1-Area Code-Number"

"Commercial # From 3-digit lines": Dial "7-1-1-Area Code-Number"

Initial Roll Call

(Time Contacted: 24-hour clock)

Final Roll Call

(√)

_____ **Pennsylvania EMA** ☐
 Ext. 216 or 1-800-424-7362 /
 1-717-651-2001

_____ **Maryland EMA** ☐
 Ext. 205 or 1-410-517-3600

_____ **York County** ☐
 Ext. 219 or 1-717-854-5571

_____ **Harford County** ☐
 Ext. 214 or 1-410-638-3400 /
 1-410-638-4900

_____ **Cecil County** ☐
 Ext. 234 or 1-410-392-2010

_____ **Lancaster County** ☐
 Ext. 217 or 1-800-808-5236 /
 1-717-664-1190

_____ **Chester County** ☐
 Ext. 218 or 1-610-344-5100

_____ **Initial Roll Call Completed**

FOLLOW-UP NOTIFICATIONS *
(PEACH BOTTOM ONLY)

[] **Maryland Dept. of the Environment**
 Emergency ext. 292 or 235
 1-866-633-4686

Contacted at: _____ (time: 24-hour clock)

[] **PA State Police, York Barracks**

Ext. 284 or 1-717-428-1011

Contacted at: _____ (time: 24-hour clock)

* NOT required within 15 minutes of Classification

"15 Minute Notifications"
LIMERICK (841)

Initial Roll Call

(Time Contacted: 24-hour clock)

Final Roll Call

(√)

_____ **Pennsylvania EMA** ☐
 Ext. 116 or 1-800-424-7362 or
 1-717-651-2001

_____ **Montgomery County** ☐
 Ext. 117 or 1-610-631-6541

_____ **Chester County** ☐
 Ext. 118 or 1-610-344-5100

_____ **Berks County** ☐
 Ext. 119 or 1-610-655-4931

_____ **Initial Roll Call Completed**

"15 Minute Notifications"
TMI (44)

"Notification Line": Dial "44" for all-call. If necessary, dial 3-digit extension #'s to notify individual agencies

Commercial or Toll-Free # From TMI: Dial the #'s as they appear below

Commercial or Toll-Free # From EOF: Dial "9" and the #'s as they appear below

Initial Roll Call

(Time Contacted: 24-hour clock)

Final Roll Call

(√)

_____ **Pennsylvania EMA** ☐
 Ext. 315 or 1-800-424-7362 or
 1-717-651-2001

_____ **Cumberland County** ☐
 Ext. 319 or 1-717-238-9676, 1-717-243-4121
 or 1-717- 532-8878

_____ **Lebanon County** ☐
 Ext. 321 or 1-717-272-2025 / -7621 / -2054

_____ **Lancaster County** ☐
 Ext. 318 or 1-717-664-1190 / -1200

_____ **York County** ☐
 Ext. 317 or 1-717-854-5571, 1-717-840-2955
 or 1-800-427-8347

_____ **Dauphin County** ☐
 Ext. 320 or 1-717-558-6900

_____ **Initial Roll Call Completed**

FOLLOW-UP NOTIFICATIONS * (TMI)

[] **York Haven Power Station**

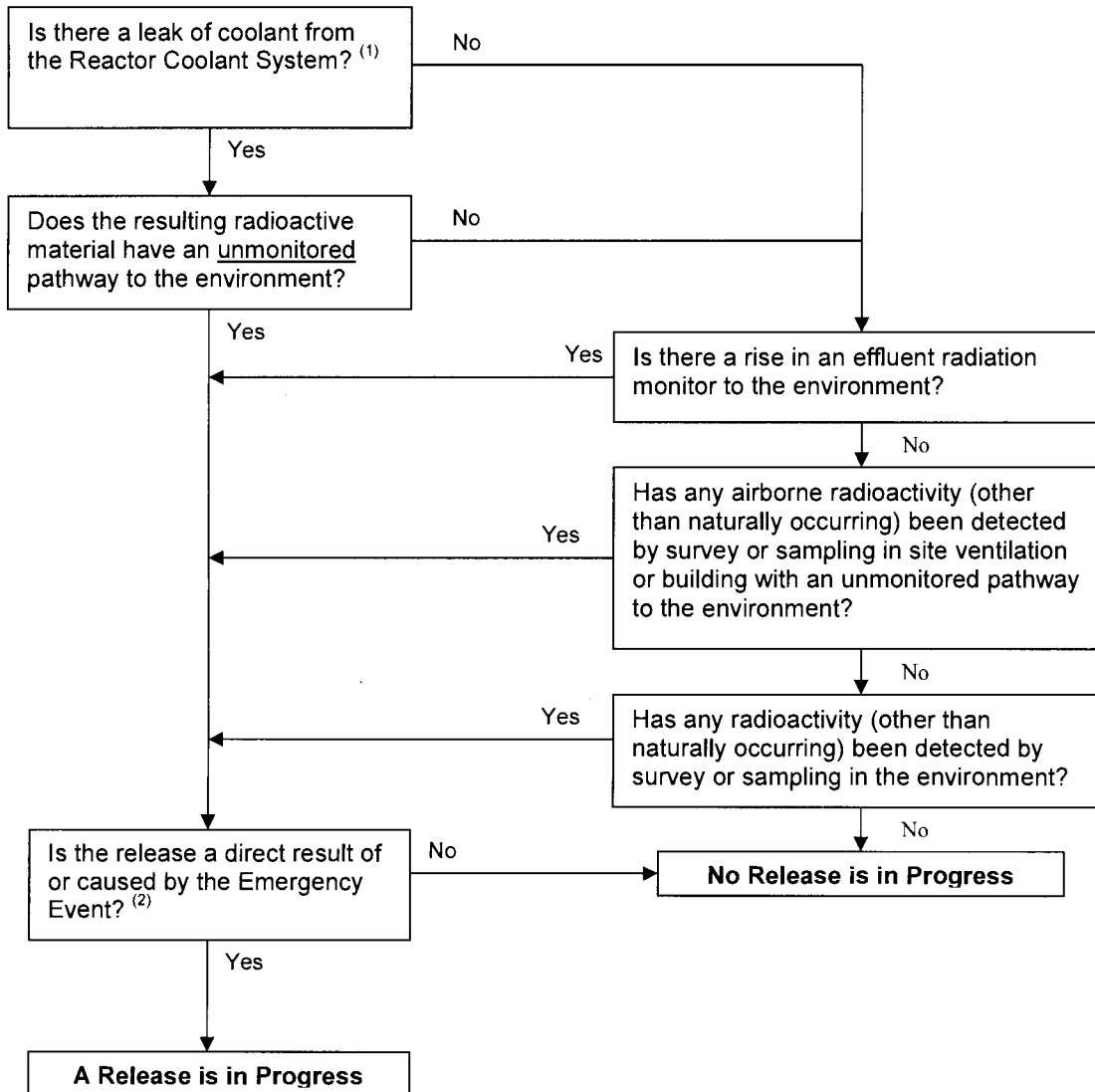
1-717-266-3654 or 1-717-818-3962

Contacted at: _____ (time: 24-hour clock)

Nuclear PWR RELEASE IN PROGRESS DETERMINATION GUIDANCE PWR Airborne

An “**Airborne**” release due to the event is defined as:

Any airborne radioactive release (Particulate, Iodine or Noble Gas) that is a result of, or caused by, the emergency event. A steam release from a PWR secondary system is not considered a release in progress unless a pathway for reactor coolant to the secondary side to the offsite environment is present.

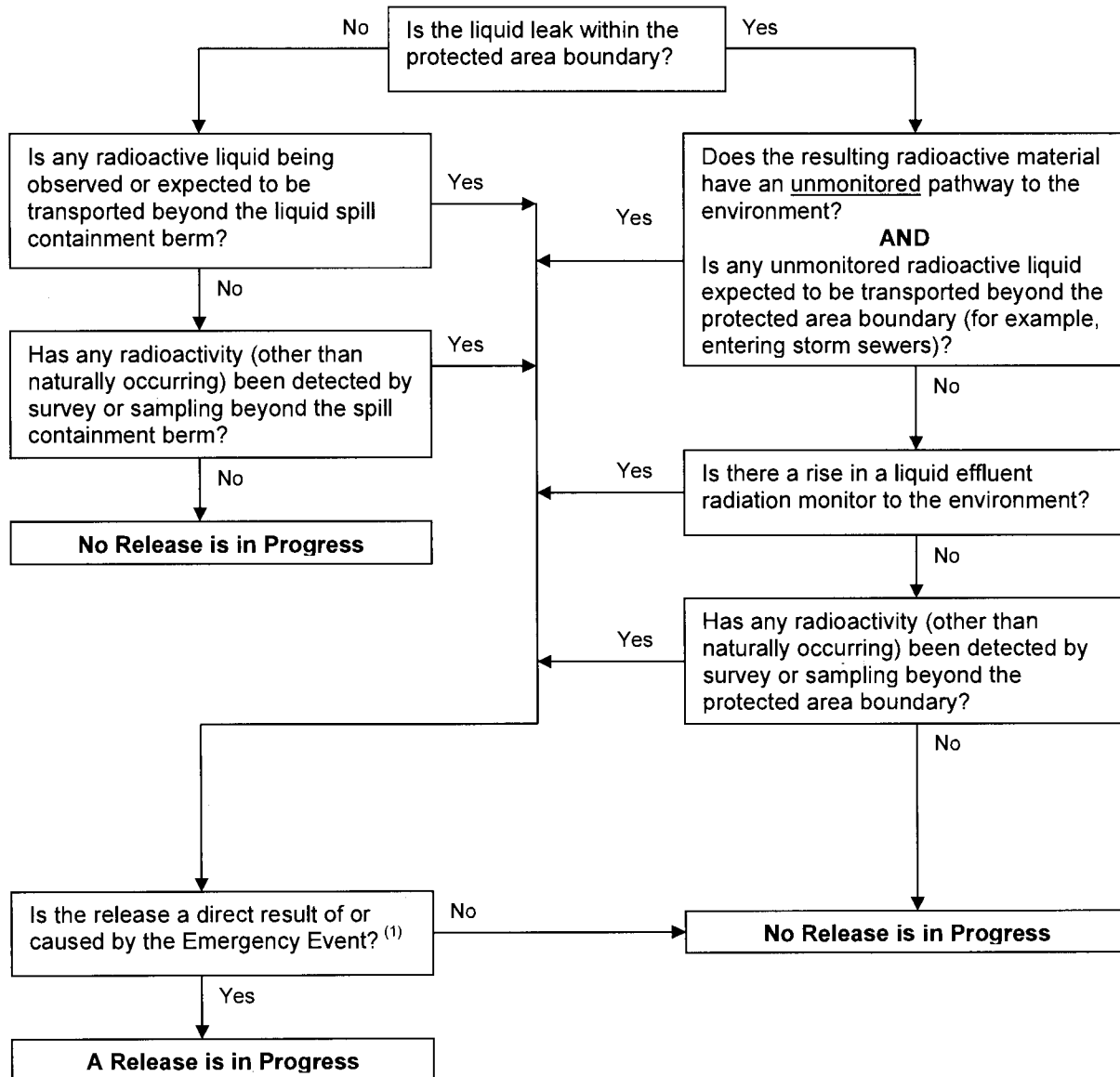


1. For release determination, a loss or leak from a barrier is NOT equivalent to the Potential Loss or Loss as determined by the EAL Fission Product Barrier matrix.
2. If a release of radioactivity is identified, then it must be a direct result of, or caused by, the classified or a concurrent emergency event and not attributed to the normal operation or shutdown of plant systems to be considered a "Release in Progress."

PWR RELEASE IN PROGRESS DETERMINATION GUIDANCE**Liquid**

A “**Liquid**” release due to the event is defined as:

The movement of radioactive liquid beyond the protected area boundary or beyond a spill berm for liquid storage outside of the protected area, that is a result of, or caused by, the emergency event



1. If a release of radioactivity is identified, then it must be a direct result of, or caused by, the classified or a concurrent emergency event and not attributed to the normal operation or shutdown of plant systems to be considered a “Release in Progress.”

Facility: THREE MILE ISLAND Task No.: 21101013

Task Title: Emergency Borate Using the BAMT as the Source – Alternate Path JPM No.: ILT 16-01 NRC JPM A

K/A Reference: 004 A2.14 3.8/3.9 Bank JPM: TQ-TM-104-211-J110

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 plant is stable post trip, with one control rod stuck out.
- You are the URO
- The examiner will act as the CRS and ARO
- The booth operator will be the Auxiliary Operator

Task Standard: Initiate an alternate method of emergency boration.

Required Materials:

- OP-TM-EOP-010, 'Emergency Procedure Rules, Guides and Graphs', Rev 19.

General References:

- OP-TM-EOP-010, 'Emergency Procedure Rules, Guides and Graphs', Rev 19.

Initiating Cue: As the URO, Initiate Emergency Boration IAW Rule 5, Emergency Boration

Time Critical Task: No

Validation Time: 4 minutes

SIMULATOR SETUP

1. Reset the simulator to IC 246 or similar 100% IC.
2. Run the setup:
 - Initialize the simulator and go to run.
 - INSERT malfunction **RD0202** IMMEDIATELY, stuck rod Group 4.
 - OVERRIDE **MU-V-14B** Open Pushbutton to **OFF**
 - 02A5S77-ZDIPBOMUV14B
 - TRIP the Rx and carry out immediate manual actions.
 - Stabilize the plant post trip
 - INSERT malfunction MUR69, MU-V-14A Breaker Open
 - MONITOR:
 - **MUMMT** – Make Up Tank Mass
 - **MUBMUT1** – Make Up Tank Boron Concentration
3. When the above steps are completed for this and other JPMs to be run concurrently then validate, if not previously validated, the concurrently run JPMs using the JPM Validation Checklist.
4. This completes the setup for this JPM.

PERFORMANCE INFORMATION

(Denote Critical Steps with a check mark)

START TIME: _____

EVALUATORS CUE: As the CRS, direct the examinee to initiate Emergency Boration IAW Rule 5.

OP-TM-EOP-010, Rule 5, Step 1

Performance Step: 1 **WAAT** one of the following conditions exist:

- 1% dk/k SHUTDOWN has been achieved for the expected plant condition IAW Figure 10 of OP-TM-300-000, "Reactivity and Power Distribution Calculations", **or** OP-TM-300-205, "Shutdown Margin for Hot Shutdown Conditions", **or** OP-TM-300-206, "Shutdown Margin for Low Temperature Conditions."
- LPI > 1250 gpm per line
- Tavg > 525 °F and stable or rising **and** all Control Rods are inserted, and Neutron flux is lowering as expected.

then emergency boration **may** be terminated.

Standard: The examinee will read the step, and leave it open. It will be not applicable for this JPM.

Comment:

OP-TM-EOP-010, Rule 5, Step 2

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

Standard: Examinee verifies that MU-P-1B is operating.

Comment:

BOOTH CUE: If the examinee contacts the Primary AO to Manually open MU-V-14A/B, wait 10 seconds and report that MU-V-14A/B will not manually operate.

PERFORMANCE INFORMATION

OP-TM-EOP-010, Rule 5, Step 3

Performance Step: 3 Perform one of the following:

- **OPEN** MU-V-14A,

Standard: Examinee recognizes MU-V-14A does not have power.

Comment:

OP-TM-EOP-010, Rule 5, Step 3

Performance Step: 4 Perform one of the following:

- **OPEN** MU-V-14B,

Standard: Examinee presses the MU-V-14B Open PB. Examinee diagnoses that MU-V-14B is not opening and informs the CRS.

Comment:

OP-TM-EOP-010, Rule 5, Step 3

Performance Step: 5 Perform one of the following:

- **PERFORM** Guide 1 "Emergency Boration Backup Methods."

Standard: Examinee goes to GUIDE 1 to perform Emergency Boration

Comment:

Alternate Path Begins

EXAMINER CUE:

If the examinee asks the backup Emergency Boration source, inform them that the BAMT is the source.

PERFORMANCE INFORMATION

OP-TM-EOP-010, Guide 1, Step A.1

- √ **Performance Step: 6** If the backup Emergency Boration source is the BAMT, then perform the following:

OPEN MU-V-51

Standard: Examinee pushes the open pushbutton for MU-V-51 and observes the red "open" light comes on and the green "close" light goes out.

Comment:

OP-TM-EOP-010, Guide 1, Step A.2

- √ **Performance Step: 7** **START** boric acid pumps CA-P-1A and CA-P-1B

Standard: Examinee starts CA-P-1A by turning the control switch to the start position and observes the red light comes on and the green light goes out pump.

Examinee starts CA-P-1B by turning the control switch to the start position and observes the red light comes on and the green light goes out pump

Comment:

Terminating Cue: Once MU-V-51 is open and CA-P-1A and 1B are running, the JPM can be terminated.

STOP TIME: _____

VERIFICATION OF COMPLETION

Job Performance Measure No.: ILT 16-01 NRC JPM A

Examinee's Name:

Date Performed:

Facility Evaluator:

Number of Attempts:

Time to Complete:

Question Documentation:

Question:

Response:

Result: SAT _____ UNSAT _____

Examiner's Signature: _____ Date: _____

- INITIAL CONDITIONS:
- The plant is stable post trip, with one control rod stuck out.
 - You are the URO
 - The examiner will act as the CRS and ARO
 - The booth operator will be the Auxiliary Operator

INITIATING CUE: As the URO, Initiate Emergency Boration IAW Rule 5, Emergency Boration

TIME CRITICAL: No

5

EB

RULE 5
EMERGENCY BORATION

IAAT any of the following conditions exist:

- Emergency boration is directed by procedure,
- Reactor is shutdown **and** all control rods are **not** fully inserted,
- Reactor is shutdown **and** Neutron flux is **not** lowering as expected,

then Emergency Borate as follows:

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
<p>1. WAAT <u>one</u> of the following conditions exist:</p> <ul style="list-style-type: none"> – 1% dk/k SHUTDOWN has been achieved for the expected plant condition IAW the Reactivity Data Sheet, or OP-TM-300-205, "Shutdown Margin for Hot Shutdown Conditions", or OP-TM-300-206, "Shutdown Margin for Low Temperature Conditions". – LPI > 1250 gpm per line – Tavg > 525 °F and stable or rising and <u>all</u> Control Rods are inserted, and Neutron flux is lowering as expected. <p>then emergency boration may be terminated.</p>	
<p>2. VERIFY a MU pump is operating.</p>	<p>INITIATE OP-TM-AOP-041 "Loss of Seal Injection".</p>

CONTINUED (over)

5

EB

OP-TM-EOP-010

Revision 19

Page 11 of 40

RULE 5
EMERGENCY BORATION

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
<p>3. Perform <u>one</u> of the following:</p> <ul style="list-style-type: none">– OPEN MU-V-14A,– OPEN MU-V-14B,– PERFORM Guide 1 "Emergency Boration Backup Methods".	
<p>4. VERIFY Total Injection (MU, SI and HPI) > 50 gpm.</p>	<p>1. INITIATE OP-TM-211-950, "Restoration of Letdown Flow".</p> <p>2. INITIATE OP-TM-211-441, "Increased Letdown Flowrates".</p>
<p>5. STOP any activities which may be diluting RCS boron concentration.</p>	
<p>6. If SCM > 25 °F and neutron flux indication is rising, then STABILIZE RCS temperature.</p>	

GUIDE 1
EMERGENCY BORATION BACKUP METHODS

Page 1 of 1

- ___ If required per Rule 5, **then** perform either A or B.
- ___ A. If the backup Emergency Boration source is the BAMT, **then** perform the following:
- ___ 1. **OPEN** MU-V-51.
- ___ 2. **START** boric acid pumps CA-P-1A and CA-P-1B.
- ___ B. If Backup Emergency Boration source is the RBAT, **then** perform the following:
- ___ 1. **POSITION** the "Boric Acid Injection" switch to "INJECT" (opens WDL-V-61).
- ___ 2. **MAXIMIZE** the Batch Size **and SELECT** Run on the totalizer batch controller.
- ___ 3. **OPEN** MU-V-10.
- ___ 4. If using the 'A' RBAT, **then** perform the following:
- (At Radwaste Panel in the Auxiliary Building),
- ___ a) **OPEN** WDL-V-89.
- ___ b) **OPEN** WDL-V-49.
- ___ c) **CLOSE** WDL-V-93.
- ___ d) **ENSURE** boric acid recycle pump WDL-P-13A is running.
- ___ 5. If using the 'B' RBAT, **then** perform the following:
- (At Radwaste Panel in the Auxiliary Building),
- ___ a) **OPEN** WDL-V-92.
- ___ b) **OPEN** WDL-V-50.
- ___ c) **CLOSE** WDL-V-94.
- ___ d) **ENSURE** boric acid recycle pump WDL-P-13B is running.

