HARRIS 2018 NRC SCENARIO 1

Facility: Harris Nuclear Plant	Scenario No.: 1 Op Test No.: 05000400/2018301
Examiners:	Operators: SRO:
	RO:
	BOP:
Initial Conditions: IC-28, MOL, 42% power	

- ‘B’ MD AFW Pump is under clearance for pump packing replacement
- ‘B’ DEH Oil Pump is under clearance for motor repairs
- 1CS-9, Letdown Isolation Valve is under clearance for solenoid replacement

Turnover:	A plant shutdown is required due to problems encountered during the repairs on the ‘B’ MDAFW Pump. Repairs have not been able to be completed and the LCO is expiring. The plant is operating at ~42% power in MOL. ‘A’ Heater Drain Pump was secured just prior to shift turnover. When turnover is complete, the crew will secure “B” HDP then commence a power reduction at 4 MW/min to support being in Mode 3 within the next 6 hours.
Critical Task:	• Open 1MS-70 or 1MS-72 to establish a minimum of 200 KPPH AFW flow to the Steam Generators prior to 2 of 3 SG’s Wide Range Levels < 15% • Start the “B” Emergency Diesel Generator to restore AC Emergency bus power prior to initiation of ELAP mitigating actions in accordance with EOP-ECA-0.0

Event No.	Malf. No.	Event Type*	Event Description
1	N/A	R – RO/SRO N – BOP/SRO	Plant Shutdown (GP-006) Secure ‘B’ Heater Drain Pump
2 #	RCS10	C – RO/SRO	Reactor Vessel Flange Leak (ALB-010 and/or AOP-016)
3 #	hva04	C – BOP/SRO TS – SRO	“A” Emergency Services Chilled Water Chiller Trip (AOP-026)
4	cws01a	C – BOP/SRO	Trip of the ‘A’ Circ Water Pump and discharge valve, 1CW-10 fails to automatically shut (AOP-012)
5	cvc05A	C - RO/SRO TS – SRO	CSIP ‘A’ Trip (AOP-018) (FK-122.1 to Manual)
6 #	eps01	M – ALL	Loss of Offsite Power, Reactor Trip (EOP-E-0)
7 #	dsg38 zdg2032b	C – BOP/SRO C – RO/SRO	Loss of ALL AC power (EOP-ECA-0.0)
8 #	z1974tdi z1975tdi	C – BOP/SRO	1MS-70 and 1MS-72 fail to auto open

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

\# Event or Major Transient NOT used on the previous 2 NRC initial licensing operating tests

SCENARIO SUMMARY: 2018 NRC EXAM SCENARIO 1

A plant shutdown is required due to problems encountered during the repairs on the 'B' MDAFW Pump. Repairs will not be able to be completed prior to the LCO expiring. The plant is operating at ~42% power in MOL. The 'A' Heater Drain pump has been secured prior to turnover. When turnover is complete the crew will secure the 'B' Heater Drain pump then continue a power reduction at 4 MW/min to support being in Mode 3 within the next 6 hours. All required notifications have been made to individuals concerning the reason for the shutdown.

The following equipment is under clearance:

- 'B' MDAFW Pump is under clearance for pump packing repairs. The pump has been inoperable for 62 hours and will NOT be restored to operable status within the next 10 hours. Tech Spec 3.7.1.2 LCO Action **a** and Tech Spec 3.3.3.5.b Action **c** applies. 72 hour LCO or HSB within the next 6 hours, HSD following 6 hours.

PLANT SYSTEMS
AUXILIARY FEEDWATER SYSTEM

LIMITING CONDITION FOR OPERATION

3.7.1.2 At least three independent steam generator auxiliary feedwater pumps and associated flow paths shall be OPERABLE with:

a. Two motor-driven auxiliary feedwater pumps, each capable of being powered from separate emergency buses, and

b. One steam turbine-driven auxiliary feedwater pump capable of being powered from an OPERABLE steam supply system.

APPLICABILITY: MODES 1, 2, and 3.

ACTION:

a. With one auxiliary feedwater pump inoperable, restore the required auxiliary feedwater pumps to OPERABLE status within 72 hours* or be in at least HOT STANDBY within the next 6 hours and in HOT SHUTDOWN within the following 6 hours.

INSTRUMENTATION
REMOTE SHUTDOWN SYSTEM

LIMITING CONDITION FOR OPERATION

3.3.3.5.a The Remote Shutdown System monitoring instrumentation channels shown in Table 3.3-9 shall be OPERABLE.

3.3.3.5.b All transfer switches, Auxiliary Control Panel Controls and Auxiliary Transfer Panel Controls for the OPERABILITY of those components required by the SHNPP Safe Shutdown Analysis to (1) remove decay heat via auxiliary feedwater flow and steam generator power-operated relief valve flow from steam generators A and B, (2) control RCS inventory through the normal charging flow path, (3) control RCS pressure, (4) control reactivity, and (5) remove decay heat via the RHR system shall be OPERABLE.

APPLICABILITY: MODES 1, 2, and 3.

ACTION:

c. With one or more inoperable Remote Shutdown System transfer switches, power, or control circuits required by 3.3.3.5.b, restore the inoperable switch(s)/circuit(s) to OPERABLE status within 7 days, or be in HOT STANDBY within the next 12 hours.

SCENARIO SUMMARY: 2018 NRC EXAM SCENARIO 1 continued

The following equipment is under clearance (continued):

- 'B' DEH Pump is under clearance for motor repairs. The pump has been unavailable for 8 hours. Repairs are expected to be completed within 24 hours.

- Letdown Orifice Isolation Valve 1CS-9 is under clearance for solenoid replacement. Tech Spec 3.6.3 LCO Action **b** applies. OWP-CS-09 has been completed.

CONTAINMENT SYSTEMS

3/4.6.3 CONTAINMENT ISOLATION VALVES

LIMITING CONDITION FOR OPERATION

3.6.3 Each containment isolation valve specified in the Technical Specification Equipment List Program, plant procedure PLP-106, shall be OPERABLE with isolation times less than or equal to required isolation times.

APPLICABILITY: MODES 1, 2, 3, and 4.

ACTION:

With one or more of the containment isolation valve(s) inoperable, maintain at least one isolation valve OPERABLE in each affected penetration that is open and:

a. Restore the inoperable valve(s) to OPERABLE status within 4 hours, or

b. Isolate each affected penetration within 4 hours by use of at least one deactivated automatic valve secured in the isolation position, or

c. Isolate each affected penetration within 4 hours by use of at least one closed manual valve or blind flange, or

d. Be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

SCENARIO SUMMARY: 2018 NRC EXAM SCENARIO 1 continued

Event 1: Plant Shutdown (GP-006). Turnover takes place with the unit at 42% Reactor power. The BOP will stop 'B' Heater Drain Pump in accordance with OP-136, Section 7.1. After securing the Heater Drain Pump the crew will continue the power reduction in accordance with GP-006, Normal Plant Shutdown From Power Operation To Hot Standby (Mode 1 To Mode 3). The crew will be given credit for a reactivity manipulation during the down power. It is expected that the SRO will conduct a reactivity brief, the RO will borate and monitor auto rod insertion per the reactivity plan. The BOP will operate the DEH Turbine controls as necessary to lower power. After the crew has demonstrated that they have control of the plant during a shutdown (at Evaluator discretion) event 2 can be inserted.

Event 2: Reactor Vessel Flange leak of ~ 15 gpm. Annunciator ALB-10-5-5, Reactor vessel flange leakoff high temp will alarm when MCB temperature indicator TI-401 reaches 140°F. The crew should notice Pressurizer level slowly decreasing and an increase in Charging flow. The SRO should direct the BOP to place Turbine controls in HOLD to stop the downpower and allow the crew to focus on the event in progress. Annunciator response actions for Reactor Vessel leakage directs shutting 1RC-46, Head Flange Seal Leakoff Line Isolation. The closure of this valve will stop leakage from the inner Reactor head seal. AOP-016, Excessive Primary Plant Leakage could be entered by the crew to address the flange leakage but the leakage will be stopped when addressed with the APP actions. The SRO may evaluate the following Tech Spec for the time the leak exceeded 10 gpm (briefly until 1RC-46 is shut):

T.S. 3.4.6.2: Reactor Coolant System operational leakage shall be limited to:

d. 10 gpm IDENTIFIED LEAKAGE from the Reactor Coolant System (Modes 1, 2, 3, and 4)

Action:

b. With any Reactor Coolant System operational leakage greater than anyone of the above limits, excluding primary-to-secondary leakage, PRESSURE BOUNDARY LEAKAGE and leakage from Reactor Coolant System Pressure Isolation Valves, reduce the leakage rate to within limits within 4 hours or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

Event 3: : "A" Emergency Services Chilled Water Chiller Trip (AOP-026). The crew will respond to various alarms on ALB-023, diagnose the event, and enter AOP-026, Loss of Essential Chill Water System (no immediate actions). The SRO will direct the BOP to start the 'B' Train ESCWS Chiller in accordance with OP-148, Essential Service Chilled Water System. The crew should implement OWP-ECW-01 for the ESCW Chiller 1A-SA failure. The SRO should evaluate Tech Spec 3.7.13, Essential Services Chilled Water System and PLP-114, Relocated Technical Specifications and Design Basis Requirements – Attachment 4 for Area Temperature Monitoring. Note that the 'A' Chiller will be inoperable for the remainder of the scenario and this will impact plant response during the Major Event in that this failure will prevent Load Block 9 on sequencer Train 'A" from energizing. The SRO will commence OMM-001 Attachment 5 for the failure.

SCENARIO SUMMARY: 2018 NRC EXAM SCENARIO 1 continued

TS 3.7.13

PLANT SYSTEMS

3/4.7.13 ESSENTIAL SERVICES CHILLED WATER SYSTEM

LIMITING CONDITION FOR OPERATION

3.7.13 At least two independent Essential Services Chilled Water System loops shall be OPERABLE.

APPLICABILITY: MODES 1, 2, 3, and 4.

ACTION:

With only one Essential Services Chilled Water System loop OPERABLE, restore at least two loops to OPERABLE status within 72 hours* or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

---NOTE---

*The 'A' Train Essential Services Chilled Water System loop is allowed to be inoperable for a total of 14 days only to allow for the implementation of design improvements on the 'A' Train ESW pump. The 14 days will be taken one time no later than October 29, 2016. During the period in which the 'A' Train ESW pump supply from the Auxiliary Reservoir or Main Reservoir is not available, Normal Service Water will remain available and in service to supply the 'A' Train ESW equipment loads until the system is ready for post maintenance testing. Allowance of the extended Completion Time is contingent on meeting the Compensatory Measures and Conditions described in HNP LAR submittal correspondence letter HNP-16-056.

Event 4: Trip of the 'A' Circ Water Pump and discharge valve 1CW-10 failure to automatically shut. The crew should identify the trip of the 'A' Circ Water pump from annunciator ALB-021-4-4 and respond using the APP. The trip of the Circ Water pump is entry conditions for AOP-012, Partial Loss Of Condenser Vacuum. The BOP should identify that the discharge valve for the 'A' Circ Water pump 1CW-10 did not automatically shut (interlock with pump) and should attempt to shut the valve by taking the Circ Water pump control switch to stop. The crew should monitor condenser vacuum for Reactor trip criteria (5" Hg absolute AND Turbine first stage pressure is < 60% Turbine Load) while continuing with the GP-006 shutdown.

Event 5: Trip of the running 'A' Charging Pump (CSIP) breaker. The crew will enter AOP-018, RCP Abnormal Conditions and carry out the immediate action of isolating letdown. They will continue in AOP-018 and place the 'B' CSIP in service. During this evaluation the RO will take ***FK-122.1*** to manual control for support of start of 'B' CSIP.

A low RCP seal injection will cause the ASI system to function. After placing the 'B' CSIP in service the crew will have to secure the ASI pump. They will also have to evaluate the boration effects caused by the ASI pump running. The SRO should evaluate the loss of the CSIP in Tech Specs 3.1.2.2 (Boration Flowpaths are met), 3.1.2.4 and 3.5.2

SCENARIO SUMMARY: 2018 NRC EXAM SCENARIO 1 continued

TS 3.1.2 4 - With only one Charging/safety injection pump OPERABLE restore at least two charging/safety injection pumps to OPERABLE status within 72 hours or be in at least HOT STANDBY and borated to a SHUTDOWN MARGIN as specified in the CORE OPERATING LIMITS REPORT (COLR) plant procedure PLP-106 at 200°F within t he next 6 hours: restore at least two charging/safety injection pumps to OPERABLE status within the next 7 days or be in HOT SHUTDOWN within the next 6 hours.

Event 5: Tech Spec Evaluation of loss of Charging Pump (continued)

TS 3.5.2 - Two independent Emergency Core Cooling System (ECCS) subsystems shall be OPERABLE with each subsystem comprised of:

a. One OPERABLE Charging/safety injection pump
b. One OPERABLE RHR heat exchanger
c. One OPERABLE RHR pump and
d. An OPERABLE flow path capable of taking suction from the refueling water storage tank on a Safety Injection signal and. upon being manually aligned transferring suction to the containment sump during the recirculation phase of operation.

ACTION: a. With one ECCS subsystem inoperable restore the inoperable subsystem to OPERABLE status within 72 hours or be in at least HOT STANDBY within the next 6 hours and in HOT SHUTDOWN within the following 6 hours. The SRO should also prepare OMM-001, Attachment 5 Equipment Problem Checklist for the failure.

Event 6 (**Major**): Loss of Offsite Power, Reactor Trip – Once the crew has stabilized the unit and have started the standby CSIP a Loss of Offsite Power will occur. The crew will enter EOP-E-O, Reactor Trip or Safety Injection. While implementing the actions of E-0 for the loss of Offsite power/Reactor Trip Event 7, Loss of ALL AC Power will occur. This will require a transition from EOP-E-0 to EOP-ECA-0.0. The crew may assign an individual to refer to AOP-025 actions based on the de-energized Emergency Busses.

Event 7: Loss of ALL AC power: During the loss of offsite power the ‘A’ EDG will start but the output breaker to the Emergency Bus, Breaker 106, will trip prior to the sequencer reaching Load Block 9 (< 60 seconds from breaker 106 closing). ‘B’ EDG will fail to start and the ‘B’ Emergency Bus will remain de-energized. At this point there will be a complete loss of AC power to the station. The crew should transition from EOP-E-0 step 3 to EOP-ECA-0.0 or directly enter EOP-ECA-0.0 depending on timing. During implementation of EOP-ECA-0.0 the crew checks for each EDG availability. Since Breaker 106 is NOT available for the ‘A’ EDG the crew will be required to place the EDG Emergency Stopped to EMERG STOP.
After determining that the ‘B’ EDG is not running and not tripped, did not have a start failure alarm and Breaker 126 is available the crew should perform the RNO actions for no EDG running and manually start the ‘B’ EDG. When started the EDG will slow start which is a 30 second start as opposed to an emergency start in 10 seconds. When at normal speed and voltage and the output breaker will close and the sequencer will load equipment onto the emergency buss. (The failure was a problem with the EDG receiving a start signal on the UV signal from the Emergency bus). The crew will check AC Emergency bus voltages, initiate monitoring Critical Safety Function Status Trees and then return to EOP-E-0. The crew will then transition to EOP-ES-0.1, Reactor Trip Response and stabilize the plant.

SCENARIO SUMMARY: 2018 NRC EXAM SCENARIO 1 continued

Event 8: 1MS-70 and 1MS-72 fail to auto open (Loss of all AFW until operator opens 1MS-70 or 1MS-72). ‘B’ MD AFW Pump is under clearance and ‘A’ MD AFW Pump will lose power and not have emergency power since the ‘A’ EDG output breaker has tripped. The Turbine Driven AFW pump will start on a loss of power to the Emergency Bus. There is also another start signal to the TDAFW pump on 2/3 SG’s <25% level. Both of these start signals have failed preventing the auto start of the TDAFW pump by the opening of both 1MS-70 and 1MS-72. If the crew does not respond by opening either 1MS70 or 1MS-72 then a loss of all FW to the Steam Generators will create a RED path on Heat Sink (FR-H.1). Since a loss of ALL AC Power will occur the crew will be implementing EOP-ECA-0.0. A caution prior to step 1 of EOP-ECA-0.0 states: Critical Safety Function Status Trees should be monitored for information only. Function Restoration Procedures should NOT be implemented unless directed by this procedure. The crew should remain in EOP-ECA-0.0 and NOT transition to FR-H.1 if there is a time when a RED path exists. The crew should identify that there is no Feedwater flow to the SG’s and open either 1MS-70 or 1MS-72 (or both) to establish a motive force to run the Turbine Driven AFW pump. Additionally, after opening either 1MS-70 or 1MS-72 to establish flow to the SG the TDAFW pump speed controller should be manually increased and monitored to continue supplying the SG’s a minimum of 200 KPPH AFW flow until at least one intact SG is > 25%.

Scenario termination is met after the crew restores power to the ‘B’ Emergency bus in accordance with EOP-ECA-0.0, has transitioned from EOP-ECA-0.0 to EOP-E-0 then to EOP-ES-0.1 and reached step 5.c, which checks adequate heat sink by having established a minimum feed flow of > 200 KPPH to the SGs.

CRITICAL TASK JUSTIFICATION:

1. Open 1MS-70 or 1MS-72 to establish a minimum of 200 KPPH AFW flow to the Steam Generators prior to 2 of 3 SG's WR Levels < 15%

Wide Range level indications: SG 'A' LI-477.1-SA, SG 'B' 487.1-SB, SG 'C' 497.1-SA

Failure to establish minimum AFW flow is a violation of the basic objective of ECA-0.0 and of the assumptions of the analyses upon which ECA-0.0 is based. Both intend to mitigate deterioration of RCS conditions while ac emergency power is not available. Without AFW flow, the SGs could not support any significant plant cooldown. Thus, the crew would lose the ability to delay the adverse consequences of core uncovery. Also without AFW flow, decay heat would still open the SG safety valves and would rapidly deplete the SG inventory, leading to a loss of secondary heat sink. Decay heat would then increase RCS temperature and pressure until the pressurizer PORVs open, imposing a larger LOCA than RCP seal leakage. Both of these examples violate the basic assumptions of the analyses on which ECA-0.0 is based, complicating the mitigation actions.

2. Start the "B" Emergency Diesel Generator and restore AC Emergency bus power prior to declaring an Extended Loss of AC Power has occurred (within 60 minutes of a loss of all AC Power).

Failure to energize an AC emergency bus constitutes mis-operation or incorrect crew performance with a loss and degradation of emergency power capability. Initiating Extended Loss of AC Power (ELAP) mitigating actions will needlessly prolong the return of power to emergency equipment.

Not starting the Emergency Diesel will require the crew to use the Emergency Stop switch on the MCB. Placing this switch to Emergency Stop will prevent any auto start attempts of the Diesel. This will then require the crew and possible offsite assistance, to continue with the Loss of All AC Power procedure and rely on either getting power restored from an offsite source or using the standby equipment designed for extended power loss. During this extended loss of power the potential for other events to occur is increased including the loss of heat sink. If the extended power loss equipment is determined to be needed then this equipment will or may need to be staged and locally operated.

Note: Causing an unnecessary plant trip or ESF actuation may constitute a CT failure. Actions taken by the applicant(s) will be validated using the methodology for critical tasks in Appendix D to NUREG-1021.

SIMULATOR SETUP

For the 2018 NRC Exam Simulator Scenario #1

Reset to IC-161 password “NRC2018”

Go to RUN

Silence and Acknowledge annunciators

GO TO FREEZE and inform the lead examiner the Simulator is ready. DO NOT GO TO RUN until directed by the lead examiner.

Set ERFIS screens

(The examiner has provided to the candidate with initial conditions and the initiating cues prior to placing the simulator in RUN.)

SPECIAL INSTRUCTIONS

Provide a Reactivity Plan to candidates for shutting down the plant

Provide a copy of the following procedures:

- GP-006, NORMAL PLANT SHUTDOWN FROM POWER OPERATION TO HOT STANDBY (MODE 1 TO MODE 3) **marked up** through section 6.2 step 18 and step 19.b circled needing completion

Press START on Counter Scaler
Post conditions for status board from IC-28
Reactor Power 42%
Control Bank D at 146 steps
RCS boron 1145 ppm

Note: The ‘A’ Heater Drain Pump has been secured and the plant was stabilized prior to snapping this IC.

Turnover: A plant shutdown is required due to problems encountered during the repairs on the ‘B’ MDAFW Pump. Repairs will not be able to be completed prior to the LCO expiring. The plant is operating at ~42% power in MOL. The ‘A’ Heater Drain pump has been secured prior to turnover. When turnover is complete the crew will secure the ‘B’ Heater Drain pump then continue a power reduction at 4 MW/min must be started to support being in Mode 3 within the next 6 hours.

Equipment Under Clearance:

- ‘B’ MDAFW Pump is under clearance for pump packing repairs. The pump has been inoperable for 62 hours and will NOT be restored to operable status within the next 10 hours. Tech Spec 3.7.1.2 LCO Action **a** and Tech Spec 3.3.3.5.b Action **c** applies. 72 hour LCO or HSB within the next 60 hours, HSD following 6 hours.

Equipment Under Clearance: (continued)

- ‘B’ DEH Pump is under clearance for motor repairs. The pump has been unavailable for 8 hours. Repairs are expected to be completed within 24 hours.

- Letdown Orifice Isolation Valve 1CS-9 is under clearance for solenoid replacement. Tech Spec 3.6.3 LCO Action **b** applies. OWP-CS-09 has been completed.

Align equipment for repairs:

Hang CIT on “B” MDAFW Pump MCB switch then place protected train placards per OMM-001 Attachment 16 on "A" MDAFW Pump, MS-70 and 72, "B" ESW Pump, "B" RHR Pump and "B" CCW Pump – note IAW OMM-001, “A” Train PICs: 1, 3, 9, 13, and 17 are also protected.

Place the “B” DEH Pump in PTL and then hang a CIT on MCB switch

Place a CIT on the switch for 1CS-9.

Place filled out copies of OWP’s into the OWP book – ensure they are removed at end of day

- OWP-CS-09 and place in MCR OWP book for 1CS-09 clearance

Hang restricted access signs on MCR entry swing gates

Op Test No.:	NRC	Scenario #	1	Event #	1	Page	11	of	58

Event Description: **Plant Shutdown (GP-006) – Secure "B" Heater Drain Pump**

Time	Position	Applicant's Actions or Behavior

Lead Evaluator:	**When the crew has completed their board walk down and are ready to take the shift inform the Simulator Operator to place the Simulator in Run. When the Simulator is in run announce:** **CREW UPDATE – (SRO's Name) Your crew has the shift. END OF UPDATE**

Simulator Operator:	**When directed by the Lead Evaluator, ensure that the annunciator horns are on and place the Simulator in RUN.**

Evaluator Note:	**The crew has been directed to continue with the plant shutdown using GP-006, Normal Plant Shutdown, due to "B" MDAFW pump LCO expiring. They have been directed to secure the "B" Heater Drain Pump prior to commencing the down power.**

OP-136		OP-136, Feedwater Heaters, Vents, and Drains
Section 7.0 Shutdown		7.1 Shutdown of Heater Drain Pumps
		7.1.1 Initial Conditions
Procedure Note:		Normally the Heater Drain Pumps are stopped when Reactor power is 40 to 45% per GP-006.
	BOP	1. IF only one Heater Drain Pump is to be stopped, THEN the following conditions should be met: a. Reactor power is less than 99% to accommodate for the loss of secondary efficiency. (YES) b. The MW feedback loop is removed from service (YES) 2. IF both Heater Drain pumps are to be stopped, THEN Maintenance has verified that PS-01MS-110 is reset to prevent a turbine runback (YES)

Op Test No.:	NRC	Scenario #	1	Event #	1	Page	12	of	58

Event Description: **Plant Shutdown (GP-006) – Secure "B" Heater Drain Pump**

Time	Position	Applicant's Actions or Behavior
OP-136		Section 7.1.2 Procedure Steps
Procedure Note:		• The intent of this section is to establish 4A (B) Feedwater Heater level control on the Condenser Dump valve before stopping the Heater Drain Pump. This minimizes the level transient when the pump is secured. • As the Condenser Dump valves starts to control level, the HDP discharge level control valve will start to shut and discharge flow will decrease. • The Main Control Room operator must monitor HDP flow and provide trending information to the operator at the pneumatic alternate level controller.
Procedure Caution:		Stopping Heater Drain Pumps at power levels greater than 50% can result in oscillations in heater levels. Heater 4A (4B) Condenser Dump Controller may need adjustment to stabilize levels.
Evaluator Note:		**ERFIS group display or either one of these quick plots "HDPB" or "B_HDP" has been previously created and is a plot available to the Operators**
	BOP	1. CREATE a plot on ERFIS to monitor Heater Drain Pump discharge flow, discharge pressure and heater level. (FHD-1255B, PHD1255B and LHD1250B)
	BOP	2. ESTABLISH communications between the Main Control Room and the operator at 4B pneumatic alternate level controller
Simulator Communicator:		**Acknowledge directions to establish communications with the BOP.**

Op Test No.:	NRC	Scenario #	1	Event #	1	Page	13	of	58

Event Description: **Plant Shutdown (GP-006) – Secure "B" Heater Drain Pump**

Time	Position	Applicant's Actions or Behavior
Simulator Operator:		**Monitor the FW Heater 4b using simulator drawing FWH05** ***(LC-01HD-1251B is HD-323 on the drawing)*** **NOTE: the as-found LC-01HD-1251B (*HD-323*) pneumatic controller setting is also on this display and will be asked for in step 4. Provide the settings value to the Communicator.**
	BOP	**3. IF** desired, **THEN PLACE** the 4B Feedwater Heater Sight Glass in service by slowly opening the applicable isolation valves listed below: • 1HD-299-LI1-2, LG-01HD-1250B Instrument Valve. • 1HD-299-HI1-2, LG-01HD-1250B Instrument Valve. **N/A – Not desired**
	BOP	4. PERFORM the following at LC-01HD-1251B: a. RECORD as-found LC-01HD-1251B pneumatic controller setting in the control room log.
Simulator Communicator:		**Report the as-found LC-01HD-1251B (*HD-323 setpoint*) pneumatic controller setting to the BOP.**
Procedure Note:		Actions in Step 7.1.2.4.b cause response being monitored in Step 7.1.2.4.c. Step 7.1.2.4.b will cause HDP discharge flow to lower.
	BOP	b. While monitoring Heater Drain Pump discharge flow, DIRECT the local operator to slowly lower the set point on 4B pneumatic alternate level controller.
Evaluator Note:		**The lowering of HDP "B" discharge flow will cause ALB-19-3/1A HTR DRN PUMP B LO ΔP-LO FLOW, and ALB-21-2/2B LP HTR 4B HIGH-LOW LVL to alarm.**
Simulator Operator:		**Run Trigger 12 -** ***(HD-323 is put to manual and the setpoint is adjusted down to 2")*** **to open the 4B FWH alternate level control valve to lower HDP "B" discharge flow**
	BOP	c. WHEN Heater Drain Pump discharge flow is less than or equal to 500 kpph, THEN STOP Heater Drain Pump B.

Op Test No.:	NRC	Scenario #	1	Event #	1	Page	14	of	58

Event Description: **Plant Shutdown (GP-006) – Secure “B” Heater Drain Pump**

Time	Position	Applicant’s Actions or Behavior
Simulator Operator:		**DO NOT run** Trigger 13**:** conditionally activates when “B” HDP control switch is taken to STOP.
	BOP	d. DIRECT the operator at LC-01HD-1251B to slowly adjust 4B Feedwater Heater level to approximately 2 inches.
	BOP	e. RECORD as-left LC-01HD-1251B pneumatic controller setting in the control room log.
Simulator Communicator:		**(As left setting of LC-01HD-1251B can be found on drawing FWH05)** **Report the as-left LC-01HD-1251B pneumatic controller setting to the BOP.** ***(HD-323 should read 2”)***
	BOP	5. IF necessary, THEN REPEAT Steps 7.1.2.1 through 7.1.2.4 for the remaining pump. **(N/A)**
	BOP	6. VERIFY the 4A and 4B Feedwater Heater Sight Glasses are isolated by shutting isolation valves listed below: • 1HD-293-HI1-2, LG-01HD-1250A Instrument Valve • 1HD-293-LI1-2, LG-01HD-1250A Instrument Valve • 1HD-299-HI1-2, LG-01HD-1250B Instrument Valve • 1HD-299-LI1-2, LG-01HD-1250B Instrument Valve **N/A sight glasses were NOT cut in.**
	BOP	Reports to CRS that the “B” Heater Drain Pump is secured
Evaluator Note:		**The following steps will re-initiate turbine load reduction IAW GP-006. These steps have been previously completed and should be validated prior to recommencing the power reduction.**
Evaluator Note:		**There is no procedural guidance directing when the boration to lower power is required. The crew may elect to perform the boration prior to placing the Turbine in GO.**
	SRO	DIRECTS BOP to prepare for a power reduction at 4 DEH Units/Min. and directs the RO to initiate a boration before the power reduction begins.

Op Test No.:	NRC	Scenario #	1	Event #	1	Page	15	of	58
Event Description:	**Plant Shutdown (GP-006) – Secure "B" Heater Drain Pump**								

Time	Position	Applicant's Actions or Behavior
GP-006		Normal Plant Shutdown From Power Operation to Hot Standby
	SRO	Direct RO to perform boration IAW the Reactivity Plan
OP-107.01		Section 5.2 Blender Boration Operation
	RO	• DETERMINE the reactor coolant boron concentration from chemistry OR the Main Control Room status board. • DETERMINE the magnitude of boron concentration change required. • DETERMINE the volume of boric acid to be added using the reactivity plan associated with the IC.
Procedure Note:		FIS-113, BORIC ACID BATCH COUNTER, has a tenths position.
Procedure Caution:		If the translucent covers associated with the Boric Acid and Total Makeup Batch counters FIS-113 and FIS-114, located on the MCB, are not closed, the system will not automatically stop at the preset value.
	RO	SET FIS-113, BORIC ACID BATCH COUNTER, to obtain the desired quantity.
		• SET controller 1CS-283, FK-113 BORIC ACID FLOW, for the desired flow rate. • VERIFY the RMW CONTROL switch has been placed in the STOP position. • VERIFY the RMW CONTROL switch green light is lit.

Op Test No.:	NRC	Scenario #	1	Event #	1	Page	16	of	58

Event Description: **Plant Shutdown (GP-006) – Secure "B" Heater Drain Pump**

Time	Position	Applicant's Actions or Behavior
Procedure Note:		Boric Acid flow controller must be set between 0.2 and 6 (1 and 30 gpm.). Performing small borations at high flow rates may result in an overboration based on equipment response times. Boration flow should be set such that the time required to reach the desired setpoint will happen after release of the control switch.
	RO	IF the current potentiometer setpoint of controller 1CS-283, FK-113 BORIC ACID FLOW, needs to be changed to obtain makeup flow, THEN: • RECORD the current potentiometer setpoint of controller 1CS-283, FK-113 BORIC ACID FLOW, in Section 5.2.3. • SET controller 1CS 283, FK-113 BORIC ACID FLOW, for the desired flow rate. PLACE control switch RMW MODE SELECTOR to the BOR position.
Procedure Note:		Boration may be manually stopped at any time by turning control switch RMW CONTROL to STOP. During makeup operations following an alternate dilution, approximately 10 gallons of dilution should be expected due to dilution water remaining in the primary makeup lines.
	RO	o START the makeup system as follows: o TURN control switch RMW CONTROL to START momentarily. o VERIFY the RED indicator light is LIT. o IF expected system response is not obtained, THEN TURN control switch RMW CONTROL to STOP. IF controller 1CS-283, FK-113 BORIC ACID FLOW, was changed in Step 5.2.2.5, THEN: o REPOSITION controller 1CS-283, FK-113 BORIC ACID FLOW, to the position recorded in Step 5.2.2.5.a.

Op Test No.:	NRC	Scenario #	1	Event #	1	Page	17	of	58
Event Description:	**Plant Shutdown (GP-006) – Secure “B” Heater Drain Pump**								

Time	Position	Applicant’s Actions or Behavior
	BOP	o INDEPENDENTLY VERIFY controller 1CS-283, FK-113 BORIC ACID FLOW, position.
	RO	MONITOR Tavg and rod control for proper operation. ESTABLISH VCT pressure between 20 – 30 psig.
	RO	TURN control switch RMW MODE SELECTOR to AUTO. START the makeup system as follows: o TURN control switch RMW CONTROL to START momentarily. o VERIFY the RED indicator light is LIT.
Procedure Note:		Systems and components operated from the Main Control Board on a daily basis to support normal plant operations do not require Independent Verification. If this evolution is performed daily or more frequently, then performance of Section 5.2.3 is not required.

Op Test No.:	NRC	Scenario #	1	Event #	1	Page	18	of 58

Event Description: **Plant Shutdown (GP-006) – Secure "B" Heater Drain Pump**

Time	Position	Applicant's Actions or Behavior
GP-006		Normal Plant Shutdown From Power Operation to Hot Standby
	BOP	Requests PEER check prior to manipulations of DEH Control • DEPRESS the LOAD RATE MW/MIN push-button. • ENTER the desired rate, **NOT** to exceed 5 MW/MIN, in the DEMAND display. (4 DEH Units/minute) • DEPRESS the ENTER push-button. • DEPRESS the REF push-button. • ENTER the desired load (120 MW) in the DEMAND display. • DEPRESS the ENTER push-button. The HOLD push-button should illuminate.
Procedure Note:		The unloading of the unit can be stopped at any time by depressing the HOLD push-button. The HOLD lamp will illuminate and the GO lamp will extinguish. The load reduction can be resumed by depressing the GO push-button. The HOLD lamp will extinguish and the GO lamp will illuminate.
	BOP	DEPRESS the GO push-button to start the load reduction and inform crew through 'Crew Update' Turbine in 'GO'. • VERIFY the number in the REFERENCE display decreases. • VERIFY Generator load is decreasing. • WHEN Turbine 1st Stage pressure is less than 260 psig, THEN PLACE the SG LVL ATWS PANEL BYPASS Switch to BYPASS.
Lead Evaluator:		**AFTER the crew has reduced power to the satisfaction of the evaluation crew, cue the Simulator Operator to insert Trigger 2** **Event 2 - "Reactor Vessel Flange Leak"**

Op Test No.:	NRC	Scenario #	1	Event #	2	Page	19	of	58

Event Description: **Reactor Vessel Flange Leak**

Time	Position	Applicant's Actions or Behavior
Simulator Operator:		**On cue from the Lead Evaluator actuate Trigger 2: Reactor Vessel Flange Leak**
Indications Available:		• **ALB-10-5-5, Reactor Vessel Flange Leakoff High Temp** • **TI-401, Reactor Vessel Flange Leakoff Temp increasing**
Evaluator Note:		**Responding to the annunciator will direct the operator to shut 1RC-46, Head Flange Seal leakoff Line Isolation to stop leakage from the inner Reactor head seal. With the condition clear the crew may not enter AOP-016.**
APP-ALB-010	RO	Responds to alarm and evaluates APP-ALB-010-5-5
		• CONFIRM alarm using: o TI-401 o Reports TI-401 reading or trending high. • VERIFY Automatic Functions: None • PERFORM Corrective Actions: o CHECK containment temperature trend for high containment temperature resulting from a nearby steam/RCS leak (NONE) o Shut 1RC-46, Head Flange Seal Leakoff Line Isolation to stop leakage from inner Reactor head seal o Monitors TI-401 indications and identifies temperature is lowering
	RO	Informs SRO Reactor Vessel Flange leakage is isolated
	SRO	• Reviews/prepares OMM-001, Attachment 5 Equipment Problem Checklist • Contacts WCC to coordinate Containment entry per AP-545

Op Test No.: NRC	Scenario # 1	Event # 2	Page 20 of 58
Event Description:	**Reactor Vessel Flange Leak**		

Time	Position	Applicant's Actions or Behavior
Evaluator Note:		**Any Tech Spec evaluation can be conducted with a follow up question after the scenario. Leakrate may not be easily determinable due to changing RCS Temperature and may require Engineering assistance**
	SRO	Evaluates Reactor Coolant System TS 3.4.6.2 Reactor Coolant System operational leakage shall be limited to: d. 10 gpm IDENTIFIED LEAKAGE from the Reactor Coolant System. ACTION B. - With any Reactor Coolant System operational leakage greater than anyone of the above limits, excluding primary-to-secondary leakage, PRESSURE BOUNDARY LEAKAGE and leakage from Reactor Coolant System Pressure Isolation Valves, reduce the leakage rate to within limits within 4 hours or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.
Evaluator Note:		**The following write up is if AOP-016 is used for the response to the Reactor Vessel Flange Leak.**
	Crew	Identifies entry conditions met for AOP-016, Excessive Primary Plant Leakage NOTE- AOP-016 contains NO Immediate Actions
AOP-016	SRO	Enters AOP-016 Makes a plant PA announcement for AOP entry
	SRO	CHECK RHR in operation (NO) CHECK RCS leakage within VCT makeup capability (YES) MAINTAIN VCT level GREATER THAN 5% (YES) CHECK Containment Ventilation monitors clear (YES) Radiation monitors normal (YES) Evacuate personnel from area (NO)

Op Test No.:	NRC	Scenario #	1	Event #	2	Page	21	of	58
Event Description:			**Reactor Vessel Flange Leak**						

Time	Position	Applicant's Actions or Behavior
	BOP	NOTIFY Chemistry to stop any primary sampling activities (Calls Chemistry)
Communicator:		**Acknowledge request to stop primary sampling activities.**
	RO	PERFORM a qualitative RCS flow balance ESTIMATE leak rate considering the following parameters: • PRZ level rate of change (~55 gal/% at 683°F) • Charging flow • Total seal injection flow • Letdown flow • Total seal return flow (Estimate = 15 gpm flow to RCDT) Operate Letdown as necessary to maintain Charging on scale (NO changes required)
	SRO	Determines it is not necessary to more accurately quantify leakage using either OST-1026 or OST-1226
Evaluator Note:		**Any Tech Spec evaluation can be conducted as a follow up question after the scenario.**

Op Test No.:	NRC	Scenario #	1	Event #	2	Page	22	of	58
Event Description:		**Reactor Vessel Flange Leak**							

Time	Position	Applicant's Actions or Behavior
	SRO	Reviews Reactor Coolant System TS 3.4.6.2 Reactor Coolant System operational leakage shall be limited to: d. 10 gpm IDENTIFIED LEAKAGE from the Reactor Coolant System. ACTION B. - With any Reactor Coolant System operational leakage greater than anyone of the above limits, excluding primary-to-secondary leakage, PRESSURE BOUNDARY LEAKAGE and leakage from Reactor Coolant System Pressure Isolation Valves, reduce the leakage rate to within limits within 4 hours or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.
	SRO	Leak location identified from MCB indications • From RV Flange
	BOP	NOTIFY HP of Reactor Vessel Flange leakage
Simulator Communicator:		**Acknowledge RCs leakage is coming from Reactor Vessel Flange.**
	SRO	Transitions to Attachment 6: Leakage From RV Flange • Consult with Operation Management to determine leak isolation and recovery actions Exit AOP-016 Contacts WCC to coordinate Containment entry per AP-545 Reviews/prepares OMM-001, Attachment 5 Equipment Problem Checklist
Evaluator Cue:		**After a request for support has been completed, cue Simulator Operator to insert Trigger 3** **Event 3 – 'A' Essential Services Chilled Water Pump Trip**

Op Test No.:	NRC	Scenario #	1	Event #	3	Page 23 of 58
Event Description:	**'A' Essential Services Chilled Water Pump Trip**					

Time	Position	Applicant's Actions or Behavior
Simulator Operator:		**On cue from the Lead Evaluator actuate Trigger 3:** **'A' Essential Services Chilled Water Pump Trip**
Indications Available:		• **ALB-23-1-18 CHILLER WC2-A TROUBLE**
Evaluator Note:		• **Alarm ALB-23-1/15 WC-2 CH 1A CNDSR REFRIG LO PRESS may alarm.**
	BOP	• RESPONDS to alarm on ALB-23 (1-18). • REPORTS WC-2A-SA tripped.
AOP-026		LOSS OF ESSENTIAL SERVICE CHILLED WATER SYSTEM
	SRO	ENTERS AOP-026, LOSS OF ESSENTIAL SERVICE CHILLED WATER SYSTEM Makes PA announcement for AOP entry
Procedure Note:		**This procedure contains no immediate actions.**
	BOP	CHECK the in-service chiller RUNNING. (NO)
	CREW	DISPATCH an AO to determine the cause of the chiller trip.
Simulator Communicator:		**When contacted, wait 2 minutes and then the TB AO report that the breaker for the chiller has tripped on overcurrent and as the RAB AO report that there are no visible problems locally at the chiller.**
	BOP	PERFORM the following using OP-148, Essential Service Chilled Water System: START the Standby chiller NOTE: IF ESW Header Temps are > 92°F then OP-148 will require a start of an ESW pump to support the Chiller start. (NO)

Op Test No.:	NRC	Scenario #	1	Event #	3	Page	24	of	58
Event Description:	**'A' Essential Services Chilled Water Pump Trip**								

Time	Position	Applicant's Actions or Behavior
Evaluator Note:		**OP-148 sections 5.1 and 5.2 can be found at the end of the guide in Attachment 1.** **OP-148 will start the Chiller, and Attachment 8 will direct various equipment swaps and procedures used.**
Simulator Communicator:		**If contacted, report "Pre-start checks on P-4B and 'B' Chiller are complete." No simulator booth operations are required.**
OP-148, Section 5.1 or Section 5.2		NOTE: Due to crew preference the OP-148 sections are located at the end of this guide in Attachment 1. The BOP will perform the actions of the OP procedure.
Simulator Communicator:		**IF contacted by the BOP to RESET the Low Chilled Water Flow alarm, wait 15 seconds and then report "The Low Chilled Water No Flow Alarm has been reset, and there are no other alarms." There are NO simulator operations required.**
Evaluator Note:		**Expect ALB-02-4/5 SERV WTR LEAKAGE alarm to come in and clear.**
	CREW	Makes a PA announcement prior to starting chiller. Starts 'B' Chiller
AOP-026 (step 5)	CREW	CONTACT Maintenance as necessary for troubleshooting and appropriate corrective actions.
Evaluator NOTE:		**Chiller start is delayed for 30 seconds after switch is placed in start.**

Op Test No.: NRC	Scenario # 1	Event # 3	Page 25 of 58

Event Description: **‘A’ Essential Services Chilled Water Pump Trip**

Time	Position	Applicant’s Actions or Behavior
AOP-026 (step 6)	BOP	CHECK EITHER chiller STARTED. (YES)
AOP-026 (step 7)	SRO	Step 7 GO to step 16
AOP-026 (steps 16 and 17)	BOP	VERIFY the following AH units for the operating train chiller are RUNNING: • AH-15, Control Room Normal Supply • AH-17, Fuel Vent FP Pump Room Fan Cooler • AH-16, Elec Equip Prot Rm Supply VERIFY the following alarm is CLEAR for the running chiller • ALB-23-1-20, Expansion TK A LO-LO Level • ALB-23-2-20, Expansion TK B LO-LO Level
AOP-026 (step 18)	SRO	REFER TO Tech Spec 3.7.13. At least two independent Essential Services Chilled Water System loops shall be OPERABLE. • ACTION: With only one ESCW System loop OPERABLE, restore at least two loops to OPERABLE status within 72 hours or be in at least HSB within the next 6 hours and in CSD within the following 30 hours.
	SRO	• Contacts WCC for Work Request and LCO Tracking Record. Contacts Maintenance to investigate and fills out an Equipment Problem Checklist. • Obtains OWP-ECW • Direct BOP to perform Train Swap • EXIT this procedure.
Evaluators Note:		**After the ESCWS Chiller is running and the Evaluators have seen enough of the event, cue Simulator Operator to insert Trigger 4** **Event 4 “Trip of the ‘A’ Circ Water Pump and disch valve 1CW-10 failure”**

Op Test No.:	NRC	Scenario #	1	Event #	4	Page	26 of 58
Event Description:	**‘A’ Circ Water Pump Trip and Failure of Discharge Valve 1CW-10 to shut**						

Time	Position	Applicant’s Actions or Behavior
Simulator Operator:		**When directed by Lead Evaluator: Actuate Trigger 4 “Trip of the ‘A’ Circ Water Pump and Failure of Discharge Valve 1CW-10 to shut”**
Indications Available:		• ALB-021-4-4, CIRC WTR PMP A O/C - GND – TRIP
	BOP	RESPONDS to alarm ALB-021-4-4.
Evaluator Note:		**The crew may enter AOP-012, Partial Loss of Condenser Vacuum, without doing the alarm response procedure. The SRO may elect to reduce power to control vacuum.**
APP-ALB-021	SRO	ENTERS APP-ALB-021-4-4.
Evaluator Note:		**In accordance with AD-OP-ALL-1000, the operator may take MANUAL actions when automatic actions do not occur and place the CWP ‘A’ control switch in the stop position to shut the pump discharge valve before being directed by a procedure.**
	BOP	CONFIRM alarm using: • Circ Wtr Pump A status lights • Circ Wtr Pump A discharge valve position
	BOP	VERIFY Automatic Functions: CWP A trips (YES)

Op Test No.:	NRC	Scenario #	1	Event #	4	Page	27 of 58
Event Description:	**‘A’ Circ Water Pump Trip and Failure of Discharge Valve 1CW-10 to shut**						