Facility: THREE MILE ISLAND Task No.: 21101009

Task Title: Restoration of Letdown Flow
Following Temperature Closure of
MU-V-3 JPM No.: ILT 16-01 NRC JPM B

K/A Reference: 002 A1.02 3.6/3.9 Bank JPM: TQ-TM-104-211-J100

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:
- 100% power
 - You are the ARO
 - The examiner will act as the CRS
 - The booth operator will be the Auxiliary Operator
 - MU-V-3 has automatically closed on high temperature due to problems while back-washing the ICCW coolers.
 - Surveillance is complete, and ICCW flow to the letdown coolers has been returned to normal.
 - Letdown line to the makeup tank has been assessed for integrity issues, SAT.
 - All radiation monitoring indicates normal.
 - The Shift Manager has given permission to re-open containment isolation valves.

Task Standard: Once letdown flow is established, and the examinee demonstrates the ability to control raising letdown at < 2.5 gpm/min, the JPM can be terminated.

- Required Materials:
- OP-TM-211-950, Rev 7, 'Restoration of Letdown Flow'
 - OP-TM-541-461, Rev 10, 'IC & NS Temperature Control'

- General References:
- OP-TM-211-950, Rev 7, 'Restoration of Letdown Flow'
 - OP-TM-541-461, Rev 10, 'IC & NS Temperature Control'

Initiating Cue: The CRS directs you to restore Letdown flow in accordance with OP-TM-211-950, "Restoration of Letdown Flow"

Time Critical Task: No

Validation Time: 18 minutes

SIMULATOR SETUP

1. Reset the simulator to IC16 or Temporary IC 247

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

2. Place the simulator in "RUN".
3. Insert:
 - A. Remote **MUR01** to OPEN on Event #1.
 - B. Remote **MUR89** to BYPASS on immediately.
 - C. Remote **MUR90** to BYPASS on immediately.
4. Secure BOTH ICCW Pumps in PTL.
5. When MAP D-2-1, LETDOWN CLRS OUTLET TEMP HI, is received, ensure MU-V-3, Letdown Isolation Valve (CIV) closes. Verify "closed" indication on CC and PCR for MU-V-3.
6. Once MAP D-2-1 is received and MU-V-3 is verified closed, restart ICCW pump 1A and place ICCW pump 1B in NAS.
7. Pull CRDM Stator temperatures on STA PPC Screens (Area 10, Groups 31-37)
8. Restore letdown until temperature is ~145F @ MU-TS-1&2. Allow MU-V-3 to close.
9. Freeze the simulator.
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. 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.

PERFORMANCE INFORMATION

(Denote Critical Steps with a check mark)

START TIME: _____

EVALUATORS CUE: Direct the examinee to restore letdown to 70 gpm, in accordance with OP-TM-211-950, 'Restoration of Letdown Flow'

OP-TM-211-950, Step 3.3.1

Performance Step: 1 **VERIFY** ICCW flow > 550 GPM.

Standard: Examinee verifies ICCW flow is >550 gpm on the total flow indicator on Console Right.

Comment:

OP-TM-211-950, Step 3.3.2

Performance Step: 2 **VERIFY** the following valves are Open:

- IC-V-2
- IC-V-3
- IC-V-4

Standard: Examinee verifies IC-V-2, IC-V-3 and IC-V-4 are open verifying amber indication for the valves on PCR.

Comment:

PERFORMANCE INFORMATION

OP-TM-211-950, Step 3.3.3

Performance Step: 3 **VERIFY** any of the following:

- ESAS defeated.
- ESAS did not actuate.
- AOP-046 was entered.

Standard: Examinee verifies that ESAS did not actuate by verifying ESAS is reset on CC and CR using PCR indications.
Other two conditions are N/A

Comment:

OP-TM-211-950, Step 3.3.4

Performance Step: 4 **VERIFY** ICCW cooler outlet temperature < 100°F.

Standard: Examinee verifies ICCW cooler outlet temperature is <100°F using the temperature indication on CR.

Comment:

EXAMINER NOTE: If the examinee asks or requests CRD temperatures, inform the examinee the STA will monitor CRD Temperatures.

OP-TM-211-950, Step 3.3.5

Performance Step: 5 **VERIFY** all CRD stator temperatures < 160°F or reactor is shutdown.

Standard: Verifies on PPC that CRDM temperatures are < 160°F

Comment:

EXAMINER CUE: If the examinee asks if RM-L-1 has alarmed inform them that it has NOT alarmed.

PERFORMANCE INFORMATION

OP-TM-211-950, Step 3.3.6**Performance Step: 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.

Standard:

Examinee verifies RM-L-1 has not alarmed by observing indication on PR.

Comment:**EXAMINER NOTE:**

The following Steps isolate BOTH Demineralizers and open the bypass around them to ensure hot Letdown water is NOT introduced to the resin beds as Letdown flow is restored.

OP-TM-211-950, Step 4.1

√

Performance Step: 7

If isolation was due to high letdown temperature, then perform the following:

1. CLOSE MU-V-6A.

Standard:

Examinee pushes closed PB for MU-V-6A.

MU-V-6A GREEN light LIT, RED light is NOT LIT.

Comment:

PERFORMANCE INFORMATION

OP-TM-211-950, Step 4.1

- √ **Performance Step: 8** If isolation was due to high letdown temperature, then perform the following:

2. CLOSE MU-V-6B.

Standard: Examinee pushes closed PB for MU-V-6B.
MU-V-6B GREEN light LIT, RED light is NOT LIT.

Comment:

EXAMINER NOTE: MU-V-70A is located in the Auxiliary Building 305' elevation, in the mini valve alley.

BOOTH CUE: When directed to open MU-V-70A, insert EVENT #1 to open MU-V-70A.

OP-TM-211-950, Step 4.1

- √ **Performance Step: 9** If isolation was due to high letdown temperature, then perform the following:

3. **OPEN MU-V-70A** (MU Demin Bypass) (AB 305: Mini Valve Alley).

Standard: Examinee contacts Primary AO to OPEN MU-V-70A.

Comment:

BOOTH CUE: When directed to bypass the MU-V-2A/2B high temperature interlock, wait 30 seconds and inform the examinee the interlock is in bypass. The interlock was bypassed as part of the setup. No booth action required.

OP-TM-211-950, Step 4.1

- √ **Performance Step: 10** If isolation was due to high letdown temperature, then perform the following:
4. PLACE MU-V-2A/B High Temperature bypass switches in BYPASS position (AB 305: 1B ES Valves MCC Unit 5D).

Standard: Examinee contacts Primary AO to place MU-V-2A/2B HI Temperature Interlock in "BYPASS" on 1B ES Valves MCC Unit 5D.

Comment:

PERFORMANCE INFORMATION

BOOTH CUE: When contacted as the Auxiliary Operator to bypass the MU-V-3 high temperature interlock wait 30 seconds and inform the examinee the interlock is bypassed. The interlock was bypassed as part of the setup, no booth action required here.

EXAMINER NOTE: Terminal Box T-85 is located just outside the entrance to the Valve Alley on an I-beam

OP-TM-211-950, Step 4.1

- √ **Performance Step: 11** If isolation was due to high letdown temperature, then perform the following:
5. PLACE MU-V-3 High Temperature bypass switch in BYPASS position (AB 281: on terminal box T-85 near MU-V-3).

Standard: Examinee contacts Primary AO to place MU-V-3 High Temperature Interlock in "Bypass" on Terminal Box T-85

Comment:

EXAMINER NOTE: Alarms D-3-2 MU Tank Level HI/LO and D-3-3 MU Tank Press HI/LO may actuate depending on the examinee's pace in restoring letdown. Additional action is not required by the examinee assuming that makeup tank pressure and level are still in the unrestricted operating area. Based on the knowing the reason for the alarms, the examinee can continue restoring letdown to correct them.

OP-TM-211-950, Steps 4.2, 4.3, and 4.4 are not applicable.

OP-TM-211-950, Step 4.5

- √ **Performance Step: 12** **ENSURE** the following valves are Closed:
- MU-V-3

Standard: Examinee ensures MU-V-3 is closed by verifying the GREEN/CLOSED lamp is lit and the RED/OPEN lamp is off on CC.

Comment:

PERFORMANCE INFORMATION

OP-TM-211-950, Step 4.5

- √ **Performance Step: 13** **ENSURE** the following valves are Closed:
- MU-V-4

Standard: Examinee depresses the GREEN/CLOSED pushbutton for MU-V-4 on Console Center and verifies the GREEN/CLOSED light is on and the RED/OPEN light is off.

Comment:

√ ***OP-TM-211-950, Step 4.5***

- Performance Step: 14** **ENSURE** the following valves are Closed:
- MU-V-5 or MU-V-97A (AB 281: MU Valve Alley)

Standard: Examinee rotates the dial setpoint for MU-V-5 to 0 % demand.

Comment:

OP-TM-211-950, Step 4.6 is not applicable

OP-TM-211-950, Step 4.7

- √ **Performance Step: 15** **ENSURE** the following are Open:
- MU-V-1A
 - MU-V-1B

Standard: Examinee verifies OPEN MU-V-1A and MU-V-1B by observing on Console Center the RED/OPEN lights are LIT and the GREEN/CLOSED lights are NOT LIT.

If necessary the examinee will open either or close both of these valves to conform to the required condition stated in this step.

Comment:

PERFORMANCE INFORMATION

OP-TM-211-950, Step 4.8.1 is not applicable

OP-TM-211-950, Step 4.8

Performance Step: 16 2. ENSURE the following are Open:

- MU-V-2A
- MU-V-2B

Standard: The examinee will verify open both valves indicate OPEN. RED light LIT and the GREEN/CLOSED lights are NOT LIT.

Comment:

OP-TM-211-950, Steps 4.8.3, 4.8.4 and 4.9.1 are not applicable.

OP-TM-211-950 Step 4.9

✓ **Performance Step: 17** Establish min flow path around block orifice as follows:

- 2. If MU-V-5 is remotely operable, **then PLACE** MU-V-5 at 10% Open

Standard: Using the Letdown Flow Controller for MU-V-5 on Console Center, turns the dial in the lower portion of the controller to approximately 10% and monitors MU-V-5 demand signal rising.

Comment:

OP-TM-211-950 Step 4.10

Performance Step: 18 **ENSURE** MU-V-8 is aligned to the THRU position.

Standard: Observing on Console Center the RED/THRU light is LIT

Comment:

PERFORMANCE INFORMATION

OP-TM-211-950 Step 4.11

✓ **Performance Step: 19** Open MU-V-3 as follows:

1. **If** MU-V-3 closed on high temperature, **then PUSH AND HOLD** MU-V-3 open pushbutton until high letdown temperature alarm clears.

Standard:

Examinee depresses and holds OPEN PB for MU-V-3 until alarm D-2-1; "LETDOWN CLRS OUTLET TEMP HI" clears.

Observing on Console Center the RED/OPEN light is LIT and the GREEN/CLOSED light is NOT LIT.

Comment:

OP-TM-211-950, Steps 4.11.2 thru 5 are not applicable.

EXAMINER CUE: Provide the examinee a copy of OP-TM-541-461 if requested

OP-TM-211-950 Step 4.12

Performance Step: 20 **CONTROL** ICCW temperature IAW OP-TM-541-461

Standard: Step is left OPEN

Comment:

EXAMINER NOTE: With the setup of this JPM it is not expected that Letdown temperature will rise above 125°F or that ICCW temperature will rise above 100°F

OP-TM-211-950 Step 4.13

Performance Step: 21 **MAINTAIN** letdown temperature < 125°F.

Standard: Step is left OPEN

Comment:

PERFORMANCE INFORMATION

OP-TM-211-950, Steps 4.14.1 and 4.14.2 are not applicable.

OP-TM-211-950 Step 4.14.3

- √ **Performance Step: 22** Raise letdown flow at < 2.5 gpm/min to desired flow as follows:
3. If MU-V-5 is remotely operable, then THROTTLE MU-V-5.

Standard: With MU-V-5 remotely operable the examinee opens MU-V-5 slowly (less than 2.5 gpm/min rise), until greater than 50-gpm-letdown flow is obtained on MU-4FI.

Using the Letdown Flow Controller for MU-V-5 on Console Center, the dial in the lower portion of the controller is turned clockwise to raise MU-V-5's demand signal.

Comment:

Terminating Cue: Once the examinee demonstrates the ability control at < 2.5 gpm/min, the JPM may be terminated

STOP TIME: _____

VERIFICATION OF COMPLETION

Job Performance Measure No.: ILT 16-01 NRC JPM B

Examinee's Name:

Date Performed:

Facility Evaluator:

Number of Attempts:

Time to Complete:

Question Documentation:

Question:

Response:

Result: SAT _____ UNSAT _____

Examiner's Signature: _____ Date: _____

INITIAL CONDITIONS:

- 100% power
- You are the ARO
- The examiner will act as the CRS
- The booth operator will be the Auxiliary Operator
- MU-V-3 has automatically closed on high temperature due to problems while back-washing the ICCW coolers.
- Surveillance is complete, and ICCW flow to the letdown coolers has been returned to normal.
- Letdown line to the makeup tank has been assessed for integrity issues, SAT.
- All radiation monitoring indicates normal.
- The Shift Manager has given permission to re-open containment isolation valves.

INITIATING CUE:

The CRS directs you to restore Letdown flow in accordance with OP-TM-211-950, "Restoration of Letdown Flow"

TIME CRITICAL:

No

RESTORATION OF LETDOWN FLOW

1.0 PURPOSE

This procedure provides direction for restoring letdown following ESAS actuation, loss of ICCW, loss of AUTO power, loss of Instrument Air pressure or other unplanned isolation events.

NOTE: The Letdown line may have been isolated by one or more of the following:

- MU-V-1A & B Close on High ICCW temperature out of CRDM > 160°F or Loss of Auto power.
- MU-V-2A & B close on high temperature (145°F on MU-TS-0002), ESAS actuation (1600# or 4#), or high radiation level (RM-L-1).
- MU-V-3 closes on high temperature (135°F MU5-TS or 145°F MU-TS-0001), ESAS actuation (1600# or 4#), Loss of Auto power or Loss of Instrument air.
- MU-V-4 and 5 close on loss of IA.

2.0 MATERIAL AND SPECIAL EQUIPMENT

If MU-V-5 is **not** remotely operable, then a headset is required for MU Valve Alley communications with an operator at MU-V-98.

3.0 PRECAUTIONS, LIMITATIONS, AND PREREQUISITES

3.1 Precautions

None

3.2 Limitations

- 3.2.1 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.

3.3 Prerequisites

3.3.1 **VERIFY** ICCW flow > 550 GPM. _____

3.3.2 **VERIFY** the following valves are Open:

– IC-V-2 _____

– IC-V-3 _____

– IC-V-4 _____

3.3.3 **VERIFY** any of the following:

– ESAS defeated. _____

– ESAS did **not** actuate. _____

– AOP-046 was entered. _____

3.3.4 **VERIFY** ICCW cooler outlet temperature < 100°F. _____

3.3.5 **VERIFY** all CRD stator temperatures < 160°F **or** reactor is shutdown. _____

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. _____

4.0 MAIN BODY

4.1 If isolation was due to high letdown temperature, **then** perform the following:

1. **CLOSE** MU-V-6A. _____
2. **CLOSE** MU-V-6B. _____
3. **OPEN** MU-V-70A (MU Demin Bypass) (AB 305: Mini Valve Alley). _____
4. **PLACE** MU-V-2A/B Letdown Cooler "A" and "B" MU-V-2A/B Temperature Interlock switches in BYPASS position (AB 305: 1B ES Valves MCC Unit 5D). _____
5. **PLACE** MU-V-3 Letdown Block Valve Temperature Interlock switch in BYPASS position (AB 281: on terminal box T-85 near MU-V-3). _____

4.2 If Aux Bldg IA pressure < 60 psig, **then CLOSE** the following: _____

- MU-V-3 _____
- MU-V-4 _____
- MU-V-6A _____
- MU-V-6B _____
- MU-V-11A _____
- MU-V-11B _____

4.3 If Aux Bldg IA pressure < 60 psig, **then OPEN** the following: _____

- MU-V-70A (MU Demin Bypass) (AB 305: Mini Valve Alley). _____
- MU-V-110 (MU-F-1A/B Bypass) (281 AB: Decant Slurry Pump Rm). _____

4.4 If ICS AUTO power is de-energized, **then** perform the following: _____

1. **OBTAIN** SM concurrence: _____

Shift Manager

2. **DISCONNECT** lead 7-3-3-16 (ICS/NNI cabinet #7) (MU-V-1A and MU-V-1B). _____

CV _____ Date _____

3. **DISCONNECT** lead 5-4-5-4 (ICS/NNI cabinet #5) (MU-V-3). _____

CV _____ Date _____

4. **IAAT** two **or** more CRD stator temperatures exceed 160°F
or ICCW flow to reactor building is lost, **then CLOSE** the following: ☐

– MU-V-3 _____

– MU-V-2A _____

– MU-V-2B _____

4.5 **ENSURE** the following valves are Closed:

– MU-V-3 _____

– MU-V-4 _____

– MU-V-5 **or** MU-V-97A (AB 281: MU Valve Alley) _____

4.6 If MU-V-98 is Throttled Open IAW OP-TM-211-441, Increased Letdown Flowrates,
then CLOSE MU-V-98. _____

NOTE: If MU-V-1A/B is open and 480 VAC power is lost, these valves will
remain open.

4.7 **ENSURE** the following are Open:

– MU-V-1A _____

– MU-V-1B _____

4.8 Open MU-V-2A and MU-V-2B as follows:

1. **If** "Makeup & Purif" switch in RSTSP "B" is in the EMERG position,
then OPEN the following at RSD Panel "B":
 - MU-V-2A
 - MU-V-2B
2. **ENSURE** the following are Open:
 - MU-V-2A
 - MU-V-2B
3. **If** MU-V-2A is closed, **then** perform the following:
 - A. **OPEN** MU-V-2A-BK (1B ESV MCC Unit 4D)
 - B. Manually **OPEN** MU-V-2A (281 RB: Letdown Cooler Room).
4. **If** MU-V-2B is closed, **then** perform the following:
 - A. **OPEN** MU-V-2B-BK at (1B ESV MCC Unit 5D)
 - B. Manually **OPEN** MU-V-2B (281 RB: Letdown Cooler Room).

NOTE: For all MU-V-98 operations, headset communications should be used between operator at MU-V-98 and the control room.

4.9 Establish min flow path around block orifice as follows:

1. **If** MU-V-5 is not remotely operable,
then THROTTLE MU-V-98 one-quarter turn Open.
2. **If** MU-V-5 is remotely operable, **then PLACE** MU-V-5 at 10% Open.

4.10 **ENSURE** MU-V-8 is aligned to the THRU position.

4.11 Open MU-V-3 as follows:

1. If MU-V-3 closed on high temperature,
then **PUSH AND HOLD** MU-V-3 open pushbutton until high letdown
temperature alarm clears. _____
2. If aux bldg IA pressure < 60 psig,
then **UNLOCK and locally OPEN** MU-V-3 (RCS Letdown RB Isol)
(281 AB: N on Mezzanine, S end). _____
3. If "Makeup & Purif" switch in RSTSP "A" is in the EMERG position,
then **OPEN** MU-V-3 at RSD Panel "A" _____
4. **ENSURE** MU-V-3 is Open. _____
5. If MU-V-3 is closed, then **UNLOCK and locally OPEN** MU-V-3 (RCS Letdown
RB Isol) (281 AB: N on Mezzanine, S end). _____

4.12 **CONTROL** ICCW temperature IAW OP-TM-541-461. ☐4.13 **MAINTAIN** letdown temperature < 125°F. ☐

4.14 Raise letdown flow at < 2.5 gpm/min to desired flow as follows:

1. If letdown flow indication is not available, then perform the following: _____
 - A. **LIMIT** position of MU-V-98 to ½ turn open or MU-V-5 to 50% demand. _____
 - B. Gradually **OPEN** MU-V-98 or MU-V-5 over at least 20 minutes. _____
2. If MU-V-5 is not remotely operable, then **THROTTLE** MU-V-98. _____
3. If MU-V-5 is remotely operable, then **THROTTLE** MU-V-5. _____

5.0 RETURN TO NORMAL

5.1 If primary Instrument Air pressure was less 60 psig, **then** perform the following: _____

1. **When** primary Instrument Air pressure is greater than 80 psig, **then CONTINUE.** _____
2. **OPEN** the following to place the NORMAL demin in service:
 - MU-V-6A _____
 - MU-V-6B _____
3. **OPEN** MU-V-11A. _____
4. **CLOSE** the following: _____
 - MU-V-70A (MU Demin Bypass) (AB 305: Mini Valve Alley). _____
 - MU-V-110 (MU-F-1A/B Bypass) (281 AB: Decant Slurry Pump Rm). _____
5. **PRESS** OPEN pushbutton for MU-V-3. _____
6. **PLACE** MU-V-3 handwheel in the Full Closed position (full clockwise direction) and **LOCK** handwheel. _____

CRIT

IV Date

7. **VERIFY** MU-V-3 is Open. _____

5.2 If undefeatable "A" train ESAS actuation occurred **and** MU-V-3 was locally opened, **then** perform the following: _____

1. **When** "A" train ESAS actuation signal has cleared, **then CONTINUE.** _____
2. **PRESS** OPEN pushbutton for MU-V-3. _____
3. **PLACE** MU-V-3 handwheel in the Full Closed position (full clockwise direction) and **LOCK** handwheel. _____

CRIT

IV Date

4. **VERIFY** MU-V-3 is Open. _____

5.3 If undefeatable "B" train ESAS actuation occurred **and** MU-V-2A/B were locally opened, **then** perform the following: _____

1. **When** "B" train ESAS actuation signal has cleared, **then CONTINUE**. _____

2. **CLOSE** the following at 1B ESV MCC:

A. MU-V-2A-BK (1B ESV MCC Unit 4D)

CRIT

IV Date

B. MU-V-2B-BK at (1B ESV MCC Unit 5D)

CRIT

IV Date

3. **VERIFY** the following are Open:

– MU-V-2A _____

– MU-V-2B _____

5.4 If isolation was due to high letdown temperature, **then** perform the following: _____

1. **If** MU-V-70A (MU Demin Bypass) is Open, **then** perform the following: _____

A. **OPEN** the following to place the NORMAL demin in service:

– MU-V-6A _____

– MU-V-6B _____

B. **CLOSE** MU-V-70A. (AB 305: Mini Valve Alley). _____

2. **PLACE** MU-V-2A/B Letdown Cooler "A" and "B" MU-V-2A/B Temperature Interlock switches to NORMAL position. _____

3. **PLACE** MU-V-3 Letdown Block Valve Temperature Interlock switch to NORMAL position. _____

5.5 If MU-V-5 was **not** remotely operable, **then** perform the following:

- **When** MU-V-5 is remotely operable (Instrument air and HAND power), **then** transfer letdown flow control to MU-V-5 as follows: _____

A. **ENSURE** MU-V-97A is Open. _____

B. **Slowly** **CLOSE** MU-V-98 **and OPEN** MU-V-5 maintaining letdown flow as constant as possible. _____

5.6 **Slowly** **ADJUST** MU-V-5 to obtain approximately 50 GPM letdown flow. _____

5.7 **When** pressurizer level is restored to the desired range **and** letdown flow is approximately 50 GPM, **then** perform the following: _____

- **OPEN** MU-V-4. _____

- **CLOSE** MU-V-5. _____

5.8 If RCS temperature > 200°F, **then MAKE** Transient Cycle Logbook entry G11 for RCS Letdown Cooler Thermal Cycle. _____

5.9 If ICS AUTO power was de-energized, **then** perform the following:

- **When** ICS AUTO power is energized, **then CONNECT** the following lifted leads: _____

- Lead 7-3-3-16 (ICS/NNI cabinet #7) (for MU-V-1A and MU-V-1B) _____

CV _____ Date _____

- Lead 5-4-5-4 (ICS/NNI cabinet #5) (for MU-V-3) _____

CV _____ Date _____

6.0 **REFERENCES**

6.1 FHAR Attachments 3-3 and 3-7

7.0 **ATTACHMENTS**

None

Facility: THREE MILE ISLAND Task No.: 64201006

Task Title: Respond to an Inadvertent ESAS Actuation-Alternate Path JPM No.: ILT 16-01 NRC JPM C

K/A Reference: 006 A2.13 3.7/4.2 Modified JPM: TQ-TM-104-A46-J100

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:
- 100% power
 - You are the URO
 - The examiner will act as the ARO and CRS
 - The ICO will act as the Auxiliary Operators in the plant.

Task Standard: 'B' ESAS signal is defeated, Makeup Pump 1C is secured, MU-V-16B is throttle open to establish MU PUMP FLOW of > 115 gpm.

Required Materials: • OP-TM-AOP-046, 'Inadvertent ESAS Actuation', Rev 6

General References: • OP-TM-AOP-046, 'Inadvertent ESAS Actuation', Rev 6

Initiating Cue: Respond to the cues or indications provided by the examiner or the simulator.

Time Critical Task: No

Validation Time: 10 minutes

Worksheet

SIMULATOR SETUP

1. Reset the simulator to IC 16 or temporary IC 248.
2. ENSURE SI Flow is less than 40 gpm.
3. Insert:
 - a. MALFUNCTION **ES08B** on EVENT #1
 - b. MALFUNCTION **MU07** immediately to 45% (ensure this setting does not let SI flow go greater than 40 gpm)
 - c. REMOTE **RSR09** on Event #2 with a 20 second time delay
 - d. Override ZDIMU42FIC(2) 02A5A03-ZDIMU42FIC(2) to OFF to ensure MU-V-32 will not transfer to hand.
4. Place the simulator in RUN.
5. When the above steps are completed for this and other JPMs to be run concurrently then validate, if not previously validated, the concurrently run JPMs using the JPM Validation Checklist.
6. This completes the setup for this JPM.

PERFORMANCE INFORMATION

(Denote Critical Steps with a check mark)

START TIME: _____

EVALUATORS CUE: When the examinee is in role, direct the ICO to insert Event #1.

EVALUATORS NOTE: The examinee may perform immediate actions from memory, or pull the IMA book from below the console. Either method is acceptable.

BOOTH CUE: When directed by the examiner, insert EVENT #1.

Performance Step: 1 Diagnoses an inadvertent 500# ES signal on the 'B' train of ES.

Standard: Examinee recognizes the failure and makes an update on the 'B' train 500# signal failure.

Comment:

OP-TM-AOP-046, Immediate Actions, Step 2.1

Performance Step: 2 Defeat the invalid ESAS signals.

Standard: Examinee will attempt to defeat the invalid 'B' ES signals by pressing the 500# bypass and/or channel reset pushbuttons on console right. The signal will not be able to be cleared, and the RNO of Step 2.1 is entered.

Comment:

EXAMINER CUE: When the examinee GOES TO section 5.0, hand the examinee a copy of the procedure and direct the examinee to perform OP-TM-AOP-046.

PERFORMANCE INFORMATION

OP-TM-AOP-046, Immediate Actions, Step 2.1 RNO

Performance Step: 3 2. If "B" train can not be defeated then GO TO section 5.0.

Standard: The examinee recommends going to Section 5.0 of OP-TM-AOP-046.

Comment:

OP-TM-AOP-046, Section 5.0, Step 5.1

√ **Performance Step: 4** Shutdown the "B" train Makeup Pump NOT required for seal injection.

Standard: The examinee should recognize that MU-P-1C (on Console Right) and rotate the pistol grip counterclockwise to shutdown the pump. The green and amber lamps should light.

Comment:

OP-TM-AOP-046, step 5.2 is not applicable

BOOTH CUE: When the examinee directs an Auxiliary Operator to OPEN RSTSP "B" using key #98, and PLACE "Makeup & Purification" transfer switch in EMERG position, insert EVENT #2.

OP-TM-AOP-046, Step 5.3

Performance Step: 5 If B side RSD system available, then perform the following:
1. OPEN RSTSP "B" using key #98 (1S 480V Bus Room)
2. PLACE "Makeup & Purif" transfer switch in EMERG position.

Standard: Examinee will dispatch an operator to perform this step. When the step is completed, the examinee will move to the next step.

Comment:

PERFORMANCE INFORMATION

EXAMINER CUE: If the examinee requests the positions of MU-V-77A & B and MU-V-76A & B, reply that they are in their normal position. The examinee can verify the position of the above valves by using the configuration control placard on console center, below the makeup pump control switches.

EXAMINER CUE: In addition to raising the setpoint on the MU-V-32 controller (SI controller) the examinee may attempt to take the controller to hand, and demand MU-V-32 open to raise SI flow > 40 gpm. Either or both methods are acceptable, but neither method will work, as the valve is failed in the current position.

OP-TM-AOP-046, Step 5.4

Performance Step: 6 If all of the following conditions exist:

- MU-V-77A & B are Open
- MU-V-76A & B are Closed
- "A" train ESAS did not actuate, then perform the following:
 1. RAISE SI flow to > 40 gpm using setpoint controller.

Standard: The examinee will rotate the SI setpoint clockwise to raise SI demand. This will not get SI flow greater than 40 gpm, and the RNO should be entered.

Comment:

Alternate Path Begins

PERFORMANCE INFORMATION

BOOTH CUE: If dispatched as an Auxiliary Operator to investigate MU-V-32, wait 30 seconds and report that MU-V-32 appears normal.

EXAMINER NOTE: In OS-24, MU Pump Flow includes normal makeup (MU24-FI), seal injection (MU42-FI), HPI Flow and pump recirculation flow of 95 GPM per pump. In this JPM, there is no recirculation flow due to MU-V-37 closing on the inadvertent ES, therefore to get to >115 gpm, the operator will sum the normal makeup (~40 gpm), seal injection (~ 35 gpm) and the flow through MU-V-16B. The flows can easily be seen from the PPC on the makeup system overview screen.

OP-TM-AOP-046, Step 5.4 RNO

✓ **Performance Step: 7** THROTTLE MU-V-16B to establish a MU PUMP FLOW of > 115 gpm.

Standard: The applicant should throttle open MU-V-16B by pressing the red OPEN pushbutton. The operator will have to press the white STOP pushbutton when MU-V-16B is in the desired position. The operator may choose to throttle open or closed MU-V-16B to establish 115 gpm flow rate.

Comment:

Terminating Cue: When MU-V-16B is throttle open to a MU PUMP Flow >115 gpm, the JPM can be terminated.

STOP TIME: _____

VERIFICATION OF COMPLETION

Job Performance Measure No.: ILT 16-01 NRC JPM C

Examinee's Name:

Date Performed:

Facility Evaluator:

Number of Attempts:

Time to Complete:

Question Documentation:

Question:

Response:

Result: SAT _____ UNSAT _____

Examiner's Signature: _____ Date: _____

INITIAL CONDITIONS:

- 100% power
- You are the URO
- The examiner will act as the ARO and CRS
- The ICO will act as the Auxiliary Operators in the plant.

INITIATING CUE:

Respond to the cues or indications provided by the examiner or the simulator.

TIME CRITICAL:

No

INADVERTENT ESAS ACTUATION

1.0 ENTRY CONDITIONS

All of the following:

- Makeup and Purification System in the ES Standby Mode.
- Any of the following:
 - ESAS 1600# RCS press actuation.
 - ESAS 500# RCS press actuation.
 - ESAS 4# RB press actuation.
- No ESAS actuation setpoints have been exceeded.
- No fires in the following zones:
 - AB-FZ-4: AB 281' Shield Wall Area
 - CB-FA-3C: ESAS Room
 - CB-FA-3D: Relay Room
 - CB-FA-4B: Control Room

2.0 IMMEDIATE ACTIONS

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
____ 2.1 DEFEAT invalid ESAS signals.	____ 1. If "A" train can <u>not</u> be defeated, then GO TO Section 4.0. ____ 2. If "B" train can <u>not</u> be defeated, then GO TO Section 5.0.
____ 2.2 STOP Makeup Pumps <u>not</u> required for seal injection.	
____ 2.3 THROTTLE MU-V-16s with HPI flow to minimize and maintain MU PUMP FLOW > 115 gpm.	____ If <u>any</u> MU-V-16 with HPI flow can <u>not</u> be controlled from CR, then TRIP the reactor.

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5.0 ACTIONS IF UNABLE TO CLEAR "B" TRAIN ES SIGNAL

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
<p>___ 5.1 SHUTDOWN "B" train Makeup Pump not required for seal injection.</p>	<p>___ 1. TRIP the reactor and INITIATE EOP-001.</p> <p>___ 2. DISPATCH an operator to the 1E 4160V Bus.</p> <p>___ 3. OPEN the breaker cubicle door and TRIP the breaker for desired Makeup Pump at the 1E 4160V bus using the trip PB on the breaker frame. (MU-P-1C-BK: Unit 1E8) (MU-P-1B-BKE: Unit 1E9).</p> <p>___ 4. GO TO Step 5.3.</p>
<p>___ 5.2 If both of the following conditions exist:</p> <ul style="list-style-type: none">– MU-V-76A&B are Open– MU-V-16C or MU-V-16D are Open, <p>then TRIP the reactor.</p>	

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NOTE

The following components are transferred to the Remote Shutdown Panels when the "Makeup & Purif" switch in RSTSP "B" is placed in the EMERG position:

MU-V-2A, MU-V-2B, MU-V-18, MU-V-20, MU-P-1C, MU-V-16C, MU-V-16D, MU-V-37, MU-V-14B, MU-P-3B, MU-P-3C, MU-V-8, seal injection flow switch indication.

- | | |
|---|--|
| <p>___ 5.3 If B side RSD system available,
then perform the following:</p> <p>___ 1. OPEN RSTSP "B" using key
#98 (1S 480V Bus Room).</p> <p>___ 2. PLACE "Makeup & Purif"
transfer switch in the EMERG
position.</p> | |
|---|--|

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ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
<p>___ 5.4 If <u>all</u> the following conditions exist:</p> <ul style="list-style-type: none"> – MU-V-77A&B are Open – MU-V-76A&B are Closed – “A” train ESAS did <u>not</u> actuate, <p>then perform the following:</p> <p>___ 1. RAISE SI flow to > 40 gpm using setpoint controller.</p> <p>___ 2. ENSURE MU-V-36 is Open.</p> <p>___ 3. OPEN MU-V-37 at RSD Panel “B”.</p> <p>___ 4. VERIFY MU-V-36 and MU-V-37 are Open.</p> <p>___ 5. RESTORE SI flow rate to ~ 38 gpm using setpoint controller.</p> <p>___ 6. ENSURE MU-V-16B is Closed.</p>	<p>___ THROTTLE MU-V-16B to establish a MU PUMP FLOW of > 115 gpm.</p> <p>___ 1. OPEN MU-V-36-BK (1A ESV MCC Unit 2D).</p> <p>___ 2. <u>Manually</u> OPEN MU-V-36 (281 AB: MU Valve Alley).</p> <p>___ 1. OPEN MU-V-37-BK (1B ESV MCC Unit 2D).</p> <p>___ 2. <u>Manually</u> OPEN MU-V-37 (281 AB: MU Valve Alley).</p>

Facility: THREE MILE ISLAND Task No.: EOPG21001

Task Title: Transfer to Reactor Building Sump JPM No.: ILT 16-01 NRC JPM D
Recirculation – Alt Path

K/A Reference: 005 A2.04 2.9/2.9 Bank JPM: TQ-TM-104-212-J100

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 assigned the duties of the extra RO.
 - The examiner will act as the URO, ARO, and CRS.
 - The ICO will act as the Auxiliary Operators in the plant.
 - Reactor is shutdown with a LOCA in progress.
 - OP-TM-EOP-001 and OP-TM-EOP-006 are in progress.
 - OP-TM-EOP-010, Guide 20 has been completed.
 - BWST level is < 15 feet and lowering.

Task Standard: LPI flow balanced \leq 2800 gpm.

- Required Materials:
- OP-TM-EOP-010, 'Emergency Procedure Rules, Guides and Graphs', Rev 19
 - OP-TM-211-901, 'Emergency Injection (HPI/LPI)', Rev 7

- General References:
- OP-TM-EOP-010, 'Emergency Procedure Rules, Guides and Graphs', Rev 19
 - OP-TM-211-901, 'Emergency Injection (HPI/LPI)', Rev 7

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

Time Critical Task: No

Validation Time: 20 minutes

SIMULATOR SETUP

1. Reset the simulator to IC 16 or equivalent 100% power IC
2. Place simulator in FREEZE.
 - Insert Malfunction TH04 at 10% severity.
 - Insert remote DHR05 IN to energize CF-V-1A Breaker
 - Insert remote DHR06 IN to energize CF-V-1B Breaker
 - Insert remote DHR17 IN to energize DH-V-1 Breaker
 - Insert remote DHR18 IN to energize DH-V-2 Breaker
 - Insert remote DHR19 IN to energize DH-V-3 Breaker
 - Insert remote DHR11 at 100% to open DH-V-64
 - Override DH-V-5A Red light "On": 02A6570-2LOPBDHV5A(2)RED ON PB-DH-V-5A
 - Override DH-V-5A Green light "Off": 02A6564-2LOPBDHV5A(1)GRN OFF PB/DH-V-5B
 - Insert EVENT TRIGGER:
 - dhvdhv6b > 0.01 on EVENT 2 "Command" if dhr25 out. This will cause the breaker for DH-V-6B to trip when the examinee attempts to open DH-V-6B.
 - Monitor the following:
 - dhvdhv6a
 - dhvdhv5a
3. Place the simulator in RUN.
 - A. Using OP-TM-EOP-001 and OP-TM-EOP-006, control and monitor plant conditions.
 - B. Bypass/Reset all ESAS signals.
 - C. Complete all steps of Guide 20.
 - D. When BWST level is approximately 14.5 feet or the RB Flood Level is about 54 inches, Terminate HPI and place the Simulator in FREEZE.
4. When the above steps are completed for this and other JPMs to be run concurrently then validate, if not previously validated, the concurrently run JPMs using the JPM Validation Checklist.
5. This completes the setup for this JPM.

PERFORMANCE INFORMATION

(Denote Critical Steps with a check mark)

START TIME: _____

EVALUATORS CUE: Provide a copy of OP-TM-EOP-010, Guide 21.

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

Performance Step: 1 **ANNOUNCE** initiation of RB sump recirculation over the page and radio.

Standard: Examinee announces initiation of RB sump recirculation over plant page and radio

Comment:

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

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

Performance Step: 2 **VERIFY** RB Flood Level > 29 in.

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

Comment:

BOOTH CUE: When contacted to verify DH-V-38A or DH-V-38B is closed, wait one minute and report back that both DH-V-38A and DH-V-39B is closed.