Time	Position	Applicant's Actions or Behavior
	BOP	PERFORM Corrective Actions: • IF Circulating Water Pump trips OR Condenser vacuum is degrading, THEN GO TO AOP-012, Partial Loss of Condenser Vacuum. (YES) • IF necessary, THEN START the standby CWP. (N/A)
	SRO	DISPATCHES AO to investigate.
Simulator Communicator:		**Wait 3 minutes and report the breaker tripped on overcurrent.**
	BOP	IF STOP signal is not given to CWP ‘A’ control switch, DISPATCHES AO to manually CLOSE discharge valve. NOTE: they may direct opening the discharge valve breaker prior to manually stroking the valve
Simulator Operator		**NOTE:** The crew may direct opening the discharge valve breaker prior to having the valve manually stoked. IF they do wait 2 minutes, and instead of running Trigger 20 go to the Summary page and **modify** ilo xb2o069b (1CW-10 light status) to **OFF**.
Simulator Communicator:		**Report back that the power has been removed.** **5 minutes later report back that the discharge valve has been shut.**
Simulator Operator:		**IF power has been left on the CW pump discharge valve THEN after approximately 5 minutes from when the AO was dispatched actuate Trigger 20. This will time out the discharge valve MCB light indications and provide the BOP indication that the discharge valve is stroking closed.**

Op Test No.:	NRC	Scenario #	1	Event #	4	Page	28 of 58

Event Description: **‘A’ Circ Water Pump Trip and Failure of Discharge Valve 1CW-10 to shut**

Time	Position	Applicant’s Actions or Behavior
Simulator Communicator:		**IF the discharge valve has been manually stroked using Trigger 20, report back as the AO assigned the valve is closed when the discharge valve lights indicate the valve is closed.**
	SRO	ENTERS and directs actions of AOP-012, PARTIAL LOSS OF CONDENSER VACUUM Makes PA announcement for AOP entry Holds a crew focus brief
AOP-012		Partial Loss Of Condenser Vacuum
Procedure Note:		**This procedure contains no immediate actions.**
	SRO	CHECK Turbine – IN OPERATION (YES)
	BOP	CHECK Condenser pressure in both Zones less than: 7.5 inches Hg absolute AND Turbine first stage pressure is greater than 60% TURBINE LOAD (NO) OR 5 inches Hg absolute AND Turbine first stage pressure is less than 60% TURBINE LOAD (YES)
	SRO	REDUCE Turbine load as necessary to maintain Condenser vacuum using ONE of the following: • GP-006, Normal Plant Shutdown from Power Operation to Hot Standby • AOP-038, Rapid Downpower

Op Test No.:	NRC	Scenario #	1	Event #	4	Page	29 of	58

Event Description: **'A' Circ Water Pump Trip and Failure of Discharge Valve 1CW-10 to shut**

Time	Position	Applicant's Actions or Behavior
	SRO	CONTINUE Turbine load reduction until directed otherwise by CRS based on the following: • Cause of vacuum loss identified and corrected • Vacuum stable or increasing • Plant condition require Reactor or Turbine trip (NO action required.)
	BOP	CHECK All available Condenser Vacuum Pumps – OPERATING. (No)
	BOP	Start standby Vacuum Pump (**may keep step open based on stable condenser vacuum**)
Simulator Communicator:		**When contacted report 1AE-16, B Vacuum Pump Suction Isolation Valve, is open.**
	CREW	DISPATCH Operator(s) to locally perform actions of Attachment 1, Local Actions for a Loss of Condenser Vacuum.
	BOP	VERIFY the following valves – SHUT: • 1CE-447, Condenser Vac Breaker(YES) • 1CE-475, Condenser Vac Breaker(YES)
	BOP	CONTACT Radwaste Control Room to determine if recent equipment operations using Auxiliary Steam or Condensate may have caused loss of vacuum.
Simulator Communicator:		**Report no Auxiliary Steam or Condensate equipment has been recently operated.**
	BOP	CHECK Circulating Water Pumps – ANY TRIPPED (YES)

Op Test No.:	NRC	Scenario #	1	Event #	4	Page	30 of 58
Event Description:	**‘A’ Circ Water Pump Trip and Failure of Discharge Valve 1CW-10 to shut**						

Time	Position	Applicant’s Actions or Behavior
	BOP	VERIFY associated pump discharge valve – SHUT. IF STOP signal is not given to CWP ‘A’ control switch, DISPATCHES AO to CLOSE valve. (NO) (If not already done)
Procedure Note:		If a Circulating Water Pump has tripped, it is not considered available until the cause of the trip has been identified and corrected.
	SRO	CHECK ALL available Circulating Water Pumps – RUNNING. (YES)
Evaluator Note:		**AOP-012 does not have to be completed to continue the scenario after the discharge valve is being closed.** **Event 5 (CSIP ‘A’ Trip) can be cued after the CW pump discharge valve has been closed.**

Op Test No.:	NRC	Scenario #	1	Event #	5	Page	31 of	58
Event Description:			**‘A’ CSIP Trip**					

Time	Position	Applicant’s Actions or Behavior

Simulator Operator:	**On cue from the Lead Evaluator actuate Trigger 5 ‘A’ CSIP trip**

Indications Available:		ALB-06-1-1 Charging Pump Discharge Header High-Low Flow ALB-06-1-2 Chrg Pump A Trouble ALB-06-1-3 Chrg Pump A Trip Or Close Ckt Trouble ALB-08-2-1 RCP Seal Water Injection Low Flow ALB-08-2-2 ASI Pump Auto Start Timer Initiated
	RO	• RESPONDS to multiple alarms on ALB-06 (1-1, 1-2, 1-3) and ALB-08 (2-1 & 2-2). • REPORTS CSIP ‘A’ tripped.
	CREW	Identifies Entry Conditions met for AOP-018, Reactor Coolant Pump Abnormal Conditions
AOP-018		Reactor Coolant Pump Abnormal Conditions
Immediate Action	RO	PERFORMS immediate actions. • CHECK ANY CSIP RUNNING. (NO) • ISOLATE letdown by verifying the following valves SHUT: o 1CS-7, 45 GPM Letdown Orifice A o 1CS-8, 60 GPM Letdown Orifice B o 1CS-9, 60 GPM Letdown Orifice C
	SRO	ENTERS AOP-018, RCP Abnormal Conditions Makes PA announcement for AOP entry Conducts a focus brief
	BOP	Dispatch operators to investigate cause of trip

Op Test No.:	NRC	Scenario #	1	Event #	5	Page	32 of 58
Event Description:	**‘A’ CSIP Trip**						

Time	Position	Applicant’s Actions or Behavior
Simulator Communicator:		**If dispatched to investigate, wait 2-3 minutes then report a breaker overcurrent trip flag on Phase A. Report as second AO that there are no obvious problems at the pump.**
	SRO	Informs SM to REFER to PEP-110, Emergency Classification and Protective Action Recommendations, AND ENTER the EAL Matrix.
Procedure Note:		**Minimum allowable flow for a CSIP is 60 gpm which is provided by normal miniflow during normal operation and alternate miniflow during safety injection. Maintaining CSIP flow greater than or equal to 60 gpm also satisfies this requirement.**
	SRO	EVALUATE plant conditions AND GO TO the appropriate section: MALFUNCTION / SECTION / PAGE Loss of CCW and/or Seal Injection to RCPs / 3.1 / 5
	RO	CHECK ALB-5-1-2A, RCP Thermal Bar HDR High Flow, alarm CLEAR. (**YES**)
	SRO	CHECK ALL RCPs operating within the limits of Attachment 1. (**YES**)
	RO	• CHECK ALL RCPs RUNNING. (**YES**) • CHECK the following NORMAL for ALL RCPs: o CCW flow (**YES**) o Seal Injection flow (NO)

Op Test No.:	NRC	Scenario #	1	Event #	5	Page	33 of	58
Event Description:		**'A' CSIP Trip**						

Time	Position	Applicant's Actions or Behavior	
	SRO	RESTORE using the applicable attachment:	
		MALFUNCTION	ATTACHMENT
		Loss of Seal Injection flow only	Attachment 4 (Page 28)
Procedure Note:		**The ASI System will actuate in 2 minutes and 45 seconds from timer initiation. ALB-8-2-4 ASI pump start will alarm**	
Evaluator Note:		**The ASI system when actuated will provide RCP seal injection of highly borated water. During the time the ASI pump is running a negative reactivity addition is being conducted in the form of boration. The sooner the system is shut down the less effect it will have on reactivity.**	
	RO	• CHECK at least one CSIP RUNNING. (NO) • Dispatch an operator to monitor operation of the ASI System	
Simulator Communicator:		**Acknowledge request.**	
Simulator Operator:		**Be prepared to STOP the ASI pump when requested to.**	

Op Test No.:	NRC	Scenario #	1	Event #	5	Page	34 of 58
Event Description:			**'A' CSIP Trip**				

Time	Position	Applicant's Actions or Behavior
	RO	• ***PLACE controller FK-122.1, Charging Flow in MANUAL*** AND SHUT. • Verify open 1CS-235 and 1CS-238 • CHECK RCS pressure GREATER THAN 1400 PSIG. (**YES**) • SET FK-122.1 DEMAND position to 30%. • SHUT HC-186.1, RCP Seal WTR INJ Flow. • VERIFY a suction path for the standby CSIP by performing the following: o VERIFY CSIP suction flowpath from VCT as follows: ▪ VERIFY > 5% level is established in VCT. (**YES**) o VERIFY the following valves are OPEN: • LCV-115C, VCT Outlet (1CS-165) (**YES**) • LCV-115E, VCT Outlet (1CS-166) (**YES**)
	SRO	Before exiting AOP-018, provide Pressurizer level control bands and trip limits per OMM-001 Att. 13 – Control band - Maintain level within 5% of Reference level – trip limits of 10% low and 85% high
Procedure Caution:		**Low VCT level is a precursor to gas binding the CSIPs**
	RO	CHECK VCT level is greater than 5%, AND STABLE OR RISING (**YES**)
	RO	MAINTAIN CCW HX outlet temperature less than 105°F.
	RO	START the standby CSIP. (**Starts 'B' CSIP**)

Op Test No.:	NRC	Scenario #	1	Event #	5	Page	35 of 58
Event Description:		‘A’ CSIP Trip					

Time	Position	Applicant’s Actions or Behavior
	RO	OPEN HC-186.1, RCP Seal WTR INJ Flow. DIRECT the operator monitoring the ASI System to STOP the ASI Pump by placing CS-210.1, ASI PUMP MOTOR CONTROL SWITCH, in STOP. (At the ASI System Control Panel)
Simulator Communicator:		**Acknowledge request to secure the ASI pump**
Simulator Operator:		**Secure the ASI pump when communications are complete** **CVC 195 STOP**
Evaluator Note:		**ALB-8-2-3 ASI system Trouble will alarm when ASI pump is stopped**
Simulator Communicator:		**Report back that the ASI pump is secured**
	RO	ADJUST HC-186.1, RCP Seal WTR INJ Flow, to establish seal injection flow as necessary to maintain the following: • Less than 31 gpm total flow to all RCPs. • Between 8 and 13 gpm to all RCPs.
	RO	DIRECT the operator monitoring the ASI System to PLACE CS-210.1, ASI PUMP MOTOR CONTROL SWITCH, in AUTO. (At the ASI System Control Panel)
Simulator Communicator:		**Acknowledge request**
Simulator Operator:		**Place ASI control back to AUTO - CVC 195 AUTO**

Op Test No.:	NRC	Scenario #	1	Event #	5	Page	36 of	58
Event Description:			**'A' CSIP Trip**					

Time	Position	Applicant's Actions or Behavior
Simulator Communicator:		**After ASI controls are in AUTO:** **Report:CS-210.1, ASI PUMP MOTOR CONTROL SWITCH is in AUTO**
	BOP	START CSIP room ventilation per OP-172, Reactor Auxiliary Building HVAC System. IF B Train is being started, THEN PLACE the following Air Handling Units control switches to START AND VERIFY proper damper and valve operation (if they start): • CSIP SB AREA FAN COOLER AH-9 B SB
	RO	RESTORE Charging and Letdown flow per OP-107, Chemical and Volume Control System.
Evaluator Note:		**There is no need to wait for letdown to be restored – Continue with scenario.**
	BOP	Start 'B' Chiller per OP-148, section 5.2. Contact AO for Chiller pre-start checks (NOTE: At this time the crew may only start Pump P-4 B)
Evaluator Note:		**It is NOT intended to wait for the crew to place the standby Chiller in service – Continue with scenario.**
	RO	MONITOR Tavg to Tref. (ASI injection has added negative reactivity)
	SRO	INITIATE action to determine and correct the cause of the loss of the CSIP.
	RO	CHECK seal injection flow between 8 and 13 gpm has been established to all RCPs.

Op Test No.:	NRC	Scenario #	1	Event #	5	Page 37 of 58
Event Description:			**'A' CSIP Trip**			

Time	Position	Applicant's Actions or Behavior
	RO	WHEN seal injection flow has been established between 8 and 13 gpm, THEN PERFORM OST-1126, Reactor Coolant Pump Seals Controlled Leakage Evaluation Monthly Interval Modes 1-4.
	RO	CHECK CCW flow is established to the RCPs.
	SRO	EXIT AOP-018 and contacts support personnel for repairs.
Simulator Communicator:		**Acknowledge requests**
	SRO	Addresses Technical Specifications: • 3.1.2.4 - CSIP's 3.1.2.4 At least two charging/safety injection pumps shall be OPERABLE. APPLICABILITY: MODES 1, 2, and 3. ACTION: With only one charging/safety injection pump OPERABLE, restore at least two charging/safety injection pumps to OPERABLE status within 72 hours or be in at least HOT STANDBY and borated to a SHUTDOWN MARGIN as specified in the CORE OPERATING LIMITS REPORT (COLR), plant procedure PLP-106 at 200°F within the next 6 hours; restore at least two charging/safety injection pumps to OPERABLE status within the next 7 days or be in HOT SHUTDOWN within the next 6 hours. • 3.5.2 Action a.- ECCS Subsystems 3.5.2 Two independent Emergency Core Cooling System (ECCS) subsystems shall be OPERABLE with each subsystem comprised of: a. One OPERABLE Charging/safety injection pump, b. One OPERABLE RHR heat exchanger, c. One OPERABLE RHR pump, and d. An OPERABLE flow path capable of taking suction from the refueling water storage tank on a Safety Injection signal and, upon being manually aligned, transferring suction to the containment sump during the recirculation phase of operation. APPLICABILITY: MODES 1, 2, and 3. ACTION: a. With one ECCS subsystem inoperable, restore the inoperable subsystem to OPERABLE status within 72 hours or be in at least HOT STANDBY within the next 6 hours and in HOT SHUTDOWN within the following 6 hours. Both are 72 hours to restore action statements.

Op Test No.:	NRC	Scenario #	1	Event #	5	Page	38	of	58

Event Description: **‘A’ CSIP Trip**

Time	Position	Applicant’s Actions or Behavior
	SRO	May perform Plant Status brief.
Evaluator Note:		**Tech Specs can be discussed as follow up questions after the scenario is completed. When appropriate the Lead Evaluator can cue Event 6 (Loss of Offsite Power, Reactor Trip – Major Event) and continue in this scenario.**

Op Test No.:	NRC	Scenario #	1	Event #	6 & 7	Page	39 of 58
Event Description:		**Loss of Offsite Power, Loss of ALL AC Power**					

Time	Position	Applicant's Actions or Behavior
Simulator Operator:		**When directed by Lead Evaluator: Actuate Trigger 6** **Loss of Offsite Power, Reactor Trip** **NOTE: The Loss of Offsite Power will also cause a loss of ALL AC. The 'A' EDG output breaker will trip during sequencer operation and the 'B' EDG will not start.**
	Crew	Identifies that the Reactor has tripped and a loss of offsite power has occurred. (The control room normal lighting goes off and the emergency lighting comes on.)
Time Loss Of All AC Power Occurs ______________________ (for CT #2)		
EOP-E-0		Reactor Trip Or Safety Injection
	SRO	Steps through immediate actions with crew Makes plant PA announcement
Immediate Action	RO	Verifies Reactor is Tripped (YES) REACTOR TRIP CONFIRMATION Reactor Trip AND Bypass BKRs - OPEN Rod Bottom Lights (Zero Steps) - LIT Neutron Flux - DROPPING
Immediate Action	BOP	Verifies Turbine is Tripped – All throttle valves shut (YES) TURB STOP VLV 1 — TSLB-2-11-1 TURB STOP VLV 2 — TSLB-2-11-2 TURB STOP VLV 3 — TSLB-2-11-3 TURB STOP VLV 4 — TSLB-2-11-4

Op Test No.:	NRC	Scenario #	1	Event #	6 & 7	Page	40 of	58
Event Description:		**Loss of Offsite Power, Loss of ALL AC Power**						

Time	Position	Applicant's Actions or Behavior
Immediate Action	BOP	Verify Power To AC Emergency Buses – (**Initially A-SA bus will be energized, but will lose power when Breaker 106 opens**) AC emergency buses – AT LEAST ONE ENERGIZED ('A' Emergency Bus – No, 'B' Emergency Bus –NO) Identifies that the 'A' EDG output breaker 106 has tripped prior to the sequencer reaching Load Block 9 (with time they will also identify that the 'B' EDG did not attempt to start)
	SRO	GO TO ECA-0.0, "LOSS OF ALL AC POWER", Step 1.
EOP- ECA-0.0		Loss of All AC Power
Procedure Note:		Steps 1 AND 2 are immediate action steps. • Critical Safety Function Status Trees should be monitored for information only. • Function Restoration procedures should NOT be implemented unless directed by this procedure.
	SRO	Enter ECA-0.0 Makes PA announcement for EOP entry Crew performs immediate actions (Steps 1 and 2)
Immediate Action	RO	Verify Reactor Trip: REACTOR TRIP CONFIRMATION Reactor Trip <u>AND</u> Bypass BKRs - OPEN Neutron Flux - DROPPING o Trip breakers RTA AND BYA – OPEN (YES) o Trip breakers RTB AND BYB – OPEN (YES) o Neutron flux – DECREASING (YES)

Op Test No.:	NRC	Scenario #	1	Event #	6 & 7	Page	41 of	58
Event Description:		**Loss of Offsite Power, Loss of ALL AC Power**						

<table>
<tr><th>Time</th><th>Position</th><th>Applicant's Actions or Behavior</th></tr>
<tr><td colspan="2">Evaluator Note:</td><td>The BOP is required to check Turbine throttle valve positions using status light indications. With a loss of power all other MCB indications for the Turbine throttle and governor valves have no indication.</td></tr>
<tr><td></td><td></td><td></td></tr>
<tr><td>Immediate Action</td><td>BOP</td><td>Verify Turbine Trip – ALL THROTTLE VALVES SHUT
<table>
<tr><td>TURB STOP VLV 1</td><td>TSLB-2-11-1</td></tr>
<tr><td>TURB STOP VLV 2</td><td>TSLB-2-11-2</td></tr>
<tr><td>TURB STOP VLV 3</td><td>TSLB-2-11-3</td></tr>
<tr><td>TURB STOP VLV 4</td><td>TSLB-2-11-4</td></tr>
</table>
All turbine throttle valves – SHUT (YES)</td></tr>
<tr><td></td><td></td><td></td></tr>
<tr><td></td><td>RO</td><td>Check If RCS Isolated
Check letdown isolation valves - SHUT:
o 1CS-1 (LCV-460) (NO)
o 1CS-2 (LCV-459) (NO)
RNO
o Shut all orifice isolation valves:
o 1CS-7
o 1CS-8
o 1CS-9
o Shut letdown isolation valves:
o 1CS-1 (LCV-460)
o 1CS-2 (LCV-459)

Check PRZ PORVs – SHUT (YES)
Verify excess letdown valves - SHUT:
o 1CS-460 (YES)
o 1CS-461 (YES)
Check RCPs – SECURED (YES)</td></tr>
<tr><td></td><td></td><td></td></tr>
</table>

Op Test No.:	NRC	Scenario #	1	Event #	6 & 7	Page	42 of 58
Event Description:		**Loss of Offsite Power, Loss of ALL AC Power**					

Time	Position	Applicant's Actions or Behavior
	BOP	**Verify AFW Flow AND Control SG Levels**: • Verify AFW Flow – GREATER THAN 200 KPPH (NO) • Reports to SRO (or identifies 1MS-70 and 1MS-72 are not open and OPENS one or both valves)
	SRO	Directs BOP to verify the TDAFW pump is running (NO) Directs BOP to open either 1MS-70 or 1MS-72

Op Test No.:	NRC	Scenario #	1	Event #	8	Page	43 of 58

Event Description: **1MS-70 and 1MS-72 fail to auto open**

Time	Position	Applicant's Actions or Behavior
Event 8 Critical Task #1	BOP	Opens 1MS-70 or 1MS-72 and establishes a minimum of 200 KPPH to the Steam Generators by adjusting TD AFW pump speed. Any level - GREATER THAN 25% [40%] (Actual Level will based on time in scenario) Control AFW flow to maintain all intact levels between 25% and 50% [40% and 50%] Critical to Open 1MS-70 or 1MS-72 to establish a minimum of 200 KPPH AFW flow to the Steam Generators prior to 2 of 3 SG's Wide Range Levels < 15% WR level indication: SG 'A' LI-477.1-SA, SG 'B' 487.1-SB, SG 'C' 497.1-SA
	SRO	Evaluate EAL Matrix
	BOP	Verify AC Emergency Bus Cross-Ties to Non-Emergency AC Buses - OPEN
	BOP	Verify any cross tie to Bus 1A-SA - OPEN o Breaker 104 o Breaker 105 Verify Any cross tie to Bus 1B-SB - OPEN o Breaker 124 o Breaker 125

Op Test No.:	NRC	Scenario #	1	Event #	7 cont.	Page	44 of 58
Event Description:				**Loss of ALL AC power**			

Time	Position	Applicant's Actions or Behavior
Procedure Caution:		• Emergency stopping an EDG will deenergize the field flashing circuit and prevent a fire in the GCP control section. • Do NOT start any EDG that is emergency stopped OR close any tripped EDG output breaker until problem corrected.
Procedure Note:		If an EDG was paralleled to the grid prior to LOOP, and the LOOP signal did not open Breaker 106 (126), the breaker is still considered available as long as it was manually opened successfully.
	BOP	ECA-0.0 Step 7 Check EDGs 1A-SA AND 1B-SB - AVAILABLE (FOR START FROM MCB) Check all of the following for EDG 1A-SA: • DIESEL GENERATOR A TRIP annunciator [ALB-024-3-1] - CLEAR – YES • DIESEL GENERATOR A START FAILURE annunciator [ALB-024-3-3] - CLEAR - YES • Breaker 106 – AVAILABLE (**NOT** TRIPPED DUE TO ELECTRICAL FAULT) - Contacts AO to investigate Breaker 106 locally Check all of the following for EDG 1B-SB: • DIESEL GENERATOR B TRIP annunciator [ALB-025-3-1] - CLEAR – YES • DIESEL GENERATOR B START FAILURE annunciator [ALB-025-3-3] - CLEAR - YES • Breaker 126 – AVAILABLE (**NOT** TRIPPED DUE TO ELECTRICAL FAULT)
Simulator Communicator:		**Breaker 106 has tripped on overcurrent on the 'C' Phase**
	BOP	RNO for A EDG: **Place the EDG 1A-SA emergency stop switch to EMERG STOP.** Check any EDG – AVAILABLE (NOT Emergency Stopped) (YES, EDG 1B-SB is available)

Op Test No.:	NRC	Scenario #	1	Event #	7 cont.	Page	45 of	58
Event Description:			**Loss of ALL AC power**					

Time	Position	Applicant's Actions or Behavior
Critical Task #2	BOP	Check any EDG – RUNNING (NO) – RNO • Perform the following as necessary to start EDGs (listed in order of preference) o Manually start EDGs Critical to Start the "B" Emergency Diesel Generator and restore AC Emergency bus power prior to declaring an Extended Loss of AC Power has occurred (within 60 minutes of a loss of all AC power) Time Loss of ALL AC Power occurred ______________ Time AC Power restored _________________ Total time AC power was lost _________ minutes (< 60 min) NOTE: The EDG will SLOW start and after the EDG is up to speed the sequencer will run and ESF equipment will be sequenced on the bus. **Takes EDG 1B-SB start switch to START and EDG starts – slow start**
	BOP	Check any EDG – RUNNING (YES – EDG 1B-SB is running)
	BOP	Energize AC Emergency Buses using EDGs: Check any AC emergency bus - ENERGIZED: • 1A-SA bus voltage (NO) • 1B-SB bus voltage (YES)
	SRO	Initiate monitoring of Critical Safety Function Status Trees.
	SRO	Return to procedure and step in effect. Transitions to EOP-E-0 step 3.b (or step 1 if EOP-ECA-0.0 was directly entered)

Op Test No.:	NRC	Scenario #	1	Event #	7 cont.	Page	46 of 58
Event Description:			Loss of ALL AC power				

Time	Position	Applicant's Actions or Behavior
EOP-E-0		Step 3.b
	SRO	AC emergency buses – BOTH ENERGIZED (NO only 'B') Perform the following while continuing with EOP implementation: As time allows restore power to de-energized emergency bus. (Refer to AOP-025, "LOSS OF ONE EMERGENCY AC BUS (6.9KV) OR ONE EMERGENCY DC BUS 125V)".)
	SRO	Safety Injection – ACTUATED (BOTH TRAINS) – NO, and not required Transition to EOP-ES-0.1, "Reactor Trip Response", step 1
EOP-ES-0.1		Reactor Trip Response
	SRO	Foldout applies. Initiate Monitoring Of Critical Safety Function Status Trees.
	SRO	Informs SM to Evaluate EAL Matrix.
	BOP	Check RCS Temperature: Check RCPs - ANY RUNNING (NO) Perform the following: • Place steam dump pressure controller in manual **AND** lower output to 0%. • Place steam dump mode select switch in STEAM PRESS.

Op Test No.:	NRC	Scenario #	1	Event #	7 cont.	Page	47 of 58
Event Description:				Loss of ALL AC power			

<table>
<tr><th>Time</th><th>Position</th><th>Applicant's Actions or Behavior</th></tr>
<tr><td></td><td>BOP</td><td>Check SG blowdown isolation valves – SHUT (YES)
<table>
<tr><th>SG</th><th>(MLB-1A-SA)</th><th>(MLB-1B-SB)</th></tr>
<tr><td>A</td><td>1BD-11</td><td>1BD-1</td></tr>
<tr><td>B</td><td>1BD-30</td><td>1BD-20</td></tr>
<tr><td>C</td><td>1BD-49</td><td>1BD-39</td></tr>
</table>
</td></tr>
<tr><td></td><td></td><td></td></tr>
<tr><td></td><td>BOP</td><td>Stabilize AND Maintain Temperature Between 555°F AND 559°F using Table 1.
<table>
<tr><td colspan="4">TABLE 1: RCS TEMPERATURE CONTROL GUIDELINES FOLLOWING RX TRIP
• Guidance is applicable until another procedure directs otherwise.
• <u>IF</u> no RCPs running, <u>THEN</u> use wide range cold leg temperature.</td></tr>
<tr><td rowspan="2"></td><td colspan="3">RCS TEMPERATURE TREND</td></tr>
<tr><td>LESS THAN 557°F AND DROPPING</td><td>GREATER THAN 557°F AND RISING</td><td>STABLE AT OR TRENDING TO 557°F</td></tr>
<tr><td>OPERATOR ACTION</td><td>• Stop dumping steam
• Control feed flow
• Maintain total feed flow greater than 200 KPPH until level greater than 25% at least one intact SG
• <u>IF</u> cooldown continues, <u>THEN</u>, shut MSIVs AND BYPASS valves</td><td>• <u>IF</u> condenser available <u>THEN</u> transfer steam dump to STEAM PRESSURE mode using OP-126, Section 5.3 AND dump steam to condenser
- OR -
• Dump steam using intact SG PORVs
• Control feed flow to maintain SG levels</td><td>• Control feed flow and steam dump to establish and maintain RCS temperature between 555°F AND 559°F</td></tr>
</table>
</td></tr>
</table>

Op Test No.:	NRC	Scenario #	1	Event #	7 cont.	Page	48 of	58
Event Description:			**Loss of ALL AC power**					

Time	Position	Applicant's Actions or Behavior

Lead Evaluator:	**Terminate the scenario upon determination of RCS Temperature Control.** **Announce 'Crew Update' - End of Evaluation - I have the shift.** **Have crew remain in the Simulator without discussing the exam. Examiners will formulate any follow-up questions.**

Simulator Operator:	**When directed by the Lead Examiner place the Simulator in FREEZE.**

5.0 STARTUP

5.1. Startup Train A-SA (B-SB) from Main Control Room or Local Panel

5.1.1. Initial Conditions

> **NOTE:** CM-I0014 Section 7.1 covers Control Module Replacement and Section 7.6 covers the current limiter circuit. If maintenance is performed on any portion of the current limiter circuit, additional Post Maintenance Testing per OP-148 section 8.16 is required. This includes calibration, adjustment, or other intrusive maintenance on any of the following components:
> • Temperature Current Module (current limiter portion only)
> • Current limiter resistor
> • B-phase current transformer
> • Current limiter circuit wiring/connections.

1. **IF** any maintenance activities were performed on any portion of the current limiter circuit of WC-2 Chiller 1A-SA (1B-SB), **THEN PERFORM** Post-maintenance Testing per OP-148 Section 8.16 for the applicable WC-2 Chiller Unit. _______

> **NOTE:** Section 5.2, Placing Standby Train in Operation, should be used when swapping Trains of ESCWS.

2. No Chiller Train is in service. _______
3. System filled and vented per Section 8.1. _______
4. System lineup Attachments 1 and 2 are complete. _______
5. For non-emergency starts the prestart checks of Attachment 5 have been performed and an operator should be present to observe start of chiller. _______
6. Section 8.12 Manual Chiller Reset has been performed, if necessary due to chiller trip. _______
7. The L.O. heaters have been in service for twelve hours. (See Precaution and Limitation 4.0.3 for applicability of this Initial Condition) _______

5.1.1 Initial Conditions (continued)

NOTE: The requirement to run the ESW Pump for 30 minutes does not apply if WC-2 Chiller start is due to AOP/EOP direction.

NOTE: If service water header temperature is greater than 92°F and the ESW pump is available startup of ESW **is required**. The pump should run for approximately 30 minutes before chiller start. ESW provides additional flow at typically lower temperatures when used for service water supply. Starting ESW prior to a chiller start minimizes condenser pressure. Historically, High Condenser Pressure alarms have been received during summer months due to high service water temperatures and high chilled water loads.

8. **IF** desired due to Service Water temperatures being high,
THEN VERIFY a same train ESW Pump is running. Pump should run for approximately 30 minutes before chiller start. _______

5.1.2. Procedural Steps

NOTE: Whenever an "A" Train component is referred to in the body of this procedure it's "B" Train counterpart will immediately follow, enclosed by parentheses.

NOTE: ESR 99-00142 has evaluated and determined that long-term closure of the supply and return valves to the NNS AH units will not affect operability of the Essential Services Chiller system. The next two steps will align the NNS AH units however, if it is desired to maintain the NNS isolation valves shut, then steps 5.1.2.1 and 5.1.2.2 may be skipped.

1. **ISOLATE** the supply and return valves to the NNS AH units from the train that will not be placed in service by shutting the following valves:

1CH-125 SB (1CH-196 SB)	CHILLED WATER FROM NESSR FAN CLRS ISOL.	_____
1CH-126 SA (1CH-197 SA)	CHILLED WATER FROM NESSR FAN CLRS ISOL.	_____
1CH-115 SA (1CH-148 SB)	CHILLED WATER TO NESSR FANS CLR ISOL	_____
1CH-116 SB (1CH-149 SA)	CHILLED WATER TO NESSR FAN CLRS ISOL	_____

2. **ALIGN** the supply and return valves to the NNS AH units associated with the train that will be placed in service by opening the following valves:

1CH-125 SB (1CH-196 SB)	CHILLED WATER FROM NESSR FAN CLRS ISOL.	_____
1CH-126 SA (1CH-197 SA)	CHILLED WATER FROM NESSR FAN CLRS ISOL.	_____
1CH-115 SA (1CH-148 SB)	CHILLED WATER TO NESSR FANS CLR ISOL	_____
1CH-116 SB (1CH-149 SA)	CHILLED WATER TO NESSR FAN CLRS ISOL	_____

5.1.2 **Procedural Steps** (continued)

> **NOTE:** The local alarm indication for low chilled water flow and low chilled water temperature will lock in until manually reset at the WC-2 control panel.

3. **START** WC-2 Chiller 1A-SA (1B-SB) Chilled water pump P-4 to establish chilled water flow. _______

4. At the Local Control panel, **RESET** the Low Chilled Water Flow alarm using the CHILLED WATER NO FLOW TRIP INDICATION RESET push-button. _______

5. **IF** starting the chiller for the first time following maintenance where the chiller lube oil heater circuit was under clearance.
THEN PERFORM the following:

   a. Locally **START** the oil pump on the 1A-SA (1B-SB) compressor by taking the control switch on the local panel to the MAN position. _______

   b. **RUN** pump for 5 minutes. _______

   c. **STOP** the oil pump on the 1A-SA (1B-SB) chiller compressor by taking the control switch on the local panel to the AUTO position. _______

6. At the Local Control Panel, **CHECK** that all alarm lights are **NOT** lit. _______

7. **IF** any alarm light(s) is lit,
THEN PERFORM the following:

   a. **IF** the Local Select switch is in the LOCAL position,
   THEN locally **DEPRESS** the STOP push-button. _______

   b. **IF** the Local Select switch is in the MCB HVAC position,
   THEN place the 1A-SA (1B-SB) compressor control switch on AEP-1 to STOP. _______

   c. **IF** any alarm light is still lit,
   THEN PERFORM the following:

      (1) **DECLARE** the chiller inoperable. _______

      (2) **INITIATE** corrective actions. _______

5.1.2 **Procedural Steps** (continued)

> **NOTE:** If the unit cycles off due to low chilled water flow or low chilled water temperature, the unit will automatically restart if all start permissive conditions exist.
>
> **NOTE:** An anti-recycle feature prevents more than one normal start within a 30 minute period. This anti-recycle feature is bypassed upon any automatic start signal from the ESF sequencer.
>
> **NOTE:** After going to START on the Chiller Control Switch, the oil pump will start and bring oil pressure up to normal operating pressure prior to chiller start.
>
> **NOTE:** OPT-1512 rotates the Temperature Control Point potentiometer to clean the surfaces. While OPT-1512 restores the potentiometer to its original position, it is possible that due to the surface cleaning the characteristics of the potentiometer have changed sufficiently to require a manual temperature adjustment per Section 8.14 of this procedure. This will be determined by monitoring temperature after chiller start in the following Step.
>
> **NOTE:** ALB-023/1-14 (2-14), WC-2 CH 1A (1B) CNDSR REFRIG HI PRESS, may alarm during startup of the Chillers. High chiller condenser pressure is caused by inadequate cooling of the refrigerant. Causal factors for high condenser pressure include high chiller service water inlet temperature, condenser tube fouling, condenser shell air binding, or reduction of service water flow.

8. **START** the chiller by performing one of the following:

   a. At AEP-1, **PLACE** Water Chiller Compressor WC-2 A-SA (WC-2 B-SB) control switch to the START position and release. ______

   OR

   b. **DEPRESS** the START push-button at the local control panel with the Local Select switch in the LOCAL position. ______

> **NOTE:** Engineering recommends running ESW for about 5-10 minutes after the chiller starts to ensure it reaches steady state operation. Operator judgment should be used to determine if continuing to run the ESW pump to prevent the High Condenser Pressure alarm is warranted. There is no operability impact, but a nuisance alarm can be prevented.

9. **IF** desired,
   THEN STOP the ESW Pump started in Step 5.1.1.8. ______

5.2. Placing Standby Train In Operation

NOTE: It is necessary to shift associated trains of HVAC units when shifting trains of Essential Services Chilled Water.

NOTE: This Section is written for swapping from Train B ESCW to Train A ESCW, with components for swapping from Train A ESCW to Train B ESCW in parentheses.

5.2.1. Initial Conditions

NOTE: CM-I0014 Section 7.1 covers Control Module Replacement and Section 7.6 covers the current limiter circuit. If maintenance is performed on any portion of the current limiter circuit, additional Post Maintenance Testing per OP-148 section 8.16 is required. This includes calibration, adjustment, or other intrusive maintenance on any of the following components:
- Temperature Current Module (current limiter portion only)
- Current limiter resistor
- B-phase current transformer
- Current limiter circuit wiring/connections.

1. **IF** any maintenance activities were performed on any portion of the current limiter circuit of WC-2 Chiller 1A-SA (1B-SB), **THEN PERFORM** Post-maintenance Testing per OP-148 Section 8.16 for the applicable WC-2 Chiller Unit. ______
2. Service water is being supplied to the non-operating chiller WC-2 1A-SA (WC-2 1B-SB). ______
3. One train of ESCW is already in operation. ______
4. For non-emergency starts the prestart checks of Attachment 5 have been performed and an operator should be present to observe start of chiller. ______
5. Section 8.12, Manual Chiller Reset performed if necessary for non-operating chiller. ______
6. The L.O. heaters have been in service for twelve hours. (See Precaution and Limitation 4.0.3 for applicability of this Initial Condition) ______

5.2.1 Initial Conditions (continued)

> **NOTE:** The requirement to run the ESW Pump for 30 minutes does not apply if WC-2 Chiller start is due to AOP/EOP direction.
>
> **NOTE:** If service water header temperature is greater than 92°F and the ESW pump is available startup of ESW **is required**. The pump should run for approximately 30 minutes before chiller start. ESW provides additional flow at typically lower temperatures when used for service water supply. Starting ESW prior to a chiller start minimizes condenser pressure. Historically, High Condenser Pressure alarms have been received during summer months due to high service water temperatures and high chilled water loads.

7. **IF** desired due to Service Water temperatures being high, **THEN VERIFY** a same train ESW Pump is running. Pump should run for approximately 30 minutes before chiller start. ______

5.2.2. **Procedural Steps**

NOTE:	The local alarm indication for low chilled water flow and low chilled water temperature will lock in until manually reset at the WC-2 control panel.
NOTE:	If starting the chiller compressor is delayed following the start of the P-4 Pump in the next Step, the compressor oil could cool down to the point that the compressor will trip on low oil pressure.
NOTE:	In Winter months (December - February) Step 5.2.2.7 can be performed anytime after Step 5.2.2.1. It is preferable to start the fans before the chiller. This allows the chill water to heat up and prevents the chiller cycling on and off on low temperature.

1. At AEP-1, **START** the non-operating Chiller WC-2 A-SA (B-SB) Chilled Water Pump P-4 A-SA (B-SB) to establish chilled water flow in the non-operating train. ______

2. At the Local Control panel, **RESET** the Low Chilled Water Flow alarm using the CHILLED WATER NO FLOW TRIP INDICATION RESET push-button. ______

3. **IF** starting the chiller for the first time following maintenance where the chiller lube oil heater circuit was under clearance,
   THEN PERFORM the following:

   a. Locally **START** the oil pump on the standby chiller compressor by taking the control switch on the local panel to the MAN position. ______

   b. **RUN** pump for 5 minutes. ______

   c. **STOP** the standby chiller compressor oil pump by taking the control switch on the local panel to the AUTO position. ______

4. At the Local Control Panel, **CHECK** that all alarm lights are **NOT** lit. ______

5. **IF** any alarm light(s) is lit,
   THEN PERFORM the following:

   a. **IF** the Local Select switch is in the LOCAL position,
      THEN locally **DEPRESS** the STOP push-button. ______

   b. **IF** the Local Select switch is in the MCB HVAC position,
      THEN place the standby chiller compressor control switch on AEP-1 to STOP. ______

OP-148	Rev. 77	Page 17 of 170

5.2.2 Procedural Steps (continued)

c. **IF** any alarm light is still lit,
THEN PERFORM the following:

(1) **DECLARE** the chiller inoperable. ______

(2) **INITIATE** corrective actions. ______

> **NOTE:** OPT-1512 rotates the Temperature Control Point potentiometer to clean the surfaces. While OPT-1512 restores the potentiometer to its original position, it is possible that due to the surface cleaning the characteristics of the potentiometer have changed sufficiently to require a manual temperature adjustment per Section 8.14 of this procedure. This will be determined by monitoring temperature after chiller start in the following Step.
>
> **NOTE:** ALB-023/1-14 (2-14), WC-2 CH 1A (1B) CNDSR REFRIG HI PRESS, may alarm during startup of the Chillers. High chiller condenser pressure is caused by inadequate cooling of the refrigerant. Causal factors for high condenser pressure include high chiller service water inlet temperature, condenser tube fouling, condenser shell air binding, or reduction of service water flow.

6. **START** the chiller by performing **ONE** of the following:

a. At AEP-1, **PLACE** Water Chiller Compressor WC-2 A-SA (WC-2 B-SB) control switch to the START position **AND RELEASE**. ______

OR

b. **DEPRESS** the START push-button at the local control panel with the local select switch in the LOCAL position. ______

7. **START** Train A (B) ESF Equipment Cooling System per OP-172, Section 5.6. ______

5.2.2 Procedural Steps (continued)

> **NOTE:** ESR 99-00142 has evaluated and determined that long-term closure of the supply and return valves to the NNS AH units will not affect operability of the Essential Services Chiller system. The next two Steps will align the NNS AH units however, if it is desired to maintain the NNS isolation valves shut, then steps 5.2.2.8 and 5.2.2.9 may be skipped.

8. **ISOLATE** the supply and return valves to the NNS AH units from the train that was already operating by shutting the following valves:

1CH-196 SB (1CH-125 SB)	CHILLED WATER FROM NESSR FAN CLRS ISOL	______
1CH-197 SA (1CH-126 SA)	CHILLED WATER FROM NESSR FAN CLRS ISOL	______
1CH-148 SB (1CH-115 SA)	CHILLED WATER TO NESSR FANS CLR ISOL	______
1CH-149 SA (1CH-116 SB)	CHILLED WATER TO NESSR FAN CLRS ISOL	______

9. **ALIGN** NNS AH units to the train that will remain operating by opening the following valves:

1CH-125 SB (1CH-196 SB)	CHILLED WATER FROM NESSR FAN CLRS ISOL.	______
1CH-126 SA (1CH-197 SA)	CHILLED WATER FROM NESSR FAN CLRS ISOL.	______
1CH-115 SA (1CH-148 SB)	CHILLED WATER TO NESSR FANS CLR ISOL	______
1CH-116 SB (1CH-149 SA)	CHILLED WATER TO NESSR FAN CLRS ISOL	______

10. **IF** shifting chillers to support placing the standby safety equipment train in service,
THEN PERFORM Attachment 8. ______

Facility: Harris Nuclear Plant	Scenario No.: 2	Op Test No.: 05000400/2018301	
Examiners:		Operators:	SRO:
			RO:
			BOP:
Initial Conditions:	IC-8, MOL, 3-4% power Turbine at 1700 RPM with Throttle Valve control		

- 'A' Gland Steam Condenser Exhaust Fan is under clearance for motor replacement
- PORV Block valve 1RC-113 is SHUT due to PZR PORV 444B Seat Leakage
- 1CS-9, Letdown Isolation Valve is under clearance for solenoid replacement

Turnover:	The plant is at 3-4% power, MOL, plant startup in progress. Criticality was achieved 2 hours ago, 72 hours after a trip from 100% power. GP-005, Power Operation (Mode 2 to Mode 1) is being implemented.
Critical Task:	• Control PRZ Spray Valve, PCV-444C, prior to RCS pressure reaching the Reactor Trip setpoint of 1960 psig • Shut BIT Outlet valves 1SI-3 and 1SI-4 prior to PZR SRV's Discharge Line High Temperature occurring (250°F)

Event No.	Malf. No.	Event Type*	Event Description
1	N/A	R – RO/SRO N – BOP/SRO	Start power escalation to 7 – 9% to raise turbine speed from 1700 rpm to 1800 rpm
2 #	RMS007 ZCR744	I - BOP/SRO TS - SRO	Radiation Monitor 3502A high alarm, Containment Purge fails to isolate automatically (AOP-005)
3 #	ccw01a ccw047	C – RO/SRO TS – SRO	Trip of 'A' CCW Pump on O/C with standby CCW pump 'B' failure to auto start (AOP-014)
4 #	JFB7579 Z2715TIC	C-BOP/SRO	AH-39A Containment Fan Coil Unit fan trip with back up auto start failure ('C' RCP cooling fan)
5 #	PRS14A	I - RO/SRO	Pressurizer Spray Valve, PCV-444C, fails Open (AOP-019 - Manual Control available)
6 #	CFW20B	M - All	Feedline Break on 'B' SG inside Containment (EOP-E-0)
7	ZRPK616A ZRPK616B	I – BOP/SRO	Failure of Auto AFW Isolation on 'B' SG
8	NIS06A	I – RO/SRO	SR Nuclear Instruments fail to energize post trip due to IR NI-35 undercompensated

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

Event or Major Transient NOT used on the previous 2 NRC initial licensing operating tests

SCENARIO SUMMARY: 2018 NRC EXAM SCENARIO 2

The plant is at 3%-4% power, MOL, with a plant startup in progress. GP-005, Power Operation (Mode 2 to Mode 1) is being implemented. Criticality was achieved 2 hours ago, 72 hours after a trip from 100% power. During the previous shift secondary chemistry parameters degraded and Reactor power was reduced to <5%. Chemistry reports that all secondary chemistry is now adequate to continue the power increase. The Turbine is at 1700 rpm with Turbine Throttle Valves controlling Turbine speed. After taking turnover the crew will raise Reactor power to 7% - 9% power then transfer control from Throttle Valves to Turbine Governor valves then ramp the Turbine speed up to 1800 rpm.