PERFORMANCE INFORMATION

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

Performance Step: 3 **VERIFY** either DH-V-38A or DH-V-38B is Closed

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

Comment:

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

✓ **Performance Step: 4** **THROTTLE** both DH-V-4A and DH-V-4B to the maximum controllable flow ≤ 3000 gpm in each line

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

Comment:

BOOTH CUE: *When DH-V-6A is > 0.5 in monitor, set dhvdhv5a = 0.*

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

BOOTH CUE: **If asked, role-play as AO and respond to request to investigate tripped breaker.**

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

✓ **Performance Step: 5** **When** BWST level reaches 9.5 ft., **or** RB Flood Level > 56 inches, **then**

- OPEN DH-V-6A
- OPEN DH-V-6B

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

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

Examinee enters RNO section, announces same to CRS

Comment:

PERFORMANCE INFORMATION

Alternate Path Begins

EXAMINER CUE: **Acknowledge entry into OP-TM-211-901 if/when announced.
Provide copy of OP-TM-211-901**

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

- √ **Performance Step: 6**
1. **PLACE** affected DH pump in PTL
 2. **PLACE** affected BS pump in PTL
 3. **INITIATE** contingency actions for one DH pump IAW OP-TM-211-901, "Emergency Injection HPI/LPI"
- Standard:**
1. Examinee places extension control for DH-P-1B in PTL
 2. Examinee places extension control for BS-P-1B in PTL
 3. Examinee obtains copy of
OP-TM-211-901 and announces entry into procedure

Comment:

OP-TM-211-901, Precautions, Prerequisites, and Limitations

- Performance Step: 7** Review precautions, limitations, & prerequisites.
Continue at step 4.2.7 under Contingency Actions
- Standard:** Examinee reviews precautions, limitations, & prerequisites.
Examinee determines, upon procedure review, that he/she
needs to initiate contingency step 4.2.7.

Comment:

PERFORMANCE INFORMATION

OP-TM-211-901, Step 4.2.7.1, 4.2.7.2 , and 4.2.7.3.A are not applicable. Examinee should proceed to step 4.2.7.3B.

BOOTH CUE: Role-play as AO and when requested, report back that it has been determined that both DH-V-38A and B are accessible in step 4.2.7.3.A.

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

- √ **Performance Step: 8** IAAT DH-P- f DH-P-1A or DH-P-1B is not operating, then perform the following:
B. If DH-V-38A and B are accessible, **then** perform the following:
1) **CLOSE** DH-V-4 on the train with the inoperable DH pump

Standard: Examinee closes DH-V-4B on Panel CR

Comment:

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

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

- √ **Performance Step: 9** 2) **OPEN** DH-V-38A and DH-V-38B (Aux Bldg 281' el.)

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

Comment:

EXAMINER CUE: Acknowledge performance of Rule 2 for LPI throttling in the next step.

PERFORMANCE INFORMATION

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

Performance Step: 10 3) **THROTTLE** DH-V-4A and DH-V-4B to balance LPI flow IAW Rule 2

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

Comment:

EXAMINER NOTE: In all cases, throttle using DH-V-4A and DH-V-4B and flow indications on DH-FI-802A and DH-FI-803A

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

✓ **Performance Step: 11** **VERIFY** both DH-V-6A and DH-V-6B Closed

Standard: Examinee determines that
DH-V-6A is OPEN and DH-V-6B is CLOSED.
Examinee performs RNO section of Rule 2 for LPI throttling.

Comment:

OP-TM-EOP-010, Rule 2B, Step 1 RNO Step 1 is not applicable

EXAMINER NOTE: The total minimum flow is 2500 gpm.

OP-TM-EOP-010, Rule 2B, Step 1 RNO

✓ **Performance Step: 12** 2. If both DH-V-38A and DH-V-38B are Open, **then THROTTLE both** trains for balanced total flow ≤ 2800 gpm

Standard: Examinee throttles DH-V-4A and DH-V-4B using the OPEN and STOP pushbuttons on Panels CC and CR, respectively, to achieve a balanced total LPI flow of ≤ 2800 gpm, as indicated on DH-FI-802A and DH-FI-803A

Comment:

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

STOP TIME: _____

VERIFICATION OF COMPLETION

Job Performance Measure No.: ILT 16-01 NRC JPM D

Examinee's Name:

Date Performed:

Facility Evaluator:

Number of Attempts:

Time to Complete:

Question Documentation:

Question:

Response:

Result: SAT _____ UNSAT _____

Examiner's Signature: _____ Date: _____

INITIAL CONDITIONS:

- You are assigned the duties of the extra RO.
- The examiner will act as the URO, ARO, and CRS.
- The ICO will act as the Auxiliary Operators in the plant.
- Reactor is shutdown with a LOCA in progress.
- OP-TM-EOP-001 and OP-TM-EOP-006 are in progress.
- OP-TM-EOP-010, Guide 20 has been completed.
- BWST level is < 15 feet and lowering.

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

TIME CRITICAL: No

GUIDE 21
TRANSFER TO RB SUMP RECIRCULATION

Page 1 of 1

IAAT BWST level < 15 feet or RB Flood Level > 54 in, then perform the following:

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
<p>___ 1. ANNOUNCE initiation of RB sump recirculation over the page and radio.</p>	
<p>___ 2. VERIFY RB Flood Level > 29 in.</p>	
<p>___ 3. VERIFY <u>either</u> DH-V-38A or DH-V-38B is Closed.</p>	<p>___ THROTTLE <u>both</u> DH-V-4A and DH-V-4B for balanced <u>total flow</u> ≤ 2800 gpm as read on <u>both</u> DH-FI-802A and DH-FI-803A.</p> <p>___ GO TO Step 5.</p>
<p>___ 4. THROTTLE <u>both</u> DH-V-4A and DH-V-4B to the maximum controllable flow ≤ 3000 gpm in each line.</p>	
<p>5. When BWST Level reaches 9.5 ft, or RB Flood Level > 56 inches, then OPEN the following:</p> <p>___ DH-V-6A</p> <p>___ DH-V-6B</p>	<p>___ 1. PLACE affected DH pump in PTL.</p> <p>___ 2. PLACE affected BS pump in PTL.</p> <p>___ 3. INITIATE contingency actions for one DH pump IAW OP-TM-211-901, "Emergency Injection HPI/LPI".</p>
<p>6. When BWST Level reaches 6.33 ft, or RB Flood Level > 56 inches, then CLOSE the following:</p> <p>___ DH-V-5A</p> <p>___ DH-V-5B</p>	
<p>___ 7. INITIATE Guide 22 "RB Sump Recirculation".</p>	

EMERGENCY INJECTION (HPI/LPI)

1.0 PURPOSE

This procedure provides direction for operation of the active emergency injection systems, High Pressure Injection (i.e., MU system equipment which performs HPI function) and Low Pressure Injection (i.e., DH system equipment which performs LPI function). This procedure is used for manual initiation or for operations following automatic actuation of the system.

2.0 MATERIAL AND SPECIAL EQUIPMENT

None

3.0 PRECAUTIONS, LIMITATIONS, AND PREREQUISITES

3.1 Precautions

- 3.1.1 To prevent MU pump damage from overheating, MU-V-36 and MU-V-37 must be Open when MU pump flow is reduced to less than 115 GPM/pump with DH-V-7A and DH-V-7B Closed.
- 3.1.2 To prevent MU pump damage from overheating, RC-V-2 and RC-RV-2 must be Open when MU pump flow is reduced to less than 115 GPM/pump with DH-V-7A or DH-V-7B open.
- 3.1.3 To prevent MU tank rupture, MU-V-36 and 37 must remain Closed while in "piggyback" mode (DH-V-7A or DH-V-7B open).
- 3.1.4 To start a MU pump, the breaker anti-pump logic must be cleared. If a MU pump is placed in PTL with an ES start signal present, the breaker will open, but the breaker anti-pump start logic will be actuated. The pump cannot be started again without first removing all start signals.

3.2 Limitations

- 3.2.1 If LPI flow > 1250 GPM can **not** be verified through each injection line, **then** HPI must remain in service.

3.3 Prerequisites

- 3.3.1 **VERIFY** 1D or 1E 4160V bus is energized. _____
- 3.3.2 **VERIFY** Make Up system was in ES standby IAW OP-TM-211-000, "Make Up and Purification". _____
- 3.3.3 **VERIFY** Decay Heat system was in ES standby IAW OP-TM-212-000, "Decay Heat Removal". _____
- 3.3.4 **VERIFY** a valid automatic actuation has occurred or a manual actuation of HPI is required. _____

- 4.2.7 **IAAT DH-P-1A or DH-P-1B fails to start or is shut down unexpectedly (e.g., cavitation), then** perform the following: ☐
1. **If DH-P-1A failed to start, then** perform the following:
 - A. **VERIFY** DC-P-1A is operating.
 - B. **START** DH-P-1A.
 2. **If DH-P-1B failed to start, then** perform the following:
 - A. **VERIFY** DC-P-1B is operating.
 - B. **START** DH-P-1B.
 3. **If DH-P-1A or DH-P-1B is not operating, then** perform the following:
 - A. **If DH-V-38A or B are inaccessible, then** perform the following:
 - 1) **NOTIFY** CRS and SM, "HPI must remain in service to compensate for loss of one train of LPI".
 - 2) **If HPI is not operating, then** restore HPI as follows:
 - a) **ENSURE** MU-V-3 or [MU-V-2A and MU-V-2B] are Closed.
 - b) **ENSURE** MU-V-25 or MU-V-26 is Closed.
 - c) **ENSURE** MU-V-36 or MU-V-37 is Closed.
 - d) **OPEN** DH-V-7A or DH-V-7B.
 - e) **ENSURE** MU-V-32 or MU-V-20 is Closed.
 - f) **ENSURE** MU-V-14A or MU-V-14B is Open.
 - g) **If MU-P-1A or MU-P-1B-D is available, then** perform the following:
 1. **ENSURE** MU-V-16A and MU-V-16B are Open.
 2. **ENSURE** closed cooling water system is operating.
 3. **START** MU-P-1A or MU-P-1B-D.

h) If MU-P-1C or MU-P-1B-E is available, **then** perform the following: _____

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

2. **ENSURE** closed cooling water system is operating. _____

3. **START** MU-P-1C or MU-P-1B-E. _____

B. If DH-V-38A and B are accessible, **then** perform the following: _____

1) **CLOSE** DH-V-4 on the train with the inoperable DH pump. _____

2) **OPEN** DH-V-38A and DH-V-38B (Aux. Bldg. 281' EI). _____

3) **THROTTLE** DH-V-4A and DH-V-4B to balance LPI flow IAW Rule 2. _____

4.2.8 If DH-V-5A or DH-V-5B is not Open, **then** perform the following: _____

1. If DH-V-5A or DH-V-6A is not Open, **then** perform the following: _____

A. If BWST level < 9.5 ft, **then** perform the following: _____

1) **ENSURE** DH-V-6A DISABLED PB light is Off. _____

2) **OPEN** DH-V-6A. _____

B. If BWST level > 6.33 ft, and DH-V-6A is not Open, **then OPEN** DH-V-5A. _____

C. **VERIFY** DH-V-5A or DH-V-6A is Open. _____

2. If DH-V-5B or DH-V-6B is not Open, **then PERFORM** the following: _____

A. If BWST level < 9.5 ft, **then --perform** the following: _____

1) **ENSURE** DH-V-6B DISABLED PB light is Off. _____

2) **OPEN** DH-V-6B. _____

B. If BWST level > 6.33 ft, and DH-V-6B is not Open, **then OPEN** DH-V-5B. _____

C. **VERIFY** DH-V-5B or DH-V-6B is Open. _____

2

HPI

RULE 2 LPI THROTTLING

B IAAT LPI has been actuated, **then** perform the following:

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
<p style="text-align: center;"><u>NOTE</u></p> <p>1. Maximum LPI flow limits are reduced by 100 gpm if RC-V-4 is Open. 2. In <u>all</u> cases, throttle using DH-V-4A and DH-V-4B and flow indications on DH-FI-802A and DH-FI-803A</p>	
<p>1. VERIFY <u>both</u> DH-V-6A and DH-V-6B Closed.</p>	<p>1. If DH-V-38A or DH-V-38B is Closed and ECCS sump level is greater than RB flood level, then THROTTLE each train to the maximum controllable flow ≤ 3000 gpm.</p> <p>2. If <u>both</u> DH-V-38A and DH-V-38B are Open, then THROTTLE <u>both</u> trains for balanced <u>total flow</u> ≤ 2800 gpm.</p> <p>3. If DH-P-1A and DH-P-1B are operating, and ECCS sump level <u>cannot</u> be verified greater than RB flood level. then THROTTLE each train to the maximum controllable flow ≤ 1500 gpm.</p> <p>4. GO TO Step 4.</p>
<p>2. VERIFY DH-V-38A or DH-V-38B is Closed.</p>	<p>1. THROTTLE <u>both</u> trains for balanced <u>total flow</u> ≤ 3300 gpm.</p> <p>2. GO TO Step 4.</p>
<p>3. THROTTLE each train to the maximum controllable flow ≤ 3300 gpm.</p>	
<p>4. VERIFY RCS temperature > 310 °F.</p>	<p>THROTTLE <u>both</u> trains to MINIMIZE SCM.</p>

Facility: THREE MILE ISLAND Task No.: 53401007

Task Title: Perform Emergency Operations of
Reactor Building Emergency
Cooling Water – Alternate Path JPM No.: ILT 16-01 NRC JPM E

K/A Reference: 022 A4.04 3.1 / 3.2 Modified JPM: TQ-TM-104-534-
J100

Examinee: NRC Examiner:

Facility Evaluator: Date:

Method of testing:

Simulated Performance: _____ Actual Performance: X
Classroom _____ Simulator X Plant _____

READ TO THE EXAMINEE

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

Initial Conditions:

- You are the ARO.
- The examiner will act as the URO and CRS.
- The Plant is at 100% power.
- There is a small steam leak inside Containment.
- The Director of Operations is informed of the situation.

Task Standard: "A" Reactor Building Emergency cooling is initiated, and RR-P-1B is in PTL.

Required Materials:

- OP-TM-534-901, RB EMERGENCY COOLING OPERATIONS, Rev 14

General References:

- OP-TM-534-901, RB EMERGENCY COOLING OPERATIONS, Rev. 14

Initiating Cue: The Control Room Supervisor has directed you to initiate Reactor Building Emergency Cooling using OP-TM-534-901, RB Emergency Cooling Operations.

Time Critical Task: No

Validation Time: 8 minutes

SIMULATOR SETUP

- 1) Reset the simulator to IC16.
- 2) Insert override 03A6S05 – ZLORRV1BG to ON immediately
- 3) Insert override 03A6S10-ZLORRV1BR to OFF immediately
- 4) Insert Malfunction MS02B at 0.1% severity
- 5) Place the simulator in freeze.

PERFORMANCE INFORMATION

(Denote Critical Steps with a check mark)

START TIME: _____

EVALUATORS CUE: Direct the examinee to:
"Initiate RB Emergency Cooling in accordance with OP-TM-534-901".

EVALUATORS CUE: When the procedure is located, hand the examinee a copy of the procedure.

OP-TM-534-901, Precautions, Limitations and Prerequisites

Performance Step: 1 Examinee reviews Precautions, Limitations, and Prerequisites.
Standard:

Comment:

BOOTH CUE: When directed, respond as the AO and use Remote Function CCR 32 to close NS-V-85. Wait 2 minutes and report that NS-V-85 is closed.

OP-TM-534-901, Step 4.1.1

Performance Step: 2 **DISPATCH** an operator to CLOSE NS-V-85 (IB 295: S of RR Valve Room)

Standard: An AO is dispatched via radio to close NS-V-85.

Comment:

EXAMINER NOTE: The NOTE in the procedure allows the examinee to perform either train first or both trains in parallel.

PERFORMANCE INFORMATION

OP-TM-534-901, Step 4.1.2

Performance Step: 3 **IAAT** expected equipment response is not obtained when initiating the desired train(s) of RBEC, **then INITIATE** Section 4.2, Contingency Actions

Standard: Step is left open.

Comment:

OP-TM-534-901, Step 4.1.3

✓ **Performance Step: 4** **START or VERIFY** running:

- RR-P-1A
- RR-P-1B

Standard: RR-P-1A and RR-P-1B are started on CC (CR) by turning the extension control to the Normal After Start position and verifying the RED/RUNNING light(s) lit and GREEN/OFF lights off.

Comment:

OP-TM-534-901, Step 4.1.4

✓ **Performance Step: 5** **ENSURE OPEN:**

- RR-V-3A (Train A)
- RR-V-3B (Train B)
- RR-V-3C (Train A or B)

Standard: The valves are verified open (RED/OPEN lights lit and GREEN/CLOSED lights off).

Comment:

EXAMINER NOTE: **RR-V-1B not opening is the beginning of the alternate path. The student may identify RR-V-1B not opening after they check the pressure indicators. The alternate path script begins after they check the pressure indicators.**

PERFORMANCE INFORMATION

OP-TM-534-901, Step 4.1.5**√ Performance Step: 6 ENSURE OPEN:**

- | | |
|-----------|-----------|
| – Train A | – Train B |
| – RR-V-4A | – RR-V-4B |
| – RR-V-4C | – RR-V-4D |
| – RR-V-1A | – RR-V-1B |

Standard: Examinee presses the RED/OPEN pushbutton and verifies the RED/OPEN lights are lit and the GREEN/CLOSED LIGHTS are off for each valve listed.

Examinee notes that RR-V-1B open light does not become bright and the close light stays lit.

Comment:

OP-TM-534-901, Step 4.1.6

Performance Step: 7 VERIFY the coolers in service are controlled at 50 – 75 psig:

- RR-PI-224
- RR-PI-225
- RR-PI-226

Standard: Examinee checks in-service coolers controlled at 50 – 75 psig.

Comment:

Alternate Path Begins

OP-TM-534-901, Steps 4.2.1 through 4.2.9 are not applicable.

PERFORMANCE INFORMATION

OP-TM-534-901, Step 4.2.10

√ **Performance Step: 8** If RR-V-1B is closed, then perform the following:

1. Open RR-V-1B
2. If RR-V-1B is NOT open, the place RR-P-1B in PTL.

Standard: Examinee attempts to open RR-V-1B. When the valve does not open, the examinee will place RR-P-1B in PTL.

Comment:

Terminating Cue: When RR-P-1B is in PTL, the JPM can be terminated.

STOP TIME: _____

VERIFICATION OF COMPLETION

Job Performance Measure No.: ILT 16-01 NRC JPM E

Examinee's Name:

Date Performed:

Facility Evaluator:

Number of Attempts:

Time to Complete:

Question Documentation:

Question:

Response:

Result: SAT _____ UNSAT _____

Examiner's Signature: _____ Date: _____

INITIAL CONDITIONS:

- You are the ARO.
- The examiner will act as the URO and CRS.
- The Plant is at 100% power.
- There is a small steam leak inside Containment.
- The Director of Operations is informed of the situation.

INITIATING CUE: The Control Room Supervisor has directed you to initiate Reactor Building Emergency Cooling using OP-TM-534-901, RB Emergency Cooling Operations.

TIME CRITICAL: No

RB EMERGENCY COOLING OPERATIONS

1.0 PURPOSE

This procedure provides direction for emergency operations of Reactor Building Emergency Cooling System. This procedure is used for manual initiation or following automatic actuation of the system.

NOTE: Actuation of RBEC will discharge corrosion protection chemicals from coolers into the river. Actuation of RBEC is not required to be reported to PaDEP under NPDES Permit PA 0009920 issued October 30, 2007.

2.0 MATERIAL AND SPECIAL EQUIPMENT

None

3.0 PRECAUTIONS, LIMITATIONS, AND PREREQUISITES

3.1 Precautions

None

3.2 Limitations

3.2.1 When the RR system is actuated, maintain RR cooler outlet pressure (RR-PI-224, 225, 226) above 50 psig, on all in-service coolers. This ensures that the reactor river system pressure is greater than the maximum containment pressure during design basis events.

3.2.2 To prevent RB fan overload, operate RB fans in SLOW SPEED when RB pressure is greater than 2 psig.

3.3 Prerequisites

3.3.1 **VERIFY** Reactor Building Emergency River Water System was in ES standby IAW OP-TM-534-000, "Reactor Building Emergency Cooling Water System". _____

3.3.2 **VERIFY** 1600 psig ES actuation, RB pressure is approaching 2 psig **or** Emergency Director **or** Shift Manager has authorized use of RBEC. _____

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

4.0 **MAIN BODY**

NOTE: "Total RR system flow" is obtained by summing the indications of Computer Points A1049, A1050 and A1051.

4.1 **Initiation of RB Emergency Cooling**

4.1.1 **DISPATCH** an operator to CLOSE NS-V-85 (IB 295: S of RR Valve Room).

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.

4.1.2 **IAAT** expected equipment response is not obtained when initiating the desired train(s) of RBEC, **then INITIATE** Section 4.2, Contingency Actions. ☐

4.1.3 **START or VERIFY** running:

Train A	✓	Train A <u>or</u> Train B	✓	Train B	✓
RR-P-1A				RR-P-1B	

4.1.4 **ENSURE OPEN:**

Train A	✓	Train A <u>or</u> Train B	✓	Train B	✓
RR-V-3A		RR-V-3C		RR-V-3B	

4.1.5 **ENSURE OPEN:**

Train A	✓	Train A <u>or</u> Train B	✓	Train B	✓
RR-V-4A				RR-V-4B	
RR-V-4C				RR-V-4D	
RR-V-1A				RR-V-1B	

4.1.6 **VERIFY** the coolers in service are controlled at 50 – 75 psig:

- RR-PI-224
- RR-PI-225
- RR-PI-226

4.1.7 **VERIFY** the following fans are running (Fast or Slow speed):

Train A	√	Train A <u>or</u> Train B	√	Train B	√
AH-E-1A		AH-E-1C		AH-E-1B	

4.1.8 **GO TO** Section 4.3.

4.2 Contingency Actions

- 4.2.1 If RR-P-1A or RR-P-1B is **not** operating, then perform the following: _____
1. If RR-P-1A is **not** operating and 1D 4160V bus is energized, then perform the following: _____
 - A. **START** RR-P-1A. _____
 - B. If RR-V-10A and RR-V-1A are Closed, then **OPEN** RR-V-1A. _____
 2. If RR-P-1B is **not** operating and 1E 4160V bus is energized, then perform the following: _____
 - A. **START** RR-P-1B. _____
 - B. If RR-V-10B and RR-V-1B are Closed, then **OPEN** RR-V-1B. _____
 3. If neither RR-P-1A/B can be started, then **CLOSE** all RR-V-3's and 4's. _____
- 4.2.2 If RR-V-3A, RR-V-3B or RR-V-3C are **not** Open, then perform the following: _____
1. If AH-E-1A is available, then **ENSURE** RR-V-3A is Open. _____
 2. If AH-E-1B is available, then **ENSURE** RR-V-3B is Open. _____
 3. If AH-E-1C is available, then **ENSURE** RR-V-3C is Open. _____
- NOTE: In the remaining steps, fans may be started or additional RR-V-4 opened while waiting to confirm RR-V-4 travel.
- 4.2.3 If AH-E-1A is **not** operating in SLOW SPEED, then perform the following: _____
1. If RB pressure > 2 psig, then **ENSURE** AH-E-1A is operating in SLOW SPEED. _____
 2. If AH-E-1A is **not** operating, then **START** AH-E-1A in FAST SPEED. _____
- 4.2.4 If RR-V-4A is **not** Open, then perform the following: _____
1. **OPEN** RR-V-4A. _____
 2. If RR-V-4A is **not** Open, then **PLACE** AH-E-1A in PTL. _____

- 4.2.5 If AH-E-1B is **not** operating in SLOW SPEED, **then** perform the following: _____
1. If RB pressure > 2 psig, **then ENSURE** AH-E-1B is operating in SLOW SPEED. _____
 2. If AH-E-1B is **not** operating, **then START** AH-E-1B in FAST SPEED. _____
- 4.2.6 If RR-V-4B is **not** Open, **then** perform the following: _____
1. **OPEN** RR-V-4B. _____
 2. If RR-V-4B is **not** Open, **then PLACE** AH-E-1B in PTL. _____
- 4.2.7 If AH-E-1C is **not** operating in SLOW SPEED, **then** perform the following: _____
1. If RB pressure > 2 psig, **then ENSURE** AH-E-1C is operating in SLOW SPEED. _____
 2. If AH-E-1C is **not** operating, **then START** AH-E-1C in FAST SPEED. _____
- 4.2.8 If RR-V-4C and RR-V-4D are **not** Open, **then** perform the following: _____
1. **OPEN** RR-V-4C or RR-V-4D. _____
 2. If RR-V-4C and RR-V-4D are Closed, **then PLACE** AH-E-1C in PTL. _____
- 4.2.9 If RR-V-1A is Closed, **then** perform the following: _____
1. **OPEN** RR-V-1A. _____
 2. If RR-V-1A is **not** Open, **then PLACE** RR-P-1A in PTL. _____
- 4.2.10 If RR-V-1B is Closed, **then** perform the following: _____
1. **OPEN** RR-V-1B. _____
 2. If RR-V-1B is **not** Open, **then PLACE** RR-P-1B in PTL. _____
- 4.2.11 If **all** the following conditions exist:
- RR-V-10A is Open
 - RR-P-1A is operating
 - "Total RR system flow" < 4800 GPM,
- then CLOSE** RR-V-10A by isolating the air signal regulator. _____

Facility: THREE MILE ISLAND

Task No.: 73101008

Task Title: Transfer BOP Busses from 1B to 1A
Aux TransformerJPM No.: ILT 16-01 NRC JPM F

K/A Reference: 062 A4.01 3.3/3.1

Modified JPM: TQ-TM-104-731-
J100

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:

- 100% power
- No major equipment out of service
- No surveillances in progress
- You are the ARO
- The examiner will act as the CRS
- The booth operator will be the Auxiliary Operator

Task Standard:

The 1B 7kV bus and the 1C 4160V bus successfully transferred to the 1A Auxiliary Transformer.

Required Materials:

- 1107-1, 'Normal Electrical System', Rev 98, Section 5.3
- 2 copies of 1107-11, 'TMI Grid Operations', Rev 40, Section 3.5.3
 - Indicate Step 3.5.3.1.1 Prerequisites are complete, and sign off steps 3.5.3.1.2 1-4 as complete

General References:

- 1107-1, 'Normal Electrical System', Rev 98
- 1107-11, 'TMI Grid Operations', Rev 40

Worksheet

Initiating Cue: Place the 1B 7kV and the 1C 4kV busses on the 'A' Auxiliary Transformer IAW 1107-1, Section 5.3, Manual Hot Bus Transfers of 4kV or 7kV busses.

Time Critical Task: No

Validation Time: 23 minutes

SIMULATOR SETUP

1. Reset the simulator to IC 16

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. 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.
4. Pull up Area 16 Group 13 trend on PPC

PERFORMANCE INFORMATION

(Denote Critical Steps with a check mark)

START TIME: _____

EVALUATORS CUE: Direct the examinee to place the 1B 7kV and the 1C 4kV busses on the 1A Auxiliary Transformer, IAW Section 5.3, Manual Hot Bus Transfers of 4kV or 7kV busses.
Provide the examinee with a copy of the procedure.

1107-1, Prerequisites, Step 5.3.1

Performance Step: 1 a. Verify that there is a DC control power available to the breakers by observing the red and green lights above their control switches

Standard: Examinee verifies DC control power available.

Comment:

1107-1, Prerequisites, Step 5.3.1

Performance Step: 2 b. Verify that the Aux Transformer that the bus will be transferred to is available to supply power to the bus. Ensure that the Aux Transformer trouble alarm (AA-2-7, AA-2-8) for that transformer is not in alarm.

Standard: Examinee verifies 1A Aux Xfmr is available to supply the bus

Comment:

PERFORMANCE INFORMATION

1107-1, Prerequisites, Step 5.3.1**Performance Step: 3**

- c. Verify switches A through D are in the Open position for the following:
- 1A\50-51/46-A Test Switch A (RBB)
 - 1B\50-51/46-A Test Switch B (RBA)

Standard:

Examinee with verify the switches on the bottom of RBA and RBB are open (back of the simulator on the west side)

Comment:**1107-1, Prerequisites, Step 5.3.1****Performance Step: 4**

- d. Notify the CRS/SM that a "Hot Bus Transfer" will be performed

Standard:

Examinee will notify the CRS (examiner) that a hot bus transfer is going to occur.

Comment:**EXAMINER NOTE:**

As soon as practical, after the alternate supply breaker has closed, the other supply breaker should be opened. DO NOT leave the Aux Transformers paralleled.

1107-1, Procedure, 5.3.2.A

√

Performance Step: 5

1. Turn the control switch for the alternate supply breaker to the CLOSE position and hold until the red light comes on, indicating that the breaker has successfully closed

Standard:

Examinee turns 1SA-72 (breaker from 1A Aux Transformer to 1B 7kV bus) breaker control to the CLOSE position and holds until the RED CLOSED light comes on.

Comment:

PERFORMANCE INFORMATION

1107-1, Procedure, 5.3.2.A

- √ **Performance Step: 6** 2. Turn the control switch for the other supply breaker to the TRIP position and hold until the green light comes on, indicating the breaker has opened

Standard: Examinee turns 1SB-02 (breaker from 1B Auxiliary Transfer to 1B 7kV bus) breaker control to the TRIP position and holds until the GREEN TRIPPED light comes on

Comment:

1107-1, Procedure, 5.3.2.A

- Performance Step: 7** 3. Verify that the Main Annunciator, AA-3-7, "AUX XFMRS PARALLEL", is clear

Standard: Examinee verifies that AA-3-7, "AUX XFMRS PARALLEL" clears

Comment:

EXAMINER NOTE: **Role-play as CRS/SM and acknowledge that a hot bus transfer been successfully performed for the 1A 7KV bus to the 'B' Aux transformer.**

1107-1, Procedure, 5.3.2.A

- Performance Step: 8** 4. Notify the CRS/SM that the 7KV bus has been successfully transferred to the other Aux Transformer

Standard: Examinee notifies the CRS/SM that the 1B 7KV bus has been successfully transferred to the 'A' Aux Transformer.

Comment:

PERFORMANCE INFORMATION

EXAMINER CUE: **Notify the examinee that the URO will be logging all events in the log book.**

1107-1, Procedure, 5.3.2.A

Performance Step: 9 5. Log the bus transfer in the Control Room Log (if more than 1 bus is being transferred at a time, the log book entry may wait for all transfers to be completed prior to it being logged)

Standard: The examinee will notify the examiner to make the required log.

Comment:

EXAMINER NOTE: **The next section is for the 1C 4kV bus.**

1107-1, Procedure, 5.3.2.B

Performance Step: 10 1. At PR Panel, note tap changer positions:
1A _____ 1B _____

Standard: Examinee notes tap changer positions for 1A and 1B at Panel PR

Comment:

EXAMINER NOTE: **When requested by the examinee, provide a copy of 1107-11 TMI Grid Operations, Section 3.5.3. Indicate Steps 3.5.3.1.1 Prerequisites as completed. In addition sign off 3.5.3.1.2 Procedure Steps 1, 2, 3, and 4 as completed.**

1107-1, Procedure, 5.3.2.B

Performance Step: 11 2. Verify or place Aux Xfmr 1A load tap changer switch in manual IAW 1107-11, TMI Grid Operations.
3. Verify or place Aux Xfmr 1B load tap changer switch in manual IAW 1107-11, TMI Grid Operations.

Standard: Examinee will request 1107-11 to place the 1A and 1B load tap changers in manual.

Comment:

PERFORMANCE INFORMATION

1107-11, Procedure, 3.5.3.1.2 for both Load Tap Changers

- √ **Performance Step: 12**
5. On panel PR SELECT "Manual" on the "Auto-Man" select switch for the Aux. Transformer LTC to be manipulated
 6. While monitoring voltage on CR, RAISE or LOWER the tap changer, as required, to maintain voltage between 4162 and 4218 volts using the "Raise – Lower" switch on panel PR.

Standard: The examinee will select manual on each load tap changer, and ensure voltage is between 4162-4218 volts on CR.

Comment:

1107-1, Procedure, 5.3.2.B

- Performance Step: 13**
4. Verify that the 230 kV busses are cross tied.
 - At least one cross-tie is required

Standard: Examinee should verify on panel SS-1 that at least one cross tie is energized.

Comment:

EXAMINER NOTE: A momentary low voltage alarm is acceptable. Use the below band until loads are transferred over to the other Aux Transformer.

1107-1, Procedure, 5.3.2.B

- Performance Step: 14**
5. Verify the transformer that is to lose load is between 4150V and 4176V (4150V is the Low Voltage Alarm and 4176V is one tap above this) or adjust the LTC as needed.

Standard: If voltage is not with the band, the examinee will adjust voltage to the band using the LTC on the 1B Auxiliary Transformer.

Comment:

PERFORMANCE INFORMATION

EXAMINER NOTE: A momentary high voltage alarm is acceptable.

1107-1, Procedure, 5.3.2.B

Performance Step: 15 6. Adjust the voltage on the transformer that is picking up load so that the voltage is 4218V to 4244V (4218V is top of the Tap Changer Control Band and 4244V is 1 tap above this. The High Voltage Alarm is 4250V.

Standard: If the voltage is not in bank, the examinee will adjust voltage to the band using the LTC on the 1A Auxiliary Transformer.

Comment:

1107-1, Procedure 5.3.2.B Step 7 is not applicable.

EXAMINER NOTE: Closing the feeder breaker to the 1C 4kV bus to the 1A Auxiliary Transformer, and opening the breaker for the 1C 4kV bus to the 1B Auxiliary Transformer should be done in rapid succession (less than 2 seconds).

1107-1, Procedure, 5.3.2.B

√ **Performance Step: 16** 8. Close the feeder breaker from the transformer being loaded.

Standard: Examinee turns 1SA-C2 breaker control to the CLOSE position and holds until the RED CLOSED light comes on.

Comment:

√ **Performance Step: 17** 9. Open the feeder breaker from the transformer being loaded.

Standard: Examinee turns 1SB-C2 breaker control to the TRIP position and holds until the GREEN TRIPPED light comes on.

Comment:

PERFORMANCE INFORMATION

Terminating Cue:**Once the 1C 4kV bus being supplied by the 1A Auxiliary Transformer only, the JPM can be terminated.****STOP TIME:** _____

VERIFICATION OF COMPLETION

Job Performance Measure No.: ILT 16-01 NRC JPM F

Examinee's Name:

Date Performed:

Facility Evaluator:

Number of Attempts:

Time to Complete:

Question Documentation:

Question:

Response:

Result: SAT _____ UNSAT _____

Examiner's Signature: _____ Date: _____

INITIAL CONDITIONS:

- 100% power
- No major equipment out of service
- No surveillances in progress
- You are the ARO
- The examiner will act as the CRS
- The booth operator will be the Auxiliary Operator

INITIATING CUE:

Place the 1B 7kV and the 1C 4kV busses on the 'A' Auxiliary Transformer IAW 1107-1, Section 5.3, Manual Hot Bus Transfers of 4kV or 7kV busses.

TIME CRITICAL:

No



Exelon Generation

TMI - Unit 1
Operating Procedure

Number

1107-1

Title

Revision No.

Normal Electrical System**98**

Applicability/Scope

USAGE LEVEL

Effective Date

TMI Division

1**05/11/16**

This document is within QA plan scope

☒ Yes

No

50.59 Applicable

☒ Yes

No

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21	98	61	98	101	98		
22	98	62	98	102	98		
23	98	63	98	103	98		
24	98	64	98	104	98		
25	98	65	98	105	98		
26	98	66	98	106	98		
27	98	67	98	107	98		
28	98	68	98	108	98		
29	98	69	98	109	98		
30	98	70	98	110	98		
31	98	71	98	111	98		
32	98	72	98	112	98		
33	98	73	98	113	98		
34	98	74	98	114	98		
35	98	75	98	115	98		
36	98	76	98	116	98		
37	98	77	98	117	98		
38	98	78	98	118	98		
39	98	79	98	119	98		
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5.3 Manual Hot Bus Transfers of 4KV or 7KV busses

NOTE

DO NOT leave the Aux transformers paralleled when the reactor is critical.

CAUTION

During power operation, aligning both 4 KV ES Busses to a single aux transformer is prohibited. If the aux transformer will not be able to supply the vital 4 KV loads, it will be necessary to load it on its emergency diesel immediately.

5.3.1 Prerequisites

- a. Verify that there is a DC control power to the breakers is available by observing the red and green lights above their control switches.
- b. Verify that the Aux Transformer that the bus will be transferred to is available to supply power to the bus. Ensure that the Aux Transformer trouble alarm (AA-2-7, AA-2-8) for that transformer is not in alarm.
- c. Verify switches A through D are in the Open position for the following:
 - 1A\50-51/46-A Test Switch A (RBB).
 - 1B\50-51/46-A Test Switch A (RBA).
- d. Notify CRS/SM that a "Hot Bus Transfer" will be performed.

5.3.2 Procedure

NOTE

As soon as practical, after the alternate supply breaker has closed, the other supply breaker should be opened. **DO NOT** leave the Aux Transformers paralleled.

A. 7KV Hot Bus Transfers

1. Turn the control switch for the alternate supply breaker, to the CLOSE position and hold, until the red light comes on, indicating that the breaker has successfully closed.
2. Turn the control switch for the other supply breaker, to the TRIP position and hold, until the green light comes on, indicating the breaker has opened.
3. Verify that the Main Annunciator, AA-3-7, "AUX XFMRs PARALLEL" is clear.

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4. Notify the CRS/SM that the 7KV bus has been successfully transferred to the other Aux Transformer.
5. Log the bus transfer in the Control Room Log. (If more than 1 bus is being transferred at a time, the log book entry may wait for all transfers to be completed, prior to it being logged.)

B. 4KV Hot Bus Transfers

NOTE

4 kV voltage fluctuations due to load changes associated with cross ties and bus transfers during manual LTC operation can lead to the LTC controller latching into "lower" mode. This will result in the AA-2-7 alarm. Clearing this condition will require reset via the "HHR" pushbutton located at the aux transformer.

1. At PR Panel, note tap changer positions:
1A _____ 1B _____
2. Verify or place Aux Xfmr 1A load tap changer switch in manual IAW 1107-11, TMI Grid Operations.
3. Verify or place the Aux Xfmr 1B load tap changer switch in manual IAW 1107-11, TMI Grid Operations.
4. Verify that the 230KV buses are cross-tied.
- At least one cross-tie is required.
5. Verify the transformer that is to lose load is between 4150V and 4176V (4150V is the Low Voltage Alarm and 4176V is one tap above this) or adjust the LTC as needed.

NOTE

Momentary Low Voltage Alarm is acceptable.

6. Adjust the voltage on the transformer that is picking up load so that the voltage is 4218V to 4244V (4218V is top of the Tap Changer Control Band and 4244V is 1 tap above this. The High Voltage Alarm is 4250V.).

NOTE

Momentary High Voltage Alarm is acceptable.

7. If these criteria can not be achieved, then obtain Engineering advice.

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NOTE

Steps 8 and 9 are to be performed in rapid succession (less than 2 seconds).

- | | | |
|-------|-----|---|
| _____ | 8. | Close feeder breaker from the transformer being loaded. |
| _____ | 9. | Open feeder breaker from the transformer being unloaded. |
| _____ | 10. | Repeat Steps 5 thru 9, as needed, for all buss(es) being transferred. |
| _____ | 11. | Verify that Main Annunciator, AA-3-7, "Aux. Xfmrs. Parallel" is clear. |
| _____ | 12. | Place both Load Tap Changers in Auto IAW 1107-11, TMI Grid Operations. |
| _____ | 13. | Notify CRS/SM that the 4KV Buss(es) have been successfully transferred to the other Aux. Transformer. |
| _____ | 14. | Log bus transfer(s) in the Control Room Log. |



Exelon Generation

TMI - Unit 1
Operating Procedure

Number

1107-11

Title

Revision No.

TMI Grid Operations**40**

Applicability/Scope

USAGE LEVEL

Effective Date

TMI Division

M**01/17/17**This document is within QA plan scope
50.59 Applicable

X	Yes		No
X	Yes		No

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	TMI - Unit 1 Operating Procedure	Number 1107-11
Title		Revision No.
TMI Grid Operations		40

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	TMI - Unit 1 Operating Procedure	Number 1107-11
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3.5.3 Load Tap Changer Ops - LEVEL 2

NOTE

The Load Tap Changers (LTC) will normally be in "Auto"..