The following equipment is under clearance:

- The ‘A’ Gland Steam Condenser Exhaust Fan is under clearance for motor replacement. Repairs are expected to be completed within 24 hours.
- PORV Block valve 1RC-113 is SHUT due to PZR PORV 444B Seat Leakage. The actions of Tech Spec 3.4.4 are met (block valve is shut). OWP-RC-02 has been completed.

REACTOR COOLANT SYSTEM

3/4.4.4 RELIEF VALVES

LIMITING CONDITION FOR OPERATION

3.4.4 All power-operated relief valves (PORVs) and their associated block valves shall be OPERABLE.

APPLICABILITY: MODES 1, 2, and 3

ACTION:

a. With one or more PORV(s) inoperable, because of excessive seat leakage, within 1 hour either restore the PORV(s) to OPERABLE status or close the associated block valve(s) with power maintained to the block valve(s); otherwise, be in at least HOT STANDBY within the next 6 hours and in HOT SHUTDOWN within the following 6 hours.

SCENARIO SUMMARY: 2018 NRC EXAM SCENARIO 2 (continued)

The following equipment is under clearance (continued):

- Letdown Orifice Isolation Valve 1CS-9 is under clearance for solenoid replacement. Tech Spec 3.6.3 LCO Action **b** applies. OWP-CS-09 has been completed.

CONTAINMENT SYSTEMS

3/4.6.3 CONTAINMENT ISOLATION VALVES

LIMITING CONDITION FOR OPERATION

3.6.3 Each containment isolation valve specified in the Technical Specification Equipment List Program, plant procedure PLP-106, shall be OPERABLE with isolation times less than or equal to required isolation times.

APPLICABILITY: MODES 1, 2, 3, and 4.

ACTION:

With one or more of the containment isolation valve(s) inoperable, maintain at least one isolation valve OPERABLE in each affected penetration that is open and:

a. Restore the inoperable valve(s) to OPERABLE status within 4 hours, or

b. Isolate each affected penetration within 4 hours by use of at least one deactivated automatic valve secured in the isolation position, or

c. Isolate each affected penetration within 4 hours by use of at least one closed manual valve or blind flange, or

d. Be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

SCENARIO SUMMARY: 2018 NRC EXAM SCENARIO 2

Event 1: Start power escalation to 7% – 9% then transfer Turbine valve control from Throttle valves to Governor valves. Once Governor valves are controlling the Turbine the speed will be raised from 1700 rpm to 1800 rpm. After Main Turbine speed is at 1800 rpm the crew will continue with GP-005. After completion of placing one DEH pump in Auto the Evaluator can continue with event 2.

Event 2: Failure of REM-01LT-3502ASA, CNMT RCS Leak Detection Radiation Monitor. This failure will cause the output to immediately fail high and RM-11 to go into high alarm. The automatic response to isolate Normal Containment Purge fails to occur due to a failed relay. The crew should respond to the alarms and enter AOP-005, Radiation Monitoring. AOP-005 Attachment 1 will direct verifying that the automatic response for this alarm has occurred (other procedure options are available and detailed in exercise guide). This will also require the SRO to evaluate Tech Spec 3.3.3.1 for the failed Containment Isolation and Tech Spec 3.4.6.1, Leakage Detection Systems.

Tech Spec 3.3.3.1 – (Table 3.3-6 item 1.b.1) Airborne Gaseous Radioactivity – RCS leakage Detection Actions 26 and 27

- ACTION 26 - Must satisfy the ACTION requirement for Specification 3.4.6.1.
- ACTION 27 - With less than the Minimum Channels OPERABLE requirement, operation may continue provided the containment purge makeup and exhaust isolation valves are maintained closed.

Tech Spec 3.4.6.1 action

- With the Leakage Detection Systems INOPERABLE, operation may continue for up to 30 days provided grab samples of the containment atmosphere are obtained and analyzed for airborne gaseous and particulate radioactivity at least once per 24 hours when the required Airborne Gaseous or Particulate Radioactivity Monitoring System is inoperable; otherwise. be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

Tech Spec 3.3.2 Functional Unit 3.c.4.b

- RCS Leak Detection (normal purge) - See Table 3.3-6, Item 1.b.1, for initiating functions and requirements.

NOTE – required actions will be addressed per TS 3.3.3.1 (Table 3.3-6 item 1.b.1)

The SRO should also commence OMM-001, Attachment 5 Equipment Problem Checklist for the failure.

SCENARIO SUMMARY: 2018 NRC EXAM SCENARIO 2 (continued)

Event 3: : Trip of ‘A’ CCW Pump on O/C with standby CCW pump failure to auto start (AOP-014). The standby ‘B’ CCW Pump fails to Auto Start due to a pressure transmitter failure (instrument is isolated therefore pressure decrease is not sensed). The crew should recognize the loss and enter AOP-014, Loss of Component Cooling Water. AOP-014 will direct the restoration of the CCW system. The RO will be directed by the SRO to manually start the ‘B’ CCW (or will have started it in accordance with AD-OP-ALL-1000 when it did not auto start). The SRO should also commence OMM-001, Attachment 5 and evaluate Tech Spec 3.7.3, Component Cooling Water System and 3.5.2 Emergency Core Cooling Systems.

PLANT SYSTEMS
3/4.7.3 COMPONENT COOLING WATER SYSTEM

LIMITING CONDITION FOR OPERATION

3.7.3 At least two component cooling water (CCW) pumps*, heat exchangers and essential flow paths shall be OPERABLE.

APPLICABILITY: MODES 1, 2, 3, and 4.

ACTION:

With only one component cooling water flow path OPERABLE, restore at least two flow paths to OPERABLE status within 72 hours** or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

* The breaker for CCW pump 1C-SAB shall not be racked into either power source (SA or SB) unless the breaker from the applicable CCW pump (1A-SA or 1B-SB) is racked out.

EMERGENCY CORE COOLING SYSTEMS
3/4.5.2 ECCS SUBSYSTEMS - T_{avg} GREATER THAN OR EQUAL TO 350°F

LIMITING CONDITION FOR OPERATION

3.5.2 Two independent Emergency Core Cooling System (ECCS) subsystems shall be OPERABLE with each subsystem comprised of:

a. One OPERABLE Charging/safety injection pump,

b. One OPERABLE RHR heat exchanger,

c. One OPERABLE RHR pump, and

d. An OPERABLE flow path capable of taking suction from the refueling water storage tank on a Safety Injection signal and, upon being manually aligned, transferring suction to the containment sump during the recirculation phase of operation.

APPLICABILITY: MODES 1, 2, and 3.

ACTION:

a. With one ECCS subsystem inoperable, restore the inoperable subsystem to OPERABLE status within 72 hours* or be in at least HOT STANDBY within the next 6 hours and in HOT SHUTDOWN within the following 6 hours.

SCENARIO SUMMARY: 2018 NRC EXAM SCENARIO 2 (continued)

Event 4: Trip of AH-39A Containment Fan Coil Unit fan with back up auto start failure. The failure will cause annunciator ALB-029 4-5 “Containment Fan Coolers AH-39 Low Flow-O/L” to alarm. The crew should identify that the standby fan did not auto start and start the standby fan.

Event 5: Pressurizer Spray Valve, PCV-444C, fails Open (***Manual Control available***). This failure will cause one of the Pressurizer spray valves to fail to 100% open while the other valve closes to 0% open. The crew should respond to multiple alarms and enter AOP-019, Malfunction of RCS Pressure Control. The RO should complete the immediate actions by gaining control of the Pressurizer Spray Valves. A critical task is associated with this malfunction in that the crew must control PRZ Spray Valve, PCV-444C, prior to RCS pressure reaching the Reactor Trip setpoint of 1960 psig. The justification for the critical task is based on the crew/individual causing an unnecessary plant trip or ESF actuation.

This malfunction may require the SRO to evaluate Technical Specification 3.2.5 (If RCS pressure decreases to < 2185 psig during the event)
3.2.5 The following DNB-related parameters shall be maintained within the following limits:

a. Reactor Coolant System $T_{avg} \leq 594.8°F$ after addition for instrument uncertainty and
b. Pressurizer Pressure $\geq$ 2185 psig after subtraction for instrument uncertainty and
c. RCS total flow rate $\geq$ 293,540 gpm after subtraction for instrument uncertainty

- With any of the above parameters not within its specified limit restore the parameter to within its limit within 2 hours or reduce THERMAL POWER to less than 5% of RATED THERMAL POWER within the next 6 hours.

Event 6: Once RCS pressure control has been established, a Feed Line Break inside Containment on the ‘B’ SG will occur. The crew should enter and carry out the immediate actions of EOP-E-0. The crew should diagnose that there is not a LOCA in progress and transition to EOP-E-2, Faulted Steam Generator Isolation. RCS pressure will continue to reduce as the RCS cools down requiring securing RCPs in accordance with Foldout A.

Event 7: AFW Auto Isolation for the ‘B’ SG fails requiring the crew to manually isolate AFW flow. With ‘B’ SG pressure 100 psig below the other 2 SG’s pressure an automatic FW isolation should have occurred. When the BOP is asked to verify that isolation has occurred he/she will identify that the MDAFW AND TDAFW pump isolation valves to the ‘B’ SG (faulted SG) are NOT shut and will then shut both valves.

Event 8: Source Range channels will fail to energize due to under compensation of Intermediate Range channel N-35. The crew will need to identify the failure and then manually energize the SR channels to establish an audio count rate.

The scenario termination is met in EOP-E-2, when Safety Injection has been terminated. The scenario ends when the crew transitions to EOP-ES-1.1, SI Termination.

CRITICAL TASK JUSTIFICATION:

1. Control PRZ Spray Valve, PCV-444C, prior to RCS pressure reaching the Reactor Trip setpoint of 1960 psig

Justification is based on the crew/individual causing an unnecessary plant trip or ESF actuation. See note below.

2. Shut BIT Outlet valves 1SI-3 and 1SI-4 prior to PZR SRV's Discharge Line High Temperature occurring (250°F on any Safety valve discharge line temperature indicator either TI-465, or TI-467 or TI-469)

Justification is based on NuReg 1021 Rev. 11 Appendix D – Take one or more actions that would prevent a challenge to plant safety. Shutting BIT outlet valves 1SI-3 and 1SI-4 prior to water relief through the PZR Safety Relief Valves (SRV's). FSAR Section 15.1.5.2 (page 15.1.5-7) states the operator will secure one of the two CSIPs to facilitate PZR level indication remaining on scale and controllable. At low fluid temperature (like those present in the PZR at this time). SRV's may not reset after fluid operation and if they will not shut RCS mass will be lost out a release path to the PRT which in turn will rupture the PRT and be released into Containment.

Note: Causing an unnecessary plant trip or ESF actuation may constitute a Critical Task failure. Actions taken by the applicant(s) will be validated using the methodology for critical tasks in Appendix D to NUREG-1021.

SIMULATOR SETUP

For the 2018 NRC Exam Simulator Scenario # 2

Reset to IC-162 password “NRC2018”

Go to RUN

Silence and Acknowledge annunciators

GO TO FREEZE and inform the lead examiner the Simulator is ready. DO NOT GO TO RUN until directed by the lead examiner.

Set ERFIS screens

(The examiner has provided to the candidate with initial conditions and the initiating cues prior to placing the simulator in RUN.)

SPECIAL INSTRUCTIONS

Post conditions for status board from IC-8
Reactor Power 3% steady state
Control Bank D at 94 steps
RCS boron 1615 ppm
GP-005 step 84

- ‘A’ Gland Seal Exhauster Fan is under clearance for motor repairs. The fan has been under clearance for 8 hours. Repairs are expected to be completed within 24 hours. Place a CIT on the MCB switch.

- PORV Block valve 1RC-113 is SHUT due to PZR PORV 444B Seat Leakage. Place an OFF NORMAL placard on the MCB switch. Place a completed copy of OWP-RC-02 in the OWP book.

- Letdown Orifice Isolation Valve 1CS-9 is under clearance for solenoid replacement. Tech Spec 3.6.3 LCO Action b applies. Place a completed copy of OWP-CS-09 in the OWP book. Place a CIT on the MCB switch.

- Hang restricted access signs on MCR entry swing gates

Op Test No.: NRC	Scenario # 2	Event # 1	Page 9 of 56
Event Description:	**Start Power Escalation – Place Gov valves in Turbine Control**		

Time	Position	Applicant's Actions or Behavior

Lead Evaluator:	**When the crew has completed their board walk down and are ready to take the shift inform the Simulator Operator to place the Simulator in Run. When the Simulator is in run announce:** **CREW UPDATE – (SRO's Name) Your crew has the shift. END OF UPDATE**

Simulator Operator:	**When directed by the Lead Evaluator, ensure that the annunciator horns are on and place the Simulator in RUN.**

Evaluator Note:		**May manually withdraw Control rods or perform RCS dilution:**
GP-005	CREW	Raise Reactor Power to ~ 7%-9% to support Main Turbine Roll
	BOP	Adjusts steam dump demand signal as necessary.
	RO	Withdraws Control Rods as necessary then initiates dilution per the reactivity plan with SRO concurrence
OP-104	RO	Withdraw Control Rods per OP-104, Section 5.4
	RO	Verifies Initial Conditions: • All shutdown rods have been withdrawn, per Section 5.3, by observing the Group Step Counters and Digital Rod Position Indication System. All Shutdown Rod Group Step Counters must read greater than or equal to 225 steps. • Reactivity evolution signs have been posted to limit MCR access.

Op Test No.: NRC	Scenario # 2	Event # 1	Page 10 of 56
Event Description:	**Start Power Escalation – Place Gov valves in Turbine Control**		

Time	Position	Applicant's Actions or Behavior
Procedure Note:		**Reactivity Evolution category to be determined by the CRS.**
	RO	Verifies At the MCB, the ROD BANK SELECTOR Switch in MAN.
	RO	VERIFY Rod Speed of 48 steps per minute on SI-408.
Procedure Note:		**During a Reactor Startup or testing, Steps 5.4.2.3 through 5.4.2.7 may be repeated multiple times, with rod motion stopped to observe reactivity affects, record 1/M data, or for other reasons. The intent is to initial for these Steps at the completion of the entire evolution, not for each time it is performed.**
	RO	At the MCB, POSITION ROD MOTION Switch to WITHDRAW. OBSERVE that the RODS OUT Direction Lamp lights.
	RO	OBSERVE Bank Step Counters for proper rod motion, overlap and sequencing.
	RO	VERIFY the rods are moving out by OBSERVING the Digital Rod Position Indication System Display.
	RO	At the MCB, STOP rod motion by RELEASING the ROD MOTION Switch allowing it to return to the neutral position. VERIFY the RODS OUT Direction Lamp extinguishes.

Op Test No.: NRC	Scenario # 2	Event # 1	Page 11 of 56
Event Description:	**Start Power Escalation – Place Gov valves in Turbine Control**		

Time	Position	Applicant's Actions or Behavior
	RO	IF necessary, THEN REPEAT Steps 5.4.2.3 through 5.4.2.7.
OP-107.01	RO	Dilution per OP-107.01, Section 5.4
	RO	• DETERMINE the volume of makeup water to be added using the reactivity plan associated with the IC.
Procedure Note:		**FIS-114 may be set for one gallon less than desired. A pressure transient caused by 1CS-151 shutting results in FIS-114 normally indicating one gallon more than actual flow but two gallons more would be unexpected.**
Procedure Caution:		**If the translucent covers associated with the Boric Acid and Total Makeup Batch counters FIS-113 and FIS-114, located on the MCB, are not closed, the system will not automatically stop at the pre-set value.**
	RO	SET FIS-114, TOTAL MAKEUP WTR BATCH COUNTER, to obtain the desired quantity.
	RO	• VERIFY the RMW CONTROL switch has been placed in the STOP position. • VERIFY the RMW CONTROL switch green light is lit. • PLACE control switch RMW MODE SELECTOR to the ALT DIL position.

Op Test No.: NRC	Scenario # 2	Event # 1	Page 12 of 56
Event Description:	**Start Power Escalation – Place Gov valves in Turbine Control**		

Time	Position	Applicant's Actions or Behavior
Procedure Note:		**Alternate Dilution may be manually stopped at any time by turning the control switch RMW CONTROL to STOP.**
	RO	START the makeup system as follows: • TURN control switch RMW CONTROL to START momentarily. • VERIFY the red indicator light is lit. • IF expected system response is not obtained, THEN TURN control switch RMW CONTROL to STOP.
	RO	**VERIFY** dilution automatically terminates when the desired quantity has been added. **MONITOR** Tavg and rod control for proper operation. **TURN** control switch RMW MODE SELECTOR to AUTO.
	RO	• START the makeup system as follows: o TURN control switch RMW CONTROL to START momentarily. o VERIFY the RED indicator light is LIT. • Reports to CRS that dilution is complete and Makeup is back in AUTO

Op Test No.: NRC	Scenario # 2	Event # 1	Page 13 of 56
Event Description:	Start Power Escalation – Place Gov valves in Turbine Control		

Time	Position	Applicant's Actions or Behavior
GP-005	CREW	As power is raised above 5% identifies entry into Mode 1
	SRO	Completes step 57 in GP-005 Directs BOP to perform Step 84, TRANSFER control from the Throttle Valves to the Governor Valves
	BOP	Verifies Main Turbine speed on DEH control panel indicates the Turbine is at 1700 RPM then transfers control from the Throttle Valves to the Governor Valves by depressing the TRANSFER TV-GV pushbutton.
	BOP	CHECK that the transfer from the Throttle Valves to the Governor Valves is complete by checking the following indications: • Valve position indicators • TRANSFER TV light extinguished • GV light illuminated • Local observation (Throttle Valves smoothly transition to full open)
Simulator Communicator:		**For local observation of the Throttle Valves operation as Turbine Building AO report smooth operation to the full open position.**
	BOP	ENTER 1800 RPM into the DEMAND display AND VERIFY the HOLD pushbutton is illuminated.

Op Test No.: NRC	Scenario # 2	Event # 1	Page 14 of 56
Event Description:	**Start Power Escalation – Place Gov valves in Turbine Control**		

Time	Position	Applicant's Actions or Behavior
Procedure Note:		**The REFERENCE display will count up to 1800 RPM at the previously selected acceleration rate, and then the GO pushbutton will extinguish.**
	BOP	Depresses the GO pushbutton.
	BOP	Ensures the Main Turbine speed stops increasing at 1800 rpm AND the GO pushbutton extinguishes.
	BOP	At 1800 RPM, LOWER the Valve Position Limiter, as indicated in the REFERENCE display, until it indicates the percent (%) value read in the DEMAND display plus an additional 2%.
	BOP	At 1800 RPM locates the controls for the BRG OIL & SEAL OIL BU Pump from Main RSVR and STOPS the BRG OIL & SEAL OIL BU FROM MAIN RSVR Pumps, then place the control switch in AUTO.
	BOP	PLACE one DEH Pump in AUTO (Standby) operation.
Lead Evaluator:		**AFTER the crew has raised power to the satisfaction of the evaluation crew, cue the Simulator Operator to insert Trigger 2** **Event 2 – Radiation Monitor 3502A high alarm and Containment Purge fails to isolate automatically, when satisfied with power escalation performance.**

Op Test No.: NRC	Scenario # 2	Event # 3			Page 15 of 56		
Event Description:	**Radiation Monitor 3502A high alarm, Containment Purge fails to isolate automatically**						
Time	Position	Applicant's Actions or Behavior					

Simulator Operator:	**On cue from Lead Evaluator insert Trigger 2** **Radiation monitor 3502A failure**

Indications Available		**ALB-10-4-5, RAD MONITOR SYSTEM TROUBLE**
	RO	Responds to ALB-10-4-5, RAD MONITOR SYSTEM TROUBLE. (APP response below)
Simulator Communicator:		**If HP contacted to validate alarm wait one minute and then report that the monitor has failed.** **If someone other than HP is dispatched to investigate, wait three minutes and then report REM-3502 Gas Channel failed – no power, no indication.**
Evaluator Note:		**There are automatic actions associated with the failed channel that have been blocked by malfunction. The BOP may take the actions to place equipment in the required position from directions in AD-OP-ALL-1000 (failure to automatically isolate), AOP-005, OWP-RM-03 or OP-168.**
The first section of this guide is written to the response of the APP and then AOP-005, Radiation Monitoring System. The second part is written as if it will be done in the OWP which provides minor additional actions not contained in the AOP.		
	CREW	APP-ALB-010-4-5 response: CONFIRM alarm using: • RM-23, Radiation Monitoring Panel

Op Test No.: NRC	Scenario # 2	Event # 3	Page 16 of 56
Event Description:	**Radiation Monitor 3502A high alarm, Containment Purge fails to isolate automatically**		

Time	Position	Applicant's Actions or Behavior
	BOP	VERIFY Automatic Functions: • Automatic Actions are dependent upon which RM-23 Radiation Monitor is in ALARM
	CREW	PERFORM Corrective Actions: • IF the alarm is a Fuel Handling Building High Radiation alarm, THEN MANUALLY START the Spent Fuel Pool Purification System, using OP-116.01, Fuel Pool Cooling Purification System. (NO)
	SRO	• IF the alarm is RM-21AV-3509-1SA or an Area Monitor in the vicinity of the VCT Valve Gallery and air is being purge from the VCT to the plant vent per OP-120.07, THEN MANUALLY SECURE the air purge from the VCT to the plant vent per OP-120.07. (NO) • IF any radiation monitor is in alarm condition, THEN GO TO AOP-005, Radiation Monitoring System. (YES) • IF maintenance is to be performed, THEN REFER TO OWP-RM, Radiation Monitoring. (maintenance will be required) • Diagnoses as a failure of Channel 3502A (GAS) (May diagnose early)

Op Test No.:	NRC	Scenario #	2	Event #	3	Page	17	of	56
Event Description:	**Radiation Monitor 3502A high alarm, Containment Purge fails to isolate automatically**								

Time	Position	Applicant's Actions or Behavior
	SRO	Enters AOP-005, Radiation Monitoring System Makes PA announcement (No Immediate Actions)

	SRO	CHECK radiation levels NOT in HIGH ALARM:
		• Area Radiation Monitors (YES - Not in high Alarm)
		• In-Plant Airborne Radiation Monitors (YES - Not in high Alarm)
		• NOTIFY Health Physics to perform the following:
		  • a. EVALUATE ANY alarm received using HPP-780, Radiation Monitoring Systems Operator's Manual.
		  • b. IF necessary, THEN SURVEY the affected area.

Simulator Communicator:		**When notified acknowledge request to investigate alarm using HPP-780.**

	SRO	• CHECK ALL Stack Monitor radiation levels NOT in ALARM. (YES – Not in Alarm)
		• CHECK ALL Process Monitors NOT in ALARM. (YES – Not in Alarm)
		• REFER TO the following:
		  • Tech Spec Section 3.3.3.1 (applicable for this failure)
		  • Tech Spec 3.3.3.6 (not applicable for this failure)

Op Test No.: NRC	Scenario # 2	Event # 3	Page 18 of 56
Event Description:	**Radiation Monitor 3502A high alarm, Containment Purge fails to isolate automatically**		

Time	Position	Applicant's Actions or Behavior
	SRO	• REFER TO the applicable attachment based on the affected area or system monitors: • Containment Monitors – **Attachment 1 p. 8**
	SRO	AOP-005, Attachment 1 • IF the plant is in Mode 5 or 6, THEN PERFORM the following: • (N/A plant in Mode 1)
Procedure Caution:		If a Containment Ventilation Isolation signal has occurred, Tech Spec 3.0.3 is applicable, since both trains of Containment Vacuum Relief are inoperable
		• IF Containment Ventilation Isolation has actuated, THEN VERIFY proper equipment alignment using OMM-004, Post-Trip/Safeguards Actuation Review. (NO) • IF REM-01LT-3502ASA, Cnmt RCS Leak Detection Monitor, is in HIGH ALARM, THEN VERIFY Normal Containment Purge is ISOLATED, as follows: • VERIFY BOTH Cnmt Normal Purge Supply Fans are STOPPED: ▪ AH-82 A ▪ AH-82 B • VERIFY ALL Cnmt Normal Purge Inlet/Discharge Dampers are SHUT: ▪ 1CP-5 SA ▪ 1CP-9 SA ▪ 1CP-3 SB ▪ 1CP-6 SB

Op Test No.:	NRC	Scenario #	2	Event #	3	Page	19 of 56
Event Description:	**Radiation Monitor 3502A high alarm, Containment Purge fails to isolate automatically**						

Time	Position	Applicant's Actions or Behavior
	BOP	• Places AH-82A, Normal Containment Supply Fan, in STOP and releases • Places AH-82B, Normal Containment Supply Fan, in STOP and releases • Verifies 1CP-5, Normal Purge Inlet – CLOSED • Verifies 1CP-9, Normal Purge Inlet – CLOSED • Verifies 1CP-3, Normal Purge Discharge – CLOSED • Verifies 1CP-6, Normal Purge Discharge – CLOSED
	SRO	• Notes that no further actions in AOP-005 Att. 1 are applicable. Reviews the remainder of the section and reaches step to EXIT procedure • Direct BOP to perform Attachment 10, Containment Leak Detection Log for REM-01LT-3502ASA – Gas (Attachment 10 cannot be used due to the monitor being failed vice high radiation signal.)

Op Test No.: NRC	Scenario # 2	Event # 3	Page 20 of 56
Event Description:	**Radiation Monitor 3502A high alarm, Containment Purge fails to isolate automatically**		
Time	Position	Applicant's Actions or Behavior	

Evaluator Note:		**The following section is utilized if AOP-005 actions are not utilized:**
	SRO	Implement OWP-RM-03, CONTAINMENT LEAK DETECTION RADIATION MONITORS.
	BOP	Performs OWP-RM-03 component lineup:
Procedure Caution:		**The control switches for AH-82A and AH-82B must be taken to STOP momentarily to ensure they will not AUTO start.**
	BOP	• Places AH-82A, Normal Containment Supply Fan, in STOP and releases. • Places AH-82B, Normal Containment Supply Fan, in STOP and releases. • Verifies 1CP-6, Normal Purge Inlet – CLOSED. • Verifies 1CP-9, Normal Purge Inlet – CLOSED. • Verifies 1CP-3, Normal Purge Discharge – CLOSED • Verifies 1CP-5, Normal Purge Discharge – CLOSED • Contact AO to place 1D21-2B, AH-82 (1A-NNS) Normal Containment Purge Makeup Air Handler breaker in OFF • Contact AO to place 1E21-2F, AH-82 (1B-NNS) Normal Containment Purge Makeup Air Handler breaker in OFF
Simulator Communicator:		If contacted acknowledge request to place breakers to OFF

Op Test No.: NRC	Scenario # 2	Event # 3	Page 21 of 56
Event Description:	**Radiation Monitor 3502A high alarm, Containment Purge fails to isolate automatically**		
Time	Position	Applicant's Actions or Behavior	

Time	Position	Applicant's Actions or Behavior
Simulator Operator:		RF HVA052 BRK_OFF, RF HVA053 BRK_OFF
	SRO	Review/prepare OWP-RM-03 LCO Action Log. Contacts support personnel for repairs.
	SRO	• Enters TS 3.3.3.1, Action b • Table 3.3-6: o Action 26 - Must satisfy the ACTION requirement for Specification 3.4.6.1 and; o Action 27 - With less than the Minimum Channels OPERABLE requirement, operation may continue provided the containment purge makeup and exhaust isolation valves are maintained closed). • Enters TS 3.4.6.1, Action a - With a. or c. of the above required Leakage Detection Systems inoperable: o Can operate up to 30 days o Obtain and analyze a grab sample of the containment atmosphere for gaseous and particulate radioactivity at least once per 24 hours o Otherwise, be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours. Tech Spec 3.3.2 Functional Unit 3.c.4.b • RCS Leak Detection (normal purge) - See Table 3.3-6, Item 1b1, for initiating functions and requirements. **NOTE – required actions will be addressed per TS 3.3.3.1 (Table 3.3-6 item 1.b.1)**
	SRO	Reviews/prepares OMM-001, Attachment 5 Equipment Problem Checklist for the failure of the radiation monitor. Contacts support personnel for repairs.

Op Test No.: NRC	Scenario # 2	Event # 3	Page 22 of 56
Event Description:	**Radiation Monitor 3502A high alarm, Containment Purge fails to isolate automatically**		

Time	Position	Applicant's Actions or Behavior

Evaluator Note:	**AFTER the crew has Radiation Monitor failure to the satisfaction of the evaluation crew, cue the Simulator Operator to insert Trigger 3** **Event 3 – Trip of the "A" CCW Pump**

Op Test No.: NRC	Scenario # 2	Event # 3	Page 23 of 56
Event Description:	Trip of Running CCW Pump, 'A'		

Time	Position	Applicant's Actions or Behavior

Simulator Operator:	**On cue from the Lead Evaluator insert Trigger 3** **Trip of the "A" CCW Pump**

Evaluator Note:	**This event is a trip of the running 'A' CCW Pump. The standby 'B' CCW Pump fails to Auto Start due to a pressure transmitter failure. The crew should recognize the loss and enter AOP-014, Loss of Component Cooling Water and/or Manually start 'B' CCW pump IAW AD-OP-ALL-1000 guidance which allows the operator to take MANUAL actions when automatic actions do not occur**

Available Indications		**Multiple CCW alarms on ALB-005**
AOP-014	SRO	ENTER AOP-014, Loss of Component Cooling Water No Immediate Actions
Procedure Note:		This procedure contains no immediate actions. Loss of CCW may require implementation of the SHNPP Emergency Plan.
	SRO	Directs SM to REFER TO PEP-110, Emergency Classification And Protective Action Recommendations, AND ENTER the EAL Matrix.
	SRO	EVALUATE plant conditions AND GO TO the appropriate section. (Section 3.3, Loss of a CCW Pump)
Procedure Note:		The standby CCW pump starts at 52 psig discharge pressure.

Op Test No.:	NRC	Scenario #	2	Event #	3	Page	24	of	56
Event Description:			Trip of Running CCW Pump, 'A'						

Time	Position	Applicant's Actions or Behavior
	RO	CHECK the standby CCW pump has STARTED. (NO) Dispatch an operator to investigate
Simulator Communicator:		**If dispatched to the field to investigate report back after 2 minutes that 'A' CCW Pump breaker is tripped on overcurrent on "C" Phase.**
	RO	START the standby CCW pump ('B' CCW pump).
	RO	CHECK ALL RCPs operating within the limits of Attachment 1. (YES)
	RO	CHECK CCW header pressure greater than 52 psig. (YES)
	RO	VERIFY adequate ESW cooling water flow to the associated CCW heat exchanger. (YES)
	RO	CHECK RHR operating. (NO)

Op Test No.: NRC	Scenario # 2	Event # 3	Page 25 of 56
Event Description:	Trip of Running CCW Pump, 'A'		

Time	Position	Applicant's Actions or Behavior
	SRO	REFER TO Technical Specification 3.7.3 • With only one component cooling water flow path OPERABLE. restore at least two flow paths to OPERABLE status within 72 hours or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours. REFER TO Technical Specification 3.5.2 (RHR Hx without CCW Flow) • With one ECCS subsystem inoperable, restore the inoperable subsystem to OPERABLE status within 72 hours* or be in at least HOT STANDBY within the next 6 hours and in HOT SHUTDOWN within the following 6 hours.
	SRO	CONTACT Maintenance to determine the cause of the CCW pump failure, AND INITIATE corrective action.
	SRO	CHECK with Operations Staff to determine the desirability of using the swing CCW pump.
	SRO	CHECK CCW flow RESTORED to the affected train.
	Crew	May dispatch Aux Operator to Open the control power knife switch for the 'A' CCW pump.
Simulator Communicator / Operator		**Acknowledge request.** **Open control power knife switch on 'A' CCW pump then contact MCR that control power has been removed.**

Op Test No.:	NRC	Scenario #	2	Event #	3	Page	26	of	56
Event Description:		Trip of Running CCW Pump, 'A'							

Time	Position	Applicant's Actions or Behavior

Evaluator Note:		**Crew may implement OWP-CC at this point. This OWP will have the crew verify the ESF Status Light Boxes.** **The implementation of the OWP is not required to continue with the scenario.**
	SRO	EXIT this procedure.
Evaluator Cue:		**After the completion of AOP-014, cue Simulator Operator to insert Trigger 4** **Event 4 – AH-39 Containment Fan trip**

Op Test No.:	NRC	Scenario #	2	Event #	4	Page	27	of	56
Event Description:				**Trip of AH-39A**					

Time	Position	Applicant's Actions or Behavior

Simulator Operator:	**On cue from the Lead Evaluator actuate Trigger 4:** **AH-39 Containment Fan Coil Unit Fan trip**

Indications Available		• **ALB-029-4-5 CONTAINMENT FAN COOLERS AH-39 LOW FLOW - O/L** • **Increasing 'C' RCP stator winding temperatures**
	BOP	RESPONDS to alarms and ENTERS APP-ALB-029-4-5
	BOP	• CONFIRM alarm using: o AH-39 fans running indication (NO) o Damper position indication (YES) • VERIFY Automatic Functions: o Running fan trips (YES) o Backup fan starts (NO) (BOP starts the standby fan, may utilize OP-169 section 5.2) • PERFORM Corrective Actions: o CHECK standby fan STARTS AND lead fan STOPS. o DISPATCH an operator to check status of the following breakers: ▪ 1D1-1A, AH-39 (1A-NNS) CNMT Fan Coil ▪ 1E1-7C, AH-39 (1B-NNS) CNMT Fan Coil
Simulator Communicator:		**Three minutes after being dispatched to check the breaker for 1D1-1A, AH-39 (1A-NNS) CNMT Fan cooler breaker, report that:** ***"The indications on the Static Trip Unit show that an Overload Condition occurred for AH-39 A fan. There are no abnormalities on the AH-39B breaker."***

Op Test No.:	NRC	Scenario #	2	Event #	4	Page	28 of 56
Event Description:				**Trip of AH-39A**			

Time	Position	Applicant's Actions or Behavior
	BOP	o IF any breaker has tripped on OVERLOAD or SHORT CIRCUIT as indicated on the Static Trip Unit, THEN PERFORM the following: **(Directs AO to perform based on report from communicator)** ▪ DEPRESS the breaker Alarm Reset. ▪ RACK OUT the breaker using OP-156.02, AC Electrical Distribution. ▪ VERIFY cause of the over current trip is determined prior to returning the breaker to service.
Simulator Communicator:		**Acknowledge request to perform directed actions** **at 1D1-1A**
Simulator Operator:		**Rack out breaker 1D1-1A for AH-39A** **Run AMS file "AH39ARackedOut"** **This will override the switch to STOP and turn off the RED and GREEN MCB switch lights.** **Have communicator report back after running file.**
	RO	Monitors RCP "C" parameters on ERFIS and or OSI PI
	SRO	Reviews/prepares OMM-001, Attachment 5 Equipment Problem Checklist for the failure of AH-39A. Contacts support personnel for repairs.
Evaluator Cue:		**When breaker racking is completed, cue Simulator Operator to insert Trigger 5** **Event 5 - Pressurizer Spray Valve PCV-444C fails open**

Op Test No.: NRC	Scenario # 2	Event # 5	Page 29 of 56
Event Description:	**Pressurizer Spray Valve, PCV-444C, fails OPEN (w/manual control available)**		

Time	Position	Applicant's Actions or Behavior

Simulator Operator:	**On cue from Lead Evaluator actuate Trigger 5** **Event – 5 Pressurizer Spray Valve, PCV-444C, fails Open**

Evaluator Note:		**When Pressurizer Spray Valve PCV-444C fails open, PZR pressure will decrease and all PZR heaters will energize. Annunciators for PZR low pressure will alarm. The crew should respond by entering AOP-019, Malfunction of RCS Pressure Control, and placing the malfunctioning spray valve in manual per the immediate actions. RCS pressure may drop below the DNB limit depending on how fast the operator responds to the failure. If so, the SRO should evaluate Tech Spec 3.2.5, DNB Parameters.**
Indications Available		• **ALB-09-3-3 PRZ CONT LOW PRESS AND HEATERS ON** • **ALB-09-5-1 PRESSURIZER HIGH-LOW PRESS** • **Pressurizer Pressure decreasing**
	RO	• Responds to ALB-09 alarms. • Reports malfunction in the RCS Pressure Control system.

Op Test No.: NRC	Scenario # 2	Event # 5	Page 30 of 56
Event Description:	**Pressurizer Spray Valve, PCV-444C, fails OPEN (w/manual control available)**		

Time	Position	Applicant’s Actions or Behavior
	SRO	Enters AOP-019, MALFUNCTION OF RCS PRESSURE CONTROL. Makes PA announcement
Immediate Actions	RO	Perform AOP-019 Immediate Actions. • CHECK that a bubble exists in the PRZ. (YES) • VERIFY ALL PRZ PORVs AND associated block valves properly positioned for current PRZ pressure and plant conditions. (YES) • CHECK Both PRZ spray valves properly positioned for current PRZ pressure and plant conditions. (NO)
Evaluator Note:		**The malfunction only affects PCV-444C. It is expected that the operator will recognize that only one spray valve is malfunctioning and operate that controller in MANUAL.**

Immediate Actions
 	
Critical Task #1
	RO	• CONTROL PRZ spray valves in MANUAL using ONE of the following (listed in order of preference):
		  • <u>AFFECTED Spray Valve controller in MANUAL</u> (if only one is obviously malfunctioning)
		OR
		  • PK-444A, Master Pressure Controller
		OR
		  • Both individual spray valve controllers
		
		Reports IAs complete
		
		(Critical Task - Control PRZ Spray Valve, PCV-444C, prior to RCS pressure reaching the Reactor Trip of 1960 psig)

Op Test No.: NRC	Scenario # 2	Event # 5	Page 31 of 56
Event Description:	**Pressurizer Spray Valve, PCV-444C, fails OPEN (w/manual control available)**		

Time	Position	Applicant’s Actions or Behavior
	SRO	• GO TO Section 3.1, Pressure Control Malfunctions While Operating With a Pressurizer Bubble. • Inform SM to REFER to PEP-110, Emergency Classification and Protective Action Recommendations, AND ENTER the EAL Matrix.
	RO	MONITOR PRZ pressure by observing other reliable indications.
	SRO	CHECK plant in MODE 1 OR 2. (YES)

Op Test No.:	NRC	Scenario #	2	Event #	5	Page	32	of	56
Event Description:	**Pressurizer Spray Valve, PCV-444C, fails OPEN (w/manual control available)**								

Time	Position	Applicant's Actions or Behavior
	RO	• CHECK PRZ pressure CONTROLLED. (YES) • CHECK PRZ pressure 2335 PSIG OR LESS. (YES) • CHECK ALL of the following PRZ PORV block valves OPEN: o 1RC-117 (for PCV-445A SA) (YES) o 1RC-115 (for PCV-445B) (YES) o 1RC-113 (for PCV-444B SB) (NO closed for leaking PORV earlier) • CHECK that a malfunction of one or more of the following has occurred: o PT-444 (NO) o PK-444A (NO) o PRZ heater(s) (NO) o PRZ spray valve(s) or controller(s) (YES 1RC-107 failed while in AUTO) • CHECK PK-444A controlling properly in AUTO. (YES) • CONTROL PRZ pressure as follows: o CHECK BOTH PRZ spray valve controllers in AUTO AND BOTH spray valves operating as desired. (NO) o VERIFY PRZ Spray Valve controllers in ONE of the following alignments: ▪ AFFECTED Spray Valve controller in MANUAL (if only one is obviously malfunctioning) (YES) o OPERATE Spray Valves as necessary to control PZR pressure. o CHECK ALL PRZ heaters operating as desired. (YES) • CHECK at least one of the following conditions present: o PRZ pressure is UNCONTROLLED (NO) o Status of a normal spray valve or a PRZ heater bank is UNCONTROLLED (NO)

Op Test No.: NRC	Scenario # 2	Event # 5	Page 33 of 56
Event Description:	**Pressurizer Spray Valve, PCV-444C, fails OPEN (w/manual control available)**		

Time	Position	Applicant's Actions or Behavior
	SRO	• REFER TO Tech Spec 3.2.5 (DNB Parameters) AND IMPLEMENT action where appropriate. POWER DISTRIBUTION LIMITS 3/4.2.5 DNB PARAMETERS LIMITING CONDITION FOR OPERATION 3.2.5 The following DNB-related parameters shall be maintained within the following limits: a. Reactor Coolant System $T_{avg} \leq 594.8°F$ after addition for instrument uncertainty, and b. Pressurizer Pressure ≥ 2185 psig* after subtraction for instrument uncertainty, and c. RCS total flow rate ≥ 293,540 gpm after subtraction for instrument uncertainty. APPLICABILITY: MODE 1. ACTION: With any of the above parameters not within its specified limit, restore the parameter to within its limit within 2 hours or reduce THERMAL POWER to less than 5% of RATED THERMAL POWER within the next 6 hours. (Limit is 2185 psig – restore within 2 hours) • Commences an Equipment Problem Checklist and contacts WCC for assistance. (WR, LCO Tracking Record and Maintenance support)
Evaluator Note:		**The Lead Evaluator can cue Event 6 (Feedline break on 'B' SG inside Containment) once the plant has stabilized back in its normal pressure band.**

Op Test No.: NRC	Scenario # 2	Event # 6	Page 34 of 56
Event Description:	**‘B’ SG Feedline Break Inside Containment**		

Time	Position	Applicant’s Actions or Behavior
Evaluator Note:		**A Feedline Break inside Containment from the ‘B’ SG will occur requiring tripping the Reactor and manually actuating SI (if auto actuation does not occur first) and entry into EOP-E-0. The crew will initiate a MSL Isolation. The crew should diagnose that a LOCA is NOT in progress and transition to EOP-E-2, Faulted Steam Generator Isolation.** **AFW isolation will not occur for the ‘B’ SG, requiring manual action to isolate the AFW flow to the ‘B’ SG.** **Source Range channel NI-31 will fail to energize due to IR NI-35 compensating voltage failure.**
Simulator Operator:		**On cue from the Lead Evaluator, insert Trigger 6 (Feedline break inside Containment)**
Indications Available		• **Multiple alarms on ALB-014 associated with the B SG** • **Lowering level in the ‘B’ SG** • **“B” SG FF/STM Flow mismatch** • **Containment press/temp and humidity increasing** • **Containment Sump level increasing**
	CREW	• Identify secondary transient • (Identify AOP-010 entry) • Identify feedline rupture
AOP-010	BOP	• AOP-010 Immediate actions when Feedwater Regulator valves are NOT operating properly • Place ‘B’ FW Reg Bypass valve in manual • Maintain SG level 52%-62% • ‘B’ SG level cannot be maintained in band

Op Test No.:	NRC	Scenario #	2	Event #	6	Page	35 of	56
Event Description:			**‘B’ SG Feedline Break Inside Containment**					

Time	Position	Applicant’s Actions or Behavior
	SRO	• Direct tripping the Reactor
Evaluator Note:		SRO may direct Main Steam Line Isolation as allowed per EOP Users Guide if time does not permit per AOP-042.
	RO	Manually trips the Reactor.
EOP-E-0	SRO	Makes PA announcement for Reactor Trip
Immediate Action	RO	VERIFY Reactor Trip: • AUTO or MANUAL Reactor Trip successful: • CHECK for any of the following: o Trip breakers RTA and BYA OPEN (YES) o Trip breakers RTB and BYB OPEN (YES) o ROD Bottom lights LIT (YES) o NEUTRON flux decreasing (YES)
Immediate Action	BOP	VERIFY Turbine Trip: • CHECK for any of the following: o ALL turbine throttle valves – SHUT (YES) o ALL turbine governor valves – SHUT (YES) • VERIFY power to AC Emergency Buses o 1A-SA AND 1B-SB Buses energized by off-site power or EDG’s. (YES)

Op Test No.: NRC	Scenario # 2	Event # 6	Page 36 of 56
Event Description:	**‘B’ SG Feedline Break Inside Containment**		

Time	Position	Applicant’s Actions or Behavior
Immediate Action	RO	CHECK SI Actuation: • CHECK for any of the following – LIT o SI Actuated bypass permissive light (NO/Yes if actuated manually) o ALB-11-2-2 (NO/YES) o ALB-11-5-1 (NO/YES) o ALB-11-5-3 (NO/YES) o ALB-12-1-4 (NO/YES) CHECK SI Actuation criteria: • CNMT pressure - GREATER THAN 3.0 PSIG (NO) • PRZ pressure – LESS THAN 1850 PSIG (NO) • Steam pressure – LESS THAN 601 PSIG (NO) • SI Actuation – REQUIRED (YES/NO – time dependent) Verifies SI actuation
	SRO	Perform the following: • Review Foldout page and assign foldout • Evaluate EAL Matrix
	RO	When conditions met, trip all RCP’s based on Foldout Page. • Secures ALL RCP’s and reports to SRO when complete
	RO	Verify All CSIPs AND RHR pumps – RUNNING (YES) Check SI Flow: • SI flow - GREATER THAN 200 GPM (YES) • RCS pressure - LESS THAN 230 PSIG (NO)

Op Test No.: NRC	Scenario # 2	Event # 6	Page 37 of 56
Event Description:	‘B’ SG Feedline Break Inside Containment		

Time	Position	Applicant’s Actions or Behavior
	BOP	Check Main Steam Isolation: • Main Steam Isolation – ACTUATED (YES) • Verify all MSIVs and bypass valves – SHUT (YES)
Evaluator Note:		**The BOP or the Crew may identify that “B” SG AFW isolation should have occurred but did not and isolate AFW to the “B” SG at any time prior to guidance from the procedure.**
	BOP	Any SG pressure - 100 PSIG LOWER THAN PRESSURE IN TWO OTHER SGs (time dependent YES/NO) **If YES then next step applies** If NO then skips verification of AFW Isolation valves for now
	BOP	Verify MDAFW **AND** TDAFW Isolation Valves **AND** Flow Control Valves To Affected SG – SHUT (NO – “B” SG is NOT isolated)
	RO	Check CNMT Pressure – HAS REMAINED LESS THAN 10 PSIG (YES)
	BOP	Check AFW Status: AFW flow - AT LEAST 200 KPPH ESTABLISHED (YES/NO Conditional based on S/G level)
	BOP	Energize AC buses 1A1 **AND** 1B1. Locates MCB switches for AC buses 1A1 and 1B1 and closes breakers to energize each bus

Op Test No.: NRC	Scenario # 2	Event # 6	Page 38 of 56
Event Description:	**‘B’ SG Feedline Break Inside Containment**		

Time	Position	Applicant’s Actions or Behavior
	BOP	Verify Alignment Of Components From Actuation Of ESFAS Signals Using Attachment 3, "Safeguards Actuation Verification", While Continuing With This Procedure.
Evaluator Note:		**EOP-E-0 Attachment 3 is included in the back of this scenario.** **The RO will perform all board actions until the BOP completes Attachment 3. The BOP is permitted to properly align plant equipment IAW EOP-E-0 Attachment 3 without SRO approval.** **The Scenario Guide still identifies tasks by board position because the time frame for completion of Attachment 3 is not predictable.**

Op Test No.:	NRC	Scenario #	2	Event #	6	Page	39 of 56
Event Description:	**‘B’ SG Feedline Break Inside Containment**						

Time	Position	Applicant’s Actions or Behavior
	BOP	Directs AO to place 1A and 1B Air Compressor in the local control mode (Refer to Attachment 7)
Simulator Communicator:		**Acknowledge the request to place 1A and 1B Air Compressor in the local control mode**
Simulator Operator:		**When directed to place the 1A and 1B Air Compressor in the local control mode:** **Run APP\air\acs_to_local**
Simulator Communicator:		**When the APP for 1A and 1B Air Compressor has completed running call the MCR and inform them that the air compressors are running in local control.**
	BOP	Direct RAB AO to locally unlock AND turn ON the breakers for the CSIP suction AND discharge cross-connect valves: (Refer to Attachment 2)
Simulator Communicator:		**Acknowledge request to unlock and turn on the breakers for the CSIP suction and discharge cross-connect valves**

MCC 1A35-SA		MCC 1B35-SB	
VALVE	CUBICLE	VALVE	CUBICLE
1CS-170	4A	1CS-171	4D
1CS-169	4B	1CS-168	7D
1CS-218	14D	1CS-220	9D
1CS-219	14E	1CS-217	12C

Op Test No.: NRC	Scenario # 2	Event # 6	Page 40 of 56
Event Description:	'B' SG Feedline Break Inside Containment		

Time	Position	Applicant's Actions or Behavior
Simulator Operator:		**Run APP\cvc\E-0 Att 3 CSIP suct & disch valve power.txt – when the APP has completed running inform MCR that the valves have power.**
	RO/BOP	Control RCS Temperature: Stabilize AND maintain temperature between 555°F AND 559°F using Table 1.

TABLE 1: RCS TEMPERATURE CONTROL GUIDELINES FOLLOWING RX TRIP

- Guidance is applicable until another procedure directs otherwise.
- IF no RCPs running, THEN use wide range cold leg temperature.

	RCS TEMPERATURE TREND		
	LESS THAN 557°F AND DROPPING	GREATER THAN 557°F AND RISING	STABLE AT OR TRENDING TO 557°F
OPERATOR ACTION	• Stop dumping steam • Control feed flow • Maintain total feed flow greater than 200 KPPH until level greater than 25% [40%] in at least one on intact SG • IF cooldown continues, THEN, shut MSIVs AND BYPASS valves	• IF condenser available THEN transfer steam dump to STEAM PRESSURE mode using OP-126, Section 5.3 AND dump steam to condenser - OR - • Dump steam using intact SG PORVs • Control feed flow to maintain SG levels	• Control feed flow and steam dump to establish and maintain RCS temperature between 555°F AND 559°F

Op Test No.: NRC	Scenario # 2	Event # 8	Page 41 of 56
Event Description:		SR NI’s fail to Energize	

Time	Position	Applicant’s Actions or Behavior
	RO/BOP	Check PRZ PORVs AND Spray Valves: • Check PRZ PORVs – SHUT (YES) • PRZ spray valves – SHUT (May be open based on integrated signal for the controller as RCS Pressure rises) • Check block valves – AT LEAST ONE OPEN (YES) Identify Any Faulted SG: Check for any of the following: • Any SG pressures - DROPPING IN AN UNCONTROLLED MANNER (YES ‘B’ SG) OR Any SG – COMPLETELY DEPRESSURIZED (NO)
Evaluator Note:		***EVENT 8 – Time dependent - The SR nuclear instrumentation will fail to energize due to under compensation on NI-35. When recognized, the crew should take action to manually energize the SR NIS.**
Event 8	CREW	SR failure: IR NI-35B MCB Amps 10^{-9} amps, IR NI-36B MCB Amps 10^{-11} amps When SR instrument failure to energize is recognized, take the following switches to RESET • SOURCE RANGE TRAIN A TRIP BLOCK • SOURCE RANGE TRAIN B TRIP BLOCK CHECK that Source Range detector high voltage is energized
	SRO	GO TO EOP-E-2, FAULTED STEAM GENERATOR ISOLATION, Step 1

Op Test No.: NRC	Scenario # 2	Event # 6	Page 42 of 56
Event Description:	‘B’ SG Feedline Break Inside Containment (continued)		

Time	Position	Applicant’s Actions or Behavior
EOP-E-2	SRO	EOP-E-2, FAULTED STEAM GENERATOR ISOLATION
Procedure Caution:		• At least one SG must be maintained available for RCS cooldown. • Any faulted SG OR secondary break should remain isolated during subsequent recovery actions unless needed for RCS cooldown.
	SRO	Initiate monitoring of Critical Safety Function Status Trees

	BOP/RO	• Check MSIVs AND Bypass Valves:
		  • Verify all MSIVs – SHUT (YES)
		  • Verify all MSIV bypass valves – SHUT (YES)
		• Check Any SG NOT Faulted:
		  • Any SG pressure - STABLE OR RISING (YES)
		• Identify Any Faulted SG:
		  • Check for any of the following:
		    o Any SG pressure - DROPPING IN AN UNCONTROLLED MANNER (YES)
		    OR
		    o Any SG - COMPLETELY DEPRESSURIZED (NO)

Procedure Caution:		**IF** the TDAFW pump is the only available source of feed flow, **THEN** maintain steam supply to the TDAFW pump from one SG.

Op Test No.: NRC	Scenario # 2	Event # 7	Page 43 of 56
Event Description:	**Failure of Auto AFW Isolation**		

Time	Position	Applicant's Actions or Behavior
Event 7	BOP/RO	Isolate Faulted SG(s): • Verify faulted SG(s) PORV – SHUT (YES) • Verify main FW isolation valves – SHUT (YES) • Verify MDAFW AND TDAFW pump isolation valves to faulted SG(s) – SHUT **(NO – Event 7)** o IF NO, close isolation valves **(Shuts isolation valves)**
	BOP/RO	• Shut faulted SG(s) steam supply valve to TDAFW pump – SHUT • SG B: 1MS-70 • SG C: 1MS-72 o IF Open, close 1MS-70 (SHUTS) • Verify main steam drain isolation(s) before MSIVs - SHUT: • SG A: 1MS-231 (YES) • SG B: 1MS-266 (YES) • SG C: 1MS-301(YES) • Verify SG blowdown isolation valves – SHUT (YES) • Verify main steam analyzer isolation valves – SHUT (YES) Check CST Level - GREATER THAN 10% (YES)
Procedure Note:		**A SG may be suspected to be ruptured if it fails to dry out following isolation of feed flow. Local checks for radiation can be used to confirm primary-to-secondary leakage.**

Op Test No.:	NRC	Scenario #	2	Event #	6	Page	44	of	56

Event Description: **'B' SG Feedline Break Inside Containment (continued)**

Time	Position	Applicant's Actions or Behavior
	BOP/RO	Any SG – Abnormal Radiation or Uncontrolled Level Rise Check Secondary Radiation: • Check for all of the following (All NORMAL): **Secondary Radiation Monitors And Indications** RM-01MS-3591 SB, Main Steam Line A RM-01MS-3592 SB, Main Steam Line B RM-01MS-3593 SB, Main Steam Line C REM-01TV-3534, Condenser Vacuum Pump Effluent (RM-11: Grid 2 or Group 16) REM-1BD-3527, Steam Generator Blowdown (RM-11: Grid 2 or Group 16) RM-1TV-3536-1, Turbine Building Vent Stack Effluent (RM-11: Grid 2 or Group 16) SG Activity Sample • Check SG Levels: • Any level – RISING Uncontrolled (NO)
	RO/BOP	Check If SI Has Been Terminated: (NO) • Check for all of the following: o Check BIT outlet valves – SHUT OR ISOLATED 1SI-3 1SI-4 • Check cold leg AND hot leg injection valves - SHUT 1SI-52 1SI-86 1SI-107 (SI flow - GREATER THAN 200 GPM)

Op Test No.: NRC	Scenario # 2	Event # 6	Page 45 of 56
Event Description:	‘B’ SG Feedline Break Inside Containment (continued)		

Time	Position	Applicant’s Actions or Behavior
	RO/BOP	• Check SI Termination Criteria: o Check Subcooling - GREATER THAN 10°F [40°F] - C 20°F [50°F] – M (YES) (Note the ‘C’ and ‘M’ above refers to how subcooling is calculated. ‘C’ is by the Computer, ‘M’ is Manual)
	BOP/RO	• Check secondary heat sink by observing any of the following: o Level in at least one intact SG – GREATER THAN 25% [40%] (YES) o Total feed flow to SGs - GREATER THAN 200 KPPH (YES or Available) o RCS pressure - STABLE OR RISING (YES) o PRZ level - GREATER THAN 10% [30%] (YES)
	RO/BOP	Reset SI
	SRO	(to crew) Manually Realign Safeguards Equipment Following A Loss Of Offsite Power. (Refer to E-0, Attachment 6.)
	RO/BOP	• Reset Phase A AND Phase B Isolation Signals. (Resets Phase A – Phase B • Open Instrument Air AND Nitrogen To CNMT: o Opens the following valves: 1IA-819 (ISOL VALVE CONT. BLDG 236' PENETRATION (M-80)) 1SI-287 (ACCUMULATOR & PRZ PORV N2 SUPPLY ISO VLV)

Op Test No.: NRC	Scenario # 2	Event # 6	Page 46 of 56
Event Description:	**'B' SG Feedline Break Inside Containment (continued)**		

Time	Position	Applicant's Actions or Behavior
	RO/BOP	• Stop All But One CSIP • RCS Pressure - STABLE OR RISING (YES) Isolate High Head SI Flow: • Check CSIP suction - ALIGNED TO RWST (YES) VCT OUTLET (SHUT): 1CS-165 (LCV-115C), 1CS-166 (LCV-115E) RWST SUCTION (OPEN): 1CS-291 (LCV-115B), 1CS-292 (LCV-115D) • Open normal miniflow isolation valves: CSIP A: 1CS-182 CSIP B: 1CS-196 CSIP C: 1CS-210 COMMON: 1CS-214
Critical Task #3	RO	• Shut BIT outlet valves: 1SI-3 1SI-4 *(Critical task - Shut BIT Outlet valves 1SI-3 and 1SI-4 prior to PZR SRV's Discharge Line High Temperature occurring (250°F on any Safety valve discharge line temperature indicator either TI-465, or TI-467 or TI-469)* • Verify cold leg AND hot leg injection valves - SHUT 1SI-52 1SI-86 1SI-107
Procedure Caution:		**High head SI flow should be isolated before continuing.**

Op Test No.: NRC	Scenario # 2	Event # 6	Page 47 of 56
Event Description:	**‘B’ SG Feedline Break Inside Containment (continued)**		

Time	Position	Applicant’s Actions or Behavior
	RO/BOP	• Establish Charging Lineup: o Shut charging flow control valve: FK-122.1 • Open charging line isolation valves: o 1CS-235 (MUST OPEN) o 1CS-238 (MUST OPEN)
	RO/BOP	Monitor RCS Hot Leg Temperature: • Check RCS hot leg temperature – STABLE (YES/NO) • Manually dump steam AND control feed flow to maintain RCS temperature stable
Procedure Caution:		**Charging flow should NOT exceed 150 GPM to prevent damage to the regenerative heat exchanger.**
	RO/BOP	Control Charging Flow To Maintain PRZ Level: • Control charging using charging flow control valve: • FK-122.1 • Maintain charging flow less than 150 GPM. • PRZ Level - CAN BE MAINTAINED STABLE OR RISING (YES)

Op Test No.:	NRC	Scenario #	2	Event #	6	Page	48	of	56
Event Description:	**‘B’ SG Feedline Break Inside Containment (continued)**								

Time	Position	Applicant’s Actions or Behavior
Evaluator Note:		**If the failure of the Source Range to energize is not recognized, it will be addressed at EOP-ES-1.1 step 29.**
	SRO	GO TO EOP-ES-1.1, SI TERMINATION, Step 1.

Lead Evaluator:	**On Transition to EOP-ES-1.1 Ensure all Evaluators have collected the information needed to perform the evaluation then TERMINATE THE SCENARIO** **Announce ‘Crew Update’ - End of Evaluation - I have the shift.** **Have crew remain in the Simulator without discussing the exam. Examiners will formulate any follow-up questions.**

Simulator Operator	**When directed by Lead Evaluator go to FREEZE**

EOP-E-0 Attachment 3

REACTOR TRIP OR SAFETY INJECTION

Attachment 3
Sheet 1 of 8
SAFEGUARDS ACTUATION VERIFICATION

NOTE

- General guidance for verification of safeguards equipment is contained in Attachment 4 of this procedure.
- ERFIS displays of safeguards equipment status are not reliable while any associated safety-related electrical buses are de-energized.

☐ 1. Verify Two CSIPs - RUNNING

☐ 2. Verify Two RHR Pumps - RUNNING

☐ 3. Verify Two CCW Pumps - RUNNING

☐ 4. Verify All ESW **AND** ESW Booster Pumps - RUNNING

☐ 5. Verify SI Valves - PROPERLY ALIGNED

(Refer to Attachment 1.)

☐ 6. Verify CNMT Phase A Isolation Valves - SHUT

(Refer to OMM-004, "POST TRIP/SAFEGUARDS ACTUATION REVIEW", Attachment 4.)

EOP-E-0 Attachment 3

REACTOR TRIP OR SAFETY INJECTION

Attachment 3
Sheet 2 of 8
SAFEGUARDS ACTUATION VERIFICATION

☐ 7. Verify SG Blowdown **AND** SG Sample Isolation Valves In Table 1 - SHUT

Table 1: SG Blowdown And Sample Isolation Valves

Process Line	Outside CNMT (MLB-1A-SA)	Inside CNMT (MLB-1B-SB)
SG A Sample	1SP-217	1SP-214/216
SG B Sample	1SP-222	1SP-219/221
SG C Sample	1SP-227	1SP-224/226
SG A Blowdown	1BD-11	1BD-1
SG B Blowdown	1BD-30	1BD-20
SG C Blowdown	1BD-49	1BD-39

8. **IF** Main Steam Line Isolation Actuated **OR** Is Required By Any Of The Following, **THEN** Verify MSIVs **AND** MSIV Bypass Valves - SHUT

☐ • Steam line pressure - LESS THAN 601 PSIG

☐ • CNMT pressure - GREATER THAN 3.0 PSIG

9. **IF** CNMT Spray Actuation Signal Actuated **OR** Is Required, **THEN** Verify The Following:

(Refer to OMM-004, "POST TRIP/SAFEGUARDS ACTUATION REVIEW", Attachment 9.)

☐ • CNMT spray pumps - RUNNING

☐ • CNMT spray valves - PROPERLY ALIGNED

☐ • Phase B isolation valves - SHUT

☐ • All RCPs - STOPPED

EOP-E-0 Attachment 3

REACTOR TRIP OR SAFETY INJECTION

Attachment 3
Sheet 3 of 8
SAFEGUARDS ACTUATION VERIFICATION

☐ 10. Verify Both Main FW Pumps - TRIPPED

☐ 11. Verify FW Isolation Valves - SHUT

(Refer to OMM-004, "POST TRIP/SAFEGUARDS ACTUATION REVIEW", Attachment 6.)

☐ 12. Verify both MDAFW pumps - RUNNING

13. **IF** any of the following conditions exist, **THEN** verify the TDAFW pump - RUNNING

- ☐ Undervoltage on either 6.9 KV emergency bus
- ☐ Level in two SGs - LESS THAN 25%
- ☐ Manual actuation to control SG level

14. Verify AFW Valves - PROPERLY ALIGNED

- ☐ **IF** no AFW Isolation Signal, **THEN** verify isolation and flow control valves - OPEN

NOTE

An AFW Isolation signal signal requires a Main Steam Line Isolation coincident with one SG pressure 100 PSIG below the other two SGs.

- ☐ **IF** AFW Isolation Signal present, **THEN** verify MDAFW and TDAFW isolation and flow control valves to affected SG - SHUT

☐ 15. Verify Both EDGs - RUNNING

☐ 16. Verify CNMT Fan Coolers - ONE FAN PER UNIT RUNNING IN SLOW SPEED

REACTOR TRIP OR SAFETY INJECTION

Attachment 3
Sheet 4 of 8
SAFEGUARDS ACTUATION VERIFICATION

☐ 17. Verify CNMT Ventilation Isolation Valves - SHUT

(Refer to OMM-004, "POST TRIP/SAFEGUARDS ACTUATION REVIEW", Attachment 7.)

☐ 18. Verify Control Room Area Ventilation - MAIN CONTROL ROOM ALIGNED FOR EMERGENCY OPERATION

(Refer to OMM-004, "POST TRIP/SAFEGUARDS ACTUATION REVIEW", Attachment 5, Sheets 1 and 2, Sections for MAIN CONTROL BOARD, SLB-5 and SLB-6.)

19. Verify Essential Service Chilled Water System Operation:

☐ • Verify both WC-2 chillers - RUNNING

☐ • Verify both P-4 pumps - RUNNING

☐ (Refer to AOP-026, "LOSS OF ESSENTIAL SERVICE CHILLED WATER SYSTEM" for loss of any WC-2 chiller.)

20. Verify CSIP Fan Coolers - RUNNING

☐ AH-9 A SA
☐ AH-9 B SB
☐ AH-10 A SA
☐ AH-10 B SB

NOTE

Security systems are powered by bus 1A1 (normal supply) or bus 1B1 (alternate supply). Backup power will be available for approximately 30 MINUTES after the supplying bus is de-energized. (Refer to OP-115, "CENTRAL ALARM STATION ELECTRICAL SYSTEMS", Section 8.9 and 8.10.)

☐ 21. Verify AC buses 1A1 **AND** 1B1 - ENERGIZED

☐ 22. Place Air Compressor 1A **AND** 1B In The LOCAL CONTROL Mode.

(Refer to Attachment 7.)

REACTOR TRIP OR SAFETY INJECTION

Attachment 3
Sheet 5 of 8
SAFEGUARDS ACTUATION VERIFICATION

CAUTION

The maximum calculated dose rate in the vicinity of MCC 1A35-SA and MCC 1B35-SB is between 10 MREM/HR and 150 MREM/HR.

☐ 23. Dispatch An Operator To Unlock **AND** Turn ON The Breakers For The CSIP Suction **AND** Discharge Cross-Connect Valves:

(Refer to Attachment 2.)

MCC 1A35-SA		MCC 1B35-SB	
VALVE	CUBICLE	VALVE	CUBICLE
1CS-170	4A	1CS-171	4D
1CS-169	4B	1CS-168	7D
1CS-218	14D	1CS-220	9D
1CS-219	14E	1CS-217	12C

24. Check If C CSIP Should Be Placed In Service:

☐ • **IF** two charging pumps can **NOT** be verified to be running, **AND** C CSIP is available, **THEN** place C CSIP in service in place of the non-running CSIP using OP-107, "CHEMICAL **AND** VOLUME CONTROL SYSTEM, Section 8.5 or 8.7.

REACTOR TRIP OR SAFETY INJECTION

Attachment 3
Sheet 6 of 8
SAFEGUARDS ACTUATION VERIFICATION

25. Start The Spent Fuel Pump Room Ventilation System:

   a. At AEP-1, verify the following ESCWS isolation valves - OPEN

      1) SLB-11 (Train A)

      ☐ • AH-17 SUP CH 100 (Window 9-1)

      ☐ • AH-17 RTN CH 105 (Window 10-1)

      2) SLB-9 (Train B)

      ☐ • AH-17 SUP CH 171 (Window 9-1)

      ☐ • AH-17 RTN CH 182 (Window 10-1)

   b. At AEP-1, start one SFP PUMP ROOM FAN COOLER:

   ☐ • AH-17 1-4A SA

   ☐ • AH-17 1-4B SB

REACTOR TRIP OR SAFETY INJECTION

Attachment 3
Sheet 7 of 8
SAFEGUARDS ACTUATION VERIFICATION

NOTE

- Fuel pool levels **AND** temperatures should be monitored approximately every 1 to 2 HOURS.
- Following the initial check of fuel pool levels and temperature, monitoring responsibilities may be assumed by the plant operations staff (including the TSC or STA).
- Only fuel pools containing fuel are required to be monitored.

26. Check Status Of Fuel Pools:

☐ a. Operate spent fuel cooling pumps to maintain fuel pool temperatures between 85°F and 105°F.

b. Monitor fuel pool levels **AND** temperatures:

☐ • Refer to AOP-041, "SPENT FUEL POOL EVENT" Attachments 7, 8, 9, 10 and 11 for SFP parameter monitoring methods.

☐ • Refer to Curves H-X-24, H-X-25 and H-X-26 for SFP time to 200°F.

☐ • Levels - GREATER THAN LO ALARM (284 FT, 0 IN)

☐ • Temperatures - LESS THAN HI TEMP ALARM (105°F)

REACTOR TRIP OR SAFETY INJECTION

Attachment 3
Sheet 8 of 8
SAFEGUARDS ACTUATION VERIFICATION

NOTE

IF control room ventilation was previously aligned to an emergency outside air intake for post-accident operations, **THEN** follow-up actions will be required to restore the alignment.

27. Consult Plant Operations Staff Regarding Alignment Of The Control Room Ventilation System:

☐ • Site Emergency Co-ordinator - Control Room

☐ • Site Emergency Co-ordinator - Technical Support Center

(Refer to PEP-230, "CONTROL ROOM OPERATIONS".)

- END -

EOP-E-0	Rev. 7	Page 66 of 82

HARRIS 2018 NRC SCENARIO 3

Facility: Harris Nuclear Plant	Scenario No.: 3	Op Test No.: 05000400/2018301	
Examiners:		Operators:	SRO:
			RO:
			BOP:

Initial Conditions: IC-26, MOL, 86% power

- 'B' RHR Pump is under clearance for high motor vibrations
- 'B' DEH Oil Pump is under clearance for motor repairs
- 1CS-9, Letdown Orifice Isolation Valve, is under clearance for solenoid replacement

Turnover:	The plant is at 86% power, middle of core life. Due to the 'B' RHR pump LCO expiring, a normal shutdown in accordance with GP-006, Normal Plant Shutdown From Power Operation To Hot Standby (Mode 1 To Mode 3) is in progress as directed by plant management. It is to continue after shift turnover at 4 MW / minute.
Critical Task:	• Maintain control of SG 'C' level above 25% to prevent an automatic Reactor trip after the controlling level transmitter LT-496 fails high. • Manually actuate Safety Injection on one or more trains during a Small Break LOCA event prior to completion of EOP-ES-0.1 step 13.a

Event No.	Malf. No.	Event Type*	Event Description
1	N/A	R – RO/SRO N – BOP/SRO	Reduce power (GP-006)
2	crf08	I – RO/SRO	T_{ref} Failure (high) (AOP-001)
3 #	lt:496	I – BOP/SRO TS – SRO	SG 'C' Controlling Level Transmitter, LT-496 Channel III (selected for 1C SG) fails high – (AOP-010)
4 #	rcs14b	N/A	RCP 'B' #1 Seal degrades (AOP-018)
5	pt:308b	C – BOP/SRO TS – SRO	SG 'B' PORV Pressure Instrument fails high - PORV Opens. (AD-OP-ALL-1000)
6 #	rcs14b	C – RO/SRO	RCP 'B' #1 Seal fails (AOP-018)
7 #	prs04b	M – ALL	Steam Space LOCA inside containment (EOP-E-0)
8 #	rhr01a	C – RO/SRO	'A' RHR Pump trips on overcurrent on start
9 #	zrpk502b zrpk622a	C – BOP/SRO	Phase 'A' fails on the 'B' train and partially isolates on the 'A' train

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

\# Event or Major Transient was not used on the previous 2 NRC initial licensing operating tests

SCENARIO SUMMARY: 2018 NRC EXAM SCENARIO 3

The plant is at 86% power, middle of core life. Due to the 'B' RHR pump LCO expiring, a normal shutdown in accordance with GP-006, Normal Plant Shutdown From Power Operation To Hot Standby (Mode 1 To Mode 3) is in progress as directed by plant management. It is to continue after shift turnover at 4 MW / minute.

The following equipment is under clearance:

- RHR Pump B-SB is under clearance for high motor vibrations. The pump has been inoperable for 66 hours and cannot be restored to operable status. Tech Spec 3.5.2 LCO Action **a** and Tech Spec 3.3.3.5.b Action **c** applies. OWP-RH-02 has been completed.

EMERGENCY CORE COOLING SYSTEMS

3/4.5.2 ECCS SUBSYSTEMS - T_{avg} GREATER THAN OR EQUAL TO 350°F

LIMITING CONDITION FOR OPERATION

3.5.2 Two independent Emergency Core Cooling System (ECCS) subsystems shall be OPERABLE with each subsystem comprised of:

a. One OPERABLE Charging/safety injection pump,

b. One OPERABLE RHR heat exchanger,

c. One OPERABLE RHR pump, and

d. An OPERABLE flow path capable of taking suction from the refueling water storage tank on a Safety Injection signal and, upon being manually aligned, transferring suction to the containment sump during the recirculation phase of operation.

APPLICABILITY: MODES 1, 2, and 3.

ACTION:

a. With one ECCS subsystem inoperable, restore the inoperable subsystem to OPERABLE status within 72 hours or be in at least HOT STANDBY within the next 6 hours and in HOT SHUTDOWN within the following 6 hours.

INSTRUMENTATION

REMOTE SHUTDOWN SYSTEM

LIMITING CONDITION FOR OPERATION

3.3.3.5.b All transfer switches, Auxiliary Control Panel Controls and Auxiliary Transfer Panel Controls for the OPERABILITY of those components required by the SHNPP Safe Shutdown Analysis to (1) remove decay heat via auxiliary feedwater flow and steam generator power-operated relief valve flow from steam generators A and B, (2) control RCS inventory through the normal charging flow path, (3) control RCS pressure, (4) control reactivity, and (5) remove decay heat via the RHR system shall be OPERABLE.

APPLICABILITY: MODES 1, 2, and 3.

ACTION:

c. With one or more inoperable Remote Shutdown System transfer switches, power, or control circuits required by 3.3.3.5.b, restore the inoperable switch(s)/circuit(s) to OPERABLE status within 7 days, or be in HOT STANDBY within the next 12 hours.

SCENARIO SUMMARY: 2018 NRC EXAM SCENARIO 3 continued

The following equipment is under clearance (continued):

- 'B' DEH Pump is under clearance for motor repairs. The pump has been unavailable for 8 hours. Repairs are expected to be completed within 24 hours.

- Letdown Orifice Isolation Valve 1CS-9 is under clearance for solenoid replacement inspection. Tech Spec 3.6.3 LCO Action **b** applies. OWP-CS-09 has been completed.

CONTAINMENT SYSTEMS

3/4.6.3 CONTAINMENT ISOLATION VALVES

LIMITING CONDITION FOR OPERATION

3.6.3 Each containment isolation valve specified in the Technical Specification Equipment List Program, plant procedure PLP-106, shall be OPERABLE with isolation times less than or equal to required isolation times.

APPLICABILITY: MODES 1, 2, 3, and 4.

ACTION:

With one or more of the containment isolation valve(s) inoperable, maintain at least one isolation valve OPERABLE in each affected penetration that is open and:

a. Restore the inoperable valve(s) to OPERABLE status within 4 hours, or

b. Isolate each affected penetration within 4 hours by use of at least one deactivated automatic valve secured in the isolation position, or

c. Isolate each affected penetration within 4 hours by use of at least one closed manual valve or blind flange, or

d. Be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

SCENARIO SUMMARY: 2018 NRC EXAM SCENARIO 3 (Continued)

Event 1: Plant Shutdown (GP-006). Turnover takes place with the unit at 86% Reactor power. The crew will be given credit for a reactivity manipulation during the down power. It is expected that the SRO will conduct a reactivity brief, the RO will borate and monitor auto rod insertion per the reactivity plan. The BOP will operate the DEH Turbine controls as necessary to lower power. After power is reduced 3% - 5% and the crew has demonstrated that they have control of the plant during a shutdown (at Evaluator discretion) event 2 can be inserted.

Event 2: Failure of the T_{ref} Processor (fails high). The crew should enter AOP-001 and carry out the immediate actions. The OATC will perform the immediate actions of AOP-001 by verifying that <2 rods are dropped (no rods have dropped), place Rod Control in MANUAL and then verify no rod motion. With concurrence from the SRO the OATC will restore T_{ave} to pre-failure conditions by inserting the rods in manual.
The SRO should set control and trip limits in accordance with OMM-001 for rod control in manual.

Event 3: SG 'C' Controlling Level Transmitter LT-496 fails. The crew will respond by entering AOP-010, Feedwater Malfunction and taking manual control of 'C' Main Feedwater Regulating Valve to increase Feedwater flow and stabilize level. With the controller in manual and the plant stabilized the crew will implement OWP-RP-07 to remove the failed channel from service.
The SRO should set control and trip limits and evaluate the following Tech Specs for failure of LT-496:

T.S. 3.3.1: As a minimum, the Reactor Trip System instrumentation channels and interlocks of Table 3.3-1 shall be OPERABLE

REACTOR TRIP SYSTEM INSTRUMENTATION

FUNCTIONAL UNIT	TOTAL NO. OF CHANNELS	CHANNELS TO TRIP	MINIMUM CHANNELS OPERABLE	APPLICABLE MODES	ACTION
13. Steam Generator Water Level--Low-Low	3/stm. gen.	2/stm. gen. in any operating stm. gen.	2/stm. gen. each operating stm. gen.	1, 2	6(1)

(1)The applicable MODES for these channels noted in Table 3.3-3 are more restrictive and, therefore, applicable.

ACTION 6 - With the number of OPERABLE channels one less than the Total Number of Channels, STARTUP and/or POWER OPERATION may proceed provided the following conditions are satisfied:

a. The inoperable channel is placed in the tripped condition within 6 hours, and

b. The Minimum Channels OPERABLE requirement is met; however, the inoperable channel may be bypassed for up to 4 hours for surveillance testing of other channels per Specification 4.3.1.1.

SCENARIO SUMMARY: 2018 NRC EXAM SCENARIO 3 (Continued)

Event 3: Tech Spec evaluation continued

T.S. 3.3.2: The Engineered Safety Features Actuation System (ESFAS) instrumentation channels and interlocks shown in Table 3.3-3 shall be OPERABLE with their Trip Setpoints set consistent with the values shown in the Trip Setpoint column of Table 3.3-4.

ENGINEERED SAFETY FEATURES ACTUATION SYSTEM INSTRUMENTATION

FUNCTIONAL UNIT	TOTAL NO. OF CHANNELS	CHANNELS TO TRIP	MINIMUM CHANNELS OPERABLE	APPLICABLE MODES	ACTION
5. Turbine Trip and Feedwater Isolation					
b. Steam Generator Water Level--High-High (P-14)	4/stm. gen.	2/stm. gen. in any stm. gen.	3/stm. gen. in each stm. gen.	1, 2	19
6. Auxiliary Feedwater					
c. Steam Generator Water Level--Low-Low					
1) Start Motor-Driven Pumps	3/stm. gen.	2/stm. gen. in any stm. gen.	2/stm. gen. in each stm. gen.	1, 2, 3	19
2) Start Turbine-Driven Pump	3/stm. gen.	2/stm. gen. in any 2 stm. gen.	2/stm. gen. in each stm. gen.	1, 2, 3	19

ACTION STATEMENTS (Continued)

ACTION 19 - With the number of OPERABLE channels one less than the Total Number of Channels, operation may proceed provided the following conditions are satisfied:

a. The inoperable channel is placed in the tripped condition within 6 hours, and

b. The Minimum Channels OPERABLE requirement is met; however, the inoperable channel may be bypassed for up to 4 hours for surveillance testing of other channels per Specification 4.3.2.1.

T.S. 3.3.3.6: The accident monitoring instrumentation channels shown in Table 3.3-10 shall be OPERABLE.

SCENARIO SUMMARY: 2018 NRC EXAM SCENARIO 3 (Continued)

Event 3: Tech Spec evaluation continued

TABLE 3.3-10

ACCIDENT MONITORING INSTRUMENTATION

INSTRUMENT	TOTAL REQUIRED NO. OF CHANNELS	MINIMUM CHANNELS OPERABLE
1. Containment Pressure		
a. Narrow Range	2	1
b. Wide Range	2	1
2. Reactor Coolant Hot-Leg Temperature--Wide Range	2	1
3. Reactor Coolant Cold-Leg Temperature--Wide Range	2	1
4. Reactor Coolant Pressure--Wide Range	2	1
5. Pressurizer Water Level	2	1
6. Steam Line Pressure	2/steam generator	1/steam generator
7. Steam Generator Water Level--Narrow Range	N.A.	1/steam generator
8. Steam Generator Water Level--Wide Range	N.A.	1/steam generator
9. Refueling Water Storage Tank Water Level	2	1
10. Auxiliary Feedwater Flow Rate	N.A.	1/steam generator
11. Reactor Coolant System Subcooling Margin Monitor	N.A.	1
12. PORV Position Indicator*	N.A.	1/valve
13. PORV Block Valve Position Indicator**	N.A.	1/valve
14. Pressurizer Safety Valve Position Indicator	N.A.	1/valve
15. Containment Water Level (ECCS Sump)--Narrow Range	2	1
16. Containment Water Level--Wide Range	2	1

***NOTE:** The OWP is not required to be implemented in order to continue with the scenario. If the crew allows SG levels to lower to < 30% they will be required to perform a manual Reactor Trip. IF the crew does not respond to the low water level in the SG a Low level (< 25%) Automatic Reactor trip will occur.

An unplanned Reactor Trip for this event will create critical task. (See **Note** after critical task justification statements for details on unanticipated critical tasks.)

Event 4: RCP ‘B’ #1 Seal degrades – The crew should identify an RCP seal malfunction then enter AOP-018, Reactor Coolant Pump Abnormal Conditions to evaluate the seal malfunction. The crew should identify the ‘B’ RCP #1 seal as “degraded”. The crew should continue with the plant shutdown using GP-006. They should determine that they are required to stop the ‘B’ RCP within eight hours of the seal leakoff flow exceeding 6 gpm and additionally must shut 1CS-396, ‘B’ RCP #1 Seal Water Return valve, between three and five minutes after securing the RCP. The SRO should evaluate Tech Spec 3.4.1.1, Reactor Coolant Loops and Coolant Circulation (will determine to be not applicable).

SCENARIO SUMMARY: 2018 NRC EXAM SCENARIO 3 (Continued)

Event 4: Tech Spec evaluation continued

3/4.4 REACTOR COOLANT SYSTEM

3/4.4.1 REACTOR COOLANT LOOPS AND COOLANT CIRCULATION

STARTUP AND POWER OPERATION

LIMITING CONDITION FOR OPERATION

3.4.1.1 All reactor coolant loops shall be in operation.

APPLICABILITY: MODES 1 and 2.*

ACTION:

With less than the above required reactor coolant loops in operation, be in at least HOT STANDBY within 6 hours.

Event 5: SG 'B' PORV Pressure Instrument fails high. A transmitter failure will cause the 'B' SG PORV to fail 100% open. The crew should identify this failure by annunciator ALB-014-8-5, Computer Alarm Steam Generators alarming and status light indications for the 'B' SG PORV. Note: The PT-308B does not have MCB indications. In accordance with AD-OP-ALL-1000, the BOP should identify a system malfunction and notify the CRS prior to taking manual control of the PORV. He/she will then place the controller in manual and shut the PORV. The SRO should evaluate Tech Specs 3.6.3, Containment Isolation Valves and PLP-106 Technical Specification Equipment List Program and Core Operating Limits Report.

TS 3.6.3 – Action c, isolate the affected penetration within 4 hours. The redundant manual isolation valve per PLP-106 is 1MS-61 MS Line B PORV Isol Vlv. (The 4 hour action is met by shutting the PORV Isolation valve.)

CONTAINMENT SYSTEMS

3/4.6.3 CONTAINMENT ISOLATION VALVES

LIMITING CONDITION FOR OPERATION

3.6.3 Each containment isolation valve specified in the Technical Specification Equipment List Program, plant procedure PLP-106, shall be OPERABLE with isolation times less than or equal to required isolation times.

APPLICABILITY: MODES 1, 2, 3, and 4.

ACTION:

With one or more of the containment isolation valve(s) inoperable, maintain at least one isolation valve OPERABLE in each affected penetration that is open and:

a. Restore the inoperable valve(s) to OPERABLE status within 4 hours, or

b. Isolate each affected penetration within 4 hours by use of at least one deactivated automatic valve secured in the isolation position, or

c. Isolate each affected penetration within 4 hours by use of at least one closed manual valve or blind flange, or

d. Be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

SCENARIO SUMMARY: 2018 NRC EXAM SCENARIO 3 (Continued)

TS 3.3.3.5.b Action c – restore within 7 days.

INSTRUMENTATION

REMOTE SHUTDOWN SYSTEM

LIMITING CONDITION FOR OPERATION

3.3.3.5.b All transfer switches, Auxiliary Control Panel Controls and Auxiliary Transfer Panel Controls for the OPERABILITY of those components required by the SHNPP Safe Shutdown Analysis to (1) remove decay heat via auxiliary feedwater flow and steam generator power-operated relief valve flow from steam generators A and B, (2) control RCS inventory through the normal charging flow path, (3) control RCS pressure, (4) control reactivity, and (5) remove decay heat via the RHR system shall be OPERABLE.

APPLICABILITY: MODES 1, 2, and 3.

ACTION:

c. With one or more inoperable Remote Shutdown System transfer switches, power, or control circuits required by 3.3.3.5.b, restore the inoperable switch(s)/circuit(s) to OPERABLE status within 7 days, or be in HOT STANDBY within the next 12 hours.

Event 6: RCP ‘B’ #1 Seal fails – The RCP ‘B’ #1 seal will fail requiring the crew to implement the continuous action for AOP-018 and trip the Reactor, perform the immediate actions of EOP-E-0, Reactor Trip Or Safety Injection, then complete the remaining required actions of AOP-018 which is securing the RCP ‘B’ and shutting the associated spray valve. In accordance with AOP-018 the actions with the RCP will be performed as time permits.

Event 7: Steam Space LOCA inside Containment – The major event is a Steam Space LOCA from the PRZ. During the Reactor trip actions called for in AOP-018, the crew will determine a Safety Injection is currently NOT required and transition to EOP-ES-0.1, Reactor Trip Response. Shortly after entering EOP-ES-0.1, the crew will identify unexpected PRT and PRZ parameter changes (pressure, level, temperature). Based on the foldout criteria in EOP-ES-0.1, PRZ level will be maintained > 5% and RCS subcooling will remain greater than 10°F. This will require the crew to monitor for the automatic actuation of Safety Injection when PRZ Pressure reaches 1850 psig. Safety Injection will not automatically actuate and the crew will be required to manually actuate Safety Injection in accordance with AD-OP-ALL-1000 guidance and return to EOP-E-0. After returning to EOP-E-0 and with SI actuated the crew will identify the Foldout Criteria for securing RCPs has been met and secure the RCPs. Pressure in the Containment will continue to rise due to the LOCA. The degrading conditions in Containment will cause the crew to transition from EOP-E-0 and go to EOP-E-1, Loss of Reactor or Secondary Coolant.

Event 8: ‘A’ RHR Pump trips on overcurrent on start – The ‘A’ RHR Pump will start automatically by the sequencer with the actuation of the SI. When the pump is started it will immediately trip on overcurrent. The RO should identify this failure and due to the annunciator indicating a trip/overcurrent condition occurred the operator should not make an attempt to manually restart the pump. The loss of RHR will complicate recovery actions and result in the crew transitioning from EOP-E-1 to EOP-ECA-1.1, Loss of Emergency Coolant Recirculation, which will address the loss of RHR capability.

SCENARIO SUMMARY: 2018 NRC EXAM SCENARIO 3 (Continued)

Event 9: The ‘B’ train of CNMT Phase A isolation valves will fail to automatically realign and the ‘A’ train CNMT Phase A isolation valve for the CNMT Fan Coiling Units 1SW-240 will fail to isolate. The crew should identify this failure and manually shut both Service Water return line Containment Isolation valves, 1SW-240 and 1SW-242. (Only one of the valves need to be shut for isolation since these are in series valves but both are required to be shut per OMM-004 Attachment 4.)

The scenario termination is met in EOP-ECA-1.1 after the crew determines a RCS cooldown of 100°F has occurred within the last hour and that an additional RCS cooldown must wait until at least one hour has past. They can carry out actions of other procedures that do NOT cause an RCS cooldown OR raise RCS pressure.

CRITICAL TASK JUSTIFICATION:

1. Maintain control of SG ‘C’ level above 25% to prevent an automatic Reactor trip after the controlling level transmitter LT-496 fails high.

An unnecessary automatic Reactor Trip for this event will create a critical task. See note below.

2. Manually actuate Safety Injection (one train) during a Small Break LOCA event prior to completion of EOP-ES-0.1 step 13.a

Failure to manually actuate SI under the postulated conditions constitutes misoperation or incorrect crew performance in which the crew does not prevent “degraded emergency core cooling system (ECCS)…capacity.” In this case, SI can be manually actuated from the control room. Therefore, failure to manually actuate SI also represents a failure by the crew to “demonstrate the following abilities:

- Effectively direct or manipulate engineered safety feature (ESF) controls that would prevent (degraded emergency core cooling system (ECCS)…capacity)
- Recognize a failure or an incorrect automatic actuation of an ESF system or component”
- Take one or more actions that would prevent a challenge to plant safety”

Additionally, under the postulated plant conditions, failure to manually actuate SI (when it is possible to do so) results in a “significant reduction of safety margin beyond that irreparably introduced by the scenario.” Finally, failure to manually actuate SI under the postulated conditions is a “violation of the facility license condition.”

In the scenario postulated by the plant conditions, failure to manually actuate SI results in the needless continuation of a situation in which there has been no systematic and thorough actuation of even one train of SIS-actuated safeguards. (Some safeguards components such as AFW and feedwater isolation components may be running because of other actuation signals. However, safeguards systems such as ECCS, phase A containment isolation, CCW/SW, and containment fan coolers will not be operating in their safeguards mode.) Although the completely degraded status is not due to the crew’s action (was not initiated by operator error), continuation in the completely degraded status is a result of the crew’s failure to manually actuate SI.

The acceptable results obtained in the FSAR analyses are predicated on the assumption that, at the very least, one train of safeguards actuates. If SI is not actuated, the FSAR assumptions and results are invalid. Because compliance with the assumptions of the FSAR is part of the facility license condition, failure to manually actuate at least one train of SI (under the postulated conditions and when it is possible to do so) constitutes a violation of the license condition.

Note: Causing an unnecessary plant trip or ESF actuation may constitute a CT failure. Actions taken by the applicant(s) will be validated using the methodology for critical tasks in Appendix D to NUREG-1021.

Simulator Setup

Reset to IC-163 password “NRC2018”

Go to RUN

Silence and Acknowledge annunciators

GO TO FREEZE and inform the lead examiner the Simulator is ready. DO NOT GO TO RUN until directed by the lead examiner.

Set ERFIS screens for normal full power conditions

(The examiner has provided to the candidate with initial conditions and the initiating cues prior to placing the simulator in RUN.)

SPECIAL INSTRUCTIONS

Provide a Reactivity Plan to candidates for shutting down the plant

Provide a copy of the following procedures:

- GP-006, NORMAL PLANT SHUTDOWN FROM POWER OPERATION TO HOT STANDBY (MODE 1 TO MODE 3) **marked up** through section 6.2 step 3

Press START on Counter Scaler
Post conditions for status board from IC-26
Reactor Power 86%
Control Bank D at 200 steps
RCS boron 1094 ppm

Turnover: The plant is at 86% power, middle of core life. Due to the ‘B’ RHR pump LCO expiring, a normal shutdown in accordance with GP-006, Normal Plant Shutdown From Power Operation To Hot Standby (Mode 1 To Mode 3) is in progress as directed by plant management. It is to continue after shift turnover at 4 MW / minute.