NOTE

Information on LTC Accuracy

The LTC is set to control the 4KV voltage between 4162 and 4218 volts.

Given the accuracy of the LTC controller actual voltage could range from a low of 4151 volts to a high of 4228 volts.

The Control Room typically uses PPC Points A1039 and A1038 to observe the 1D and 1E bus voltages. Given the accuracy of the indication loop and the accuracy of the LTC controller the indicated voltage could range to a low of 4139 volts to a high of 4240 volts.

Despite the inaccuracies the total control range at any given time should be about 56 volts.

3.5.3.1 Transferring LTC from Auto to Man

3.5.3.1.1 Prerequisites

- Manual control of plant voltage is required, or loss of automatic control of the LTC.
- Computer point L2577(1A) and/or L2578(1B) are clear (not in alarm) indicating power is available to the LTC controller.

	TMI - Unit 1 Operating Procedure	Number 1107-11
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3.5.3.1.2 Procedure

NOTE

The following steps also satisfy compliance with notification requirements of OP-TM-108-107-1002, TMI SWITCHYARD OPERATIONS.

1. **NOTIFY** FirstEnergy RCC TSO that TMI-1 will be taking Manual control of LTC.

NOTE

When required by NERC Standards or Agreements to communicate information to RTO TMI communicates the information to Generation Dispatch (GD) and it is Generation Dispatch's responsibility to communicate with RTO.

2. **NOTIFY** Generation Dispatch (GD) that TMI-1 will be taking Manual control of LTC.
3. **NOTIFY** the NDO that TMI-1 will be taking Manual control of LTC.
4. **LOG** conversations with FirstEnergy RCC TSO, NDO, and Generation Dispatch (GD) in the Control Room Logbook.
5. On panel PR **SELECT** "Manual" on the "Auto-Man" select switch for the Aux. Transformer LTC to be manipulated.
6. While monitoring voltage (e.g., A1039/A1038, system voltage on CR) **RAISE or LOWER** the tap changer, as required, to maintain voltage between 4162 and 4218 volts using the "Raise – Lower" switch on panel PR.
7. If RCC TSO or Generation Dispatch (GD) reports that on loss of TMI-1, post LOCA contingency (Emergency Low) voltage alarm will be ≤ 223 on the TMI 230 kV bus, **then REFER TO** Section 3.4.6 for actions.

NOTE

The lower voltage control range during light load conditions will limit inverter cycling between DC and AC inputs.

The higher voltage control range for Power Operations allows for voltage decrease on generator trip and fast transfer upon loss of an auxiliary transformer.

Facility: THREE MILE ISLAND UNIT 1 Task No.: 53101011

Task Title: Cross Connect the Secondary River Water System to the Nuclear River Water System JPM No.: ILT 16-01 NRC JPM G

K/A Reference: 026 AA2.02 (2.9/3.6) Modified Bank TQ-TM-104-531-J001

Examinee: NRC Examiner:

Facility Evaluator: Date:

Method of testing:

Simulated Performance: _____ Actual Performance: X
Classroom _____ Simulator X Plant _____

READ TO THE EXAMINEE

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

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

Task Standard: Secondary River Water is cross connected with Nuclear River Water and temperatures are being controlled.

Required Materials: None

General References: OP-TM-EOP-001, REACTOR TRIP, Rev. 16
OP-TM-AOP-031, LOSS OF NUCLEAR SERVICES COMPONENT COOLING, Rev. 6
OP-TM-541-901, CROSS-TIE SECONDARY RIVER TO SUPPLY NUCLEAR RIVER, Rev. 3

Handout: OP-TM-541-901, CROSS-TIE SECONDARY RIVER TO SUPPLY
NUCLEAR RIVER, Rev. 3

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

Time Critical Task: NO

Validation Time: 25 minutes

SIMULATOR SETUP

- 100% IC16
1. Ensure NR-P-1A/C are running.
 2. Place NR-P-1B extension controls in PTL on CC and CR. Hang information tags on both switches.
 3. Insert remote function **RWR10** to OUT, to rack out breaker for NR-P-1B
 4. Open NR-V-4A and NR-V-4B on PL. (note, NR-V-4A is a jog control valve therefore opening requires the switch to be held down until only the open light is on.)
 5. Insert malfunction **RW02C** to trip NR-P-1C.
 6. Insert LO Overrides to illuminate NR-V-4A/B closed lights:
 - **04A2S04-ZLONRV4BG GRN NR-V-4BG** Value - ON
 - **04A2S08- ZLONRV4BR RED NR-V-4BR** Value - OFF
 - **04A2S11-ZLONRV4AG GRN NR-V-4AG** Value - ON
 - **04A2S15-ZLONRV4AR RED NR-V-4AR** Value - OFF
 - **08A1S40-ZLOPCRNRV4A(1) BLU** Value - ON
 - **08A1S40-ZLOPCRNRV4A(2) AMB** Value - OFF
 - **08A3S17-ZLOPCRNRV4B(1) BLU** Value - ON
 - **08A3S17-ZLOPCRNRV4B(2) AMB** Value - OFF
 7. Perform OP-TM-EOP-001 IMA's and execute OP-TM-AOP-031 up through Step 3.9
 8. Raise River Water temperature high enough to result in NS cooler outlet temperature > 100°F
 - Insert Remote Function **RWR14** at 100°F (It takes ~ 6 minutes in run for NS Cooler Outlet Temperatures to exceed 100°F)
 9. Adjust MUT level for current plant conditions (**MUMMT** to 27500)
 10. Set **Event 1** to close the following breakers:
 - **RWR47** 1A ES SHMCC Unit 2A (NR-V-1) Value - CLOSE
 - **RWR19** 1A ES SHMCC Unit 2B (NR-V-3) Value - CLOSE
 - **RWR20** 1A ESV MCC Unit 8D (NR-V-5) Value - CLOSE
 - **RWR21** 1B ESV MCC Unit 10D (NR-V-6) Value - CLOSE
 - **RWR48** 1B ES SHMCC Unit 2A (NR-V-7) Value - CLOSE
 11. Place the simulator in FREEZE

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

PERFORMANCE INFORMATION

(Denote Critical Steps with a check mark)

START TIME: _____

EVALUATOR CUE: When OP-TM-541-901 has been located, provide a copy of OP-TM-541-901.

OP-TM-541-901, PRECAUTIONS, LIMITATIONS, AND PREREQUISITES

Performance Step: 1 Precautions - None

Limitations - To prevent SR pump motor overload, maintain secondary river header pressure (as read on SR-PI-134) greater than 21 psig.

Prerequisites - VERIFY one of the following conditions:

- Reactor is shutdown
- TS 3.0.1 action statement has been entered

Standard: Examinee verifies the reactor is shutdown.

Comment:

EVALUATOR NOTE: Step 4.1 is N/A

OP-TM-541-901, Step 4.2

Performance Step: 2 ENSURE NR-V-4A or NR-V-4B is Closed.

Standard: Notes both NR-V-4A and NR-V-4B are Closed as indicated by Green lights on PL or Blue lights on (PCR).

Comment:

PERFORMANCE INFORMATION

OP-TM-541-901, Step 4.3**Performance Step: 3**

ENSURE discharge valves are Closed on all NR or SR pumps which are shutdown.

Standard:

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

Comment:**OP-TM-541-901, Step 4.4****Performance Step: 4**

DISPATCH an Operator to Close the following breakers:

- NR-V-2-BK (1A ES Screen House MCC Unit 2A)
- NR-V-3-BK (1A ES Screen House MCC Unit 2B)
- NR-V-7-BK (1B ES Screen house MCC Unit 2A)
- NR-V-5-BK (1A ES Valves MCC Unit 8D)
- NR-V-6-BK (1B ES Valves MCC Unit 10D)

Standard:

Examinee contacts an AO and directs closing of the breakers for NR-V-2, NR-V-3, NR-V-5, NR-V-6 and NR-V-7.

**BOOTH OPERATOR
CUE:**

When requested to close the breakers for NR-V-2, NR-V-3, NR-V-5, NR-V-6, and NR-V-7:

- **Acknowledge the request.**
- **Insert Event 1. Ensure RWR19, RWR20, RWR21, RWR47 and RWR48 inserted.**
- **Report that the breakers for NR-V-2, NR-V-3, NR-V-5, NR-V-6, NR-V-7 are closed**

Comment:

PERFORMANCE INFORMATION

OP-TM-541-901, Step 4.5

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

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

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

Comment:

OP-TM-541-901, Step 4.6

- √ **Performance Step: 6** ENSURE the third Secondary River pump is operating.
Standard: Starts the third SR pump SR-P-1A by rotating extension control clockwise (CL) observes RED light on GREEN light off.

Comment:

OP-TM-541-901, Step 4.7

- √ **Performance Step: 7** ENSURE SR pump discharge valves are OPEN.
Standard: Opens the discharge valve for SR-P-1A, SR-V-1A by depressing Open PB. Notes GREEN light out, RED light lit.

Comment:

OP-TM-541-901, Step 4.8

- √ **Performance Step: 8** WAAT OPEN NR-V-2-BK is CLOSED, then OPEN NR-V-2.
Standard: Presses the OPEN pushbutton for NR-V-2 (CC). Notes green light out, red light lit.

Comment:

PERFORMANCE INFORMATION

OP-TM-541-901, Step 4.9

- ✓ **Performance Step: 9** WAAT NR-V-7-BK is closed, then OPEN NR-V-7.
Standard: Presses the OPEN pushbutton for NR-V-7 (CC). Notes green light out, red light lit.

Comment:

✓ **OP-TM-541-901, Step 4.10**

- Performance Step: 10** WAAT NR-V-6-BK is CLOSED, then OPEN NR-V-6..
Standard: Presses the OPEN pushbutton for NR-V-6. Notes green light out, red light lit.

Comment:

OP-TM-541-901, Step 4.11

- Performance Step: 11** THROTTLE SR-V-2 to maintain Secondary River discharge pressure (SR-PI-134) above 21 psig.
Standard: If necessary, Examinee throttles SR-V-2 to maintain Secondary River discharge pressure (SR-PI-134) above 21 psig.

Comment:

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

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

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

OP-TM-541-901, Step 4.12

- Performance Step: 12** THROTTLE OPEN NR-V-16 A, B, C, D to maintains NS cooler outlet temperature less than 95 °F.
Standard: If needed, Examinee directs an NLO to throttle open NR-V-16D to maintains NS cooler outlet temperature less than 95 °F.

Comment:

PERFORMANCE INFORMATION

OP-TM-541-901, Step 4.13

Performance Step: 13 THROTTLE OPEN NR-V-15A, B to maintain IC cooler outlet temperature less than 100 °F.

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

Comment:

Terminating Cue: When candidate has control (giving the direction to throttle NR-V-16D and/or throttling an NR-V-15) of outlet temperatures JPM may be terminated.

STOP TIME: _____

TIME CRITICAL STOP TIME: N/A

VERIFICATION OF COMPLETION

Job Performance Measure No.: ILT 16-01 NRC JPM G

Examinee's Name:

Date Performed:

Facility Evaluator:

Number of Attempts:

Time to Complete:

Question Documentation:

Question:

Response:

Result: SAT _____ UNSAT _____

Examiner's Signature: _____ Date: _____

INITIAL CONDITIONS:

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

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

TIME CRITICAL: No

CROSS-TIE SECONDARY RIVER TO SUPPLY NUCLEAR RIVER**1.0 PURPOSE**

This procedure provides direction for supplying Secondary River (SR) to the Nuclear Service (NS) and Intermediate Closed (IC) heat exchangers.

2.0 MATERIAL AND SPECIAL EQUIPMENT

None

3.0 PRECAUTIONS, LIMITATIONS, AND PREREQUISITES**3.1 Precautions**

None

3.2 Limitations

To prevent SR pump motor overload, maintain secondary river header pressure (as read on SR-PI-134) greater than 21 psig.

3.3 Prerequisites**3.3.1 VERIFY one of the following conditions:**

Reactor is shutdown,

TS 3.0.1 action statement has been entered.

4.0 MAIN BODY

- 4.1 **IAAT** Secondary Closed cooler outlet temperature is greater than 90 °F, then **LOWER** reactor power. ☐
- 4.2 **ENSURE** NR-V-4A or NR-V-4B is Closed. ☐
- 4.3 **ENSURE** discharge valves are Closed on all NR or SR pumps which are shutdown. ☐
- 4.4 **DISPATCH** an Operator to Close the following breakers:
- NR-V-2-BK (1A ES SCREEN HOUSE MCC UNIT 2A) ☐
 - NR-V-3-BK (1A ES SCREEN HOUSE MCC UNIT 2B) ☐
 - NR-V-7-BK (1B ES SCREEN HOUSE MCC UNIT 2A) ☐
 - NR-V-5-BK (1A ES VALVES MCC UNIT 8D) ☐
 - NR-V-6-BK (1B ES VALVES MCC UNIT 10D) ☐
- 4.5 **IAAT** NR piping between NR-V-3 and NR-V-5 is ruptured or blocked, then **CLOSE** the following valves: ☐
1. NR-V-3 ☐
 2. NR-V-5 ☐
- 4.6 **ENSURE** the third Secondary River pump is operating. ☐
- 4.7 **ENSURE** SR pump discharge valves are OPEN. ☐
- 4.8 **WAAT** NR-V-2-BK (1A ES SCREEN HOUSE MCC UNIT 2A) is CLOSED, then **OPEN** NR-V-2. ☐
- 4.9 **WAAT** NR-V-7-BK (1B ES SCREEN HOUSE MCC UNIT 2A) is CLOSED, then **OPEN** NR-V-7. ☐
- 4.10 **WAAT** NR-V-6-BK (1B ES VALVES MCC UNIT 10D) is CLOSED, then **OPEN** NR-V-6. ☐
- NOTE: Available river system capacity above that required to maintain NS & IC temperature within limits may be distributed between SR, IC & NS.
- 4.11 **THROTTLE** SR-V-2 to maintain Secondary River discharge pressure (SR-PI-134) above 21 psig. ☐

- 4.12 **THROTTLE OPEN** NR-V-16A, B, C, D to maintains NS cooler outlet temperature less than 95 °F. _____
- 4.13 **THROTTLE OPEN** NR-V-15A, B to maintain IC cooler outlet temperature less than 100 °F. _____
- 4.14 **When** at least one NR pump **and** flowpath to NS heat exchanger are available, **then GO TO** Section 5.0, "Return To Normal". _____

Facility: THREE MILE ISLAND Task No.: 66101004
Task Title: Respond IAW OP-TM-MAP-C0101 JPM No.: ILT 16-01 NRC JPM H
Alarm Response with Failure –
Alternate Path
K/A Reference: 072 A3.01 (2.9 / 3.1) Previous JPM: 12-01 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:

- 100% power
- You are the ARO.
- The examiner will act as the URO and CRS.
- The booth operator will be the Auxiliary Operators.
- No Maintenance or surveillances are scheduled for this shift.

Task Standard: Once control tower ventilation is on emergency recirculation via AH-E-18A, the JPM can be terminated.

Required Materials:

- OP-TM-MAP-C0101, Radiation Level HI, Rev 3
- OP-TM-826-901, CONTROL BUILDING VENTILATION SYSTEM RADIOLOGICAL RESPONSE OPERATIONS, Rev 3

General References:

- OP-TM-MAP-C0101, Radiation Level HI, Rev 3
- OP-TM-826-901, CONTROL BUILDING VENTILATION SYSTEM RADIOLOGICAL RESPONSE OPERATIONS, Rev 3

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

Time Critical Task: No

Validation Time:

SIMULATOR SETUP

1. Reset the simulator to IC 16
2. Insert the following Malfunctions:
RM01G, AH-E-17A fails to trip on interlock, insert immediately
13A6S06ZDICAHE18B(5) str to OFF, AH-E-18B fails to start, insert immediately
Set **RM24** = 3000 on **EVENT #1**
Set **RM27** = 4020 on **EVENT #1**
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: _____

EVALUATORS CUE: The examinee may recognize that the Automatic actions of C-1-1 did not occur and may perform the actions IAW OS-24.

BOOTH CUE: When directed, insert EVENT #1

EVALUATORS CUE: Acknowledge condition and entry into OP-TM-MAP-C0101.

OP-TM-MAP-C0101, Step 4.1

Performance Step: 1 ANNOUNCE alarm over plant page and radio.

Standard:

- Announces RM-A-1 Hi Alarm over the plant page and radio.

Comment:

BOOTH CUE: Acknowledge, as RadPro to verify the alarm and determine the source.

OP-TM-MAP-C0101, Step 4.2

Performance Step: 2 Notify Radiation Protection to verify the alarm and determine the source.

Standard:

- Notifies Radiation Protection to verify the alarm and determine the source.

Comment:

Evaluator Cue: If addressed, state that SCBA's are not required.

OP-TM-MAP-C0101, Step 4.3.1

Performance Step: 3 IAAT High alarm is Lit, then PERFORM OP-TM-826-901, "Control Building Ventilation System Radiological Response Operations":

Standard:

- Verifies RM-A-1 High alarm is Lit (PRF), and PERFORMS OP-TM-826-901.

Comment:

OP-TM-826-901, Precautions, Limitations, and Prerequisites

Performance Step: 4 Examinee retrieves procedure and verifies prerequisites.

Standard: Examinee marks off steps.

Comment:

OP-TM-826-901, Step 4.1.1 is not applicable

EVALUATORS CUE: TIME AH-E-17A is secured:

OP-TM-826-901, Step 4.1.2

✓ **Performance Step: 5** ENSURE the following fans are shutdown:

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

Standard:

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

Comment:

OP-TM-826-901, Step 4.1.3

Performance Step: 6 SHUTDOWN AH-E-19A and AH-E-19B.

Standard:

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

Comment:

OP-TM-826-901, Step 4.1.4

Performance Step: 7 ENSURE AH-D-28 or AH-D-617 are CLOSED.

Standard:

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

Comment:

OP-TM-826-901, Step 4.1.5

Performance Step: 8 PLACE ext. control for AH-E-93/94A and AH-E-93/94B to the OFF position.

Standard:

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

Comment:

OP-TM-826-901, Step 4.1.6

Performance Step: 9 START AH-E-18B (A) if AH-E-17A (B) was previously operating.

Standard:

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

Comment:

Alternate Path Begins

EXAMINER NOTE: The 'B' train, which is the standby train, will not start. The 'A' train must be used. Student must recognize and identify the need to allow a two minute time delay and then proceed with 'A' train vice expected 'B' train.

EXAMINER CUE: When the candidate states that there is a 2 minute wait, announce "time compression is in effect and 2 minutes has elapsed".

√ **EVALUATORS CUE:** TIME AH-E-18A is started:
(must be greater than 2 mins)

OP-TM-826-901, Step 4.1.7

√ **Performance Step: 10** If the opposite train of ventilation is unavailable, then WAIT 5 minutes after AH-E-17A (B) was shutdown and START AH-E-18A (B).

Standard:

- Waits 2 minutes
- Starts AH-E-18A by rotating extension control on H&V A clockwise and holding until the discharge damper travels and the RED light comes on indicating AH-E-18 contactor picked up.

Comment:

OP-TM-826-901, Step 4.1.8

Performance Step: 11 ENSURE AH-E-19A or B is operating.

Standard:

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

Comment:

OP-TM-826-901, Step 4.1.9**Performance Step: 12** ENSURE AH-E-95A or B is operating.**Standard:**

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

Comment:***OP-TM-826-901, Step 4.1.10*****Performance Step: 13** START AH-E-90 and AH-E-91.**Standard:**

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

ICO Cue: Acknowledge, as an NLO, to start AH-E-90 and AH-E-91.**Comment:****Terminating Cue:** When AH-E-18A has been started and the order has gone out to an NLO to start AH-E-90/91, the JPM may be terminated.