Equipment Under Clearance:

- RHR Pump B-SB is under clearance for motor high vibrations. The pump has been inoperable for 66 hours and cannot be restored to operable status. Tech Spec 3.5.2 LCO Action **a** and Tech Spec 3.3.3.5.b Action **c** applies. OWP-RH-02 has been completed.

- ‘B’ DEH Pump is under clearance for motor repairs. The pump has been unavailable for 8 hours. Repairs are expected to be completed within 24 hours.

- Letdown Orifice Isolation Valve 1CS-9 is under clearance for solenoid replacement. Tech Spec 3.6.3 LCO Action **b** applies. OWP-CS-09 has been completed.

Simulator Setup (continued)

Align equipment for repairs:

Place CIT on 'B-SB' RHR pump MCB Switch
Place protected train placards IAW OMM-001 Attachment 7
Protected Train placards on 'A-SA' RHR pump,'B-SB' MDAFW Pump

Place the “B” DEH Pump in PTL and then hang a CIT on MCB switch

Place a CIT on the switch for 1CS-9.

Place filled out copies of OWP’s into the OWP book – ensure they are removed at end of day

- OWP-CS-09 and place in MCR OWP book for 1CS-09 clearance

Hang restricted access signs on MCR entry swing gates

Op Test No.: NRC	Scenario # 3	Event # 1	Page 13 of 80
Event Description:	**Power Reduction**		

Time	Position	Applicant's Actions or Behavior

Lead Evaluator:	**The crew has been directed to re-commence a power reduction from 86% to the unit is off line. The power reduction is on hold for turnover. The SRO is expected to conduct a reactivity brief prior to commencing the power reduction. This brief may be conducted outside the simulator prior to starting the scenario.**
	When the crew has completed their board walk down and are ready to take the shift inform the Simulator Operator to place the Simulator in Run. When the Simulator is in run announce: **CREW UPDATE – (SRO's Name) Your crew has the shift. END OF UPDATE**

Simulator Operator:	**When directed by the Lead Evaluator, ensure that the annunciator horns are on and place the Simulator in RUN.**

Evaluator Note:		**The crew may elect to begin boration prior to lowering turbine load.**
	OATC	OP-107.01, Section 5.2
	OATC	• DETERMINE the reactor coolant boron concentration from chemistry OR the Main Control Room status board. • DETERMINE the magnitude of boron concentration increase required. • DETERMINE the volume of boric acid to be added using the reactivity plan associated with the IC.
Procedure Note:		**FIS-113, BORIC ACID BATCH COUNTER, has a tenths position.**

Op Test No.: NRC	Scenario # 3	Event # 1	Page 14 of 80
Event Description:	**Power Reduction**		

Time	Position	Applicant's Actions or Behavior
Procedure Caution:		**If the translucent covers associated with the Boric Acid and Total Makeup Batch counters FIS-113 and FIS-114, located on the MCB, are not closed, the system will not automatically stop at the preset value.**
	OATC	SET FIS-113, BORIC ACID BATCH COUNTER, to obtain the desired quantity.
	SRO	Directs boration
Procedure Note:		• **Boric Acid flow controller must be set between 0.2 and 6 (1 and 30 gpm.).** • **Performing small borations at high flow rates may result in an overboration based on equipment response times. Boration flow should be set such that the time required to reach the desired setpoint will happen after release of the control switch.**
	OATC	• VERIFY the RMW CONTROL switch has been placed in the STOP position. • VERIFY the RMW CONTROL switch green light is lit. • SET controller 1CS-283, FK-113 BORIC ACID FLOW, for the desired flow rate. • PLACE control switch RMW MODE SELECTOR to the BOR position.
Procedure Note:		• **Boration may be manually stopped at any time by turning control switch RMW CONTROL to STOP.** • **During makeup operations following an alternate dilution, approximately 10 gallons of dilution should be expected due to dilution water remaining in the primary makeup lines.**

Op Test No.:	NRC	Scenario #	3	Event #	1	Page	15	of 80
Event Description:				**Power Reduction**				

Time	Position	Applicant's Actions or Behavior
	OATC	• START the makeup system as follows: o TURN control switch RMW CONTROL to START momentarily. o VERIFY the RED indicator light is LIT. o IF expected system response is not obtained, THEN TURN control switch RMW CONTROL to STOP. • VERIFY boration automatically terminates when the desired quantity of boron has been added. • Monitor Tavg and rod control for proper operation. • Establish VCT pressure between 20-30 psig. • Turn control switch RMW MODE SELECTOR to AUTO. • START the makeup system as follows: o TURN control switch RMW CONTROL to START momentarily. o VERIFY the RED indicator light is LIT.
Evaluator Note:		**The following steps have been completed to achieve the current power level. The crew should validate status of the turbine load reduction IAW GP-006 section 6.2 step 5 before re-initiating the turbine load reduction.**
Procedure Note:		**Routine load changes must be coordinated with the Load Dispatcher to meet system load demands.**

Op Test No.: NRC	Scenario # 3	Event # 1	Page 16 of 80
Event Description:	**Power Reduction**		

Time	Position	Applicant's Actions or Behavior
Procedure Caution:		A failure of the VIDAR in the DEH computer has resulted in a plant trip in the past. This failure would affect operation in Operator Auto, and can be detected as follows: • If OSI-PI is available, then VIDAR is functioning properly if the 'DEH_MEGAWATTS' point is updating. • If OSI-PI is not available, then accessing the 'ANALOG INPUTS' screen on the Graphics Display Computer (located in the Termination Cabinet Room near the ATWS Panel) will show several points, most of which should be updating if the VIDAR Unit is functioning properly. • If the DEH graphics computer is out of service, then VIDAR can be checked as updating on the operator panel as follows: o Depress 'Turbine Program' display button. o Check 'Turbine Program' display button is illuminated. o Check 'Reference' and 'Demand' displays indicate '0000'. o Depress '1577'. o Depress 'Enter'. o If the 'Demand' display indicates '0000', then VIDAR is updating. o If the 'Demand' display indicates '0001', then VIDAR is not updating
Evaluator Note:		**There is no procedural guidance directing when the boration to lower power is required. The crew may elect to perform the boration prior to placing the Turbine in GO.**
	SRO	DIRECTS BOP to start power reduction at 4 MW/Min. May direct initiation of a boration before the power reduction begins.
	BOP	Requests PEER check prior to manipulations of DEH Control

Op Test No.: NRC	Scenario # 3	Event # 1	Page 17 of 80
Event Description:	**Power Reduction**		

Time	Position	Applicant's Actions or Behavior
	BOP	• DEPRESS the LOAD RATE MW/MIN push-button. • ENTER the desired rate, **NOT** to exceed 5 MW/MIN, in the DEMAND display. (4 DEH Units/minute) • DEPRESS the ENTER push-button. • DEPRESS the REF push-button. • ENTER the desired load (per CRS) in the DEMAND display. • DEPRESS the ENTER push-button. The HOLD push-button should illuminate.
Procedure Note:		**The unloading of the unit can be stopped at any time by depressing the HOLD push-button. The HOLD lamp will illuminate and the GO lamp will extinguish. The load reduction can be resumed by depressing the GO push-button. The HOLD lamp will extinguish and the GO lamp will illuminate.**
	BOP	• DEPRESS the GO push-button to start the load reduction. • VERIFY the number in the REFERENCE display decreases. • VERIFY Generator load is decreasing. • Communicate to the SRO that the Turbine is in GO.
Evaluator Note:		**The crew has demonstrated a load reduction at the satisfaction of the evaluators. Inform Simulator Operator to insert Trigger 2, Tref Failure (fails to 589°F)**

Op Test No.: NRC	Scenario # 3	Event # 2	Page 18 of 80
Event Description:	**Tref Fails to 589°F**		

Time	Position	Applicant's Actions or Behavior
Simulator Operator:		On cue from Lead Evaluator insert Trigger 2 T-ref processor failure to 589°F
Indications Available		• **Uncontrolled outward rod motion** • **Tave – Tref MCB digital indication reads Tref at 589°F**
	OATC	RESPONDS to uncontrolled rod motion.
AOP-001		Malfunction of Rod Control and Indication System
	SRO	ENTERS and directs actions of AOP-001. Makes PA announcement for AOP entry
	OATC	PERFORMS immediate actions.
Immediate Action	OATC	CHECK that LESS THAN TWO control rods are dropped. (YES)
Immediate Action	OATC	POSITION Rod Bank Selector Switch to MAN.
Immediate Action	OATC	CHECK Control Bank motion STOPPED. (YES)
	SRO	Conduct a Crew Update on entry into AOP-001.
Evaluators Note:		**Turbine may go to HOLD due to the C-16 Automatic Loading Stop. ALB-20-2/1 TURBINE AUTOMATIC LOADING STOP may alarm.**
	SRO	READS immediate actions and proceeds to Section 3.2. Directs BOP to place Turbine to HOLD if in GO.

Op Test No.:	NRC	Scenario #	3	Event #	2	Page	19	of	80
Event Description:				**Tref Fails to 589°F**					

Time	Position	Applicant's Actions or Behavior
	BOP	Places Turbine to HOLD if in GO.
	OATC	CHECK that instrument channel failure has NOT OCCURRED by observing the following: • RCS Tavg (YES) • RCS Tref (NO)
	OATC	PERFORM the following: • IF a power supply is lost, THEN GO TO AOP-024, Loss of Uninterruptible Power Supply. (NO) • IF an individual instrument failed, THEN MAINTAIN manual rod control until corrective action is complete. • IF a Power Range NI Channel failed, THEN BYPASS the failed channel using OWP-RP. (N/A)
	SRO	Provides trip limits and operating bands IAW OMM-001 Attachment 13 for Rod Control in Manual
	OATC	MANUALLY OPERATE affected control bank to restore the following: • EQUILIBRIUM power and temperature conditions • RODS above the insertion limits of Tech Spec 3.1.3.6 and PLP-106, Technical Specification Equipment List Program and Core Operating Limits Report.
	OATC	Determines Tref based on 1st Stage pressure using Curve G-4. He/she may instead use Tref just before the failure to determine the current value of Tref or use OSI-PI plot values.

Controller	Control Band	Trip Limit	
		Low	High
Rod Control Stable Plant	T Avg within 2° of T Ref	T Avg Within 10° of T Ref	T Avg Within 10° of T Ref
Rod Control Transient Plant	T Avg within 5° of T Ref	T Avg Within 10° of T Ref and the trend show no sign of turning	T Avg Within 10° of T Ref and the trend show no sign of turning

Op Test No.: NRC	Scenario # 3	Event # 2	Page 20 of 80
Event Description:	**Tref Fails to 589°F**		

Time	Position	Applicant's Actions or Behavior
Evaluator Note:		The following will be done when Tave is restored.
	OATC	VERIFY proper operation of the following: • CVCS demineralizers (YES) • BTRS (N/A) • REACTOR Makeup Control System (YES)
	SRO	CHECK that this section was entered due to control banks MOVING OUT. (YES)
	OATC	ENSURE CSIP suction aligned to the VCT: CHECK VCT level greater than 5%. (YES) ENSURE that the following valves are OPEN: • LCV-115C, VCT OUTLET (**1CS-165**) (YES) • LCV-115E, VCT OUTLET (**1CS-166**) (YES) ENSURE that the following valves are SHUT: • LCV-115B, SUCTION FROM RWST (**1CS-291**) (YES) • LCV-115D, SUCTION FROM RWST (**1CS-292**) (YES)
	OATC	CHECK that NEITHER of the following OCCURRED: • Unexplained RCS boration (YES) • Unplanned RCS dilution (YES)
	SRO	CHECK that spurious rod motion is due to malfunction of the Automatic Rod Control System (NO)
	SRO/ OATC	Reviews/prepares OMM-001, Attachment 5 Equipment Problem Checklist. Contacts support personnel for repairs.

Op Test No.:	NRC	Scenario #	3	Event #	2	Page	21	of	80
Event Description:				**Tref Fails to 589°F**					

Time	Position	Applicant's Actions or Behavior
	SRO	Exits AOP-001
	SRO/ OATC	May discuss Equipment Problem Checklist with WCC and ask for support for the failure.
Evaluator's Note:		**When Tavg is restored and AOP-001 exited, cue initiation of Event 3 SG "C" LT-496 fails high**

Op Test No.: NRC	Scenario # 3	Event # 3	Page 22 of 80
Event Description:	SG 'C' Controlling Level Transmitter (LT-496) fails high		

Time	Position	Applicant's Actions or Behavior
Simulator Operator:		**On cue from the Lead Evaluator actuate Trigger 3 "SG 'C' Controlling Level Transmitter (LT-496) fails high"**
Indications Available:		• ALB-014-3-1B SG C NR LVL/SP HI/LO DEV • ALB-014-6-3B STEAM GEN C HIGH-HIGH LVL • ALB-017-1-1 SG LEVEL ATWS PANEL TROUBLE
	BOP	RESPONDS to alarms and ENTERS AOP-010
AOP-010		Feedwater Malfunctions
	SRO	ENTERS and directs actions of AOP-010. Makes PA announcement for AOP entry
Procedure Note:		**Steps 1 through 4 are immediate actions.**
Critical Task # 1	BOP	CHECK Feedwater Regulator valves operating properly. (NO) PERFORM the following: • PLACE affected Feedwater Regulator valve(s) in MANUAL. Places SG 'C' Feedwater Reg valve in MANUAL • MAINTAIN Steam Generator level(s) between 52 and 62%. Checks SG level and operates manual controller to maintain level between 52%-62% ***Critical Task: Maintain control of SG 'C' level above 25% to prevent an automatic Reactor trip after the controlling level transmitter LT-496 fails high.*** IF Steam Generator level(s) cannot be controlled, THEN TRIP the Reactor AND GO TO EOP-E-0. (Should be controlled)
	BOP	CHECK ANY Main Feedwater Pump TRIPPED. (NO)

Op Test No.: NRC	Scenario # 3	Event # 3	Page 23 of 80
Event Description:	**SG 'C' Controlling Level Transmitter (LT-496) fails high**		

Time	Position	Applicant's Actions or Behavior
	BOP	CHECK DEH controlling Turbine Valves PROPERLY. (YES)
	BOP	MAINTAIN ALL of the following: • At least ONE Main Feedwater Pump RUNNING • Main Feedwater flow to ALL Steam Generators • ALL Steam Generator levels greater than 30%
	BOP	CHECK Feedwater Regulator Valves operating properly in AUTO: (NO not 'C') • Response to SG levels • Valve position indication • Response to feed flow/steam flow mismatch CONTROL Steam Generator levels using Feedwater Regulator Valve(s) in MANUAL. • MAINTAIN Steam Generator levels between 52-62%. • REFER to Tech Spec 3.3.1 AND IMPLEMENT OWP-RP or OWP-ESF where appropriate. • IF needed, THEN CONTROL feed flow to SGs using Main Feed Reg Valve Bypass FCVs.
	SRO	Provides control bands and trip limits IAW OMM-001 Attachment 13

Controller	Control Band	Trip Limit	
		Low	High
Steam Generator Level	52% to 62%	30%	73%

Procedure Note:		**Inability to monitor one or more Safety System Parameters concurrent with a turbine runback of greater than 25%, requires a change of event classification per the HNP Emergency Plan.**
	BOP	CHECK turbine runs back less than 25% turbine load. (YES)

Op Test No.: NRC	Scenario # 3	Event # 3	Page 24 of 80
Event Description:	SG ‘C’ Controlling Level Transmitter (LT-496) fails high		

Time	Position	Applicant’s Actions or Behavior
	SRO	CHECK the following Pump status: • ALL Feedwater Train Pumps RUNNING (YES) • BOTH Heater Drain Pumps RUNNING (YES) GO TO the applicable section : 3.1 page 12, All Condensate/Feedwater flow malfunctions
	BOP	CHECK the following Recirc and Dump Valves operating properly in MODU: (YES) • Main Feedwater Pumps • Condensate Booster Pumps • Condensate Pumps • 1CE-293, Condensate Recirc • 1CE-142, Condensate Dump To CST Isolation Valve (SLB-4/7-1)
	BOP	CHECK the Condensate and Feedwater System INTACT. (YES)
	BOP	CHECK pumps for NORMAL OPERATION. (YES)
	SRO	NOTIFY Load Dispatcher of ANY load limitations. (NONE)
	SRO	CHECK Reactor thermal power changed by less than 15% in any one hour period. (YES) EXIT this procedure.
OWP-RP-07	SRO	Refer to OWP-RP-07 to remove channel from service.
	SRO	Contacts WCC for support, requests WR and LCOTR. Contacts I&C to have channel removed from service.
Simulator Communicator:		**Respond to crew requests.**

Op Test No.: NRC	Scenario # 3	Event # 3	Page 25 of 80
Event Description:	**SG ‘C’ Controlling Level Transmitter (LT-496) fails high**		

Time	Position	Applicant’s Actions or Behavior
	SRO	Enters Instrumentation TS 3.3.1 Action 6 - With the number of OPERABLE channels one less than the Total Number of Channels, STARTUP and/or POWER OPERATION may proceed provided the following conditions are satisfied: a. The inoperable channel is placed in the tripped condition within 6 hours, and b. The Minimum Channels OPERABLE requirement is met; however, the inoperable channel may be bypassed for up to 4 hours for surveillance testing of other channels per Specification 4.3.1.1 3.3.2 Action 19 With the number of OPERABLE channels one less than the Total Number of Channels, operation may proceed provided the following conditions are satisfied : a. The inoperable channel is placed in the tripped condition within 6 hours, and b. The Minimum Channels OPERABLE requirement is met; however, the inoperable channel may be bypassed for up to 4 hours for surveillance testing of other channels per Specification 4.3.2.1.

Evaluator Note:	**Channel does NOT have to be removed from service using the OWP to continue the scenario.** **Cue Event 4 (RCP ‘B’ #1 Seal degrades) after SG level is under control and the TS has been identified.**

Op Test No.: NRC	Scenario # 3	Event # 4		Page	26 of 80
Event Description:		RCP ‘B’ #1 Seal degrades			
Time	Position	Applicant’s Actions or Behavior			

Time	Position	Applicant’s Actions or Behavior
Simulator Operator:		**On cue from the Lead Evaluator actuate Trigger 4 “RCP ‘B’ #1 Seal degrades”**
Indications Available:		• ALB-008-4-3 RCP-B SEAL #1 LEAKOFF HIGH LOW FLOW
	RO	RESPONDS to alarm on ALB-008-4-3
Evaluator Note:		**ALB-008-4-3, response directs entry into AOP-018 IF No.1 or No. 2 seal appears to be damaged. Because seal injection remains higher than seal return the RCP temperature may remain stable. If crew does not enter AOP-018 based on high seal return flow Cue the booth to confirm the alarm with the following report.**
Simulator Communicator:		**Call as the RWCR operator and report the Seal Water Return Filter ∆P was ~5# over the previous 2 shifts, now it has risen to ~8# over the last 5 minutes.**
	CREW	CONFIRM alarm using ERFIS GD AOP-018 or FR-154A Identifies AOP-018 entry conditions
AOP-018		RCP Abnormal Conditions
	SRO	ENTERS and directs actions of AOP-018, RCP ABNORMAL CONDITIONS. Makes PA announcement for AOP entry
Procedure Note:		Step 1 is an immediate action. RCP abnormal conditions may require implementation of the SHNPP Emergency Plan.

<table>
<tr><td colspan="2">Op Test No.: NRC   Scenario # 3   Event # 4</td><td>Page 27 of 80</td></tr>
<tr><td colspan="2">Event Description:</td><td>RCP ‘B’ #1 Seal degrades</td></tr>
<tr><td>Time</td><td>Position</td><td>Applicant’s Actions or Behavior</td></tr>
</table>

<table>
<tr><td>Immediate Action</td><td>RO</td><td>CHECK ANY CSIP RUNNING. (YES)</td></tr>
<tr><td></td><td></td><td></td></tr>
<tr><td></td><td>SRO</td><td>REFER TO PEP-110, Emergency Classification And Protective Action Recommendations, AND ENTER the EAL Matrix.</td></tr>
<tr><td></td><td></td><td></td></tr>
<tr><td colspan="2">Procedure Note:</td><td>Minimum allowable flow for a CSIP is 60 gpm which is provided by normal miniflow during normal operation and alternate miniflow during safety injection. Maintaining CSIP flow greater than or equal to 60 gpm also satisfies this requirement.</td></tr>
<tr><td></td><td></td><td></td></tr>
<tr><td></td><td>SRO</td><td>EVALUATE plant conditions AND GO TO the appropriate section:
<table>
<tr><th>MALFUNCTION</th><th>SECTION</th><th>Page</th></tr>
<tr><td>Loss of CCW and/or Normal Seal Injection to RCPs</td><td>3.1</td><td>5</td></tr>
<tr><td>High Reactor Coolant Pump Vibration</td><td>3.2</td><td>8</td></tr>
<tr><td>Reactor Coolant Pump Seal Malfunction</td><td>3.3</td><td>10</td></tr>
<tr><td>Reactor Coolant Pump Motor Trouble</td><td>3.4</td><td>18</td></tr>
</table>
Reactor Coolant Pump Seal Malfunction, Section 3.3 (Page 10)</td></tr>
<tr><td></td><td></td><td></td></tr>
<tr><td></td><td>CREW</td><td>CHECK ANY of the following conditions exist:
ANY RCP #1 Seal FAILED as defined in
• Attachment 2 (Page 25) (NO)
ANY RCP #2 Seal FAILED as defined in
• Attachment 2 (Page 25) (NO)
ANY RCPs operating outside the limits of
• Attachment 1 (Page 23) (NO)</td></tr>
<tr><td></td><td></td><td></td></tr>
<tr><td></td><td>SRO</td><td>RNO: GO TO Step 10.</td></tr>
</table>

Op Test No.: NRC	Scenario # 3	Event # 4	Page 28 of 80
Event Description:	RCP ‘B’ #1 Seal degrades		

Time	Position	Applicant’s Actions or Behavior
	RO	MONITOR RCP Radial Bearing and RCP Seal Water Inlet temperatures (reference OSI PI for AOP-018):
	RO	DETERMINE RCP Seal status using the following: • Attachment 2 • Available plant indications
	RO	CHECK RCPs free of #1 Seal degradation. (NO)
	SRO	RNO: PERFORM the following for #1 Seal DEGRADED:
	CREW	• DISPATCH an operator to CNMT to read the RCP #2 seal leakoff flow. • VERIFY seal injection flow for the affected RCP is greater than or equal to 9 gpm.
Procedure Note:		**Total #1 seal flow is defined as the sum of #1 and #2 seal leakoff flows. When calculating total #1 seal flow with #1 seal leakoff flow greater than 6.0 gpm, #2 seal leakoff flow should be considered negligible until it can be read locally.**

	ERFIS Points		
	RCP A	RCP B	RCP C
Pump Radial Brg Temp	TRC0131	TRC0128	TRC0125
Seal Water Inlet Temp	TRC0132	TRC0129	TRC0126

Op Test No.: NRC	Scenario # 3	Event # 4	Page 29 of 80
Event Description:	**RCP 'B' #1 Seal degrades**		

Time	Position	Applicant's Actions or Behavior
	RO	• CALCULATE total #1 seal flow for the affected RCP as follows: (_______gpm + _______gpm) = _______gpm #1 Seal Leakoff Flow #2 Seal Leakoff Flow Total #1 Seal Flow • MAINTAIN seal injection flow greater than calculated total #1 seal flow. • INITIATE a plant shutdown using ONE of the following: o GP-006, Normal Plant Shutdown from Power Operation to Hot Standby o AOP-038, Rapid Downpower • STOP the affected RCP within 8 hours of exceeding 6.0 gpm #1 seal leakoff flow. • MONITOR ALB-005/1-2B, RCP THERM BAR HDR LOW FLOW, is CLEAR. (ensure adequate flow to RCP thermal barrier heat exchangers)
	RO	CHECK RCPs free of #1 Seal blockage. (YES)
	SRO	GO TO Step 19.
	RO	CONTINUE to monitor #1 seal parameters for indications of failure.
	RO	MONITOR RCP Seal injection flow to the unaffected RCPs.
	RO	ADJUST unaffected RCP Seal injection flow as necessary to maintain the following: • 8 to 13 gpm to the unaffected RCPs • Less than 31 gpm total flow to all RCPs
	RO	MAINTAIN CCW flow to all RCP Thermal Barrier HXs.

Op Test No.: NRC	Scenario # 3	Event # 4	Page 30 of 80
Event Description:	RCP 'B' #1 Seal degrades		

Time	Position	Applicant's Actions or Behavior
Procedure Note:		High RCP #1 seal leakoff may cause local boiling in the thermal barrier of the affected pump. This may cause 1CC-252 to auto shut on high flow. Locally opening this valve may result in a slow heatup of the CCW System resulting in a small rise in CCW Surge Tank level.
Procedure Caution:		DO NOT restore CCW to an RCP that has lost all seal cooling for 4 minutes.
	RO	CHECK 1CC-252, RCP THERMAL BARRIERS FLOW CONTROL, OPEN. (YES)
	RO	CHECK RCPs free of #2 or #3 seal failure per Attachment 2 (Page 24). (YES)
	SRO	CONSULT with Responsible Engineer for recommended follow-up actions.
Procedure Caution:		Following a complete loss of Seal Cooling, the affected RCP(s) should NOT be started prior to a status evaluation.
	SRO	INITIATE appropriate corrective action for repair of the damaged seal(s).
	SRO	Contacts Maintenance to coordinate Containment entry to obtain local reading of #2 seal leakoff for RCP 'B' and plan repair actions.
Simulator Communicator:		**Respond to crew requests.**

Op Test No.: NRC	Scenario # 3	Event # 4	Page 31 of 80
Event Description:	**RCP ‘B’ #1 Seal degrades**		

Time	Position	Applicant’s Actions or Behavior
	SRO	REFER TO the following Tech Specs: • 3.2.3 • 3.4.1.2 • 3.3.1 • 3.4.1.3 • 3.4.1.1 • 3.4.6.2 Evaluates Reactor Coolant System T.S. 3.4.1.1 3/4.4.1 REACTOR COOLANT LOOPS AND COOLANT CIRCULATION STARTUP AND POWER OPERATION LIMITING CONDITION FOR OPERATION 3.4.1.1 All reactor coolant loops shall be in operation. APPLICABILITY: MODES 1 and 2.* ACTION: With less than the above required reactor coolant loops in operation, be in at least HOT STANDBY within 6 hours. **Entry into the action statement is not required until the RCP ‘B’ is secured. Tech Specs may be asked as a follow up question.**
Evaluator Note:		**Actions to reduce power to remove the RCP ‘B” from service do NOT have to be restarted to continue the scenario. Cue Event 5 SG’B’ PORV opens**

Op Test No.: NRC	Scenario # 3	Event # 5	Page 32 of 80
Event Description:	**SG 'B' PORV Opens**		

Time	Position	Applicant's Actions or Behavior

Simulator Operator:	**On cue from the Lead Evaluator insert Trigger 5** **SG 'B' PORV Press Inst fails high w/ PORV staying OPEN – can be manually shut**

Evaluator Note:	**This event is a Steam Generator PORV Pressure Instrument failing high. This will require the BOP to take manual control of the PORV to shut it.** **Candidate may implement AOP-042 SECONDARY STEAM LEAK/ EFFICIENCY LOSS, based on diagnosis of a failed open S/G PORV as a secondary system steam leak. AOP-042 included Attachment 2 of this guide.** **The SRO should evaluate Tech Specs 3.3.3.5, Remote Shutdown System, and 3.6.3, Containment Isolation Valves.**

Available Indications:		• **ALB-014-8-5, Computer Alarm Steam Generators**
ALB-014	SRO	ENTERS APP-ALB-014-8-5
	BOP	IDENTIFIES 'B' SG PORV is OPEN
	BOP	In accordance with AD-OP-ALL-1000, the operator may take MANUAL actions based on a controller malfunction occurring and DEPRESSES the Manual Pushbutton for PK-308B1 to take manual control of 'B' SG PORV.
	SRO	Provide pressure band for PORV manual control (Maintain < 1170 psig).
	BOP	LOWER output for PK-308B1 to SHUT 'B' SG PORV 1MS-60 (PORV will shut) Informs CRS that 'B' SG PORV is SHUT
	SRO	The SRO will complete OMM-001 Attachment 5 Equipment

Op Test No.:	NRC	Scenario #	3	Event #	5	Page	33	of	80
Event Description:			SG 'B' PORV Opens						

Time	Position	Applicant's Actions or Behavior
		Problem Checklist for the failure of SG B PORV The SRO should evaluate TS 3.3.3.5 and TS 3.6.3. TS 3.6.3 Action c: Isolate the affected penetration within 4 hours. The redundant manual isolation valve per PLP-106, Attachment 5 is 1MS-61. TS 3.3.3.5.b Action c: Restore within 7 days. Contacts WCC and support personnel for repairs.
Simulator Operator:		**If requested to Shut 1MS-61 open Sim Drawing MSS mss01 and shut 1MS-61 (rf mss025 to zero)** **After shutting 1MS-61 wait 1 minute and report that 1MS-61 has been manually shut .**
Lead Evaluator:		**Once the plant has stabilized, cue Event 6, RCP "B" #1 seal fails**

Op Test No.: NRC	Scenario # 3	Event # 6	Page 34 of 80
Event Description:	**RCP 'B' #1 Seal fails**		

Time	Position	Applicant's Actions or Behavior
Simulator Operator:		**On cue from the Lead Evaluator actuate Trigger 6 "RCP 'B' #1 Seal failure"**
Indications Available:		• ALB-008-4-3 RCP-B SEAL #1 LEAKOFF HIGH LOW FLOW • ALB-008-4-4 RCP-B SEAL #2 LEAKOFF HIGH FLOW
	CREW	CONFIRM alarm using ERFIS GD AOP-018 or FR-154A

	CREW	CHECK ANY of the following conditions exist: ANY RCP #1 Seal FAILED as defined in Attachment 2 (YES) ANY RCP #2 Seal FAILED as defined in Attachment 2 (NO) ANY RCPs operating outside the limits of Attachment 1 (NO)
	RO	CHECK the Reactor is TRIPPED. (NO)
	SRO	RNO: TRIP the Reactor AND GO TO EOP-E-0. (Perform Steps 3 through 9 as time permits.)
Evaluator Note:		**The SRO should conduct a Crew Update and review AOP-018 Section 3.3 steps 3 through 9 and direct these actions to be performed after the E-0 immediate actions are verified complete.**
	SRO	Directs RO to perform a MANUAL Reactor trip IAW AOP-018. Transitions to EOP-E-0.
	RO	Initiates a MANUAL Reactor trip.

Op Test No.: NRC	Scenario # 3	Event # 6	Page 35 of 80
Event Description:	**RCP 'B' #1 Seal fails**		

Time	Position	Applicant's Actions or Behavior	
EOP-E-0		REACTOR TRIP OR SAFETY INJECTION	
	SRO	ENTERS and directs actions of EOP-E-0 Makes PA announcement for EOP entry	
	RO/BOP	Performs EOP-E-0 immediate actions.	
Procedure Note:		**Steps 1 through 4 are immediate action steps. (All high level steps and confirmatory steps are performed and broadcast by the OATC and BOP from memory.** **Informational NOTES, including this one, the phrase "Perform the following," and information presented in table format need not be verbalized.** **Foldout applies. (Immediate actions should be completed prior to implementing Foldout Page items.)**	
Immediate Actions	RO	VERIFY Reactor Trip: REACTOR TRIP CONFIRMATION Reactor Trip AND Bypass BKRs - OPEN Rod Bottom Lights (Zero Steps) - LIT Neutron Flux - DROPPING	(YES) (YES) (YES)
Immediate Actions	BOP	Check Turbine Trip – ALL THROTTLE VALVES SHUT TURB STOP VLV 1 — TSLB-2-11-1 TURB STOP VLV 2 — TSLB-2-11-2 TURB STOP VLV 3 — TSLB-2-11-3 TURB STOP VLV 4 — TSLB-2-11-4	(YES) (YES) (YES) (YES)

Op Test No.: NRC	Scenario # 3	Event # 6	Page 36 of 80
Event Description:	RCP 'B' #1 Seal fails		
Time	Position	Applicant's Actions or Behavior	

Immediate Actions	BOP	Perform The Following: • AC Emergency Buses – AT LEAST ONE ENERGIZED • AC Emergency Buses – BOTH ENERGIZED	(YES) (YES)
Immediate Actions	RO	Safety Injection – ACTUCATED (BOTH TRAINS) BPLP 4-1,"SI ACTUATED" - LIT (CONTINUOUSLY)	(NO)
Immediate Actions	RO	RNO Perform the following: o Check Safety Injection – REQUIRED SI ACTUATION CRITERIA PRZ Pressure - LESS THAN OR EQUAL TO 1850 PSIG CNMT Pressure - GREATER THAN OR EQUAL TO 3.0 PSIG Any SG Pressure - LESS THAN OR EQUAL TO 601 PSIG Manual - DEGRADATION TOWARDS AUTOMATIC ACTUATION Abnormal Operating Procedure - DIRECTS MANUAL ACTUATION One SI Train - FAILED (BPLP 4-1 FLASHING) o **IF** Safety Injection actuation is **NOT** required, **THEN** GO TO ES-0.1, "REACTOR TRIP RESPONSE", Step 1.	(NO)
Evaluator Note:		**AOP-018 Section 3.3 steps 3 through 9 will be completed as time permits during the transition to EOP-ES-0.1.**	
	RO	STOP the 'B' (affected) RCP.	
	RO	CHECK that ANY RCP was SECURED due to a #1 Seal FAILED.	(YES)

Op Test No.: NRC	Scenario # 3	Event # 6	Page 37 of 80
Event Description:	**RCP ‘B’ #1 Seal fails**		

Time	Position	Applicant’s Actions or Behavior	
	RO	SHUT the affected RCP Seal Water Return Valve(s) between three (3) and five (5) minutes after securing the RCP: • 1CS-355, RCP A #1 Seal Water Return • **1CS-396, RCP B #1 Seal Water Return** • 1CS-437, RCP C #1 Seal Water Return (1CS-396, RCP B #1 Seal Water Return required to be shut)	
	RO	MONITOR ALB-005/1-2B, RCP THERM BAR HDR LOW FLOW, is CLEAR. (ensure adequate flow to RCP thermal barrier heat exchangers)	
	RO	CHECK RCP A RUNNING.	(YES)
	RO	CHECK RCP B RUNNING.	(NO)
	RO	RNO: PLACE PK-444D.1 in MANUAL and SHUT with demand at 0% (1RC-103, PRZ Spray Loop B).	
	SRO	EXIT this procedure.	
	SRO	Returns to procedure in effect (E-0) and transitions to ES-0.1	
Evaluator’s Note:		**Once AOP-018, steps 3 through 9 are complete and the transition to EOP-ES-0.1 has occurred the crew will stabilize RCS temperature per step 4.**	

Op Test No.: NRC	Scenario # 3	Event # 6	Page 38 of 80
Event Description:	RCP 'B' #1 Seal fails		

Time	Position	Applicant's Actions or Behavior
	SRO	GO TO EOP-ES-0.1, Step 1. Holds a crew update
EOP-ES-0.1		REACTOR TRIP RESPONSE
Procedure Note:		**Foldout applies.**

FOLDOUT

- **SI ACTUATION CRITERIA**

  IF any of the following occurs, **THEN** actuate SI **AND** GO TO E.0, "REACTOR TRIP OR SAFETY INJECTION", Step 1:

  - RCS subcooling - LESS THAN 10° F - C
    20° F - M
  - PRZ level - CAN **NOT** BE MAINTAINED GREATER THAN 5%

- **AFW SUPPLY SWITCHOVER CRITERIA**

  IF CST level drops to less than 10%, **THEN** switch the AFW water supply to the ESW system using OP-137, "AUXILIARY FEEDWATER SYSTEM", Section 8.1.

Time	Position	Applicant's Actions or Behavior
	SRO	Initiates Monitoring Of Critical Safety Function Status Trees Informs Shift Manager to evaluate EAL Matrix. (Refer to PEP-110)
	RO	Check RCS Temperature: • Check RCPs – ANY RUNNING (YES) • Check SG blowdown isolation valves – SHUT (YES/NO based on S/G Level) • Shuts SG Blowdown FCVs

SG	(MLB-1A-SA)	(MLB-1B-SB)
A	1BD-11	1BD-1
B	1BD-30	1BD-20
C	1BD-49	1BD-39

Op Test No.: NRC	Scenario # 3	Event # 6	Page 39 of 80
Event Description:	RCP 'B' #1 Seal fails		

Time	Position	Applicant's Actions or Behavior
	BOP	• Stabilize AND maintain temperature between 555˚F AND 559˚F using Table 1. Controls feed flow and steam dumps to stabilize temperature between 555˚F AND 559˚F
Evaluator's Note:		**Cue Event 7 - Steam Space LOCA inside Containment after the crew has stabilized RCS temperature per above table to satisfaction of Evaluators (Step 4 of ES-0.1).**

TABLE 1: RCS TEMPERATURE CONTROL GUIDELINES FOLLOWING RX TRIP

- Guidance is applicable until another procedure directs otherwise.
- IF no RCPs running, THEN use wide range cold leg temperature.

	RCS TEMPERATURE TREND		
	LESS THAN 557°F AND DROPPING	GREATER THAN 557°F AND RISING	STABLE AT OR TRENDING TO 557°F
OPERATOR ACTION	• Stop dumping steam • Control feed flow • Maintain total feed flow greater than 200 KPPH until level greater than 25% [40%] in at least one on intact SG • IF cooldown continues, THEN, shut MSIVs AND BYPASS valves	• IF condenser available THEN transfer steam dump to STEAM PRESSURE mode using OP-126, Section 5.3 AND dump steam to condenser - OR - • Dump steam using intact SG PORVs • Control feed flow to maintain SG levels	• Control feed flow and steam dump to establish and maintain RCS temperature between 555°F AND 559°F

Op Test No.: NRC	Scenario # 3	Event # 7	Page 40 of 80
Event Description:	**Steam Space LOCA inside Containment**		
Time	Position	Applicant's Actions or Behavior	

Simulator Operator:		**On cue from the Lead Evaluator actuate Trigger 7** **Steam Space LOCA inside Containment**
Indications Available:		• ALB-009-3-3, PRZ CONT Low Press And Heaters ON • ALB-009-5-1, Pressurizer High-Low Press • ALB-009-5-3, Pressurizer Low Press Alert • ALB-009-8-1, Pressurizer Relief Tank High-Low Level Press Or Temp • ALB-009-8-2, Pressurizer Relief Discharge High Temp • ALB-009-8-3, Pressurizer Safety Relief Discharge High Temp
	CREW	CONFIRM alarm using: • Safety valve discharge line temperatures TI-465, TI-467, TI-469 • Pressurizer relief tank level, pressure, and temperature LI-470.1, PI-472.1, and TI-471.1 • PRZ pressure indication PI-444, PI-445.1, PI-455.1, PI-456, and PI-457

Op Test No.:	NRC	Scenario #	3	Event #	7	Page	41	of	80
Event Description:			Steam Space LOCA inside Containment						

Time	Position	Applicant's Actions or Behavior
Critical Task # 2	RO	**Pressurizer pressure lowers to less than the automatic low Safety Injection setpoint of 1850 psig** ***(SI automatic actuation signal will not actuate)*** **Crew identifies that an ESF actuation does not occur** **Manually actuates SI with one of the two SI MCB actuation switches due to identification that Pressurizer pressure is below the ESF actuation setpoint.** • **Manual SI actuation by the crew should be performed IAW AD-OP-ALL-1000 Section 5.6.3.3 where written procedures are NOT required for situations where Prompt action is necessary to protect the health and safety of the public and prevent the deterioration of plant conditions or components to a possibly unsafe or unstable level.** • **If time permits, approval from the SM/CRS shall be obtained.** ***Critical Task: Manually actuate Safety Injection on one or more trains during a Small Break LOCA event prior to completion of EOP-ES-0.1 step 13.a***

Op Test No.:	NRC	Scenario #	3	Event #	7	Page	42	of	80
Event Description:			**Steam Space LOCA inside Containment**						

Time	Position	Applicant's Actions or Behavior
EOP-E-0		Reactor Trip Or Safety Injection
	SRO	Enters EOP-E-0 Holds crew update
	RO/BOP	Performs E-0 Immediate Actions.
Procedure Note:		Steps 1 through 4 are immediate action steps Foldout applies. (Immediate actions should be completed prior implementing Foldout Page items.)
	SRO	Reviews Foldout page

Op Test No.: NRC	Scenario # 3	Event # 7	Page 43 of 80
Event Description:	**Steam Space LOCA inside Containment**		

Time	Position	Applicant's Actions or Behavior

Evaluator Note:	**FOLDOUT** • **RCP TRIP CRITERIA** **IF** both of the following occur, **THEN** stop all RCPs: • SI flow - GREATER THAN 200 GPM • RCS pressure - LESS THAN 1400 PSIG • **ALTERNATE MINIFLOW OPEN/SHUT CRITERIA** • **IF** RCS pressure drops to less than 1800 PSIG, **THEN** verify alternate miniflow isolation **OR** miniflow block valves - SHUT • **IF** RCS pressure rises to greater than 2000 PSIG, **THEN** verify alternate miniflow isolation **AND** miniflow block valves - OPEN • **RHR RESTART CRITERIA** **IF** RCS pressure drops to less than 230 PSIG in an uncontrolled manner, **THEN** restart RHR pumps to supply water to the RCS. • **RUPTURED SG AFW ISOLATION CRITERIA** **IF** all of the following occur to any SG, **THEN** stop feed flow by shutting the isolation valves (preferred) **OR** flow control valves to that SG:: • Any SG level rises in uncontrolled manner **OR** has abnormal secondary radiation • Narrow range level - GREATER THAN 25% [40%] • **AFW SUPPLY SWITCHOVER CRITERIA** **IF** CST level drops to less than 10%, **THEN** switch the AFW water supply to the ESW system using OP-137, "AUXILIARY FEEDWATER SYSTEM", Section 8.1. **Crew should verify Alternate Miniflow Isolation Valves or Miniflow Block Valves CLOSE when RCS Pressure lowers to less than 1800 PSIG** **AND** **When RCS pressure is < 1400 psig and SI flow is > 200 GPM stop all RCPs**

Op Test No.: NRC	Scenario # 3	Event # 8	Page 44 of 80
Event Description:	‘A’ RHR Pump Trip		

Time	Position	Applicant’s Actions or Behavior	
	RO	Any of the following - RNO action met or Foldout - RCP trip criteria is met or PHASE B Actuation RCP Trip Criteria: IF both of the following occurs, THEN stop all RCPS: • SI flow - GREATER THAN 200 GPM • RCS pressure - LESS THAN 1400 PSIG **STOPS ALL RCPs**	(YES) (YES)
	SRO	Evaluate EAL Matrix (Refer to PEP-110)	
	RO	Verify CSIPs – ALL RUNNING	(YES)
Event 8	RO	Verify RHR pumps – ALL RUNNING • REPORTS ‘A’ RHR has tripped and ‘B’ RHR is under clearance	(NO)
	CREW	DISPATCH operators to investigate trip of ‘A’ RHR	
Simulator Communicator:		**After being contacted -** **TB AO: Report back in ~ 2 minutes: ‘A’ RHR Pump Breaker has overcurrent flags dropped. The breaker cubical appears to be damaged. You contacted Electrical maintenance who are now looking at the breaker damage. They are in contact with WCC and are assessing what would need to be done to repair the problem.** **RAB AO: Nothing is visibly wrong locally at the pump.**	
	SRO	CONTACTS WCC to have ‘B’ RHR restored	
Simulator Communicator:		**WCC will contact maintenance and work toward lifting the clearance on the ‘B’ RHR Pump.**	

Op Test No.:	NRC	Scenario #	3	Event #	8	Page	45	of	80
Event Description:				**‘A’ RHR Pump Trip**					

Time	Position	Applicant’s Actions or Behavior	
Evaluator Note:		**‘B’ RHR Pump will NOT be returned to service during this scenario.**	
Simulator Communicator:		**IF pressed by the crew to restore ‘B’ RHR pump inform them that Maintenance said estimated time for recover is no sooner than 2 hours from now.**	
	RO	Safety Injection flow – GREATER THAN 200 GPM	(YES)
	RO	RCS pressure – LESS THAN 230 PSIG	(NO)
	SRO	RNO: GO TO Step 12.	
	BOP	MAIN Steam isolation – ACTUATED.	(NO)
	SRO	RNO: Perform the following:	
	BOP	• Check MAIN Steam isolation – REQUIRED MAIN STEAM LINE ISOLATION ACTUATION CRITERIA CNMT pressure - GREATER THAN OR EQUAL TO 3.0 PSIG Any SG pressure - LESS THAN OR EQUAL TO 601 PSIG MANUAL - DEGRADATION TOWARDS AUTOMATIC ACTUATION *This will depend on Containment pressure when the crew gets to this step	(NO*)
	RO	CHECK CNMT Pressure – HAS REMAINED LESS THAN 10 PSIG	(YES)
	BOP	Verify AFW flow – AT LEAST 200 KPPH ESTABLISHED	(YES)

Op Test No.:	NRC	Scenario # 3	Event # 9	Page 46 of 80
Event Description:	**Phase 'A' fails on the 'B' train and partially isolates on the 'A' train**			
Time	Position	Applicant's Actions or Behavior		

Evaluator Note:		**RNO may apply if AFW has been previously reduced.**	
	BOP	Sequencer Load Block 9 (Manual Loading Permissive) - ACTUATED (BOTH TRAINS)	(YES)
	BOP	Energize AC buses 1A1 AND 1B1	
Evaluator Note:		**The RO will perform all board actions until the BOP completes Attachment 3. The BOP is permitted to properly align plant equipment in accordance with Attachment 3 without SRO approval. The Scenario Guide still identifies tasks by board position because the time frame for completion of Attachment 3 is not predictable.** **To follow BOP actions E-0 Attachment 3 is located in the back of this guide.**	
	BOP	**VERIFY Alignment of Components From Actuation of ESFAS Signals Using Attachment 3, "Safeguards Actuation Verification", While Continuing with this Procedure.**	
	BOP	**Directs TB AO – Place air compressor 1A and 1B in the Local Control mode.** **Directs RAB AO – Locally unlock and turn on the breakers for the CSIP Suction and Discharge Cross-Connect valves.**	
Simulator Operator:		**When contacted to place A/B air compressors in Local Control mode, run CAEP :\air\ACs_to_local.txt.**	

Op Test No.: NRC	Scenario # 3	Event # 9	Page 47 of 80
Event Description:	**Phase 'A' fails on the 'B' train and partially isolates on the 'A' train**		
Time	Position	Applicant's Actions or Behavior	

Simulator Communicator:		**When CAEP is complete, report that the air compressors are running in local control mode.**
Simulator Operator:		**When contacted to Unlock and Turn ON the breakers for the CSIP suction and discharge cross-connect valves, run CAEP *:*\cvc\E-0 Att. 2 csip suct & disch valve power.txt.**
Simulator Communicator:		**When the CAEP is complete, report task to the MCR.**
Event 9	BOP	**Attachment 3, Step 6** Verify CNMT Phase A Isolation Valves – SHUT (Refer to OMM-004, "POST TRIP/SAFEGUARDS ACTUATION REVIEW", Attachment 4.)
Evaluator Note:		**See the following pages for Attachment 4 valve verifications. Highlighted components are out of position with the required position circled.**

Op Test No.:	NRC	Scenario #	3	Event #	9	Page	48	of	80
Event Description:	**Phase ‘A’ fails on the ‘B’ train and partially isolates on the ‘A’ train**								

Time	Position	Applicant’s Actions or Behavior

POST TRIP/SAFEGUARDS ACTUATION REVIEW	OMM-004
	Rev. 41
	Page 47 of 85

ATTACHMENT 4
Page 1 of 4

<< Reference Use - Containment Isolation Phase A Verification >>

TRAIN - A Components		REQ POS	POS CK	TRAIN - B Components		REQ POS	POS CK
MLB 1A-SA				**MLB 1B-SB**			
4-1	N2 TO PRT ISOL SHUT 1RC-141	LIT		4-1	N2 TO PRT ISOL SHUT 1RC-144	LIT	
4-2	RCP SEAL RTN SHUT 1CS-470	LIT		4-2	RCP SEAL RTN SHUT 1CS-472	LIT	
4-3	RCDT SHUT 1ED-121	LIT		4-3	RCDT PMP ISOL SHUT 1ED-125	LIT	
4-4	RCDT VENT ISOL SHUT 1ED-164	LIT		4-4	RCDT VENT ISOL SHUT 1ED-161	LIT	
5-4	CNMT SUMP VALVE SHUT 1ED-94	LIT		5-4	CNMT SUMP VALVE SHUT 1ED-95	LIT	
8-4	ACCUM SMPL SHUT 1SP-85	LIT		8-4	ACCUMS SHUT 1SP-78/81/84	LIT	
9-4	LOOP 2/3 SMPL SHUT 1SP-949	LIT		9-4	LOOP 2/3 SMPL SHUT 1SP-948	LIT	
10-4	PZR STM/LIQ SHUT 1SP-60/41	LIT		10-4	PZR STM/LIQ SHUT 1SP-59/40	LIT	
MLB 2A-SA				**MLB 2B-SB**			
				2-4	LTDN ISOL VLV SHUT 1CS-11	LIT	
4-3	CSS VLV SHUT 1CT-47	LIT		4-3	CSS VLV SHUT 1CT-95	LIT	
				4-4	TO RCDT & HX SHUT 1CC-176	LIT	
				5-4	FROM RCDT & HX SHUT 1CC-202	LIT	

Op Test No.:	NRC	Scenario #	3	Event #	9	Page	49	of	80
Event Description:	Phase ‘A’ fails on the ‘B’ train and partially isolates on the ‘A’ train								

Time	Position	Applicant’s Actions or Behavior

POST TRIP/SAFEGUARDS ACTUATION REVIEW	OMM-004
	Rev. 41
	Page 48 of 85

ATTACHMENT 4
Page 2 of 4

<< Reference Use - Containment Isolation Phase A Verification >>

TRAIN - A Components	REQ POS	POS CK	TRAIN - B Components	REQ POS	POS CK
MAIN CONTROL BOARD					
A-SA CONTAINMENT SPRAY PUMP	STOP		B-SB CONTAINMENT SPRAY PUMP	STOP	
1CT-24 SA CONTAINMENT SPRAY EDUCTOR TEST	SHUT		1CT-25 SB CONTAINMENT SPRAY EDUCTOR TEST	SHUT	
1IA-819 CONTAINMENT INSTRUMENT AIR	SHUT		1SI-179 ACCUMULATOR FILL FROM RWST	SHUT	
1SI-263 ACCUMULATOR CHECK VALVE TEST RETURN	SHUT		1SI-264 ACCUMULATOR CHECK VALVE TEST RETURN	SHUT	
1CS-7 45 GPM LETDOWN ORIFICE A	SHUT		1SI-287 ACCUMULATORS & PZR PORV N2 SUPPLY	SHUT	
1CS-8 60 GPM LETDOWN ORIFICE B	SHUT		1RC-161 RMW TO CNMT	SHUT	
1CS-9 60 GPM LETDOWN ORIFICE C	SHUT				
ACTUATED BY EITHER TRAIN A OR B	AH-37 A NNS FAN COOLER			STOP	
	AH-37 B NNS FAN COOLER			STOP	
	AH-38 A NNS FAN COOLER			STOP	
	AH-38 B NNS FAN COOLER			STOP	
	AH-39 A NNS FAN COOLER			STOP	
	AH-39 B NNS FAN COOLER			STOP	
AEP - 1					
ACTUATED BY EITHER TRAIN A OR B	1MS-25 SAB STM GEN A STM ANALYZER ISOL			SHUT	
	1MS-27 SAB STM GEN B STM ANALYZER ISOL			SHUT	
	1MS-29 SAB STM GEN C STM ANALYZER ISOL			SHUT	

Op Test No.: NRC	Scenario # 3	Event # 9	Page 50 of 80
Event Description:	**Phase 'A' fails on the 'B' train and partially isolates on the 'A' train**		

Time	Position	Applicant's Actions or Behavior

POST TRIP/SAFEGUARDS ACTUATION REVIEW	OMM-004
	Rev. 41
	Page 49 of 85

ATTACHMENT 4
Page 3 of 4

<< Reference Use - Containment Isolation Phase A Verification >>

TRAIN - A Components	REQ POS	POS CK	TRAIN - B Components	REQ POS	POS CK
			AEP - 1		
1SP-915 SA H2 SAMPLING TRAIN A CNMT ISOL	SHUT		1SP-16 SB RCS LEAK DET SAMPLE ISOL	SHUT	
1SP-917 SA H2 SAMPLING TRAIN A CNMT ISOL	SHUT		1SP-939 SB RCS LEAK DET SAMPLE ISOL	SHUT	
1SP-200 SA SAMPLE RETURN CNMT ISOL VALVE	SHUT		1SP-201 SA SAMPLE RETURN CNMT ISOL VALVE	SHUT	
1SP-208 SA SAMPLE RETURN CNMT ISOL VALVE	SHUT		1SP-209 SA SAMPLE RETURN CNMT ISOL VALVE	SHUT	
1SP-12 SA H2 SAMPLING TRAIN A CNMT ISOL	SHUT		1SP-42 SB H2 SAMPLING TRAIN B CNMT ISOL	SHUT	
1SP-941 SA H2 SAMPLING TRAIN A CNMT ISOL	SHUT		1SP-62 SB H2 SAMPLING TRAIN B CNMT ISOL	SHUT	
1SP-916 SA RCS LEAK DET SAMPLE ISOL	SHUT		1SP-919 SB H2 SAMPLING TRAIN B CNMT ISOL	SHUT	
1SP-918 SA RCS LEAK DET SAMPLE ISOL	SHUT		1SP-943 SB H2 SAMPLING TRAIN B CNMT ISOL	SHUT	
ACTUATED BY EITHER TRAIN A OR B	1SW-231 SAB NNS CNMT FAN CLRS INLET ISOL			SHUT	
1SW-240 SA NNS CNMT FAN CLRS OUTLET ISOL	SHUT		1SW-242 SB NNS CNMT FAN CLRS OUTLET ISOL	SHUT	
1FP-347 SA CNMT SPRINKLER WTR SUP ISOL	SHUT				

Op Test No.:	NRC	Scenario #	3	Event #	9	Page	51	of	80
Event Description:	**Phase 'A' fails on the 'B' train and partially isolates on the 'A' train**								

Time	Position	Applicant's Actions or Behavior

POST TRIP/SAFEGUARDS ACTUATION REVIEW	OMM-004
	Rev. 41
	Page 50 of 85

ATTACHMENT 4
Page 4 of 4

<< Reference Use - Containment Isolation Phase A Verification >>

Comment No.	Description

Signature: ______________________ Time __________ Date __________

Op Test No.: NRC	Scenario # 3	Event # 7	Page 52 of 80
Event Description:	**Steam Space LOCA inside containment (continued)**		

Time	Position	Applicant's Actions or Behavior	
	RO / BOP	Stabilize AND maintain temperature between 555°F AND 559°F using Table 1. TABLE 1: RCS TEMPERATURE CONTROL GUIDELINES FOLLOWING RX TRIP • Guidance is applicable until another procedure directs otherwise. • IF no RCPs running, THEN use wide range cold leg temperature. RCS TEMPERATURE TREND / OPERATOR ACTION: LESS THAN 557°F AND DROPPING: • Stop dumping steam • Control feed flow • Maintain total feed flow greater than 200 KPPH until level greater than 25% [40%] in at least one on intact SG • IF cooldown continues, THEN, shut MSIVs AND BYPASS valves GREATER THAN 557°F AND RISING: • IF condenser available THEN transfer steam dump to STEAM PRESSURE mode using OP-126, Section 5.3 AND dump steam to condenser - OR - • Dump steam using intact SG PORVs • Control feed flow to maintain SG levels STABLE AT OR TRENDING TO 557°F: • Control feed flow and steam dump to establish and maintain RCS temperature between 555°F AND 559°F • Control feed flow and steam dump to stabilize temperature between 555 ˚F AND 559 ˚F	
	RO	PRZ PORVs – SHUT	(YES)
	RO	PRZ spray valves – SHUT	(YES)
	RO	PRZ PORV block valves – AT LEAST ONE OPEN (All OPEN)	(YES)

Op Test No.: NRC	Scenario # 3	Event # 7	Page 53 of 80
Event Description:	Steam Space LOCA inside containment (continued)		

Time	Position	Applicant's Actions or Behavior	
	RO / BOP	ANY SG pressures – DROPPING IN AN UNCONTROLLED MANNER OR COMPLETELY DEPRESSURIZED	(NO) (NO)
	SRO	RNO: GO TO Step 27.	
	BOP	ANY SG pressures – ABNORMAL RADIATION OR UNCONTROLLED LEVEL RISE **Secondary Radiation Monitors And Indications** RM-01MS-3591 SB, Main Steam Line A RM-01MS-3592 SB, Main Steam Line B RM-01MS-3593 SB, Main Steam Line C REM-01TV-3534, Condenser Vacuum Pump Effluent (RM-11: Grid 2 or Group 16) REM-1BD-3527, Steam Generator Blowdown (RM-11: Grid 2 or Group 16) RM-1TV-3536-1, Turbine Building Vent Stack Effluent (RM-11: Grid 2 or Group 16) SG Activity Sample	(NO) (NO)
	SRO	RNO: GO TO Step 30.	
Evaluator Note:		**Containment pressure will not begin to rise until the PRT rupture disk pressure of 100 psig is exceeded. Due to this delay and the quench volume of the PRT the pressure in containment will slowly rise.**	
	RO	CNMT Pressure - NORMAL	(NO)
	SRO	RNO: GO TO EOP-E-1, "LOSS OF REACTOR OR SECONDARY COOLANT", Step 1.	

Op Test No.: NRC	Scenario # 3	Event # 7	Page 54 of 80
Event Description:	**Steam Space LOCA inside containment (continued)**		
Time	Position	Applicant's Actions or Behavior	

EOP-E-1		LOSS OF REACTOR OR SECONDARY COOLANT
	SRO	Prior to giving crew directions from EOP-E-1, performs crew update. Implements procedure
Procedure Note:		**Foldout applies.**
Evaluator Note:		FOLDOUT • **RCP TRIP CRITERIA** **IF** both of the following occur, **THEN** stop all RCPs: • SI flow - GREATER THAN 200 GPM • RCS pressure - LESS THAN 1400 PSIG • **AFW SUPPLY SWITCHOVER CRITERIA** **IF** CST level drops to less than 10%, **THEN** switch the AFW water supply to the ESW system using OP-137, "AUXILIARY FEEDWATER SYSTEM", Section 8.1. • **RHR RESTART CRITERIA** **IF** RCS pressure drops to less than 230 PSIG in an uncontrolled manner, **THEN** restart RHR pumps to supply water to the RCS. • **ALTERNATE MINIFLOW OPEN/SHUT CRITERIA** • **IF** RCS pressure drops to less than 1800 PSIG, **THEN** verify alternate miniflow isolation **OR** miniflow block valves - SHUT • **IF** RCS pressure rises to greater than 2000 PSIG, **THEN** verify alternate miniflow isolation **AND** miniflow block valves - OPEN • **SECONDARY INTEGRITY CRITERIA** **IF** any of the following occurs, **THEN** GO TO E-2, "FAULTED STEAM GENERATOR ISOLATION", Step 1 (unless faulted SG is needed for RCS cooldown). • Any SG pressure - DROPS IN AN UNCONTROLLED MANNER **AND** THAT SG HAS **NOT** BEEN ISOLATED • Any SG - COMPLETELY DEPRESSURIZED **AND** THAT SG HAS **NOT** BEEN ISOLATED • **E-3 TRANSITION CRITERIA** **IF** any intact SG level rises in an uncontrolled manner **OR** any intact SG has abnormal radiation levels, **THEN** stop RCS depressurization and cooldown **AND** GO TO E-3. "STEAM GENERATOR TUBE RUPTURE, Step 1. • **COLD LEG RECIRCULATION SWITCHOVER CRITERIA** **IF** RWST level drops to less than 23.4% (2/4 Low-Low alarm), **THEN** GO TO ES-1.3, "TRANSFER TO COLD LEG RECIRCULATION", Step 1.

Op Test No.: NRC	Scenario # 3	Event # 7	Page 55 of 80
Event Description:	**Steam Space LOCA inside containment (continued)**		

Time	Position	Applicant's Actions or Behavior	
	SRO	Reviews foldout items Then: Initiates Monitoring Of Critical Safety Function Status Trees	
	RO	Maintain RCP Seal Injection Flow Between 8 GPM And 13 GPM.	
	BOP	Check Intact SG Levels:	
	BOP	• Any level - GREATER THAN 25% [40%] • Control feed flow to maintain all intact levels between 25% And 50% [40% And 50%]. • Any level - RISING IN AN UNCONTROLLED MANNER	(YES) (NO)
	SRO	RNO: GO TO Step 4.	
	SRO	Check PRZ PORV AND Block Valves:	
	BOP	• Verify AC buses 1A1 AND 1B1 – ENERGIZED	(YES)
	RO	• Check PRZ PORVs – SHUT	(YES)
	SRO	• GO TO Step 4.f	
	RO	• Check block valves – AT LEAST ONE OPEN (All OPEN)	(YES)
	SRO	Check SI Termination Criteria:	
	RO	• RCS subcooling - GREATER THAN 10°F [40°F] – C 20°F [50°F] - M	(NO)

Op Test No.:	NRC	Scenario #	3	Event #	7	Page	56	of	80
Event Description:	**Steam Space LOCA inside containment (continued)**								

Time	Position	Applicant's Actions or Behavior	
	SRO	• RNO: GO TO Step 6.	
	SRO	Check CNMT Spray Status:	
	RO	• Check any CNMT spray pump - RUNNING	(NO)
	SRO	• RNO: GO TO Step 7.	
	SRO	Check Source Range Detector Status:	
	RO	• Intermediate range flux - LESS THAN 5x10-11 AMPS	(YES)
	RO	• Verify source range detectors - ENERGIZED	
	RO	• Transfer nuclear recorder to source range scale.	
	SRO	Check RHR Pump Status:	
	RO	• Check RHR pump suction - ALIGNED TO RWST RWST SUCTION (OPEN) RHR A: 1SI-322 RHR B: ISI-323	(YES)
	RO	RCS Pressure – GREATER THAN 230 PSIG	(YES)
	RO	RCS pressure – STABLE OR RISING (YES/NO based on current plant conditions) If YES, then Stop RHR Pumps and continue If NO, then continue	

Op Test No.: NRC	Scenario # 3	Event # 7	Page 57 of 80
Event Description:	**Steam Space LOCA inside containment (continued)**		
Time	Position	Applicant's Actions or Behavior	

Time	Position	Applicant's Actions or Behavior	
	SRO	Check RCS And SG Pressures:	
	BOP	• All SG Pressures - STABLE OR RISING • RCS pressure - STABLE OR DROPPING	(YES) (YES)
	SRO	Establish CCW Flow To The RHR Heat Exchangers:	
	RO	• Verify both CCW pumps - RUNNING	(YES)
	RO	• Open the following valves: o 1CC-147 o 1CC-167	
	RO	• Verify CCW flow to the RHR heat exchanger(s).	
	RO	• Perform one of the following to establish two independent CCW systems: o Shut train A CCW non-essential supply AND return valves: • 1CC-99 • 1CC-128 o Shut train B CCW non-essential supply AND return valves: • 1CC-113 • 1CC-127	
	SRO	Check EDG Status:	
	BOP	• Check AC emergency buses 1A-SA AND 1B-SB - ENERGIZED BY OFFSITE POWER: o Check bus voltages o Check breakers 105 AND 125 - CLOSED	 (YES) (YES)

Op Test No.: NRC	Scenario # 3	Event # 7	Page 58 of 80
Event Description:	**Steam Space LOCA inside containment (continued)**		

Time	Position	Applicant's Actions or Behavior	
	SRO	• GO TO Step 11e.	
	SRO	• Check any EDG - RUNNING UNLOADED (YES)	
	RO	• Reset SI.	
	SRO	• Manually Realign Safeguards Equipment Following A Loss Of Offsite Power. • (Refer to EOP-E-0, "REACTOR TRIP OR SAFETY INJECTION", Attachment 6.)	
	BOP	• Shutdown any unloaded EDGs using OP-155 "DIESEL GENERATOR EMERGENCY POWER SYSTEM" Section 7.0.	
	SRO	Initiate Evaluation Of Plant Status:	
	RO	• RHR system - CAPABLE OF COLD LEG RECIRCULATION	(NO)
	SRO	• RNO: GO TO EOP-ECA-1.1, "LOSS OF COLD LEG RECIRCULATION EMERGENCY COOLANT RECIRCULATION", Step 1.	
Evaluator Note:		**The Steam Space LOCA may cause a rapid RCS pressure and temperature reduction. Entry into EOP-FR-P.1, Response to Imminent Pressurized Thermal Shock MAY be required based on current plant conditions. If a RED path condition is occurring the CREW will immediately transition from the procedure they are implementing to EOP-FR-P.1. The following pages are steps from EOP-FR-P.1. Steps for EOP-ECA-1.1 follow the EOP-FR-P.1 steps.**	

Op Test No.: NRC	Scenario # 3	Event # 7	Page 59 of 80
Event Description:	**Steam Space LOCA inside containment (continued)**		
Time	Position	Applicant's Actions or Behavior	

EOP-FR-P.1		Response to Imminent Pressurized Thermal Shock	
	SRO	Prior to giving crew directions from EOP-FR-P.1, performs crew update. Foldout applies	
	RO	RCS pressure - LESS THAN 230 PSIG Any RHR HX header flow > 1000 GPM RNO – GO TO STEP 2	(NO) (NO)
	RO	Check RCS Cold Leg Temperature Trend: Check RCS Cold Leg Temperatures - STABLE **OR** RISING RNO – GO TO STEP 3	(NO)
Procedure Note:		**A faulted SG is any SG that is depressurizing in an uncontrolled manner or is completely depressurized.**	
	RO	Stop RCS Cooldown: Verify SG PORVs – SHUT	(YES)
	BOP	Verify condenser steam dump valves – SHUT	(YES)
	RO	Check RHR system – IN SHUTDOWN COOLING MODE RNO – GO TO STEP 3.e	(NO)
	BOP	Any non-faulted SG level - GREATER THAN 25% [40%]	(YES)
	BOP	Control feed flow to non-faulted SG(s) to stop RCS cooldown. Reduces feed flow if necessary	

Op Test No.: NRC	Scenario # 3	Event # 7	Page 60 of 80
Event Description:	Steam Space LOCA inside containment (continued)		
Time	Position	Applicant's Actions or Behavior	

Procedure Caution:		**IF the TDAFW pump is the only available source of feed flow, THEN maintain steam supply to the TDAFW pump from one SG**.	
	SRO	Minimize RCS Cooldown From Faulted SG(s): Check any SG – FAULTED RNO – GO TO STEP 5	(NO)
	RO	Check PRZ PORV Block Valves: Verify power to block valves – AVAILABLE Check block valves - AT LEAST ONE OPEN	(YES) (YES)
Procedure Note:		**IF PRZ PORV opens on high pressure, Step 6 should be repeated after pressure drops to less than PORV setpoint.**	
	RO	Check PRZ PORVs: Check all of the following: Check LTOPS control switches - IN NORMAL (**NOT** BLOCKED) RNO – GO TO STEP 6.d	(NO)
	RO	Check PRZ pressure - LESS THAN 2335 PSIG Verify PRZ PORVs – SHUT	(YES) (YES)
	RO	Check SI Flow - GREATER THAN 200 GPM	(YES)
	SRO	Check SI Termination Criteria: (NOT MET) RNO – GO TO STEP 9	
	SRO	Check if a RCP should be started: (Criteria not met) RNO – GO TO STEP 33	
Procedure Caution:		**Following an excessive cooldown, reactor vessel stress must be relieved to enhance and maintain vessel integrity. Do NOT perform any actions that raise pressure OR cause an RCS cooldown until the soak is complete.**	

Op Test No.: NRC	Scenario # 3	Event # 7	Page 61 of 80
Event Description:	**Steam Space LOCA inside containment (continued)**		

Time	Position	Applicant's Actions or Behavior
Procedure Note:		**Even if a soak period is required, steam may be released from intact SGs with pressure higher than the saturation pressure for lowest cold leg temperature.**
	SRO	Determine RCS Soak Requirements: RCS cooldown rate – GREATER THAN 100°F IN ANY SIXTY MINUTE PERIOD (YES) Perform one hour RCS soak: • Maintain RCS temperature stable • Maintain RCS pressure stable • Perform actions of other procedures that do **NOT** cause an RCS cooldown **OR** raise pressure.
EOP-ECA-1.1		LOSS OF EMERGENCY COOLANT RECIRCULATION
	SRO	Prior to giving crew directions from EOP-ECA-1.1, performs crew update.
	SRO	Foldout applies
Evaluator Note:		**FOLDOUT** • **RESTORATION OF EMERGENCY COOLANT RECIRCULATION** **IF** emergency coolant recirculation capability is restored during this procedure, **THEN** RETURN TO procedure and step in effect. • **LOSS OF SUCTION** **IF** RWST level drops to 3% (Empty alarm/ALB-004-2-5), **THEN** secure all pumps taking suction only from the RWST. • **AFW SUPPLY SWITCHOVER CRITERIA** **IF** CST level drops to less than 10%, **THEN** switch the AFW water supply to the ESW system using OP-137, "AUXILIARY FEEDWATER SYSTEM", Section 8.1.
	RO	Reset SI - Locates 2 MCB SI reset switches and turns to "reset" then verifies correct status light changes indicating SI is reset Reports SI is reset to the SRO

Op Test No.: NRC	Scenario # 3	Event # 7	Page 62 of 80
Event Description:	Steam Space LOCA inside containment (continued)		

Time	Position	Applicant's Actions or Behavior	
	SRO	Manually Realign Safeguards Equipment Following A Loss Of Offsite Power. (Refer to EOP-E-0, "REACTOR TRIP OR SAFETY INJECTION", Attachment 6.)	
Procedure Note:		**Resetting the SI suction auto switchover signal also defeats the automatic open and shut signals to the CSIP alternate miniflow isolation valves.**	
	RO	Reset SI Suction Auto Switchover.	
	BOP	Verify CNMT Fan Coolers - ONE FAN PER UNIT RUNNING IN SLOW SPEED	
	RO	Check RWST Level - GREATER THAN 3% (Empty alarm)	(YES)
	SRO	Determine CNMT Spray Requirements:	
	RO	• Spray pump suction - ALIGNED TO RWST	(YES)

Op Test No.:	NRC	Scenario #	3	Event #	7	Page	63	of	80
Event Description:	**Steam Space LOCA inside containment (continued)**								

Time	Position	Applicant's Actions or Behavior	
	SRO	• Determine required number of CNMT spray pumps from Table:	
	RO	• Verify spray pumps – REQUIRED NUMBER RUNNING (No CT Pump running at this point CNMT Pressure has remained below 10 psig)	(YES)
	SRO	Align CNMT Spray For Recirculation:	
	RO	• Any CNMT spray pump - RUNNING	(NO)
	SRO	• RNO: GO TO Step 9.	
	SRO	Add Makeup To RWST Using OP-107.01, "CVCS BORATION, DILUTION, AND CHEMISTRY CONTROL", Section 8.4.	
	SRO	Check Intact SG Levels:	

CONTAINMENT SPRAY REQUIREMENTS

RWST LEVEL	CONTAINMENT PRESSURE	TOTAL # OF FAN COOLER UNITS RUNNING	REQUIRED # OF CNMT SPRAY PUMPS
GREATER THAN 23.4%	GREATER THAN 45 PSIG	N/A	2
	BETWEEN 10 PSIG AND 45 PSIG	0 OR 1	2
		2 OR 3	1
		4	0
	LESS THAN 10 PSIG	N/A	0
BETWEEN 3% AND 23.4%	GREATER THAN 45 PSIG	N/A	2
	BETWEEN 10 PSIG AND 45 PSIG	0, 1 OR 2	1
		3 OR 4	0
	LESS THAN 10 PSIG	N/A	0
LESS THAN 3%	N/A	N/A	0

Op Test No.: NRC	Scenario # 3	Event # 7	Page 64 of 80
Event Description:	Steam Space LOCA inside containment (continued)		

Time	Position	Applicant's Actions or Behavior	
	BOP	• Any level - GREATER THAN 25% [40%] (YES/NO based on plant conditions) • Control feed flow to maintain all intact levels between 25% and 50% [40% and 50%].	
Procedure Note:		**After the low steam pressure SI signal is blocked, main steamline isolation will occur if the high steam pressure rate setpoint is exceeded.**	
	SRO	Check PRZ Pressure:	
	RO	• Pressure - LESS THAN 2000 PSIG • Block low steam pressure SI.	(YES)
Procedure Caution:		**The RCS cooldown should be performed as quickly as possible to minimize potential offsite releases**.	
Procedure Note:		**Even if the lowest RCS cold leg temperature has dropped by 100°F in the last 60 minutes, steam may be released from intact SGs with pressure higher than the saturation pressure for lowest cold leg temperature.**	
	SRO	Initiate RCS Cooldown To Cold Shutdown:	
	SRO	Maintain RCS cooldown rate less than 100°F/HR.	
Lead Evaluator:		**Terminate the scenario when the crew determines the RCS cooldown rate has exceeded 100°F/HR and the crew must wait before recommencing the RCS cooldown.** **Announce 'Crew Update' - End of Evaluation - I have the shift.** **Have crew remain in the Simulator without discussing the exam. Examiners will formulate any follow-up questions.**	

Simulator Operator:	**When directed by Lead Evaluator go to FREEZE**

REACTOR TRIP OR SAFETY INJECTION

Attachment 3
Sheet 1 of 8
SAFEGUARDS ACTUATION VERIFICATION

NOTE

- General guidance for verification of safeguards equipment is contained in Attachment 4 of this procedure.
- ERFIS displays of safeguards equipment status are not reliable while any associated safety-related electrical buses are de-energized.

☐ 1. Verify Two CSIPs - RUNNING

☐ 2. Verify Two RHR Pumps - RUNNING

☐ 3. Verify Two CCW Pumps - RUNNING

☐ 4. Verify All ESW **AND** ESW Booster Pumps - RUNNING

☐ 5. Verify SI Valves - PROPERLY ALIGNED

(Refer to Attachment 1.)

☐ 6. Verify CNMT Phase A Isolation Valves - SHUT

(Refer to OMM-004, "POST TRIP/SAFEGUARDS ACTUATION REVIEW", Attachment 4.)

REACTOR TRIP OR SAFETY INJECTION

Attachment 3
Sheet 2 of 8
SAFEGUARDS ACTUATION VERIFICATION

☐ 7. Verify SG Blowdown **AND** SG Sample Isolation Valves In Table 1 - SHUT

Table 1: SG Blowdown And Sample Isolation Valves		
Process Line	Outside CNMT (MLB-1A-SA)	Inside CNMT (MLB-1B-SB)
SG A Sample	1SP-217	1SP-214/216
SG B Sample	1SP-222	1SP-219/221
SG C Sample	1SP-227	1SP-224/226
SG A Blowdown	1BD-11	1BD-1
SG B Blowdown	1BD-30	1BD-20
SG C Blowdown	1BD-49	1BD-39

8. **IF** Main Steam Line Isolation Actuated **OR** Is Required By Any Of The Following, **THEN** Verify MSIVs **AND** MSIV Bypass Valves - SHUT

☐ • Steam line pressure - LESS THAN 601 PSIG

☐ • CNMT pressure - GREATER THAN 3.0 PSIG

9. **IF** CNMT Spray Actuation Signal Actuated **OR** Is Required, **THEN** Verify The Following:

(Refer to OMM-004, "POST TRIP/SAFEGUARDS ACTUATION REVIEW", Attachment 9.)

☐ • CNMT spray pumps - RUNNING

☐ • CNMT spray valves - PROPERLY ALIGNED

☐ • Phase B isolation valves - SHUT

☐ • All RCPs - STOPPED

REACTOR TRIP OR SAFETY INJECTION

Attachment 3
Sheet 3 of 8
SAFEGUARDS ACTUATION VERIFICATION

☐ 10. Verify Both Main FW Pumps - TRIPPED

☐ 11. Verify FW Isolation Valves - SHUT

(Refer to OMM-004, "POST TRIP/SAFEGUARDS ACTUATION REVIEW", Attachment 6.)

☐ 12. Verify both MDAFW pumps - RUNNING

13. **IF** any of the following conditions exist, **THEN** verify the TDAFW pump - RUNNING

☐ • Undervoltage on either 6.9 KV emergency bus

☐ • Level in two SGs - LESS THAN 25%

☐ • Manual actuation to control SG level

14. Verify AFW Valves - PROPERLY ALIGNED

☐ • **IF** no AFW Isolation Signal, **THEN** verify isolation and flow control valves - OPEN

NOTE

An AFW Isolation signal signal requires a Main Steam Line Isolation coincident with one SG pressure 100 PSIG below the other two SGs.

☐ • **IF** AFW Isolation Signal present, **THEN** verify MDAFW and TDAFW isolation and flow control valves to affected SG - SHUT

☐ 15. Verify Both EDGs - RUNNING

☐ 16. Verify CNMT Fan Coolers - ONE FAN PER UNIT RUNNING IN SLOW SPEED

REACTOR TRIP OR SAFETY INJECTION

Attachment 3
Sheet 4 of 8
SAFEGUARDS ACTUATION VERIFICATION

☐ 17. Verify CNMT Ventilation Isolation Valves - SHUT

(Refer to OMM-004, "POST TRIP/SAFEGUARDS ACTUATION REVIEW", Attachment 7.)

☐ 18. Verify Control Room Area Ventilation - MAIN CONTROL ROOM ALIGNED FOR EMERGENCY OPERATION

(Refer to OMM-004, "POST TRIP/SAFEGUARDS ACTUATION REVIEW", Attachment 5, Sheets 1 and 2, Sections for MAIN CONTROL BOARD, SLB-5 and SLB-6.)

19. Verify Essential Service Chilled Water System Operation:

☐ • Verify both WC-2 chillers - RUNNING

☐ • Verify both P-4 pumps - RUNNING

☐ (Refer to AOP-026, "LOSS OF ESSENTIAL SERVICE CHILLED WATER SYSTEM" for loss of any WC-2 chiller.)

20. Verify CSIP Fan Coolers - RUNNING

☐ AH-9 A SA
☐ AH-9 B SB
☐ AH-10 A SA
☐ AH-10 B SB

NOTE

Security systems are powered by bus 1A1 (normal supply) or bus 1B1 (alternate supply). Backup power will be available for approximately 30 MINUTES after the supplying bus is de-energized. (Refer to OP-115, "CENTRAL ALARM STATION ELECTRICAL SYSTEMS", Section 8.9 and 8.10.)

☐ 21. Verify AC buses 1A1 **AND** 1B1 - ENERGIZED

☐ 22. Place Air Compressor 1A **AND** 1B In The LOCAL CONTROL Mode.

(Refer to Attachment 7.)

REACTOR TRIP OR SAFETY INJECTION

Attachment 3
Sheet 5 of 8
SAFEGUARDS ACTUATION VERIFICATION

CAUTION

The maximum calculated dose rate in the vicinity of MCC 1A35-SA and MCC 1B35-SB is between 10 MREM/HR and 150 MREM/HR.

☐ 23. Dispatch An Operator To Unlock **AND** Turn ON The Breakers For The CSIP Suction **AND** Discharge Cross-Connect Valves:

(Refer to Attachment 2.)

MCC 1A35-SA		MCC 1B35-SB	
VALVE	**CUBICLE**	**VALVE**	**CUBICLE**
1CS-170 1CS-169 1CS-218 1CS-219	4A 4B 14D 14E	1CS-171 1CS-168 1CS-220 1CS-217	4D 7D 9D 12C

24. Check If C CSIP Should Be Placed In Service:

☐ • IF two charging pumps can **NOT** be verified to be running, **AND** C CSIP is available, **THEN** place C CSIP in service in place of the non-running CSIP using OP-107, "CHEMICAL **AND** VOLUME CONTROL SYSTEM, Section 8.5 or 8.7.

REACTOR TRIP OR SAFETY INJECTION

Attachment 3
Sheet 6 of 8
SAFEGUARDS ACTUATION VERIFICATION

25. Start The Spent Fuel Pump Room Ventilation System:
   a. At AEP-1, verify the following ESCWS isolation valves - OPEN
      1) SLB-11 (Train A)
         - ☐ • AH-17 SUP CH 100 (Window 9-1)
         - ☐ • AH-17 RTN CH 105 (Window 10-1)
      2) SLB-9 (Train B)
         - ☐ • AH-17 SUP CH 171 (Window 9-1)
         - ☐ • AH-17 RTN CH 182 (Window 10-1)
   b. At AEP-1, start one SFP PUMP ROOM FAN COOLER:
      - ☐ • AH-17 1-4A SA
      - ☐ • AH-17 1-4B SB

REACTOR TRIP OR SAFETY INJECTION

Attachment 3
Sheet 7 of 8
SAFEGUARDS ACTUATION VERIFICATION

NOTE

- Fuel pool levels **AND** temperatures should be monitored approximately every 1 to 2 HOURS.
- Following the initial check of fuel pool levels and temperature, monitoring responsibilities may be assumed by the plant operations staff (including the TSC or STA).
- Only fuel pools containing fuel are required to be monitored.

26. Check Status Of Fuel Pools:

☐ a. Operate spent fuel cooling pumps to maintain fuel pool temperatures between 85°F and 105°F.

b. Monitor fuel pool levels **AND** temperatures:

☐ • Refer to AOP-041, "SPENT FUEL POOL EVENT" Attachments 7, 8, 9, 10 and 11 for SFP parameter monitoring methods.

☐ • Refer to Curves H-X-24, H-X-25 and H-X-26 for SFP time to 200°F.

☐ • Levels - GREATER THAN LO ALARM (284 FT, 0 IN)

☐ • Temperatures - LESS THAN HI TEMP ALARM (105°F)

REACTOR TRIP OR SAFETY INJECTION

Attachment 3
Sheet 8 of 8
SAFEGUARDS ACTUATION VERIFICATION

NOTE

IF control room ventilation was previously aligned to an emergency outside air intake for post-accident operations, **THEN** follow-up actions will be required to restore the alignment.

27. Consult Plant Operations Staff Regarding Alignment Of The Control Room Ventilation System:

☐ • Site Emergency Co-ordinator - Control Room

☐ • Site Emergency Co-ordinator - Technical Support Center

(Refer to PEP-230, "CONTROL ROOM OPERATIONS".)

- END -

SECONDARY STEAM LEAK/ EFFICIENCY LOSS

INSTRUCTIONS	RESPONSE NOT OBTAINED

3.0 OPERATOR ACTIONS

> **NOTE**
>
> This procedure contains no immediate actions.

INSTRUCTIONS	RESPONSE NOT OBTAINED
✱ 1. **CHECK** that the plant can be operated safely:	1. **PERFORM** the following:
☐ • **CHECK** ALL Reactor Protection parameters will remain WITHIN TRIP LIMITS.	☐ a. **TRIP** the Reactor **AND GO TO** EOP-E-0. (Continue with RNO Step 1.b.)
☐ • **CHECK** Turbine Building envelope safe for personnel entry.	**NOTE** If Main Steam Line Isolation is required, the Reactor and Turbine should be verified tripped in EOP-E-0 before manually initiating MSLI.
☐ • **CHECK** RAB Steam Tunnel safe for personnel entry.	
	☐ b. **IF** the Reactor was tripped due to a steam leak, **THEN MANUALLY INITIATE** a Main Steam Line Isolation signal.
	☐ c. **EXIT** this procedure.
☐2. **CHECK** a steam leak exists.	☐2. GO TO Step 4.

SECONDARY STEAM LEAK/ EFFICIENCY LOSS

INSTRUCTIONS	RESPONSE NOT OBTAINED
3.0 OPERATOR ACTIONS	
☐3. **NOTIFY** personnel of evacuation requirements.	
☐ a. **SOUND** the local evacuation alarm.	
☐ b. **ANNOUNCE** on the PA: "Attention all personnel. There is a steam leak (give location). All personnel stand clear of (give location)."	
☐ c. **ESTABLISH** a boundary to prevent unauthorized personnel entry.	
☐4. **REFER TO** PEP-110, Emergency Classification and Protective Action Recommendations, **AND ENTER** the EAL Matrix.	

NOTE

Initial target reduction may be up to 100 MW less than current REFERENCE value and may be changed as necessary to reduce power to less than 100%.

INSTRUCTIONS	RESPONSE NOT OBTAINED
☐5. **DETERMINE** the required megawatt change needed for the power reduction.	☐5. **IF** no power reduction is required, **THEN GO TO** Step 17 to determine leak location.
☐6. **NOTIFY** Load Dispatcher that the Unit is reducing load.	

SECONDARY STEAM LEAK/ EFFICIENCY LOSS

INSTRUCTIONS	RESPONSE NOT OBTAINED

3.0 OPERATOR ACTIONS

NOTE

- If load reduction rates in excess of 45 MW/min are required, the Unit should be tripped.
- If OSI-PI is available, VIDAR is functioning properly if the DEH_MEGAWATTS point is updating. (Attachment 1, Checking VIDAR Functioning, provides alternative methods of checking VIDAR functioning.)

CAUTION

Failure of the DEH computer VIDAR Unit while in OPER AUTO has resulted in a plant trip.

INSTRUCTIONS	RESPONSE NOT OBTAINED
7. **CHECK** BOTH of the following: ☐ • DEH System in AUTO ☐ • VIDAR functioning properly	☐ 7. **PREPARE** to reduce Turbine load manually using OP-131.01, Main Turbine, **AND GO TO** Step 9.

SECONDARY STEAM LEAK/ EFFICIENCY LOSS

INSTRUCTIONS	RESPONSE NOT OBTAINED
3.0 OPERATOR ACTIONS	
8. PERFORM the following at the DEH panel:	
☐ a. **DEPRESS** the LOAD RATE MW/MIN pushbutton.	
☐ b. **ENTER** desired rate (NOT to exceed 45 MW/MIN) in DEMAND display.	
☐ c. **DEPRESS** ENTER pushbutton.	
☐ d. **DEPRESS** REF pushbutton.	
☐ e. **ENTER** desired load in DEMAND display.	
☐ f. **DEPRESS** ENTER pushbutton.	
☐ g. **CHECK** HOLD pushbutton LIT.	
☐9. **CHECK** Rod Control in AUTO.	9. **PERFORM** ONE of the following: ☐ a. **PLACE** Rod Control selector switch in AUTO. ☐ b. **MANUALLY POSITION** Control Rods to maintain T_{avg} within 5°F of T_{ref}.

SECONDARY STEAM LEAK/ EFFICIENCY LOSS

INSTRUCTIONS	RESPONSE NOT OBTAINED

3.0 OPERATOR ACTIONS

NOTE

During the load reduction, it is permissible to periodically move between GO and HOLD and to vary the load rate.

INSTRUCTIONS	RESPONSE NOT OBTAINED
10. COMMENCE turbine load reduction at the DEH panel:	
a. **CHECK** OPER AUTO Mode AVAILABLE.	☐ a. **MANUALLY REDUCE** Turbine load using OP-131.01, Main Turbine.
☐ (1) **DEPRESS** GO pushbutton.	☐ b. **GO TO** Step 11.
☐ (2) **VERIFY** the value in the REFERENCE display LOWERS.	
☐ **11. VERIFY** Generator load AND Reactor power LOWERING.	
✱☐ **12. MAINTAIN** Generator reactive load (VARs) within guidelines.	
✱☐ **13. CHECK** T_{avg} within 5°F of T_{ref}.	**13. RESTORE** T_{avg} to within 5°F of T_{ref} by ANY of the following methods: ☐ • **ADJUST** Turbine load ☐ • **ADJUST** boron concentration ☐ • **MANUALLY CONTROL** rod insertion or withdrawal.

SECONDARY STEAM LEAK/ EFFICIENCY LOSS

INSTRUCTIONS	RESPONSE NOT OBTAINED
3.0 OPERATOR ACTIONS	
☐14. **WHEN** Reactor power is less than 100%, **THEN DEPRESS** the HOLD pushbutton.	
☐15. **CHECK** the HOLD pushbutton is LIT.	
☐16. **CHECK** a steam leak exists.	☐16. **GO TO** Step 19.
☐17. **DISPATCH** personnel to identify the leak location using all necessary safety practices.	
✱☐18. **CHECK** that the steam leak can be isolated.	☐18. **GO TO** ONE of the following, as applicable:
☐ a. **ISOLATE** the leak.	☐ • GP-006, Normal Plant Shutdown From Power Operation to Hot Standby (Mode 1 To Mode 3), for normal plant shutdown
	☐ • AOP-038, Rapid Downpower
☐19. **NOTIFY** the Load Dispatcher that power reduction is complete.	
☐20. **CHECK** REFERENCE and DEMAND windows equalized.	20. **PERFORM** the following:
	☐ a. **DEPRESS** the REF pushbutton.
	☐ b. **ENTER** the REFERENCE value in the DEMAND window.
	☐ c. **DEPRESS** the ENTER pushbutton.

SECONDARY STEAM LEAK/ EFFICIENCY LOSS

INSTRUCTIONS	RESPONSE NOT OBTAINED

3.0 OPERATOR ACTIONS

21. GO TO ONE of the following, as applicable:

- ☐ GP-005, Power Operation (Mode 2 to Mode 1), for continued plant operation
- ☐ GP-006, Normal Plant Shutdown From Power Operation to Hot Standby (Mode 1 To Mode 3), for normal plant shutdown
- ☐ AOP-038, Rapid Downpower

☐**22. EXIT** this procedure.

-- END OF SECTION 3.0 --

SECONDARY STEAM LEAK/ EFFICIENCY LOSS

INSTRUCTIONS	RESPONSE NOT OBTAINED

Attachment 1 – Checking VIDAR Functioning
Sheet 1 of 1

NOTE

If OSI-PI is NOT available, then accessing the ANALOG INPUTS screen on the Graphics Display Computer (located in the Termination Cabinet Room near the ATWS Panel) will show several points, most of which should be updating if the VIDAR Unit is functioning properly.

1. **IF** the DEH graphics computer is out of service, **THEN** VIDAR can be checked as updating on the operator panel as follows:

☐ a. **DEPRESS** TURBINE PROGRAM DISPLAY button.