Job Performance Measure No.: ILT 16-01 NRC JPM H

Examinee's Name:

Date Performed:

Facility Evaluator:

Number of Attempts:

Time to Complete:

Question Documentation:

Question:

Response:

Result: SAT _____ UNSAT _____

Examiner's Signature: _____ Date: _____

INITIAL CONDITIONS:

- 100% power
- You are the ARO.
- The examiner will act as the URO and CRS.
- The booth operator will be the Auxiliary Operators.
- No Maintenance or surveillances are scheduled for this shift.

INITIATING CUE:

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

TIME CRITICAL

No

**RADIATION
LEVEL
HI**

MAP C-1-1

System 661

OP-TM-MAP-C0101

Revision 3

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Level 2 - Reference Use

1.0 SETPOINTS

None

2.0 CAUSES

- Alert or High Alarm on any of the following:
- RM-G-1 through RM-G-7
- RM-G-9 through RM-G-20
- RM-G-24 through RM-G-27
- RM-L-1 through RM-L-7
- RM-L-9
- RM-A-1, RM-A-2
- RM-A-4 through RM-A-9
- RM-A-15

3.0 AUTOMATIC ACTIONS

None

4.0 MANUAL ACTIONS REQUIRED

4.1 **DETERMINE** radiation monitor in alarm as indicated on PRF. _____

4.2 **GO TO** Attachment for radiation monitor in alarm. _____

**RADIATION
LEVEL
HI**

MAP C-1-1

OP-TM-MAP-C0101

System 661

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RM-A-1

Control Room

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1.0 SETPOINTS

Refer to 1101-2.1, "Radiation Monitoring System Setpoints".

2.0 CAUSES

Airborne Radioactivity in the Control Room

3.0 AUTOMATIC ACTIONS

- The following trip on a Hi Alarm:
 - 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
- AH-D-28 and AH-D-617 Close on a Hi Alarm

4.0 MANUAL ACTIONS REQUIRED

4.1 **ANNOUNCE** alarm over plant page and radio. _____

4.2 **NOTIFY** Radiation Protection to verify the alarm and determine the source. _____

4.3 **IAAT** High alarm is Lit, **then** perform the following: ☐

1. **PERFORM** OP-TM-826-901, " Control Building Ventilation System Radiological Response Operations": _____
2. **EVALUATE** donning SCBAs. _____
3. **REQUEST** SM to evaluate Emergency Action Levels (EALs). _____

CONTROL BUILDING VENTILATION SYSTEM **RADIOLOGICAL RESPONSE OPERATIONS**

1.0 PURPOSE

This procedure provides direction for control building ventilation system operation if a radiological event has occurred. This procedure is used following a High Alarm on RM-A-1 or 4 psig ESAS RBI signal, or if a radiological release has occurred and the control room environment is potentially threatened.

2.0 MATERIAL AND SPECIAL EQUIPMENT

None

3.0 PRECAUTIONS, LIMITATIONS, AND PREREQUISITES

3.1. Precautions

None

3.2. Limitations

None

3.3. Prerequisites

3.3.1. **VERIFY** the control building ventilation was operating in the normal configuration IAW 1104-19. _____

3.3.2. **VERIFY** RM-A-1 High Alarm or 4 psig ESAS signal have actuated, or Unit Supervisor has determined that pressurized re-circulation of the control tower is necessary. _____

4.0 **MAIN BODY**

4.1. Aligning the System for Emergency Recirc

4.1.1. **If** RM-A-1 high alarm **or** 4 psig ESAS did not actuate, **then NOTIFY** chemistry **and ANNOUNCE** over the page and radio, the intent to shift CB ventilation _____

4.1.2. **ENSURE** the following fans are shutdown:

- AH-E-17A **and** AH-E-17B _____

- AH-E-95A **and** AH-E-95B _____

- AH-E-20A **and** AH-E-20B _____

4.1.3. **SHUTDOWN** AH-E-19A **and** AH-E-19B. _____

4.1.4. **ENSURE** AH-D-28 or AH-D-617 are CLOSED. _____

4.1.5. **PLACE** ext. control for AH-E-93/94A and AH-E-93/94B to the OFF position. _____

4.1.6. **START** AH-E-18B (A) if AH-E-17A (B) was previously operating. _____

4.1.7. **If** the opposite train of ventilation is unavailable, **then WAIT** 2 minutes after AH-E-17A (B) was shutdown **and START** AH-E-18A (B). _____

4.1.8. **ENSURE** AH-E-19A or B is operating. _____

4.1.9. **ENSURE** AH-E-95A or B is operating. _____

4.1.10. **START** AH-E-90 and AH-E-91 at AH-E-90-EX7 (FHB 305: hallway next to Hot Tool Room). _____

4.1.11. **IF** CB return flow (FR-271) < 36000 SCFM, **then ENSURE** AH-D-41 on the IDLE train is closed (CB 380: A or B fan room, by the door, 25' overhead). _____

Facility: THREE MILE ISLAND Task No.: 44104015

Task Title: Manually/Locally operate the turbine bypass valves (MS-V-3A-F) JPM No.: ILT 16-01 NRC JPM I

K/A Reference: 041 A4.08 3.0/3.1 Bank JPM: TQ-TM-105-411-J100

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:

- Reactor trip and plant cooldown has commenced
- You are an Auxiliary Operator
- The examiner will be all control room operators

Task Standard: Take local manual control of MS-V-3C.

Required Materials: • OP-TM-411-451, MANUAL CONTROL OF TBVs/ADVs, Rev 7

General References: • OP-TM-411-451, MANUAL CONTROL OF TBVs/ADVs, Rev 7

Initiating Cue: The Control Room Supervisor has directed you to establish communication with the control room and take local manual control of MS-V-3C, IAW OP-TM-411-451, MANUAL CONTROL OF TBVs/ADVs , Attachment 7.1.

Time Critical Task: No

Validation Time: 6 minutes

SIMULATOR SETUP

N/A

PERFORMANCE INFORMATION

(Denote Critical Steps with a check mark)

START TIME: _____

- EVALUATORS CUE:** Direct the examinee to:
"Establish communications with the CRO and take local manual control of MS-V-3C, in accordance with OP-TM-411-451, Attachment 7.1 and await further direction from the control room".
- EVALUATORS CUE** A copy of the procedure should be located at the valve, or if requested by the examinee, the examiner may hand Attachment 7.1.
- EXAMINER CUE:** If asked the status of the MS-V-3A/B/C ICS hand station, inform the student that "MS-V-3/4 station for MS-V-3C is in HAND".

OP-TM-411-451, Attachment 7.1, Step 1

- Performance Step: 1** Establish communications with the control room.
- Standard:** Examinee **LOCATES** MS-V-3C on the west side of the Main Condenser, 322' elevation of the Turbine Building and **ESTABLISHES** communications with the CRO with a Radio or headset, which is located north west of MS-V-3C.

Comment:

- EXAMINER CUE:** If examinee describes rotating handwheel to align the holes in the sleeve and stem, inform him/her that holes are aligned.

OP-TM-411-451, Attachment 7.1, Step 2

- √ **Performance Step: 2** **TURN** handwheel to align holes in sleeve with hole in stem (either set of holes in sleeve will work).
- Standard:** Examinee **DESCRIBES** rotating handwheel to align the holes in the sleeve and the stem using either set of holes.

Comment:

PERFORMANCE INFORMATION

EXAMINER CUE: If examinee describes inserting the pin, inform him/her that the pin is inserted

OP-TM-411-451, Attachment 7.1, Step 3

√ **Performance Step: 3** INSERT pin into sleeve/stem.

Standard: INSERT pin into the holes of the sleeve and stem for the manual operator.

Comment:

EXAMINER NOTE: Auto/Manual switch for MS-V-3s is located on side of positioner box.

EXAMINER CUE: If examinee describes how to position switch correctly, inform him/her the switch is in MANUAL.

OP-TM-411-451, Attachment 7.1, Step 4

√ **Performance Step: 4** PRESS and ROTATE Auto/Manual switch, 90 degrees counterclockwise to Manual position

Standard: Examinee DESCRIBES Pressing and Rotating the AUTO / MANUAL Switch 90 degrees counter clockwise to the MANUAL position.

Comment:

EXAMINER CUE: If examinee describes how to open the actuator equalizing valve correctly, inform him/her the valve is open.

OP-TM-411-451, Attachment 7.1, Step 5

√ **Performance Step: 5** OPEN Actuator Equalizer valve MS-V-1162 for MS-V-3C.

Standard: Examinee OPENS the actuator Equalizing Valve by turning it counterclockwise to the fully OPEN position.

Comment:

PERFORMANCE INFORMATION

OP-TM-411-451, Attachment 7.1, Step 6

Performance Step: 6 **MAINTAIN** Turbine Header Pressure within limits by adjusting TBV / ADV handwheel.

Standard: Examinee **INFORMS** CRO that MS-V-3C is in MANUAL control and awaiting instructions to position valve.

Comment:

Terminating Cue: When examinee reports to CRO that MS-V-3C is in LOCAL / MANUAL control, JPM may be terminated

STOP TIME: _____

VERIFICATION OF COMPLETION

Job Performance Measure No.: ILT 16-01 NRC JPM I

Examinee's Name:

Date Performed:

Facility Evaluator:

Number of Attempts:

Time to Complete:

Question Documentation:

Question:

Response:

Result: SAT _____ UNSAT _____

Examiner's Signature: _____ Date: _____

INITIAL CONDITIONS:

- Reactor trip and plant cooldown has commenced
- You are an Auxiliary Operator
- The examiner will be all control room operators

INITIATING CUE:

The Control Room Supervisor has directed you to establish communication with the control room and take local manual control of MS-V-3C, IAW OP-TM-411-451 MANUAL CONTROL OF TBVs/ADVs, Rev 7, Attachment 7.1.

TIME CRITICAL:

No

ATTACHMENT 7.1
Local Operation of TBVs (MS-V-3s)
Page 1 of 2

Auto to Manual Operation of MS-V-3s:

1. **ESTABLISH** communications with Control Room. _____
 2. **TURN** handwheel to align holes in sleeve with hole in stem (either set of holes in sleeve will work). _____
 3. **INSERT** pin into sleeve/stem. _____
- NOTE: Auto/Manual switch for MS-V-3s is located on side of positioner box.
4. **PRESS and ROTATE** Auto/Manual switch, 90 degrees counterclockwise to Manual position. _____
 5. **OPEN** Actuator Pressure Equalizing valve for the desired TBV (N/A valves not used):
 - A. MS-V-1160 (MS-V-3A) _____
 - B. MS-V-1161 (MS-V-3B) _____
 - C. MS-V-1162 (MS-V-3C) _____
 - D. MS-V-1163 (MS-V-3D) _____
 - E. MS-V-1164 (MS-V-3E) _____
 - F. MS-V-1165 (MS-V-3F) _____
 6. **MAINTAIN** Turbine Header Pressure within limits by adjusting TBV / ADV handwheel. _____

Facility: THREE MILE ISLAND Task No.: 54104005

Task Title: Emergency Makeup to Nuclear Service Closed Cooling Surge Tank (NS-T-1) JPM No.: ILT 16-01 NRC JPM J

K/A Reference: 008 A4.07 2.9/2.9 Bank JPM: TQ-TM-105-541-J100

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:

- Reactor power is 67%, after a loss of 1C 4160V bus
- NS-T-1 level is slowly lowering due to a small leak
- You are an Auxiliary Operator
- The examiner will be all control room operators

Task Standard: Fill NS-T-1 with the condensate system in accordance with OP-TM-541-921.

Required Materials:

- OP-TM-541-921, EMERGENCY MAKEUP TO NS-T-1, Rev 2 with prerequisites signed off. N/A section 4.1.

General References:

- OP-TM-541-921, EMERGENCY MAKEUP TO NS-T-1, Rev 2

Initiating Cue: The Inplant Supervisor has directed you to establish communications with the control room and lineup the condensate system for Emergency Makeup to NS-T-1, IAW OP-TM-541-921, EMERGENCY MAKEUP TO NS-T-1, Section 4.2.

Time Critical Task: No

Validation Time: 8 minutes

SIMULATOR SETUP

N/A

PERFORMANCE INFORMATION

(Denote Critical Steps with a check mark)

START TIME: _____

EVALUATORS CUE: Direct the examinee to:
"Lineup the condensate system for emergency makeup of
NS-T-1, IAW OP-TM-541-921, Section 4.2"

OP-TM-541-921, Section 4.2, Step 1

Performance Step: 1 **VERIFY** CLOSED SC-V-115 (355' TB NW side SC surge tank 4' above floor).

Standard: Examinee **VERIFIES** CLOSED SC-V-115.

Comment:

EVALUATOR NOTE: Examinee should locate a ladder but may simulate using it to Open CO-V-170.

OP-TM-541-921, Section 4.2, Step 2

√ Performance Step: 2 **OPEN** CO-V-170. (305' TB 10' SE of CO-P-2C 12' above floor).

Standard: Examinee **OPENS** CO-V-170.

Comment:

OP-TM-541-921, Section 4.2, Step 3

√ Performance Step: 3 Throttle **OPEN** NS-V-104 as needed to maintain NS-T-1 level between 3 and 6 feet. (322' TB on wall just S of elevator 2' W of DW-P-1)

Standard: Examinee Throttles **OPEN** NS-V-104 as needed to maintain NS-T-1 level between 3 and 6 feet.

Comment:

Terminating Cue: When Secondary AO demonstrates control of NS-V-104 the JPM may be terminated.

STOP TIME: _____

VERIFICATION OF COMPLETION

Job Performance Measure No.: ILT 16-01 NRC JPM J

Examinee's Name:

Date Performed:

Facility Evaluator:

Number of Attempts:

Time to Complete:

Question Documentation:

Question:

Response:

Result: SAT _____ UNSAT _____

Examiner's Signature: _____ Date: _____

INITIAL CONDITIONS:

- Reactor power is 67%, after a loss of 1C 4160V bus
- NS-T-1 level is slowly lowering due to a small leak
- You are an Auxiliary Operator
- The examiner will be all control room operators

INITIATING CUE:

The Inplant Supervisor has directed you to establish communications with the control room and lineup the condensate system for Emergency Makeup to NS-T-1, IAW OP-TM-541-921, EMERGENCY MAKEUP TO NS-T-1, Section 4.2.

TIME CRITICAL:

No

EMERGENCY MAKEUP TO NS-T-1

1.0 PURPOSE

1.1 Provide alternate methods for filling NS-T-1 when DW-P-1 is not available.
The methods are:

1. Fill from Condensate system
2. Gravity fill from DW-T-1.
3. Fill from Emergency Feedwater System

2.0 MATERIAL AND SPECIAL EQUIPMENT

- 2.1 Approx. 50 ft of hose (rated pressure > 160 psig) with 1" Female NPT connectors on each end (IB 295: Near EF-V-4 & 5 in AOP Box #4) "Long hose assembly"
- 2.2 Orifice and support bracket assembly (IB 295: Near EF-V-4 & 5 in AOP Box #4)
- 2.3 Approx. 6 ft of hose (rated pressure > 1500 psig) with 1" Female NPT connectors on each end, (IB 295: Near EF-V-4 & 5 in AOP Box #4) "Short hose assembly"
- 2.4 Wrenches for installing above.
- 2.5 Ladder for CO-V-170 access.

3.0 PRECAUTIONS, LIMITATIONS, AND PREREQUISITES

3.1 Precautions

- 3.1.1 To prevent potential hose rupture, ensure NS-V-118 is open before EF-V-27B is opened and do not close NS-V-118 until EF-V-27B is closed.

3.2 Limitations

None

3.3 Prerequisites

- 3.3.1 **VERIFY** DW-P-1 unavailable. _____
- 3.3.2 **VERIFY** EFW system is in the standby mode IAW OP-TM-424-000. _____

4.0 **MAIN BODY**

NOTE: Section 4.2 may proceed in parallel with Section 4.1.

4.1 **If** NS makeup capability from DW-P-1 is lost or at risk, **then** connect temporary mod to fill NS from EFW as follows:

4.1.1 **OBTAIN** SM concurrence to install hose from EFW to NS.
(Attachment 1)

4.1.2 **VERIFY** CLOSED EF-V-27B. (IB 295: drain valve below EF-V-30B)

4.1.3 **VERIFY** CLOSED NS-V-118.
(IB 295: drain valve in room South of IA-P-1A)

4.1.4 **ATTACH** (C clamp) orifice assembly to bldg support.
(IB 295: vertical angle iron 1 FT West of EF-V-30B)

4.1.5 **CONNECT** (1" pipe thread) **short** hose assembly at EF-V-27B.

4.1.6 **CONNECT** (1" pipe union) **short** hose assembly to orifice assembly.

4.1.7 **CONNECT** (1" pipe union) **long** hose assembly to orifice assembly.

4.1.8 **CONNECT** (1" pipe thread) **long** hose at NS-V-118.

4.1.9 **SECURE** hose to IA-V-2105 support pedestal with tie wraps.

4.1.10 **ENSURE** hose is free of kinks.

4.1.11 Independently **VERIFY** configuration IAW Attachment 1.

4.1.12 **ATTACH** Attachment 2 to Control Room Drawing 302-610.

NOTE: The following two steps should be performed when time and resources allow.
The remainder of the procedure may be performed in parallel.

4.1.13 **LOG** TCC installation in the TCC Tracking Log.

4.1.14 **ENSURE** TCC tags are applied to the hoses and orifice assembly.

4.2 **If** a condensate pump is operating, **then** makeup from Condensate to Nuclear Services Closed as follows:

4.2.1 **VERIFY** CLOSED SC-V-115
(355' TB NW side SC surge tank 4' above floor).

4.2.2 **OPEN** CO-V-170. (305' TB 10' SE of CO-P-2C 12' above floor).

4.2.3 Throttle **OPEN** NS-V-104 as needed to maintain NS-T-1 level between 3 and 6 feet. (322' TB on wall just S of elevator 2' W of DW-P-1) _____

4.2.4 **When** DW-P-1 is available, **then GO TO** Return to Normal. _____

NOTE: At this condition (no condensate pump running), Section 4.3 or 4.4 may be used to fill NS-T-1.

4.3 **If** DW-T-1 level is above low alarm (i.e. PPC L2623 Clear) **and** flow path from DW-T-1 to NS-T-1 is available, **then** Gravity fill from DW-T-1 to NS-T-1 as follows: _____

4.3.1 **VERIFY** the Reactor is shutdown. _____

4.3.2 **CLOSE** IA-V-49 (SFP area, W of NS-T-1 on wall). _____

CAUTION

Ear protection is necessary while venting NS-T-1.

NOTE: As NS-T-1 pressure lowers, level in tank should rise due to DW-T-1 head (~ 8 psig in NS-T-1).

4.3.3 **OPEN** NS-V-100 (top of tank) to reduce NS-T-1 air pressure. _____

NOTE: DW-V-10 (322' TB on wall near elevator) may be used in lieu of NS-V-102 in the following two steps.

4.3.4 **When** NS-T-1 at 6 feet (NS-LI-800/801 on CC), **then CLOSE** NS-V-102. (SFP area, 2' W of NS-T-1, 3' above floor) _____

4.3.5 Throttle **OPEN** NS-V-102 as needed to maintain NS-T-1 level between 3 and 6 feet. (NS-LI-800/801 on CC). _____

4.4 **If** a condensate pump is not available, **then** makeup to NSCCW from EFW as follows:

4.4.1 **OPEN** NS-V-118. _____

4.4.2 **VERIFY** NS-V-29B is OPEN. _____

4.4.3 **VERIFY** no hose leakage and minimal leakage at connections. _____

4.4.4 **VERIFY** EF-P-1, 2A or 2B is operating. _____

4.4.5 **VERIFY** two EFW pumps are available or required steady state EFW flow to OTSGs is less than 200 GPM. _____

Facility: THREE MILE ISLAND Task No.: 23104001

Task Title: Take Corrective Action for an Unauthorized Waste Gas release - Inplant JPM No.: ILT 16-01 NRC JPM K

K/A Reference: 071 G2.1.30 4.4/4.0 Bank JPM: TQ-TM-105-231-J100

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:

- 100% power
- An authorized release is in progress from Waste Gas Decay Tank "A"
- Three sets of readings have been completed on 1104-27, Waste Disposal-Gaseous, ENCLOSURE 2

Task Standard: Identify that Waste Gas Tank 'B' pressure is lowering and secure the release in accordance with 1104-27, section 3.17.

Required Materials:

- 1104-27, Rev 87 and three sets of readings on Enclosure 2.
- A 4th set of evaluator readings of Enclosure 2

General References: • 1104-27

Initiating Cue: Perform the fourth set of 1104-27, ENCLOSURE 2 readings at the local panel

Time Critical Task: No

Validation Time: 11 minutes

SIMULATOR SETUP

N/A

Procedure Preparation

1. 1104-27, Enclosure 2, with three sets of prior readings
2. 1104-27, Rev 87, with section 3.7 filled out through and including 3.7.2.26 (N/A Method 2 in step 3.7.2.8)
3. 1104-27, section 3.17, not given to the examinee until requested.

PERFORMANCE INFORMATION

(Denote Critical Steps with a check mark)

START TIME: _____

EVALUATORS CUE: Perform the fourth set of 1104-27, ENCLOSURE 2 readings at the local panel

Provide Examine 1104-27 Section 3.7 and Enclosure 2

EVALUATORS CUE: As each instrument is located or the control room is contacted, provide the instrument reading cues as listed for the 4th set of readings on the attached EVALUATOR ENCLOSURE 2.

1104-27 Enclosure 2

Performance Step: 1 Using Enclosure 2, the examine takes the 4th set of readings

Standard: Examinee identifies each instrument used to take the appropriate reading.

Contacts the Control Room for RM-A-8 readings.

Examinee logs readings on Enclosure 2

Comment:

EVALUATORS CUE: When the examinee notifies Shift management and ask if the release should be terminated, respond: "Terminate the release IAW the procedure".

1104-27, Step 3.7.2.27

Performance Step: 2 If at any time any gas tank has a pressure decrease other than the tank being released then perform the following:
(N/A this step if no pressure drop occurs)

- **Inform** Shift Management of the problem.

Go to section 3.17 to terminate the gas release.

Standard: Examinee recognizes WDG Tank 'B' pressure has lowered and

- Notifies Shift Management
- Goes to Section 3.17 to terminate Gas release

PERFORMANCE INFORMATION

Comment:

EXAMINER CUE: Provide the examinee with Section 3.17

1104-27, Section 3.17

Performance Step: 3

Prerequisites:

- A Waste Gas Decay Tank is being released to the atmosphere.
- Per Enclosure 2, a Waste Gas Decay Tank has lowering pressure and it is not being released to the atmosphere.

Standard:

Examinee verifies prerequisites

Comment:

EXAMINER CUE: The WDG-V-47 bleed control valve is open and pressure is lowering to ZERO

1104-27, Step 3.17.2.1

✓

Performance Step: 4

Bleed off air from WDG-V-47 by adjusting the hand loader for WDG-V-47 to 0 psig.

Standard:

Examinee simulates bleeding off air from WDG-V-47 by turning the control valve (knob) on the panel in the counter-clockwise direction.

Comment:

PERFORMANCE INFORMATION

EXAMINER CUE: Indication for WDG-V-47 will go from red to green to indicate closed.

1104-27, Step 3.17.2.2

- √ **Performance Step: 5** Close WDG-V-47 by depressing the Close PB.
- Standard:** Simulates depressing WDG-V-47 CLOSE PB and verifies closed indication

Comment:

EXAMINER CUE: WDG-FR-123 is located in the LWDS panel. When the examinee goes to the door, show the examinee the attached picture of WDG-FR-123 to perform the next step. Indicate WDG-FR-123 is set at "ZERO" after the examinee performs the next step.

1104-27, Step 3.17.2.3

- √ **Performance Step: 6** Reset WDG-FR-123 setpoint to "0".
- Standard:** Examinee Adjusts WDG-FR-123 setpoint to "ZERO".

Comment:

PERFORMANCE INFORMATION

EXAMINER CUE: Provide valve closed and locking device status cues for any valve operated. Closing WDG-V-30 is the critical task.

1104-27, Step 3.17.2.4

✓ **Performance Step: 7** Close and lock closed the applicable manual outlet valve on the tank being released. (N/A the valves not open)

- Close and lock closed WDG-V-30 for WDG-T-1A.
- Close and lock closed WDG-V-31 for WDG-T-1B.
- Close and lock closed WDG-V-32 for WDG-T-1C.

Standard: Examinee Locates and simulates closing WDG-V-30 by turning it in the clockwise direction.

WD-G-V-31 & 32 are N/A

Comment:

Terminating Cue: After WDG-V-30 is simulated closed, this JPM is complete

STOP TIME: _____

VERIFICATION OF COMPLETION

Job Performance Measure No.: ILT 16-01 NRC JPM K

Examinee's Name:

Date Performed:

Facility Evaluator:

Number of Attempts:

Time to Complete:

Question Documentation:

Question:

Response:

Result: SAT _____ UNSAT _____

Examiner's Signature: _____ Date: _____

INITIAL CONDITIONS:

- 100% power
- An authorized release is in progress from Waste Gas Decay Tank "A"
- Three sets of readings have been completed on 1104-27, Waste Disposal-Gaseous, ENCLOSURE 2

INITIATING CUE: Perform the fourth set of 1104-27, ENCLOSURE 2 readings at the local panel

TIME CRITICAL: No

TMI - Unit 1 Operating Procedure		Number 1104-27
Title Waste Disposal - Gaseous	Revision No. 87	

EVALUATOR COPY

ENCLOSURE 2

Page 1 of 1

Waste Gas Release Data Sheet Permit

NOTE

Slight changes in Auxiliary Building pressure/temperature may affect waste gas tank pressure. Shift Management should make a determination if the gas release should be terminated.

1. If at any time any gas tank has a pressure decrease other than the tank being released then perform the following: (N/A this step if no pressure drop occurs)

Inform Shift Management of the problem.
Go to section 3.17 to terminate the gas release.

DATA

TIME	RELEASE RATE	RM-A-7	RM-A-8 PART IODINE GAS			TANK PRESSURES		
						A	B	C
1400	0	300	40	12	40	79.6	72.0	0
1500	9.0	400	40	15	35	72.9	72.0	0
1600	8.2	400	50	12	25	66.0	72.0	0
→ 1700	8.9	450	30	15	40	59.6	70.8	0

Release Complete _____ Operator Signature _____ Date _____

TMI - Unit 1 Operating Procedure

1104-27

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NOTE

_____ 1. If at any time any gas tank has a pressure decrease other than the tank being released then perform the following: (N/A this step if no pressure drop occurs)

Go to section 3.17 to terminate the gas release.

[illegible]

65

TMI - Unit 1 Operating Procedure		Number 1104-27
Title Waste Disposal - Gaseous		Revision No. 87

3. Close gas recycle valve WDG-V-25 (27 or 29), using the pushbuttons on the L.W.D. panel in the Auxiliary Building.
4. Vent the remaining 10 psig of gas in Waste Gas Decay Tank WDG-T-1A (1B or 1C) if desired to the Station Ventilation Stack per Section 3.7 prior to refilling the Waste Gas Decay Tank. Note that this is only necessary if it is desired to fully depressurize the Waste Gas Tank.

Performed By _____ Date _____
Signature

Reviewed By SRO _____ Date _____
or RO License _____ Signature

CAUTION

All releases to the vent stack must be accomplished with an approved waste gas release permit.

NOTE

If a gas release is terminated for any reason prior to being empty, ensure it is re-started within 12 hours if possible to prevent 4 to 6 hours of additional work by Chemistry and Rad Con to re-analyze the tank contents. Per CY-TM-170-2011 gas releases may be secured for up to 12 hours without re-sampling for a new gas release permit.

3.7 Waste Gas Decay Tank (WDG-T-1A) Disposal - Level 1

3.7.1 Prerequisites

NO

3.7.1.1

WDG-T-1A is isolated IAW section 3.14

NO

3.7.1.2

The WCS/CRS/SM verified that WDG-T-1A has had a hold time to ensure compliance with ODCM, Section 2.2.2.

NO

3.7.1.3

During release of gaseous waste from WDG-T-1A, the following conditions must be met:

NO

1

ENSURE requirements of ODCM Part 1, Section 2.1.2 are satisfied using Waste Gas Discharge monitor, RM-A-7, and/or Auxiliary and Fuel Handling Building Exhaust monitor, RM-A-8.

NO

2

Waste gas decay tank discharge valve, WDG-V-47, must be operable.

NO

3

WDG-FR-123 must be operable.

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<u>AO</u>	4	Verify that RM-A-7, WDG-FT-123 and WDG-V-47 are in service and that there are no "Equipment Deficiency" tags on the equipment that affect operability.
<u>AO</u>	5	Verify that the Aux/FH Bldg. Ventilation system is in service.
<u>AO</u>	6	Verify the following interlock tests are current. <ul style="list-style-type: none"> • WDG-V-47/RM-A-7 • WDG-V-47/RM-A-8 • WDG-V-47/FT-123 • WDG-V-47/AH-E-14A/B/C/D
<u>AO</u>	7	Verify the following valve lineup:
<u>AO</u>		WDG-V-67 Locked Open
<u>AO</u>		WDG-V-68 Locked Open
<u>AO</u>		WDG-V-31 Locked Closed
<u>AO</u>		WDG-V-32 Locked Closed

3.7.2 Procedure - Level 1

<u>AO</u>	3.7.2.1	Obtain page 1 of Exhibit 2 in procedure CY-TM-170-2011 and complete operations input to gas release permit.
<u>AO</u>	3.7.2.2	Forward completed release permit to chemistry.
<u>AO</u>	3.7.2.3	Chemistry performed samples for the release.
<u>AO</u>	3.7.2.4	Rad. Con. performed dose calculations for the release.
<u>AO</u>	3.7.2.5	Verify that IA-V-1213 is OPEN and the instrument air system is available.
<u>AO</u>	3.7.2.6	Source check RM-A-7 (Waste gas discharge monitor) by Method 1 or 2: (N/A Method not used)
<u>AO</u>	3.7.2.7	Method 1:
<u>AO</u>	1.	OBTAIN RM-A-7 check source (source #1662 or equivalent) from Radiological Protection.
<u>AO</u>	2.	NOTIFY Control Room of the intent to source check RM-A-7.
<u>AO</u>	3.	REMOVE lead plug located on top of the RM-A-7 sampler.
<u>AO</u>	4.	INSERT rod source.

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- | | | |
|-----------|---------------|---|
| <u>AO</u> | 5. | VERIFY RM-A-7 ratemeter reading in the Control Room qualitatively increases. |
| <u>NO</u> | 6. | REMOVE rod source from the sampler. |
| <u>AO</u> | 7. | INSERT lead plug in the RM-A-7 sampler. |
| <u>AO</u> | 8. | RETURN RM-A-7 check source location as directed by Radiological Protection. |
| <u>NO</u> | 9. | RECORD time and date on charts for the following equipment to indicate the source check: |

- WDG-FR-123
- RM-A-7

- | | | |
|------------|--------------------|---|
| <u>N/A</u> | 3.7.2.8 | Method 2: |
| | | 1. Power down RM-A-7 at the ratemeter. |
| | | 2. Remove the lead cover from RM-A-7 (if necessary). |
| | | 3. Remove the detector from the sampler. |
| | | 4. Attach primary calibration source, #318A, to the face of the detector using the source cup holder. |
| | | 5. Replace the detector in the sampler. |
| | | 6. Power up RM-A-7 at the ratemeter. |
| | | 7. Confirm that RM-A-7 ratemeter reading increases significantly. |
| | | 8. Power down RM-A-7 at the ratemeter. |
| | | 9. Remove the detector from the sampler. |
| | | 10. Remove the calibration source from the face of the detector. |
| | | 11. Replace the detector in the sampler. |
| | | 12. Replace all fasteners. |
| | | 13. Replace the lead cover. |
| | | 14. Power up RM-A-7 at the ratemeter. |

- | | | |
|------------|---------------------|--|
| <u>N/A</u> | | |
| <u>AO</u> | 3.7.2.9 | Verify that the RM-A-7 interlock defeat switch is in "ENABLE." |
| <u>AO</u> | 3.7.2.10 | Verify that the RM-A-8 interlock defeat switch is in "NORMAL." |

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AO

~~3.7.2.11~~

Verify that the "TEST/NORMAL" switch on WDG-FR-123 is in the "NORMAL" position.

AO

~~3.7.2.12~~

Hang the "Gas Release in Progress" signs at the following locations.

- In the Control Room on PRF at the RM-A-7 ratemeter.
- On the radwaste panel on the WDG-V-47 air controller.

NOTE

If the alarm setpoint per WG permit is 8.5 cfm., a total of 8 ½ complete revolutions will be required. An eight (8) will be showing in the window above the dial, and the dial itself will be set at fifty (50).

AO

~~3.7.2.13~~

Set the WDG-FR-123 alarm setpoint to the value that corresponds to the flow rate specified in the Waste Gas Release Permit by using the dial behind the recorder inside the radwaste panel.

AO

~~3.7.2.14~~

Sign the space on the release permit for setting WDG-FR-123 setpoint.

AO

~~3.7.2.15~~

Record the WDG-T-1A pressure prior to the start of the release on the Waste Gas Release Permit.

NOTE

Channel #1 is activity (RM-A-7) and Channel #2 is the release flow rate (WDG-FR-123).

AO

~~3.7.2.16~~

Verify that WDG-V-47 is closed.

AO

~~3.7.2.17~~

Unlock and Open WDG-V-30.

OS

IV

~~3.7.2.18~~

Operations Supervisor PERFORM Independent Verification that WDG-V-30 is Unlocked and Open.

AO

~~3.7.2.19~~

Notify the Control Room of the change in the locked valve position.

NOTE

WDG-V-47 has no positioner to amplify signal air from the manual loader. Therefore, operation of WDG-V-47 should be gradual to prevent overshooting the maximum allowable release rate when stem drag is initially overcome.

AO

~~3.7.2.20~~

Adjust the hand loader for WDG-V-47 to zero.

AO

~~3.7.2.21~~

Record RM-A-7G, RM-A-8P, RM-A-8I, RM-A-8G, and FR-123 readings on the Waste Gas Release Permit prior to the release.

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NOTE

Rad Waste Panel Alarm (RWA-1-6) "Waste Gas to Atmosphere Terminated" should be expected until WDG-V-47 is open far enough to satisfy the circuit.

AO

3.7.2.22

Depress the Open PB for WDG-V-47 on the radwaste panel.

AO

3.7.2.23

Set the control air to WDG-V-47 to the value that corresponds to the flow rate (CFM) specified on the Waste Gas Release Permit. (WDG-V-47 will gradually open by air loading.)

AO

3.7.2.24

Sign the space provided on the Waste Gas Release Permit for WDG-V-47 loaded.

AO

3.7.2.25

Record the date/time that the release was started on the Waste Gas Release Permit.

NOTE

Gas tank releases average around 13 to 14 hours for release duration. If the gas tank being released requires substantially more time to release, then a problem may exist in the release flow path.

3.7.2.26

Monitor the tank pressure, release rate, and radiation monitors hourly throughout the release and record on Enclosure 2.

NOTE

Slight changes in Auxiliary Building pressure/temperature may affect waste gas tank pressure. Shift Management should make a determination if the gas release should be terminated.

3.7.2.27

If at any time any gas tank has a pressure decrease other than the tank being released, then perform the following: (N/A if not met)

Inform Shift Management of the problem.

Go to Section 3.17 to terminate the gas release.

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_____	3.7.2.28	Record RM-A-7G, RM-A-8P, RM-A-8I, RM-A-8G, and FR-123 readings on the Waste Gas Release Permit at the following intervals during the release:
		<ul style="list-style-type: none"> • The release is ¼ complete • The release is ½ complete • The release is ¾ complete • The release is complete • The highest reading during the release
_____	3.7.2.29	Vent WDG-T-1A until the pressure is zero.
_____	3.7.2.30	When WDG-T-1A has been vented, complete the following:
_____		1. Bleed off air from WDG-V-47 by adjusting the hand loader for WDG-V-47 to 0 psig.
_____		2. Close WDG-V-47 by depressing the Close PB.
_____		3. Reset WDG-FR-123 setpoint to "0".
_____		4. Close and lock closed WDG-V-30.
_____ CV		
_____		5. Remove the "Equipment Status Tag" from IA-V-598 for WDG-V-24.
_____		6. Open IA-V-598 for WDG-V-24.
_____		7. Open manual inlet valve WDG-V-77.
_____	3.7.2.31	Purge RM-A-7 per Section 3.11 to reduce counts to approximate level prior to the release.
_____	3.7.2.32	Record the following information in the appropriate sections of the Waste Gas Release Permit:
		<ul style="list-style-type: none"> • Time/Date the release stopped. • Total duration of the release in minutes • WDG-T-1A pressure at the end of the release • Δ pressure between the beginning and end of the release

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3.7.2.33 Remove the "Gas Release in Progress" signs from the following locations.

- In the Control Room on PRF at the RM-A-7 ratemeter.
- On the Radwaste panel on the WDG-V-47 air controller.

3.7.2.34 Return the Waste Gas Release Permit and Waste Gas Release Data Sheet to the WCS/CRS.

3.7.2.35 Forward the completed release permit to Rad. Engineering.

3.7.2.36 Forward the completed 1104-27 to the Operations office.

Process Complete _____ Date _____
Operator

Reviewed By
SRO/RO License _____ Date _____
Signature

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3.17 Termination of Waste Gas Decay Tank due to a pressure drop in any other gas tank not being released – **LEVEL 1**

3.17.1 Prerequisites

- _____ 3.17.1.1 A Waste Gas Decay Tank is being released to the atmosphere.
- _____ 3.17.1.2 Per Enclosure 2, a Waste Gas Decay Tank has lowering pressure and it is not being released to the atmosphere.

3.17.2 Procedure – **Level 1**

- _____ 3.17.2.1 Bleed off air from WDG-V-47 by adjusting the hand loader for WDG-V-47 to 0 psig.
- _____ 3.17.2.2 Close WDG-V-47 by depressing the Close PB.
- _____ 3.17.2.3 Reset WDG-FR-123 setpoint to "0".
- _____ 3.17.2.4 Close and lock closed the applicable manual outlet valve on the tank being released. (N/A the valves not open)
- Close and lock closed WDG-V-30 for WDG-T-1A. _____ CV
- Close and lock closed WDG-V-31 for WDG-T-1B. _____ CV
- Close and lock closed WDG-V-32 for WDG-T-1C. _____ CV
- _____ 3.17.2.5 Notify the Control Room to update the locked valve entry.
- _____ 3.17.2.6 Purge RM-A-7 per Section 3.11 to reduce counts to approximate level prior to the release.
- _____ 3.17.2.7 Record the following information in the appropriate sections of the Waste Gas Release Permit:
- Time/Date the release stopped.
 - Total duration of the release in minutes
 - RM-A-7G, RM-A-8P, RM-A-8I, RM-A-8G, and FR-123 readings
 - Applicable WDG-T-1 pressure when the release was terminated
 - Δ pressure between the beginning and end of the release
- _____ 3.17.2.8 Notify the Control Room to contact Chemistry to sample the gas tank that had the pressure drop and was not being intentionally released.

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- _____ 3.17.2.9 Remove the "Gas Release in Progress" signs at the following locations.
- In the Control Room on PRF at the RM-A-7 ratemeter.
 - On the radwaste panel on the WDG-V-47 air controller.
- _____ 3.17.2.10 N/A the steps not completed in the section of the procedure that was in use prior to the gas release termination to ensure it is closed out properly.
- _____ 3.17.2.11 Return the Waste Gas Release Permit and Waste Gas Release Data Sheet to the WCS/CRS.
- _____ 3.17.2.12 Forward the completed release permit to Rad. Engineering.
- _____ 3.17.2.13 Forward the completed 1104-27 to the Operations office.
- _____ 3.17.2.14 Submit Issue Report to identify the gas tank pressure decrease.

Performed By _____ Date _____
Signature

Reviewed By _____ Date _____
SRO/ RO License Signature