☐ b. **CHECK** TURBINE PROGRAM DISPLAY button is illuminated.

☐ c. **CHECK** REFERENCE and DEMAND displays indicate 0000.

☐ d. **DEPRESS** 1577.

☐ e. **DEPRESS** "ENTER".

f. **CHECK** the DEMAND display:

☐ • **IF** the DEMAND display indicates 0000, VIDAR is updating.

☐ • **IF** the DEMAND display indicates 0001, VIDAR is NOT updating.

Facility:	Harris Nuclear Plant	Task No.:	301009H401
Task Title:	Initiate Emergency Boration Following a Reactor Trip (AOP-002)	JPM No.:	2018 HNP NRC Exam Simulator JPM CR a
K/A Reference:	APE024 AA1.17 RO 3.9 SRO 3.9	**ALTERNATE PATH - YES**	

Examinee: ____________________ NRC Examiner: ____________________

Facility Evaluator: ____________________ Date: ____________________

Method of testing:

Simulated Performance: ______ Actual Performance: X

Classroom ______ Simulator X Plant ________

Initial Conditions:	• The unit was at 100% power • ‘B’ BAT Pump is under clearance • ‘A’ MFW pump has tripped • The crew performed a manual Reactor Trip in accordance with AOP-010, Feedwater Malfunctions • The crew completed the immediate actions of EOP-E-0, Reactor Trip or Safety Injection and have transitioned to EOP-ES-0.1, Reactor Trip Response • RCS temperature has been stabilized in accordance with EOP-ES-0.1 step 4

Initiating Cue:	• Your position is the OATC • You have the responsibility for the Foldout items in EOP-ES-0.1 • Continue EOP-ES-0.1 starting with step 5 • Another Operator will continue to control RCS temperature

DO NOT READ TO THE EXAMINEE:	**Allow the candidate to use the procedures from the Simulator for this JPM. You will need to have pre-made copies of EOP-ES-0.1 and AOP-002 ready for replacements after the JPM is complete.** ***NOTE: This JPM will require another Operator to monitor RCS temperature. Temperature should not need to be adjusted – just monitored.***

Task Standard: Emergency Boration flow established from the RWST maintaining at least 90 gpm charging flow from the RWST to the RCS.

Required Materials: ***Operator required to perform EOP-ES-0.1, Step 4***

General References: EOP-ES-0.1, REACTOR TRIP RESPONSE Rev. 3
AOP-002, EMERGENCY BORATION Rev. 24

Handout: None – use simulator references

Time Critical Task: No

Validation Time: 8 minutes

Critical Step Justification	
Step 2	The operator must determine that there are 2 rods that have not inserted into the core following the Reactor Trip. If these rods are not identified then a boration will not be performed.
Step 5	The operator must establish the suction flow path to the CSIP from the RWST by opening one of the RWST suction valves (one or the other is critical since they are in a parallel path configuration)
Step 6	The operator must secure at least one of the suction valves from the VCT to the CSIP's to prevent gas intrusion and binding of the CSIPs during the required Emergency Boration of the RCS. (one or the other is critical since these valves are in a series configuration)
Step 7	A flow rate of > 90 gpm ensures that the boron concentration and required flow of the action statements of LCOs 3.1.1.1 and 3.1.1.2 are being met.

ALTERNATE PATH JUSTIFICATION	
Step 5	The operator must establish a boration flow path from the RWST. Then establish a minimum flow of 90 gpm from this flow path to demonstrate that they are capable of raising RCS boron concentration to add negative reactivity to compensate for 2 stuck rods.

2018 NRC Exam - SIMULATOR SETUP

Simulator Operator

- Reset to IC-165
- Password "NRC2018"
- Go To Run
- Adjust volume / range for Source Range audio counts to an in plant expected level to reduce distraction from source range audio counts

- (**IF NEEDED**) The 86 relays should roll when the simulator is placed in run. If not then run the APP file "Roll 86 Gen" or they can be manually overridden with override LO's
  - XGAO018A GEN LOCKOUT G1A-TRIP COIL ON
  - XGBO017A GEN LOCKOUT G1B-TRIP RELAY ON

- **GO TO FREEZE** and inform the lead examiner the Simulator is ready. DO NOT GO TO RUN until directed by the lead examiner. (The examiner has provided to the candidate with initial conditions and the initiating cues prior to placing the simulator in RUN.)

The following setup information is how this exam IC was developed.

- Reset to IC-19
- Go to run
- Insert a malfunction to prevent two control rods from inserting on the trip
  - CRF16a 220.0 4 (shutdown bank A Rod N-7)
  - CRF16b 220.0 27 (control bank A Rod F-14)

- Place the 'B' BAT pump under clearance for motor replacement
  - o idi xa2i175 (n 00:00:00 00:00:00)STOP,AUTO
  - o ilo xa2o175g (n 00:00:00 00:00:00)OFF
  - o Hang CIT on CB Switch for 'B' BA Pump
  - o Place MCB switch to STOP
  - o Place protected equipment tag on 'A' BA pump

- Insert a failure of 'A' BAT pump to start
  - o ior xa2i174 (n 0 0) ASIS

- Shut 1CS-8 (60 gpm letdown orifice)
- Reduce flow on FK-122.1 to < 30 gpm (somewhere close to 20 gpm)
- Place a trip of the 'A' MFW Pump on Trigger 1 (IMF CFW16A)
- Go to run, insert Trigger 1 then manually trip the Reactor
- Verify immediate action conditions are met
- Secure the TDAFW pump and adjust AFW flows to obtain SG levels > 25%
- Stabilize RCS temperature within the required range of ES-0.1, Step 4
- Acknowledge and reset annunciator alarms
- Freeze and snap to exam IC

Simulator Operator:	***When directed by the Lead Examiner go to Run.***

START TIME: ____________

ES-0.1, Step 5

Performance Step: 1 Check Feed System Status:

- RCS temperature – less than 564˚F
- Verify Feed Reg valves – SHUT
- Check feed flow to SG's – GREATER THAN 200 KPH

Standard:

Verifies RCS temperature indication less than 564˚F **YES**

Verifies each Feed Reg Valve indicating SHUT **YES**

Verifies feed flow to SG's greater than 200 KPH **YES**

Comment:

ES-0.1, Step 6

√ **Performance Step: 2** Check control rod status:

a. Check DRPI – available
b. Verify all control rods – fully inserted

Standard:

Determines DRPI available by indicating lights on AEP-1

Determines two rods stuck fully out

6.b RNO - IF two **OR** more control rods **NOT** fully inserted, **THEN** emergency borate. Refer to AOP-002, EMERGENCY BORATION.

Locates a copy of AOP-002

Evaluator Note:	**Applicant may go to AEP-1 to determine which rods are stuck but are only required to identify that 2 are stuck out. Rods F14 and N7 are the 2 that are stuck.**

Comment:

Evaluator Note:	**Provide Candidate blue copy of AOP-002 once MCR copy is located at either the CRS desk or front of the SM desk**

AOP-002, Note prior to Step 1

Performance Step: 3 This procedure contains no immediate actions.

Standard: Reads and placekeeps note

Comment:

AOP-002, Note prior to Step 1

Performance Step: 4 VERIFY a Boric Acid (BA) Pump RUNNING.

Standard: Reads step 1 and starts one BA Pump

- ‘A’ BA pump fails to start – green light lit
- Informs CRS that no Boric Acid pumps are available
- (May dispatch Aux Operators to investigate breaker and locally at the pump)

Takes RNO path for step 1. GO TO Step 6

Evaluator Cue: Acknowledge any reports to CRS

Simulator Communicator: Acknowledge request to investigate ‘A’ BA pump problems

Comment:

AOP-002, Step 6.a **Alternate Path Begins**

√ **Performance Step: 5** ESTABLISH boration flow from RWST as follows:

a. **OPEN** the following valves:

- 1CS-291, Suction From RWST LCV-115B
- 1CS-292, Suction From RWST LCV-115D

Standard: Locates the MCB control switches for the following valves and takes switch to OPEN (Red light lit)

- 1CS-291, Suction From RWST LCV-115B ☐
- 1CS-292, Suction From RWST LCV-115D ☐

Comment: **Critical to open EITHER 1CS-291 or 1CS-292 since the valves are in parallel.**

AOP-002, Step 6.b

√ **Performance Step: 6** **SHUT** the following valves:

- 1CS-165, VCT Outlet LCV-115C
- 1CS-166, VCT Outlet LCV-115E

Standard: Locates MCB switches then turns switch to SHUT (Green light lit)

- 1CS-165, VCT Outlet LCV-115C ☐
- 1CS-166, VCT Outlet LCV-115E ☐

Comment: **Critical to shut EITHER 1CS-165 or 1CS-166 since the valves are in a series alignment.**

AOP-002, Step 6.c

√ **Performance Step: 7** VERIFY and MAINTAIN at least 90 gpm charging flow from the RWST to the RCS (FI-122A.1) until required boration is completed.

Standard: Verifies flow indicated on FI-122A.1 as < 90 gpm.

With FK-122.1 in manual candidate increases demand to increase flow to ≥ 90 gpm flow to CSIP suction on FI-121A.1

Comment:

Evaluator Cue:	**After the candidate has established and verified at least 90 gpm charging flow from the RWST to the RCS on FI-122A.1** **Announce: I have the shift, END OF JPM** **Inform Simulator Operator to place the Simulator in Freeze.**

STOP TIME: ________________

Simulator Operator:	**When directed by the Lead Examiner then go to Freeze.**

Job Performance Measure No.: 2018 HNP NRC Exam Simulator JPM CR a

Initiate Emergency Boration Following a Reactor Trip
In Accordance With EOP-ES-0.1 and AOP-002

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 unit was at 100% power • ‘B’ BAT Pump is under clearance • ‘A’ MFW pump has tripped • The crew performed a manual Reactor Trip in accordance with AOP-010, Feedwater Malfunctions • The crew completed the immediate actions of EOP-E-0, Reactor Trip or Safety Injection and have transitioned to EOP-ES-0.1, Reactor Trip Response • RCS temperature has been stabilized in accordance with EOP-ES-0.1 step 4

Initiating Cue:	• Your position is the OATC • You have the responsibility for the Foldout items in EOP-ES-0.1 • Continue EOP-ES-0.1 starting with step 5 • Another Operator will continue to control RCS temperature

Facility:	Harris Nuclear Plant	Task No.:	301142H601
Task Title:	Manually Load Safeguards Equipment On AC Emergency Buses After A LOSP	JPM No.:	2018 NRC Exam Simulator JPM b
K/A Reference:	006 A4.04 RO 3.7 SRO 3.6	**ALTERNATE PATH - NO**	
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:	• With the Unit operating at 100% power a Loss of Coolant Accident occurred • A Reactor Trip and Safety Injection have been actuated • Both EDG's have failed to start and a loss of offsite power occurred • The crew implemented EOP-ECA-0.0, Loss of All AC Power Subsequently: • Offsite power has been restored to both Emergency Buses • The CRS has transitioned to EOP-ECA-0.2, Loss of All AC Power Recovery With SI Required • EOP-ECA-0.2 steps 1-3 have been completed

Initiating Cue:	• You are the OATC • The CRS has directed you to continue with EOP-ECA-0.2 starting at step 4.

Task Standard: Manually Load Safeguards Equipment On AC Emergency Buses After A LOSP.

Required Materials: None

General References: EOP-ECA-0.2 Rev. 1

Time Critical Task: No

Validation Time: 15 minutes

Critical Step Justification	
Step 4	1CC-251, RCP Thermal Barrier CCW return outside CMNT isolation, fails to shut requiring the candidate to shut 1CC-249, RCP Thermal Barrier CCW return inside CMNT isolation, from the MCB or 1CC-251 locally to prevent damage to the RCP due to water hammer once CCW flow is restored.
Step 7	The operator must direct the AO to locally close the control power knife switch to restore the ability to control the CCW pump from the MCB.
Step 9	The operator must direct the AO to locally close the control power knife switch to restore the ability to control the CCW pump from the MCB.
Step 10	The operator must start the standby CCW pump to place the system in the ECCS alignment required for Safety Injection actuation to restore the ability to provide adequate core cooling.
Step 11	The operator must start both RHR pumps to place the system in the ECCS alignment required for Safety Injection actuation to restore the ability to provide adequate core cooling.

SIMULATOR SETUP

For the 2018 NRC Exam Simulator JPM ‘b’

Simulator Operator - Exam Setup

- Reset to IC-166 password “NRC2018”
- Go to RUN
- Silence and Acknowledge annunciators
- (**IF NEEDED**) The 86 relays should roll when the simulator is placed in run. If not then run the APP file “Roll 86 Gen” or they can be manually overridden with override LO’s
  - XGAO018A GEN LOCKOUT G1A-TRIP COIL ON
  - XGBO017A GEN LOCKOUT G1B-TRIP RELAY ON
- **Silence and Acknowledge annunciators**
- **GO TO FREEZE** and inform the lead examiner the Simulator is ready. DO NOT GO TO RUN until directed by the lead examiner. (The examiner has provided to the candidate with initial conditions and the initiating cues prior to placing the simulator in RUN.)

The following setup information is how this exam IC was developed.

- Initialized to IC-19 (100% power condition)
- Insert a failure of the “A” EDG and “B” EDG to start <IMF DSG01 BOTH>. Then insert a loss of all AC <IMF EPS01 W/O DELAY>.
- Fail the ASI Pump to start <irf cvc195 (n 0 0) STOP>.
- Once the plant is stable, initiate an SI and wait 60 seconds. RESET the SI signal. Using Simulator MSC Drawing for ECA-0.0 Open the breakers for the sequencers, remove control power for both CCW pumps, both Containment Spray pumps and 1A and 1B AFW pump.
- Then insert RCS leakage to the extent that a safety injection is needed. <IMF RCS18A 6 0> Allow the Pressurizer to empty and pressure to drop to ≈ 1250 psig.
- Then delete the loss of all AC malfunction <DMF EPS01> and restore power to all buses. Use the EOP-ECA-0.0 Attachment 1 to restore power to 1A-SA and 1B-SB from off-site. Perform actions in EOP-ECA-0.0 after power restoration which includes EOP-ECA-0.0 step 36.c including setting SG PORV set points to 84%, transition to EOP-ECA-0.2, perform steps 1, 2 & 3.
- Insert a malfunction to prevent 1CC-251, RCP thermal barrier CCW return outside CNMT isolation valve from shutting from the MCB <irf ccw051 (n 0 0) engaged> <irf ccw052 (n 0 0) 100 0 100 <ior xa1073 (n 0 0) ASIS>
- Acknowledge and reset all alarms and place the simulator in FREEZE. Snap this to an IC

Simulator Operator: **When directed by the Lead Examiner go to Run.**

START TIME: ___________

EOP-ECA-0.2, Step 4.a

Performance Step: 1

Check RCP Thermal Barrier Status:

a. Check ASI pump - RUNNING

Standard:

Identifies ALB-008-2-3, ASI System Trouble annunciator is in alarm and RCP Seal water injection flow indications are 0 gpm. Determines the ASI Pump is NOT running. Takes RNO action for step 4.a - GO TO Step 4.c

(May dispatch AO to investigate)

Comment:

Evaluator Cue:

IF an AO is dispatched to investigate the ASI pump – acknowledge request. (IF they continue with EOP-ECA-0.2 do not make a follow up report)

IF candidate stops and waits for report then wait 10-20 seconds and cue: The ASI pump has not started and the 24VDC Control Power Available light is NOT lit. You will contact I&C to investigate problem.

EOP-ECA-0.2, Step 4.c

Performance Step: 2

Check RCP Thermal Barrier Status:

c. Check CCW pumps – ALL STOPPED

Standard:

Locates the control switches for CCW Pumps and determines all are DE-ENERGIZED (GREEN/RED lights NOT LIT)

.

Locates CCW Flow and Pressure Meters and determines all CCW Pumps are STOPPED (0 flow and 0 pressure)

Comment:

EOP-ECA-0.2, Step 4.d

Performance Step: 3

Check RCP Thermal Barrier Status:

d. Check RCP thermal barrier CCW return outside CNMT isolation – SHUT

- 1CC-251: A-252-FV34-W7-S10

Standard:

Locates control switch for 1CC-251 and determines the valve is in the OPEN position

Comment:

EOP-ECA-0.2, Step 4.d RNO

✓ **Performance Step: 4**

Check RCP Thermal Barrier Status:

d. Prior to starting a CCW pump, verify RCP thermal barrier CCW return isolated by **any** of the following:

- Shut outside CNMT isolation valve from the MCB OR locally:
  1CC-251

- Shut inside CNMT isolation valve from the MCB:
  1CC-249

Standard:

Locates control switch for 1CC-251 and takes switch to SHUT

Identifies 1CC-251 does NOT shut.

(May) contact Aux Operator to locally shut 1CC-251.

Locates control switch for 1CC-249 and takes switch to SHUT

Simulator Operator Cue:	**If contacted to shut 1CC-251 report:** **“Using time compression” 1CC-251 is mechanically stuck and the handwheel will not turn.**

Comment:

EOP-ECA-0.2, Caution prior to Step 5

Performance Step: 5

CAUTION:
The loads placed on the energized AC emergency bus should NOT exceed the capacity of the power source.

Restoration of DC control power to the first CCW pump will cause it to auto start on low pressure.

Standard: Operator reads and placekeeps at any procedure note or caution

Comment:

EOP-ECA-0.2, Step 5.a

Performance Step: 6

Manually Load Safeguards Equipment On AC Emergency Buses
a. Check CCW pumps – ALL STOPPED

Standard: Locates the control switches for CCW Pumps and determines all are DE-ENERGIZED (GREEN/RED lights NOT LIT).

Locates CCW Flow and Pressure Meters and determines all CCW Pumps are STOPPED (0 flow and 0 pressure)

Comment:

Evaluator Note:	• **Candidate may choose to shut control power knife switch for CCW pump "A" or "B" in performance step 7 and remaining pump in performance step 9** • **Candidate may ask CRS which CCW pump to perform actions for first. IF so, then direct the actions for CCW Pump "A" first, then CCW Pump "B".**

EOP-ECA-0.2, Step 5.b

✓ **Performance Step: 7**

Manually Load Safeguards Equipment On AC Emergency Buses

b. Locally shut control power knife switch for breaker of CCW pump to be started:
   - **1A-SA CUB 8 (CCW pump A)**
   - 1A-SA CUB 3 (CCW pump C)
   - 1B-SB CUB 8 (CCW pump B)
   - 1B-SB CUB 2 (CCW pump C)

Standard:

Contacts Turbine Building AO and directs them to shut the desired control power knife switch

- **1A-SA CUB 8 (CCW pump A)**
- 1A-SA CUB 3 (CCW pump C)
- 1B-SB CUB 8 (CCW pump B)
- 1B-SB CUB 2 (CCW pump C)

Evaluator Note:	**When the control power knife switch is closed on the first CCW pump the pump will auto start due to low pressure in the CCW system.**

Simulator Communicator:	Acknowledge request to shut the desired control power knife switch

Simulator Operator:	Shut the desired control power knife switch and report to communicator that it is shut

Simulator Communicator:	Report that the desired control power knife switch is shut

Comment:

EOP-ECA-0.2, Step 5.c

Performance Step: 8

Manually Load Safeguards Equipment On AC Emergency Buses

c. Verify CCW pump – RUNNING

Standard:

Locates the control switches for CCW Pumps and determines the desired CCW Pump is RUNNING (RED light LIT) – other redundant checks should also be performed such as pressure increasing in the CCW system, pump flow, ect.

Comment:

EOP-ECA-0.2, Step 5.d

✓ **Performance Step: 9**

Manually Load Safeguards Equipment On AC Emergency Buses

d. Locally shut control power knife switch for breaker of standby CCW pump.
   - 1A-SA CUB 8 (CCW pump A)
   - 1A-SA CUB 3 (CCW pump C)
   - **1B-SB CUB 8 (CCW pump B)**
   - 1B-SB CUB 2 (CCW pump C)

Standard:

Contacts Turbine Building AO and directs them to shut the desired control power knife switch

- 1A-SA CUB 8 (CCW pump A)
- 1A-SA CUB 3 (CCW pump C)
- **1B-SB CUB 8 (CCW pump B)**
- 1B-SB CUB 2 (CCW pump C)

Simulator Communicator:	Acknowledge request to shut the desired control power knife switch

Simulator Operator:	Shut the desired control power knife switch and report to communicator that it is shut

Simulator Communicator:	Report that the desired control power knife switch is shut

Comment:

EOP-ECA-0.2, Step 5.e

✓ **Performance Step: 10** Start standby CCW pump.

Standard: Locates control switches for the standby CCW Pump and takes switch to START

Comment:

EOP-ECA-0.2, Step 5.f

✓ **Performance Step: 11** Start both RHR pumps.

Standard: Locates control switch for RHR Pump 1A-SA and takes switch to START (identifies Green light OFF, Red light LIT)

Locates control switch for RHR Pump 1B-SB and takes switch to START (identifies Green light OFF, Red light LIT)

Evaluator Cue: **After candidate has started two CCW Pumps and BOTH RHR pumps are in service. Evaluation on this JPM is complete.**

Announce: I have the shift, the remainder of Step 5 will be completed by the BOP. End of JPM

Inform Simulator Operator to place the Simulator in Freeze.

Comment:

STOP TIME: ______________

Job Performance Measure No.: 2018 NRC Exam Simulator JPM b

Manually Load Safeguards Equipment On AC Emergency Buses After A LOSP
In Accordance With EOP-ECA-0.2, Loss of All AC Power Recovery With SI Required

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:	• With the Unit operating at 100% power a Loss of Coolant Accident occurred • A Reactor Trip and Safety Injection have been actuated • Both EDG's have failed to start and a loss of offsite power occurred • The crew implemented EOP-ECA-0.0, Loss of All AC Power Subsequently: • Offsite power has been restored to both Emergency Buses • The CRS has transitioned to EOP-ECA-0.2, Loss of All AC Power Recovery With SI Required • EOP-ECA-0.2 steps 1-3 have been completed

Initiating Cue:	• You are the OATC • The CRS has directed you to continue with EOP-ECA-0.2 starting at step 4.

Facility:	Harris Nuclear Plant	Task No.:	301135H601
Task Title:	Take Corrective Action For Failure of CSIP Mini-Flow Valves to Re-Position	JPM No.:	2018 NRC Exam Simulator JPM c
K/A Reference:	006 A4.07 RO 4.4 SRO 4.4		**ALTERNATE PATH - YES**

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 Unit was at 100% power when a technicians error resulted in a Reactor Trip / Safety Injection. • The crew is performing EOP-E-0, Reactor Trip or Safety Injection, and are at step 37.

Initiating Cue:	• You are the OATC. Beginning at Step 37, you are to continue performing EOP-E-0.

Task Standard: Obtain adequate flow through a running CSIP.

Required Materials: E-0, Reactor Trip or Safety Injection, Rev. 7

General References: E-0, Reactor Trip or Safety Injection, Rev. 7

Time Critical Task: No

Validation Time: 10 minutes

Critical Step Justification	
Step 2	Resetting SI removes the active signal to allow termination of SI (allows component re-positioning).
Step 4	Stopping one CSIP prevents unnecessary PRZ overfill to a solid condition.
Step 9	Shutting FK-122.1 prevents CSIP runout when establishing a charging flowpath.
Step 10	Opening 1CS-235 and 1CS-238 establishes a charging flowpath.
Step 11	Opening FK-122.1 to a minimum of 10% establishes minimal charging flow prior to isolating the BIT to ensure the running CSIP is not deadheaded.
Step 12	Shutting 1SI-3 and 1SI-4 isolates flow through the BIT to prevent CSIP runout.
Step 14	Establishing a flow rate of >60 gpm is required by procedure.

ALTERNATE PATH JUSTIFICATION	
Steps 7 - 14	1CS-214 (common miniflow isolation) failing to open prevents normal miniflow for the running CSIP to be established. The candidate must establish minimal charging flow prior to isolating the BIT to ensure that the running CSIP is not deadheaded.

2018 NRC Exam - SIMULATOR SETUP

Simulator Operator

- Reset to IC-167
- Password "NRC2018"
- Go to run
- Silence and Acknowledge annunciators
- It may be necessary to roll the Generator 86 relays at the start of this JPM or between runs. To accomplish this run the AMS file "Roll Gen 86 Relays" to get the 86 relays to the trip condition.
- **NOTE: The ERFIS screen that normally displays Tavg needs to be switched to Turn on code "ITREND" for RCS temperature and pressure.**

GO TO FREEZE and inform the lead examiner the Simulator is ready. DO NOT GO TO RUN until directed by the lead examiner. (The examiner has provided to the candidate with initial conditions and the initiating cues prior to placing the simulator in RUN.)

To recreate the IC setup for this JPM:

- Initial Simulator IC was IC-19
- Pre-load failure of control switch 1CS-214
    - o IDI XA2I162 (n 00:00:00 00:00:00) ASIS

Insert:

- SIS01A (1 00:00:00 00:00:00) INADVERTENT_INIT
- SIS01B (1 00:00:00 00:00:00) INADVERTENT_INIT
- Go To RUN and initiate Trigger 1 – Inadvertent SI Train A and B
- Perform / markup E-0 through Step 37 (SI Termination Criteria).
- Set up ERFIS Plot to include RCS Pressure
- Adjust AFW flow to approx. 80 KPPH/SG
- Secure TDAFWP by closing 1MS-70 and 1MS-72
- Energize 1A1 and 1B1
- Silence Acknowledge and Reset Annunciators
- FREEZE (with PZR Level at approx. 60%) and Snap these conditions to your exam IC
- **NOTE: The ERFIS screen that normally displays Tavg needs to be switched to Turn on code "ITREND" for RCS temperature and pressure.**

Simulator Operator:	***When directed by the Lead Examiner go to Run.***

START TIME: ____________

Performance Step: 1 **OBTAIN PROCEDURE**

Standard: Obtains copy of EOP-E-0 and reviews steps that will be performed prior to initiation of step.

Comment:

E-0, Step 37

✓ **Performance Step: 2** Reset Safety Injection.

Standard: Locates Train A and Train B SI reset MCB switch and takes respective train switch to reset position and then allows switch to return to normal position.

Verifies that SI is reset by observation of Bypass Permissive Lights

- SI Actuated light stays on until both A and B train reset is completed.
- When train A or B is reset the SI Reset Auto SI Blocked light blinks on and off
- When both train A and B are reset the SI Actuated light extinguishes and the SI Reset Auto SI Blocked Light stays ON

Comment:

E-0, Step 38

Performance Step: 3 Manually Realign Safeguards Equipment Following A Loss Of Offsite Power. (Refer to Attachment 6)

Standard: Acknowledges requirement to manually realign Safeguards Equipment following a loss of Offsite Power

(Notes that no loss of power has occurred)

Comment:

E-0, Step 39

✓ **Performance Step: 4** Stop All But One CSIP.

Standard: Observes that A and B CSIP are running.

- Locates MCB switch for the CSIP control and secures ONE CSIP.

Comment:

E-0, Step 40

Performance Step: 5 RCS Pressure - STABLE OR RISING

Standard: Verifies RCS pressure is rising by trends on ERFIS, OSI PI or MCB RCS pressure meters. (may report trend to CRS)

Evaluator Cue:	**(IF reported that RCS pressure is rising: acknowledge report)**

Comment:

E-0, Step 41

Performance Step: 6

Open Normal Miniflow Isolation Valves:

- CSIP A: 1CS-182
- CSIP B: 1CS-196
- CSIP C: 1CS-210
- COMMON: 1CS-214

Standard:

Locates MCB switch for each of the following valves and takes switch to OPEN position

- CSIP A: 1CS-182
- CSIP B: 1CS-196
- CSIP C: 1CS-210

Locates MCB switch for 1CS-214 and after attempting to open valve determines that the valve will NOT OPEN

Determines RNO for step 41 is needed

Comment:

E-0, Step 41 RNO - ALTERNATE PATH begins here

Performance Step: 7

- If normal miniflow for running CSIP established, THEN GO TO Step 42. (NO)
- IF normal miniflow for running CSIP can NOT be established, THEN Observe NOTE prior to Step 45 AND GO TO Step 45. (YES)

Standard:

Determines that RNO action is to go to step 45 and proceed with actions there.

Comment:

E-0, Step 45 – NOTE prior to step (ALTERNATE PATH)

Performance Step: 8 NOTE: The following step contains a Safety Injection termination sequence for which CSIP normal miniflow is not available. The charging flow control valve is opened a minimal amount prior to isolating the BIT to ensure the running CSIP is not deadheaded.

Standard: Circle / Slashes note to indicate it is read and understood.

Comment:

E-0, Step 45.a (ALTERNATE PATH)

✓ **Performance Step: 9** Establish Minimum Charging Flow AND Isolate BIT Flow:
Shut charging flow control valve: FK-122.1

Standard: Locates MCB control for FK-122.1, places FK-122.1 in MANUAL and reduces output to 0 (shuts valve)

Comment:

E-0, Step 45.b (ALTERNATE PATH)

✓ **Performance Step: 10** Open charging line isolation valves:

- 1CS-235
- 1CS-238

Standard: Locates MCB control switches for each valve and takes switches to OPEN

- 1CS-235 (red light on)
- 1CS-238 (red light on)

Comment:

E-0, Step 45.c (ALTERNATE PATH)

✓ **Performance Step: 11** Set charging flow controller demand position to 30%.

Standard: Locates MCB control for 1FK-122.1 and adjusts FK-122.1 open to 30%. (critical to establish an indication of a positive increase in charging flow)

Comment:

E-0, Step 45.d (ALTERNATE PATH)

✓ **Performance Step: 12** Shut BIT outlet valves:

- 1SI-3
- 1SI-4

Standard: Locates MCB control switches for each valve and takes switches to SHUT

- 1SI-3 (green light on)
- 1SI-4 (green light on)

Comment:

E-0, Step 45.e (ALTERNATE PATH)

Performance Step: 13 Verify cold leg AND hot leg injection valves – SHUT

- 1SI-52
- 1SI-86
- 1SI-107

Standard: Locates MCB control for 1SI-52, 1SI-86 and 1SI-107 and verifies that all three valves are shut (green lights on)

Comment:

E-0, Step 45.f (ALTERNATE PATH)

✓ **Performance Step: 14** Establish and maintain at least 60 GPM flow through CSIP.

Evaluator Note:	**Total flow through the running CSIP consists of Charging Flow (FI-122A.1) in addition to the three RCP Seal Injection Flows (FI-130A, FI-127A and FI-124A).** **With FK-122.1 set to ~30% flow will be >60 GPM**

Standard: Totals flow of Charging flow through FI-122A.1 and RCP Seal Injection flows (3) through FI-130A, FI-127A, and FI-124A. IF the total is < 60 gpm THEN Locates MCB for CSIP flow (FI-122) and adjusts Charging Flow Controller FK-122.1 until total flow maintained is ≥ 60 gpm.

Comment:

Evaluator Cue:	**After applicant adjusts/verifies Charging Flow + Seal Injection flow is verified to be maintaining >60 gpm flow –** **Evaluation on this JPM is complete.** **Announce: I have the shift. END OF JPM** **Contact the Simulator Operator and place the Simulator in Freeze.**

STOP TIME: ______________

Simulator Operator:	**When directed by the Lead Examiner then go to Freeze.**

VERIFICATION OF COMPLETION

Job Performance Measure No.: 2018 NRC Exam Simulator JPM c

Take Corrective Action For Failure of CSIP Mini-Flow Valves to Re-Position
In accordance with EOP-E-0, Reactor Trip or Safety Injection

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 Unit was at 100% power when a technician error resulted in a Reactor Trip / Safety Injection. • The crews is performing EOP-E-0, Reactor Trip or Safety Injection and are at step 37.

Initiating Cue:	• You are the OATC. • Beginning at Step 37, you are to continue performing EOP-E-0.

Facility:	Harris Nuclear Plant	Task No.:	301170H601
Task Title:	Initiate RCS Bleed and Feed (EOP-FR-H.1)	JPM No.:	2018 NRC Exam Simulator JPM CR d
K/A Reference:	EPE E05 EA1.1 RO 4.1 SRO 4.0	**ALTERNATE PATH - YES**	

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 Unit was operating at 100% power • Motor Driven AFW Pump 'A' is under clearance Subsequently: • The Reactor tripped due to a loss of off-site power • 'B' EDG tripped when it started, the cause is being investigated • The Turbine-Driven AFW Pump failed while starting • A SBLOCA occurred following the Reactor Trip • Adverse Containment values are in effect • The crew has transitioned from EOP-E-0 to EOP-FR-H.1, Response To Loss Of Secondary Heat Sink • No source of Feedwater is available • The Foldout criteria for initiation of RCS Bleed and Feed have just been met

Initiating Cue:	You are the OATC. The CRS directs you to observe the procedure CAUTION prior to EOP-FR-H.1, Step 16, then initiate RCS bleed and feed.

Task Standard: RCS feed established with maximum available bleed path.

Required Materials: Attach EOP-E-0, Attachment 1 to this JPM for use by the evaluator.

General References: EOP-FR-H.1, Response To Loss Of Secondary Heat Sink, Rev. 3

Handout: Use Simulator copy of EOP-FR-H.1 and ensure it is replaced after each use or provide a paper copy.

Time Critical Task: No

Validation Time: 10 minutes

Critical Step Justification	
Step 7	Must reset Phase A to gain control of components allowing operation of valves that were automatically repositioned from Phase A actuation.
Step 16	Critical to establish the maximum available bleed path to ensure adequate core heat removal during accident conditions.

ALTERNATE PATH JUSTIFICATION	
Step 15	The operator must establish an adequate RCS bleed path. Establishing this path using the PRZ PORVs AND associated block valves is not available so they must establish a bleed path using an alternate method which is by opening the Reactor Head Vent valves.

2018 NRC Exam - SIMULATOR SETUP

Simulator Operator

- Reset to IC-168
- Password “NRC2018”
- Hang CIT on the ‘A’ MDAFW Pump and place Star Placards in accordance with OMM-001 on required equipment
- It may be necessary to roll the 86 relays between or at the start of the set up. Run AMS file “Roll Gen 86 Relays” to get the 86 relays to the trip condition.
- Go to Run
- Turn off horn on RM-11 – turn back on at conclusion of JPMs
- Silence and Acknowledge annunciators

GO TO FREEZE and inform the lead examiner the Simulator is ready. DO NOT GO TO RUN until directed by the lead examiner. (The examiner has provided to the candidate with initial conditions and the initiating cues prior to placing the simulator in RUN.)

To recreate the IC setup for this JPM:

- Initial Simulator IC was IC-19, stay in freeze
- Remove power from the breaker on ‘A’ MDAFW Pump
  - o irf CFW113 cp_off
- Insert a malfunction to prevent the ‘B’ EDG from starting
  - o imf DSG01 B
- Insert a malfunction to trip TDAFW Pump during AUTO start
  - o imf CFW01 C
- Insert overrides to block MANUAL OPEN on PCV-445A, PCV-445B and PCV-444B
  - o idi xa2i136 (n o o) ASIS
  - o idi xa2i137 (n o o) ASIS
  - o idi xa2i138 (n o o) ASIS
- Insert a loss of Off-site Power
  - o imf eps01 w/o delay
- Go to run
- Perform EOP-E-0 with a transition to EOP-FR-H.1, go to freeze
- Insert a SBLOCA after entering EOP-FR-H.1 to get to adverse containment values.
  - o imf RCS18A 1.5
- Go to run
  - o Modify SB LOCA RCS18A from the initial value of 1.5 to 10 until Containment pressure reaches 3.0 psig then reduce the leak size back to 1.5
- Perform EOP-FR-H.1 without establishing any source of feed flow
- Run AMS file AIR\AC'S to local
- Allow SG levels to reach feed and bleed Foldout (ADVERSE) criteria
  ALL SG WR Levels should be >15% but <30%
- Silence Acknowledge and Reset Annunciators
- Freeze and Snap these conditions to your exam IC

Simulator Operator:	When directed by the Lead Examiner go to Run.

START TIME: ____________

EOP-FR-H.1, CAUTION prior to Step 16

Performance Step: 1 Perform Steps 16 through 26 without delay to establish RCS heat removal by RCS bleed and feed.

Standard: Operator reads and placekeeps at any procedure note or caution

Comment:

EOP-FR-H.1, Step 16

Performance Step: 2 Actuate Safety Injection.

Standard: (Already actuated) Verifies SI actuated or may actuate manual MCB switch.

Comment:

EOP-FR-H.1, Step 17

Performance Step: 3 Verify RCS Feed Path:

a. SI flow - > 200 GPM
b. Observe NOTE prior to Step 19 AND GO TO Step 19

Standard: Verifies SI flow indication > 200 GPM (YES)

Comment:

EOP-FR-H.1, Note Prior to Step 19

Performance Step: 4 SI reset can **NOT** occur until sixty seconds after SI signal actuation.

Standard: Operator reads and placekeeps at any procedure note or caution

Comment:

EOP-FR-H.1, Step 19

Performance Step: 5 Reset SI

Standard: Places both SI Train RESET Switches in RESET and releases.

Verifies RESET on Bypass Permissive Panel.

Comment:

- **Bypass Permissive Panel light 4-1 SI Activated – OFF**
- **Bypass Permissive Panel light 5-1 SI Reset Auto SI Blocked - ON**

EOP-FR-H.1, Step 20

Performance Step: 6 Manually Realign Safe-Guards Equipment Following A Loss Of Off-Site Power.

(Refer To EOP-E-0, Reactor Trip Or Safety Injection, Attachment 6)

Standard: Reads step but at this time there is no need to follow through with actions.

Comment:

EOP-FR-H.1, Step 21

√ **Performance Step: 7** Reset Phase A Isolation Signals.

Standard:

- Places Train “A” and Train “B” Phase “A” RESET Switches in RESET and releases.

Comment:

EOP-FR-H.1, Step 21

Performance Step: 8 Reset Phase B Isolation Signals.

Standard:

- Phase “B” has not actuated (may reset since procedure directs)
- Places Train “A” and Train “B” Phase “B” RESET Switches in RESET and releases.

Comment:

EOP-FR-H.1, Step 22

Performance Step: 9 Check Sequencers - RESET (BOTH TRAINS)

Standard:

- Identifies that Train A Sequencer is NOT reset. (NO)
- (No actions required for Train B as it cannot be energized)

Comment:

EOP-FR-H.1, Note Prior to Step 22.a RNO

Performance Step: 10 Manual actuation of Load Block 9 cannot occur for 150 SECONDS after sequencer operation.

Standard: Operator reads and placekeeps at any procedure note or caution

Comment:

EOP-FR-H.1, Step 22.a RNO

Performance Step: 11 For any Sequencer that is **NOT** reset, Perform the following:

a. Check Sequencer Load Block 9 (Manual Loading Permissive) – ACTUATED

Standard:

- Identifies that Train A Sequencer has reached Load Block 9. (No actions required for Train B as it cannot be energized)

Comment:

Evaluator Note:	**Bus 1B1 cannot be energized**

EOP-FR-H.1, Step 23

Performance Step: 12 Energize AC Buses 1A1 AND 1B1

Standard:

- Energizes Bus 1A1 by closing the cross-tie “Emergency Bus A-SA to XFMR A1-SA Breaker A1 A-SA”.

Comment:

EOP-FR-H.1, Step 24

Performance Step: 13 Open Instrument Air AND Nitrogen Valves To CNMT:

```
1IA-819 (ISOL VALVE CONT. BLDG
        236' PENETRATION (M-80))

1SI-287 (ACCUMULATOR & PRZ PORV
        N2 SUPPLY ISO VLV)
```

Standard:

- Locates MCB switch for 1IA-819 and takes switch to OPEN
- Locates MCB switch for 1SI-287 and takes switch to OPEN

Comment:

Evaluator Note:	All PORVs are blocked from opening (failed closed)

EOP-FR-H.1, Step 25

Performance Step: 14 Establish RCS Bleed Path:

a. Establish all RCS bleed paths listed in table by performing the following:

1) Verify PRZ PORV Block valves – ALL OPEN

2) Open all PRZ PORVs (safety and non-safety regardless of operability status).

RCS Bleed Paths Based On PRZ PORV AND Associated Block Valve		
Bleed Path	Block Valve	PRZ PORV
"A" Train PRZ PORV	1RC-117	1RC-118 (PCV-445A SA)
"B" Train PRZ PORV	1RC-113	1RC-114 (PCV-444B SB)
Non Safety PRZ PORV	1RC-115	1RC-116 (PCV-445B)

Standard:

- Verifies block valves RC-113 indicate OPEN (RED light) (RC-117, and RC-115 does not have power but was open)
- Attempts to open PCV-445A, PCV-445B, and PCV-444B
  - o NONE WILL OPEN (ALL Green Lights)
- Informs CRS that none of the PZR PORV's will open and no RCS bleed paths through PORV's can be established.

Evaluator Cue:	CRS acknowledges PORV's cannot be opened, continue with EOP-FR-H.1.

Comment:

EOP-FR-H.1, Step 26 – ALTERNATE PATH

Performance Step: 15 Verify adequate RCS bleed path –

a. Check PRZ PORVs AND associated block valves – AT LEAST ONE BLEED PATH OPEN **(NO)**

Standard:

- Determines no PRZ PORVs are OPEN.
  - Proceeds to 26.a RNO
  - GO TO Step 26.c

Evaluator Note:	**There is no power available to 1RC-901, 1RC-903, 1RC-905.**

EOP-FR-H.1, Step 26.c

√ **Performance Step: 16** Open all RCS vent valves to commence venting:

- 1RC-900
- 1RC-901
- 1RC-902
- 1RC-903
- 1RC-904
- 1RC-905

Standard: **(To operate each valve – must take control switch out of Pull To Lock then go to OPEN on switch)**

Opens:

- 1RC-900 ___
- 1RC-902 ___
- 1RC-904 ___

Comment:

Lead Evaluator Cue:	**After RCS Vent Valves with power available are OPENED:** **Evaluation on this JPM is complete.** **Announce: I have the shift. END OF JPM** **Inform the Simulator Operator to place the Simulator in Freeze.**

Simulator Operator:	**When directed by the Lead Examiner then go to Freeze.**

STOP TIME: ________________

VERIFICATION OF COMPLETION

Job Performance Measure No.: 2018 NRC Exam Simulator JPM CR d

Initiate RCS Bleed and Feed
EOP-FR-H.1, Response To Loss Of Secondary Heat Sink

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 Unit was operating at 100% power • Motor Driven AFW Pump ‘A’ is under clearance and partially disassembled for maintenance Subsequently: • The Reactor tripped due to a loss of off-site power • ‘B’ EDG tripped when it started, the cause is being investigated • The Turbine-Driven AFW Pump failed while starting • A SBLOCA occurred following the Reactor Trip • Adverse Containment values are in effect • The crew has transitioned from EOP-E-0 to EOP-FR-H.1, Response To Loss Of Secondary Heat Sink • No source of Feedwater is available • The Foldout criteria for initiation of RCS Bleed and Feed have just been met

Initiating Cue:	• You are the OATC. • The CRS directs you to observe the procedure CAUTION prior to EOP-FR-H.1, Step 16, then initiate RCS bleed and feed.

Facility:	Harris Nuclear Plant	Task No.:	088017H101
Task Title:	Perform Containment Ventilation Isolation Valve ISI Test (OST-1056)	JPM No.:	2018 NRC Exam Simulator JPM CR e
K/A Reference:	103 A4.01 RO 3.2 SRO 3.3	**ALTERNATE PATH - NO**	

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 operating at 100 percent power • OST-1056 is being performed to test the operability of the Containment ventilation isolation valves per the ISI program • Airborne Radioactive Removal & Normal Purge Systems were shutdown in accordance with OP-168, Containment Ventilation And Vacuum Relief

Initiating Cue:	• The CRS has directed you to perform Section 7.2 of OST-1056 beginning with the Train A components (1CP-5 and 1CP-9, 1CB-2 and CB-D51SA) and then the Train B components (1CP-3 and 1CP-6, 1CB-6 and CB52SB). • **During the performance of this OST, any additional component timing will be performed by a second operator.** • **All IV's will only confirm observation of your actions.**

Evaluator NOTE:	The candidates should be briefed outside of the Simulator prior to performing this JPM. Provide them with a copy of OST-1056 and inform them that prerequisites are met. This will allow them to review the Precautions and Limitations associated with OST-1056 and have time for a task preview of the steps. Expect that the candidates will take about 10 - 15 minutes to complete this review.

Task Standard: Critical tasks of OST-1056, Containment Ventilation Isolation Valve ISI Test Quarterly Interval Modes 1 – 6, Section 7.2 completed.

Required Materials: **Two (2) Calibrated Stopwatches**

General References: OST-1056, Containment Ventilation Isolation Valve ISI Test Quarterly Interval Modes 1 – 6, Revision 14

Time Critical Task: No

Handout: OST-1056 marked up with Prerequisites completed and CRS permission signature. Initials for ensuring the Airborne Radioactive Removal and Normal Purge Systems are shutdown per OP-168 is also initialed.

Validation Time: 25 minutes

Critical Step Justification	
Step 8	For testing single switch valves 1CP-5 and 1CP-9 Required to document the valve stroke time is within the time required by Technical Specifications for operability.
Step 10	Required for 1CP-5 and 1CP-9 to document the valve stroke time is within the time required by Technical Specifications for operability.
Step 11	Required for 1CP-5 and 1CP-9 to document the valve stroke time is within the time required by Technical Specifications for operability.
Step 21	For testing of 1CB-2 and CB-D51SA in both Open and Shut directions. Required to document the valve stroke time is within the time required by Technical Specifications for operability.
Step 22	For testing of 1CB-2 and CB-D51SA and 1CB-6 and CB52SB in both Open and Shut directions. Required to document the valve stroke time is within the time required by Technical Specifications for operability.
Step 24	**Testing of 1CB-2 OPEN** When 1CB-2 is stroked open, if these valves are allowed to shut prior to obtaining required data, then reopening could result in pre-conditioning and invalidation of the results.
Step 25	Required for 1CB-2 and CB-D51SA to document the valve stroke time is within the time required by Technical Specifications for operability.
Step 26	Required for 1CB-2 and CB-D51SA to document the valve stroke time is within the time required by Technical Specifications for operability.

2018 NRC Exam - SIMULATOR SETUP

Simulator Operator

- Reset to IC-169
- Password “NRC2018”
- Go to RUN
- Silence and Acknowledge annunciators

GO TO FREEZE and inform the lead examiner the Simulator is ready. DO NOT GO TO RUN until directed by the lead examiner. (The examiner has provided to the candidate with initial conditions and the initiating cues prior to placing the simulator in RUN.)

To recreate the IC setup for this JPM:

- Initial Simulator IC was IC-19
- Go to run
- Perform OP-168 section 7.1 to secure both ARR Fans S-1A and B
- Perform OP-168 section 7.1 to secure both Normal Purge fans AH-82A and B
- Momentarily open vacuum relief valves 1CB-2 & 1CB-6 to get Containment Pressure equal to 0” water on PDI-7680A & B
- Silence Acknowledge and Reset Annunciators
- Freeze and Snap these conditions to your exam IC

Evaluator:	When the student is ready to assume the shift direct the Simulator Operator to place the Simulator in Run.

Simulator Operator:	When directed by the Lead Examiner go to Run.

START TIME: ____________

OST-1056 Section 7.2 step 1

Performance Step: 1 **Ensure** the Airborne Radioactive Removal and Normal Purge Systems are shutdown per OP-168.

Standard: Initials step 1 (part of initial conditions)

Comment: **IF the candidate goes to look for OP-168 remind them of the initial conditions stating that it has been completed.**

OST-1056 Section 7.2 step 2

Performance Step: 2 Referring to Attachment 2, test all valves listed per the following instructions:

Standard: Reviews Attachment 2 and identifies the valves to be tested in accordance with step 7.2.2

Comment:

OST-1056 Attachment 2

Performance Step: 3 All spaces next to valve number shall be filled in with initials, data or N/A as applicable.

Standard: Operator reads and placekeeps information

Comment:

Evaluator Note:	The following JPM steps identify the actions required to stroke time each valve which is performed in pairs, and based on the Attachment 2 stroke timing of the valve pairs may not be required in both the OPEN and the SHUT directions. The second operator will provide a cue that is less than the time that the operator gets while stroking his/her valve for the following valves, 1CP-9, and CB-D51-SA-1.

OST-1056 NOTE prior to step 7.2.2.a

Performance Step: 4

- When multiple components are controlled by a single control switch, the timing of all the components should be performed concurrently using a different individual to time each component. This eliminates the need to perform multiple stroke time tests which could result in pre-conditioning of the components and invalidation of the stroke times.
- If an Air-Operated Valve must be operated to place it in its pre-test position, allow at least one minute for pressure in the actuator to stabilize before performing stroke timing.
- The following components are operated from the same switch:
    - 1CP-5 and 1CP-9
    - 1CP-3 and 1CP-6
    - 1CB-2 and CB-D51SA
    - 1CB-6 and CB-D52SB

Standard: Operator reads and placekeeps at any procedure note or caution

Comment:

OST-1056 Step 7.2.2.a

Performance Step: 5 Ensure the valve to be tested is aligned to the pretest position.

1CP-5:
1CP-9:

Standard: Locates the following valves

1CP-5:

1CP-9:

and ensures all valves indicate they are in the correct Pretest Position – SHUT

Comment: **NOTE: this check is completed for each group of valves prior to testing the single switch paired valves**

OST-1056 Step 7.2.2.b

Performance Step: 6 INITIAL for Pretest Position on Attachment 2.

Standard: Refers to Attachment 2 and initials the pretest position for

1CP-5:

1CP-9:

as SHUT

Comment:

OST-1056 Notes prior to step 7.2.2.c

Performance Step: 7

- 1CB-2 and 1CB-6 must be timed in both directions.
- When 1CB-2 and 1CB-6 are stroked open, they will automatically stroke closed when switch is released if Containment D/P is less negative than -0.25 INWC. The control switch may be held in OPEN while recording data until personnel are ready to perform stroke CLOSE testing. If these valves are allowed to SHUT prior to obtaining required data, reopening could result in pre-conditioning and invalidation of the results.

Standard: Operator reads and placekeeps at any procedure note or caution

Comment:

Evaluator Note:	Since the valves can be stroke timed in any order the procedure is written to have all of the valves listed in each step. The person performing the test should choose to test the valve in the following order based on the initial conditions 1CP-5 and 9, then 1CB-2 and CB-D51SA-1 then 1CP-3 and 6, and then 1CB-6 and CB-D52SB-1. This JPM is written to this order.

OST-1056 Step 7.2.2.c

√ **Performance Step: 8**

SIMULTANEOUSLY PERFORM the following:

- PLACE the control switch for the valve being tested to the position opposite the pretest position.

  1CP-5:
  1CP-9:

- IF timing the valve in this direction, THEN START the stopwatch.

Standard: Locates the control switch ***1CP-5 and 1CP-9*** and places the switch in the OPEN position (not timed).

Comment:

OST-1056 Step 7.2.2.d

Performance Step: 9

IF timing the valve in this direction, THEN:

- WHEN the valve has completed its travel as indicated by a singular position indicating light for the demanded position (no dual indication), THEN stop the stopwatch

Standard:

N/A - not timing the valve in the OPEN direction for

1CP-5 &1CP-9

Comment:

OST-1056 Step 7.2.2.e

√ **Performance Step: 10**

SIMULTANEOUSLY PERFORM the following:

- PLACE the control switch for the valve being tested to the pretest position shown on Attachment 2.
- START the stopwatch.

Standard:

Places the control switch for ***1CP-5 and 1CP-9*** in the SHUT position while operating the stopwatch.

Comment:

OST-1056 Step 7.2.2.f

√ **Performance Step: 11**

WHEN the valve has completed its travel as indicated by a singular position indicating light for the demanded position (no dual indication), THEN stop the stopwatch.

Standard:

When ***1CP-5 and 1CP-9*** have completed travel as indicated by a singular position indicating light for the demanded position (no dual indication).

Stops operation of the stopwatch.

Comment:

OST-1056 Step 7.2.2.g

Performance Step: 12 RECORD valve stroke time on Attachment 2.

Standard: Documents the appropriate “stroke time (sec)” space in the Full Stroke Test column of Attachment 2.

Comment:

Operator Cue:	**When asked for the stoke time of 1CP-X report a time that does not exceed the allowable stroke time but is close to the time that the candidate has just recorded:** **“I have a stroke time of X:XX seconds”.**

OST-1056 Step 7.2.2.h

Performance Step: 13 INITIAL the fail-safe column on Attachment 2.

Standard: Initials the 1CP-5 and 9, “Position Verified” space of the Fail Safe Test column on Attachment 2.

Comment:

OST-1056 Step 7.2.2.i

Performance Step: 14 INITIAL for the full stroke test on Attachment 2 as verification of satisfactory valve operation (as previously performed per Step 2.a through 2.f above).

Standard: Initials the 1CP-5 and 9, “Verification of Travel by” space in the Full Stroke Test column of Attachment 2.

Comment:

OST-1056 Step 7.2.2.j

Performance Step: 15 Ensure the valve is in the post-test position per Attachment 2.

Standard: Refers to Attachment 2 and determines 1CP-5 and 1CP-9, are in the required SHUT position for posttest position

Comment:

OST-1056 Step 7.2.2.k

Performance Step: 16 INITIAL for Posttest Position on Attachment 2.

Standard: Refers to Attachment 2 and initials 1CP-5 and 1CP-9, are in the required SHUT position for posttest position

Comment:

OST-1056 Step 7.2.2.l

Performance Step: 17 **REPEAT** Steps 2.a through 2.k above for all remaining valves to be tested per Attachment 2.

Standard: Refers to Attachment 2 and repeats steps 2.a through 2.k for the remaining valves

- 1CB-2 and CB-D51SA

Comment:

Evaluator Cue:	**Candidate may request an IV. Per initiating cue: During the performance of this OST, an IV will only confirm observation of your actions.**

OST-1056 Step 7.2.2.a

Performance Step: 18 Ensure the valve to be tested is aligned to the pretest position.

1CB-2:
CB-D51SA-1:

Standard: Locates the following valves
1CB-2:
CB-D51SA-1:
and ensures all valves indicate they are in the correct Pretest Position – SHUT

Comment: **NOTE: this check is completed for each group of valves prior to testing the single switch paired valves**

OST-1056 Step 7.2.2.b

Performance Step: 19 INITIAL for Pretest Position on Attachment 2.

Standard: Refers to Attachment 2 and initials the pretest position for
1CB-2:
CB-D51SA-1:
as SHUT

Comment:

OST-1056 Notes prior to step 7.2.2.c

Performance Step: 20

- 1CB-2 and 1CB-6 must be timed in both directions.
- When 1CB-2 and 1CB-6 are stroked open, they will automatically stroke closed when switch is released if Containment D/P is less negative than -0.25 INWC. The control switch may be held in OPEN while recording data until personnel are ready to perform stroke CLOSE testing. If these valves are allowed to SHUT prior to obtaining required data, reopening could result in pre-conditioning and invalidation of the results.

Standard: Operator reads and placekeeps at any procedure note or caution

Comment:

OST-1056 Step 7.2.2.c

√ **Performance Step: 21** SIMULTANEOUSLY PERFORM the following:

- PLACE the control switch for the valve being tested to the position opposite the pretest position.

  1CB-2:
  CB-D51SA-1:

- IF timing the valve in this direction, THEN START the stopwatch.

Standard: Locates the control switch ***1CB-2 and CB-D51SA-1*** and places the switch in the OPEN position while operating stopwatch.

Comment:

Evaluator Note:	**When testing 1CB-2 OR 1CB-6 in the OPEN position, Operator should wait 1 minute prior to shutting 1 CB-2 OR 1CB-6** √ **Critical when testing 1 CB-2 or 1CB-6**

OST-1056 Step 7.2.2.d(1)

√ **Performance Step: 22**

IF timing the valve in this direction, THEN:
- WHEN the valve has completed its travel as indicated by a singular position indicating light for the demanded position (no dual indication), THEN stop the stopwatch

Standard:

When 1CB-2 and CB-D51SA-1 have completed travel as indicated by a singular position indicating light for the demanded position (no dual indication).

Stops operation of the stopwatch.

Comment:

Evaluator Note:	**When testing 1CB-2 and 1CB-6 these valves will be stroke timed OPEN and SHUT. If Containment pressure is NOT less negative than -0.25 INWC the student will have to hold the control switch in OPEN while recording data.**

OST-1056 Step 7.2.2.d(2)

Performance Step: 23

RECORD valve stroke time on Attachment 2.

Standard:

Documents the appropriate “stroke time (sec)” space in the Full Stroke Test column of Attachment 2 for ***1CB-2***.

Comment:

OST-1056 Step 7.2.2.d(3)

√ **Performance Step: 24**

IF 1CB-2 or 1CB-6 were stroked OPEN, THEN wait at least 1 minute before continuing to allow actuator pressure to stabilize.

Standard:

When ***1CB-2 and CB-D51SA-1*** have stroked OPEN, THEN wait at least 1 minute before continuing to allow actuator pressure to stabilize.

Comment:

OST-1056 Step 7.2.2.e

√ **Performance Step: 25**

SIMULTANEOUSLY PERFORM the following:

- PLACE the control switch for the valve being tested to the pretest position shown on Attachment 2.
- START the stopwatch.

Standard:

Places the control switch for ***1CB-2 and CB-D51SA-1*** to the SHUT position while operating the stopwatch.

Comment:

OST-1056 Step 7.2.2.f

√ **Performance Step: 26**

WHEN the valve has completed its travel as indicated by a singular position indicating light for the demanded position (no dual indication), THEN stop the stopwatch.

Standard:

When 1CB-2 and CB-D51SA-1 have completed travel as indicated by a singular position indicating light for the demanded position (no dual indication).

Stops operation of the stopwatch.

Comment:

OST-1056 Step 7.2.2.g

Performance Step: 27 RECORD valve stroke time on Attachment 2.

Standard: Documents the appropriate "stroke time (sec)" space in the Full Stroke Test column of Attachment 2.

Comment:

Operator Cue:	**When asked for the stoke time of *CB-D51SA-1* report a time that does not exceed the allowable stroke time but is close to the time that the candidate has just recorded:** **"I have a stroke time of X:XX seconds"**

OST-1056 Step 7.2.2.h

Performance Step: 28 INITIAL the fail-safe column on Attachment 2.

Standard: Initials the 1CB-2 and CB-D51SA-1, "Position Verified" space of the Fail Safe Test column on Attachment 2.

Comment:

OST-1056 Step 7.2.2.i

Performance Step: 29 INITIAL for the full stroke test on Attachment 2 as verification of satisfactory valve operation (as previously performed per Step 2.a through 2.f above).

Standard: Initials the 1CB-2 and CB-D51SA-1, "Verification of Travel by" space in the Full Stroke Test column of Attachment 2.

Comment:

OST-1056 Step 7.2.2.j

Performance Step: 30 Ensure the valve is in the post-test position per Attachment 2.

Standard: Refers to Attachment 2 and determines 1CB-2 and CB-D51SA-1, are in the required SHUT position for posttest position

Comment:

OST-1056 Step 7.2.2.k

Performance Step: 31 INITIAL for Posttest Position on Attachment 2.

Standard: Refers to Attachment 2 and initials 1CB-2 and CB-D51SA-1, are in the required SHUT position for posttest position

Comment:

Evaluator Cue:	**After data entry is completed for the Train A valves (1CP-5, 1CP-9, 1CB-2 and CB-D51SA-1) announce "Another Operator will complete the remainder of the OST":** **This JPM is complete.** **END OF JPM Direct Simulator Operator to go to FREEZE**

STOP TIME: ______________

Simulator Operator:	***When directed by the Lead Examiner go to FREEZE.***

Evaluator Note:	**The students' progress can be followed using Attachment 2 Valve Test Data Sheet (Next page).** **Use the table to follow the students' progress in the JPM.**

ATTACHMENT 2
Page 1 of 2

Valve Test Data Sheet

All spaces next to valve number shall be filled in with initials, data or N/A as applicable. .... ☐

PRETEST ALIGNMENT			FULL STROKE TEST				FAIL SAFE TEST		POSTTEST ALIGNMENT			REF VALUE (sec)	ACCEPTANCE CRITERIA (SEC)					
			Verification of Travel by (INIT)		Stroke Time (SEC)								CODE CRITERIA				LIMITING VALUE	
													OPEN		SHUT			
Valve Number	Pretest Position	Init	Stem	Ind Lights	OPEN	SHUT	Fail Safe Position	Position Verified	Posttest Position	Pos Init	Verf Init	SHUT OPEN	Low	High	Low	High	OPEN	SHUT
1CP-5	SHUT		N/A		N/A		SHUT		SHUT			2.00 N/A	N/A	N/A	1.00	3.00	N/A	3.50
1CP-9	SHUT		N/A		N/A		SHUT		SHUT			2.00 N/A	N/A	N/A	1.00	3.00	N/A	3.50
1CP-3	SHUT		N/A		N/A		SHUT		SHUT			2.30 N/A	N/A	N/A	1.15	3.45	N/A	3.50
1CP-6	SHUT		N/A		N/A		SHUT		SHUT			2.18 N/A	N/A	N/A	1.09	3.27	N/A	3.50
1CB-2	SHUT		N/A				SHUT		SHUT			4.08 2.31	1.16	3.46	2.04	5.00	5.00	5.00
CB-D51SA-1	SHUT		N/A			N/A	SHUT		SHUT			N/A	N/A	N/A	N/A	N/A	10.00	N/A
1CB-6	SHUT		N/A				SHUT		SHUT			4.09 2.09	1.05	3.13	2.05	5.00	5.00	5.00
CB-D52SB-1	SHUT		N/A			N/A	SHUT		SHUT			N/A	N/A	N/A	N/A	N/A	10.00	N/A

VERIFICATION OF COMPLETION

Job Performance Measure No.: 2018 NRC Exam Simulator JPM CR e

Containment Ventilation Isolation Valve ISI Test Quarterly Interval Modes 1 - 6

IAW OST-1056, Containment Ventilation Isolation Valve ISI Test Quarterly Interval Modes 1 – 6

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 Unit is operating at 100 percent power • OST-1056 is being performed to test the operability of the Containment ventilation isolation valves per the ISI program • Airborne Radioactive Removal & Normal Purge Systems were shutdown in accordance with OP-168, Containment Ventilation And Vacuum Relief

Initiating Cue:	• The CRS has directed you to perform Section 7.2 of OST 1056 beginning with the Train A components (1CP-5 and 1CP-9, 1CB-2 and CB-D51SA) and then the Train B components (1CP-3 and 1CP-6, 1CB-6 and CB52SB). • **During the performance of this OST, any additional component timing will be performed by a second operator.** • **All IV's will only confirm observation of your actions.**

Facility:	Harris Nuclear Plant	Task No.:	301194H601
Task Title:	Restoration of Offsite Power to Emergency Buses (EOP ECA-0.0)	JPM No.:	2018 HNP NRC Exam Simulator JPM CR f
K/A Reference:	055 EA1.07 RO 4.3 SRO 4.5	**ALTERNATE PATH - YES**	
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 unit was operating at 100% power • 'A' EDG is under clearance due to a failure that caused the Generator field to not flash during OST-1013 Subsequently: • A failure of a transmission line on the Duke grid resulted in the cascading trip of several units which resulted in low grid frequency • The HNP unit has experienced a loss of offsite power • 'B' EDG failed to start. The problem is being investigated • The crew entered ECA-0.0, Loss Of All AC Power • The load dispatcher has contacted HNP and informed the MCR that the grid is now stable

Initiating Cue:	• Your position is the BOP • The CRS has directed you to restore offsite power to a (one) AC emergency bus using ECA-0.0 Attachment 1. • The Load Dispatcher has given permission to restore offsite power to 6.9 KV buses and to reset any tripped Start Up XFMR lockout relays.

Evaluator Note:	**Prior to starting this JPM position a second board operator at the OATC desk. The second board operator will be silencing annunciators not related to the initiating event. Provide the candidate a copy of ECA-0.0 Attachment 1.**

Task Standard: Energizing ONE Emergency Bus from the SUT (either the 1A-SA energized or 1B-SB energized)

Required Materials: None

General References: EOP-ECA-0.0, Attachment 1, Rev. 7

Time Critical Task: NO

Validation Time: 15 Minutes

CRITICAL STEP JUSTIFICATION	
Step 15	Critical to place synchronizer control switch to proper position to allow closing breaker in next step.
Step 16	Critical to close Start Up XFMR B To Aux Bus E Breaker 121, without the breaker being closed power cannot be restored to Emergency Bus B-SB.
Step 18	Critical to close breaker 124 for Aux Bus E To Emergency Bus B-SB, without the breaker being closed power cannot be restored to Emergency Bus B-SB.
Step 20	Critical to place synchronizer control switch to proper position to allow closing breaker in next step.
Step 21	Critical to close tie breaker 125 for Emergency Bus B-SB To Aux Bus E, without the breaker being closed power cannot be restored to Emergency Bus B-SB.
Step 23	Critical to close Emergency Bus B-SB To XFMR B1-SB Breaker B1 A-SB and Emergency Bus B-SB To XFMR B3-SB Breaker B3 A-SB to supply power to safeguards emergency equipment.

2018 NRC Exam - SIMULATOR SETUP

Simulator Operator

- Reset to IC-170
- Password "NRC2018"
- Hang clearance tags on 1A-EDG
- Protect Equipment IAW OMM-001
  - Protected Train Equipment Tags on:
    - B-SB EDG Start Switch
    - B-SB Fuel Oil Transfer Pump Switch
    - Breaker 52-1, Breaker 52-2 and Breaker 52-3

Equipment Unavailable	Equipment to be Protected	Notes
'A-SA' EDG	'B-SB' EDG 'B-SB' EDG Output breaker 126 'B-SB' DFO Transfer Pump Room 'B' Train PICs SWYD Components (Modes 1-4) 'A' SUT	SWYD Components are: Breakers 52-1, 52-2, 52-3, and Line Panels 5,6, and 7. 'B' Train PICs: 2, 4, 10, 14, and 18

- (**IF NEEDED**) The 86 relays <u>should</u> roll when the simulator is placed in run. If not then run the APP file "Roll 86 Gen" or they can be manually overridden with override LO's
  - XGAO018A GEN LOCKOUT G1A-TRIP COIL ON
  - XGBO017A GEN LOCKOUT G1B-TRIP RELAY ON
- Go to RUN
- Silence and Acknowledge annunciators

GO TO FREEZE and inform the lead examiner the Simulator is ready. DO NOT GO TO RUN until directed by the lead examiner. (The examiner has provided to the candidate with initial conditions and the initiating cues prior to placing the simulator in RUN.)

The following setup information is how this exam IC was developed

- Reset to IC-19
- Place 1A-EDG under clearance
  - IRF DSG005 (n 0 0) LOCAL
  - IRF DSG006 (n 0 0) MAINTAIN
- Fail Emergency Bus A-SA to Aux Bus D Tie Breaker 105 SA **ASIS** (this will not allow the breaker to be manually closed from the MCB switch)
  - IOR XD1I066 (n 0 0) ASIS
- Fail Emergency Bus B-SB to Aux Bus E Tie Breaker 125 SB **ASIS** (this will not allow the breaker to be manually closed from the MCB switch)
  - IOR XD1I075 (n 0 0) ASIS
- Fail 1B-SB EDG to start
  - IMF DSG01 (n 0 0) B
- Loss of Offsite Power (trigger 1)
  - IMF EPS01 (1 0 0) W/O_DELAY

JPM IC development – continued

- Since Attachment 1 allows the operator to choose energizing either bus 'A' or 'B', malfunctions were developed to fail breakers 105 and 125 ASIS. The JPM is written to have ONLY one of the buses energize due to an problem with the opposite train breaker (alternate path development). When the candidate first attempts to close either breaker 105 or breaker 125 the breaker they initially choose will NOT close. They will then have to restore power to the other bus. The conditional triggers will clear the other breakers failure when the first breaker switch is taken to the CLOSE position.
- Create 2 trigger files (note these files will NOT need to be recreated I have saved them to the Simulator trigger file this is just how I did it)
    - Breaker104toclose
        - @xbbi073|JIS|DI.value==3
    - Breaker124toclose
        - @xbbi077|JIS|DI.value==3

- Open ET (Event Trigger Summary)

- On trigger 2 – click assign file then type in the following
    - Breaker104toclose
- Click – link command – then type in the following
    - dor xd1i075 (n 0 0) ASIS

- On trigger 3 – click assign file then type in the following
    - Breaker124toclose
- Click – link command – then type in the following
    - dor xd1i066 (n 0 0) ASIS

- Place the Simulator in Run – insert Trigger 1
    - Isolate Letdown
    - Adjust TDAFW flow to maintain AFW flow > 200 KPPH and NR levels rising to restore levels to between 25% to 50% (this may require adjusting TDAFW pump speed as necessary to raise flow)
    - Place the EDG 1B-SB emergency stop switch to EMERG STOP

- Delete the Loss of Offsite Power malfunction
    - DMF EPS01

- FREEZE and SNAP these conditions to your exam IC

Simulator Operator:	***When directed by the Lead Examiner go to Run.***

START TIME: ____________

Evaluator Note:	EOP ECA-0.0 Step 9 Directs energizing AC Emergency Buses from Offsite Power using Attachment 1 The attachment allows flexibility of energizing Emergency Bus ‘A’ with steps 2-8 or ‘B’ with steps 9-15. There isn’t a fault indicated on either bus so a candidate should NOT be suspecting that either bus has a fault. Since the JPM is going to be ran as an ALTERNATE PATH the candidate has the choice of attempting to re-energize either bus first. Either choice will yield a failure of energizing the first bus but will have a success path for energizing the second bus. Since there could be a decision made by the candidate on which bus to restore first the JPM has a Part A (steps 2-8) and Part B steps 9-15). IF the candidate starts with trying to energize the ‘A’ bus (more than likely) use Part A of the JPM. IF the candidate starts with trying to energize the ‘B’ bus (least likely – maybe suspects a fault due to failure of EDG ‘B’ to start) use Part B.

Common step for Part A and Part B

EOP-ECA-0.0 Attachment 1 - RESTORATION OF OFFSITE POWER TO EMERGENCY BUSES

Caution prior to step 1

Performance Step: 1 **CAUTION**

Tripping of a Start Up XFMR lockout relay indicates a major fault on the XFMR. Re‑energizing the XFMR may cause additional damage and should **NOT** be done without dispatcher's permission.

Standard: Operator reads and placekeeps at any procedure note or caution

Comment:

Common step for Part A and Part B

EOP ECA-0.0, Attachment 1, Step 1.a, b

Performance Step: 2

Obtain Load Dispatcher's permission prior to performing the following:

a. Restoring offsite power to 6.9 KV buses
b. Resetting any tripped Start Up XFMR lockout relays

Standard:

Information provided by CRS stated that the Load Dispatcher has provided permissions to restore offsite power to the 6.9 KV buses and reset any tripped Startup XFMR lockout relays

Comment:

EOP ECA-0.0, Attachment 1, Caution / Note prior to Step 2

Performance Step: 3

CAUTION

An AC Bus should **NOT** be re-energized if it is suspected the bus may be faulted.

NOTE

Steps 2 through 8 restore power to Bus A-SA and Steps 9 through 15 restore power to Bus B-SB.

Standard:

Operator reads and placekeeps at any procedure note or caution

Comment:

Part A, Energizing the ‘A’ Emergency Bus first starts on the next page

Part B, Energizing the ‘B’ Emergency Bus first starts on page 14

PART A – Attempting restoration of power to the 'A' Emergency Bus first

PART B – Attempting restoration of power to the 'B' Emergency Bus first **(go to page 14)**

EOP ECA-0.0, Attachment 1, Step 2.a

Performance Step: 4.a On Start Up XFMR Protective Relay Panel 1A, verify off‑site power to Start Up XFMR A:
a. Verify the Start Up XFMR 1A Lockout SU 1A Relay is reset.

Standard: Locates Startup XFMR 1A Lockout SU 1A Relay and verifies that the relay is reset.
(Relay is reset when – pistol grip position is up/down - center position - not to the trip position which would be on the left, AND the switch does NOT have an orange trip flag. The flag should be BLACK if reset)

Comment:

EOP ECA-0.0, Attachment 1, Step 2.b

Performance Step: 5.a b. Verify closed any of the following switch yard tie breakers to energize Start Up XFMR A:

- Breaker 52‑2
- Breaker 52‑3

Standard: Locates tie breaker switches for Startup XFMR A

- Breaker 52‑2 **(Verifies already closed)**
- Breaker 52‑3 **(Not required to be closed but may be closed w/o consequences)**

Comment:

EOP ECA-0.0, Attachment 1, Step 3.a

Performance Step: 6.a Restore offsite power to 6.9 KV Aux Bus D:

a. Place Start Up XFMR To Aux Buses A & D Synchronizer control switch to BREAKER 101 position.

Standard: Locates Synchronizer control switch for Start Up XFMR To Aux Buses A & D and places switch to Breaker 101 position

Comment:

EOP ECA-0.0, Attachment 1, Step 3.b

Performance Step: 7.a

b. Close Start Up XFMR A To Aux Bus D Breaker 101.

Standard: Locates switch for Start Up XFMR A To Aux Bus D Breaker 101 and places switch to CLOSE. **(RED LIGHT LIT)**

Comment:

EOP ECA-0.0, Attachment 1, Step 3.c

Performance Step: 8.a

c. Place Start Up XFMR To Aux Buses A & D Synchronizer control switch to OFF.

Standard: Locates Synchronizer control switch for Start Up XFMR To Aux Buses A & D and places switch to OFF

Comment:

EOP ECA-0.0, Attachment 1, Step 4

Performance Step: 9.a Verify Aux Bus D To Emergency Bus A‑SA Breaker 104 ‑ CLOSED

Standard: Locates Aux Bus D to Emergency Bus A-SA Breaker 104 switch and takes switch to CLOSE **(RED LIGHT LIT)**

Comment:

EOP ECA-0.0, Attachment 1, Step 5

Performance Step: 10.a Verify Diesel Generator A‑SA Breaker 106 A SA ‑ OPEN

Standard: Locates Diesel Generator A‑SA Breaker 106 A SA switch and verifies breaker is Open **(GREEN LIGHT LIT)**

Comment:

EOP ECA-0.0, Attachment 1, Step 6.a

Performance Step: 11.a Energize 6.9 KV Bus A‑SA:

a. Place Emergency Bus A‑SA To Aux Bus D Synchronizer control switch to SYNC.

Standard: Locates Synchronizer control switch for Emergency Bus A‑SA To Aux Bus D and places control to SYNC

Comment:

EOP ECA-0.0, Attachment 1, Step 6.b

Performance Step: 12.a b. Close Emergency Bus A‑SA To Aux Bus D Tie Breaker 105.

Standard: Locates switch for Emergency Bus A‑SA To Aux Bus D Tie Breaker 105 and takes switch to CLOSE.

(GREEN LIGHT STAYS LIT) – Reports to CRS that Emergency Bus A‑SA To Aux Bus D Tie Breaker 105 will not close

(may dispatch AO to investigate)

Evaluator Cue:	**Acknowledge report that Emergency Bus A‑SA To Aux Bus D Tie Breaker 105 will not close.**

Simulator Communicator:	**IF AO is dispatched: Acknowledge and repeat back communications to investigate breaker**

Evaluator NOTE:	**IF needed to get the candidate back on task: Ask for an estimation on when power will be restored to an Emergency Bus.**

Comment:

EOP ECA-0.0, Attachment 1, Step 9.a – Alternate Path Begins

Restoration of power from the Start Up XFMR 1B to the B-SB Emergency Bus

Performance Step: 13.a On Start Up XFMR Protective Relay Panel 1B, verify off‑site power to Start Up XFMR B:
a. Verify the Start Up XFMR 1B Lockout SU 1B Relay is reset.

Standard: Locates Startup XFMR 1B Lockout SU 1B Relay and verifies that the relay is reset. **(Relay is reset)**

Comment:

EOP ECA-0.0, Attachment 1, Step 9.b

Performance Step: 14.a b. Verify closed any of the following switch yard tie breakers to energize Start Up XFMR B:

- Breaker 52‑13
- Breaker 52‑14

Standard: Locates tie breaker switches for Startup XFMR B

- Breaker 52‑13 **(Not required to be closed but maybe closed w/o consequences)**
- Breaker 52‑14 **(Verifies already closed)**

Comment:

EOP ECA-0.0, Attachment 1, Step 10.a

✓ **Performance Step: 15.a** Restore offsite power to 6.9 KV Aux Bus E:

a. Place Start Up XFMR To Aux Buses B & E Synchronizer control switch to BREAKER 121 position.

Standard: Locates Synchronizer control switch for Start Up XFMR To Aux Buses B & E and places switch to Breaker 121 position

Comment:

EOP ECA-0.0, Attachment 1, Step 10.b

✓ **Performance Step: 16.a** b. Close Start Up XFMR B To Aux Bus E Breaker 121.

Standard: Locates switch for Start Up XFMR B To Aux Bus E Breaker 121 and places switch to CLOSE. **(RED LIGHT LIT)**

Comment:

EOP ECA-0.0, Attachment 1, Step 10.c

Performance Step: 17.a c. Place Start Up XFMR To Aux Buses B & E Synchronizer control switch to OFF.

Standard: Locates Synchronizer control switch for Start Up XFMR To Aux Buses B & E and places switch to OFF

Comment:

EOP ECA-0.0, Attachment 1, Step 11

✓ **Performance Step: 18.a** Verify Aux Bus E To Emergency Bus B‑SB Breaker 124 ‑ CLOSED

Standard: Locates Aux Bus D to Emergency Bus B-SB Breaker 124 switch and takes switch to CLOSE **(RED LIGHT LIT)**

Comment:

EOP ECA-0.0, Attachment 1, Step 12

Performance Step: 19.a Verify Diesel Generator B‑SB Breaker 126 B SB ‑ OPEN

Standard: Locates Diesel Generator B‑SB Breaker 126 B SB switch and verifies breaker is Open **(GREEN LIGHT LIT)**

Comment:

EOP ECA-0.0, Attachment 1, Step 13.a

✓ **Performance Step: 20.a** Energize 6.9 KV Bus B-SB:

a. Place Emergency Bus B-SB To Aux Bus E Synchronizer control switch to SYNC.

Standard: Locates Synchronizer control switch for Emergency Bus B-SB To Aux Bus E and places control to SYNC

Comment:

EOP ECA-0.0, Attachment 1, Step 13.b

✓ **Performance Step: 21.a**

b. Close Emergency Bus B-SB To Aux Bus E Tie Breaker 125.

Standard: Locates switch for Emergency Bus B-SB To Aux Bus E Tie Breaker 125 and takes switch to CLOSE. **(RED LIGHT LIT)**

Comment:

EOP ECA-0.0, Attachment 1, Step 13.c

Performance Step: 22.a

c. Place Emergency Bus B-SB To Aux Bus E Synchronizer control switch to OFF.

Standard: Locates Synchronizer control switch for Emergency Bus B-SB To Aux Bus E and places control to OFF

Comment:

Evaluator NOTE:	**IF the sequencer operates after the 1B-SB Bus is energized the following breakers will NOT close until LB-9 is actuated.**

EOP ECA-0.0, Attachment 1, Step 14

✓ **Performance Step: 23.a**

Close the following 6.9 KV breakers:
- Emergency Bus B‑SB To XFMR B1‑SB Breaker B1 A‑SB
- Emergency Bus B‑SB To XFMR B3‑SB Breaker B3 A‑SB

Standard:

- Locates control switch for Emergency Bus B‑SB To XFMR B1‑SB Breaker B1 A‑SB and places control to CLOSE **(RED LIGHT LIT)**
- Locates control switch for Emergency Bus B‑SB To XFMR B3‑SB Breaker B3 A‑SB and places control to CLOSE **(RED LIGHT LIT)**

Comment:

EOP ECA-0.0, Attachment 1, Step 15

Performance Step: 24.a

Verify 6.9 KV Emergency Bus B‑SB To XFMR B2‑SB Breaker B2 A‑SB ‑ CLOSED

Standard:

- Locates control switch for 6.9 KV Emergency Bus B‑SB To XFMR B2‑SB Breaker B2 A‑SB and verifies breaker is CLOSE **(RED LIGHT LIT)**

Informs CRS that power is restored to Emergency Bus B-SB

Evaluator Cue:	**Acknowledge any reports:** **After the 6.9 KV Emergency Bus B‑SB power is restored: Evaluation on this JPM is complete.** **I have the shift, END OF JPM** **Inform Simulator Operator to place the Simulator in Freeze.**

Comment:

STOP TIME: ______________

Simulator Operator:	**When directed by the Lead Examiner then go to Freeze.**

PART B – Attempting restoration of power to the 'B' Emergency Bus first

Restoration of power from the Start Up XFMR 1B to the B-SB Emergency Bus

Performance Step: 4.b

On Start Up XFMR Protective Relay Panel 1B, verify off‑site power to Start Up XFMR B:
a. Verify the Start Up XFMR 1B Lockout SU 1B Relay is reset.

Standard:

Locates Startup XFMR 1B Lockout SU 1B Relay and verifies that the relay is reset. **(Relay is reset)**

Comment:

EOP ECA-0.0, Attachment 1, Step 9.b

Performance Step: 5.b

b. Verify closed any of the following switch yard tie breakers to energize Start Up XFMR B:

- Breaker 52‑13
- Breaker 52‑14

Standard:

Locates tie breaker switches for Startup XFMR B

- Breaker 52‑13 **(Not required to be closed but maybe closed w/o consequences)**
- Breaker 52‑14 **(Verifies already closed)**

Comment:

EOP ECA-0.0, Attachment 1, Step 10.a

Performance Step: 6.b

Restore offsite power to 6.9 KV Aux Bus E:

d. Place Start Up XFMR To Aux Buses B & E Synchronizer control switch to BREAKER 121 position.

Standard:

Locates Synchronizer control switch for Start Up XFMR To Aux Buses B & E and places switch to Breaker 121 position

Comment:

EOP ECA-0.0, Attachment 1, Step 10.b

Performance Step: 7.b e. Close Start Up XFMR B To Aux Bus E Breaker 121.

Standard: Locates switch for Start Up XFMR B To Aux Bus E Breaker 121 and places switch to CLOSE. **(RED LIGHT LIT)**

Comment:

EOP ECA-0.0, Attachment 1, Step 10.c

Performance Step: 8.b f. Place Start Up XFMR To Aux Buses B & E Synchronizer control switch to OFF.

Standard: Locates Synchronizer control switch for Start Up XFMR To Aux Buses B & E and places switch to OFF

Comment:

EOP ECA-0.0, Attachment 1, Step 11

Performance Step: 9.b Verify Aux Bus E To Emergency Bus B‑SB Breaker 124 ‑ CLOSED

Standard: Locates Aux Bus D to Emergency Bus B-SB Breaker 124 switch and takes switch to CLOSE **(RED LIGHT LIT)**

Comment:

EOP ECA-0.0, Attachment 1, Step 12

Performance Step: 10.b Verify Diesel Generator B‑SB Breaker 126 B SB ‑ OPEN

Standard: Locates Diesel Generator B‑SB Breaker 126 B SB switch and verifies breaker is Open **(GREEN LIGHT LIT)**

Comment:

EOP ECA-0.0, Attachment 1, Step 13.a

Performance Step: 11.b Energize 6.9 KV Bus B-SB:

d. Place Emergency Bus B-SB To Aux Bus E Synchronizer control switch to SYNC.

Standard: Locates Synchronizer control switch for Emergency Bus B-SB To Aux Bus E and places control to SYNC

Comment:

EOP ECA-0.0, Attachment 1, Step 13.b

Performance Step: 12.b

e. Close Emergency Bus B-SB To Aux Bus E Tie Breaker 125.

Standard: Locates switch for Emergency Bus B-SB To Aux Bus E Tie Breaker 125 and takes switch to CLOSE.

(GREEN LIGHT STAYS LIT) – Reports to CRS that Emergency Bus B-SB To Aux Bus E Tie Breaker 125 will not close

(may dispatch AO to investigate)

Evaluator Cue:	**Acknowledge report that Emergency Bus B-SB To Aux Bus E Tie Breaker 125 will not close.**

Simulator Communicator:	**IF AO is dispatched: Acknowledge and repeat back communications to investigate breaker**

Evaluator NOTE:	**IF needed to get the candidate back on task: Ask for an estimation on when power will be restored to an Emergency Bus.**

Comment:

EOP ECA-0.0, Attachment 1, Step 2.a – Alternate Path Begins

Restoration of power from the Start Up XFMR 1A to the A-SA Emergency Bus

EOP ECA-0.0, Attachment 1, Step 2.a

Performance Step: 13.b On Start Up XFMR Protective Relay Panel 1A, verify off‑site power to Start Up XFMR A:
a. Verify the Start Up XFMR 1A Lockout SU 1A Relay is reset.

Standard: Locates Startup XFMR 1A Lockout SU 1A Relay and verifies that the relay is reset. **(Relay is reset)**

Comment:

EOP ECA-0.0, Attachment 1, Step 2.b

Performance Step: 14.b b. Verify closed any of the following switch yard tie breakers to energize Start Up XFMR A:

- Breaker 52‑2
- Breaker 52‑3

Standard: Locates tie breaker switches for Startup XFMR A

- Breaker 52‑2 **(Verifies already closed)**
- Breaker 52‑3 **(Not required to be closed but maybe closed w/o consequences)**

Comment:

EOP ECA-0.0, Attachment 1, Step 3.a

✓ **Performance Step: 15.b** Restore offsite power to 6.9 KV Aux Bus D:

d. Place Start Up XFMR To Aux Buses A & D Synchronizer control switch to BREAKER 101 position.

Standard: Locates Synchronizer control switch for Start Up XFMR To Aux Buses A & D and places switch to Breaker 101 position

Comment:

EOP ECA-0.0, Attachment 1, Step 3.b

✓ **Performance Step: 16.b**

e. Close Start Up XFMR A To Aux Bus D Breaker 101.

Standard: Locates switch for Start Up XFMR A To Aux Bus D Breaker 101 and places switch to CLOSE. **(RED LIGHT LIT)**

Comment:

EOP ECA-0.0, Attachment 1, Step 3.c

Performance Step: 17.b

f. Place Start Up XFMR To Aux Buses A & D Synchronizer control switch to OFF.

Standard: Locates Synchronizer control switch for Start Up XFMR To Aux Buses A & D and places switch to OFF

Comment:

EOP ECA-0.0, Attachment 1, Step 4

✓ **Performance Step: 18.b** Verify Aux Bus D To Emergency Bus A‑SA Breaker 104 ‑ CLOSED

Standard: Locates Aux Bus D to Emergency Bus A-SA Breaker 104 switch and takes switch to CLOSE **(RED LIGHT LIT)**

Comment:

EOP ECA-0.0, Attachment 1, Step 5

Performance Step: 19.b Verify Diesel Generator A‑SA Breaker 106 A SA ‑ OPEN

Standard: Locates Diesel Generator A‑SA Breaker 106 A SA switch and verifies breaker is Open **(GREEN LIGHT LIT)**

Comment:

EOP ECA-0.0, Attachment 1, Step 6.a

✓ **Performance Step: 20.b** Energize 6.9 KV Bus A‑SA:

b. Place Emergency Bus A‑SA To Aux Bus D Synchronizer control switch to SYNC.

Standard: Locates Synchronizer control switch for Emergency Bus A‑SA To Aux Bus D and places control to SYNC

Comment:

EOP ECA-0.0, Attachment 1, Step 6.b

✓ **Performance Step: 21.b**

c. Close Emergency Bus A‑SA To Aux Bus D Tie Breaker 105.

Standard:

Locates switch for Emergency Bus A‑SA To Aux Bus D Tie Breaker 105 and takes switch to CLOSE.
(RED LIGHT LIT)

Comment:

EOP ECA-0.0, Attachment 1, Step 6.c

Performance Step: 22.b

a. Place Emergency Bus A‑SA To Aux Bus D Synchronizer control switch to OFF.

Standard:

Locates Synchronizer control switch for Emergency Bus A‑SA To Aux Bus D and places control to OFF

Comment:

Evaluator NOTE:	**IF the sequencer operates after the 1A-SA Bus is energized the following breakers will NOT close until LB-9 is actuated.**

EOP ECA-0.0, Attachment 1, Step 7

✓ **Performance Step: 23.b**

Close the following 6.9 KV breakers:
- Emergency Bus A‑SA To XFMR A1‑SA Breaker A1 A‑SA
- Emergency Bus A‑SA To XFMR A3‑SA Breaker A3 A‑SA

Standard:

- Locates control switch for Emergency Bus A‑SA To XFMR A1‑SA Breaker A1 A‑SA and places control to CLOSE **(RED LIGHT LIT)**
- Locates control switch for Emergency Bus A‑SA To XFMR A3‑SA Breaker A3 A‑SA and places control to CLOSE **(RED LIGHT LIT)**

Comment:

EOP ECA-0.0, Attachment 1, Step 8

Performance Step: 24.b Verify 6.9 KV Emergency Bus A‑SA To XFMR A2‑SA Breaker A2 A‑SA ‑ CLOSED

Standard:

- Locates control switch for 6.9 KV Emergency Bus A‑SA To XFMR A2‑SA Breaker A2 A‑SA and verifies breaker is CLOSE **(RED LIGHT LIT)**

Informs CRS that power is restored to Emergency Bus A-SA

Evaluator Cue:	**Acknowledge any reports:** **After the 6.9 KV Emergency Bus A‑SA power is restored: Evaluation on this JPM is complete.** **I have the shift, END OF JPM** **Inform Simulator Operator to place the Simulator in Freeze.**

Comment:

STOP TIME: ______________

Simulator Operator:	**When directed by the Lead Examiner then go to Freeze.**

Job Performance Measure No.: 2018 HNP NRC Exam Simulator JPM f

Restoration of Offsite Power to Emergency Buses
In accordance with EOP ECA-0.0, Loss Of All AC Power, Attachment 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:	• The unit was operating at 100% power • 'A' EDG is under clearance due to a failure that caused the Generator field to not flash during OST-1013 Subsequently: • A failure of a transmission line on the Duke grid resulted in the cascading trip of several units which resulted in low grid frequency • The HNP unit has experienced a loss of offsite power • 'B' EDG failed to start. The problem is being investigated • The crew entered ECA-0.0, Loss Of All AC Power • The load dispatcher has contacted HNP and informed the MCR that the grid is now stable

Initiating Cue:	• Your position is the BOP • The CRS has directed you to restore offsite power to a (one) AC emergency bus using ECA-0.0 Attachment 1. • The Load Dispatcher has given permission to restore offsite power to 6.9 KV buses and to reset any tripped Start Up XFMR lockout relays.

Facility:	Harris Nuclear Plant	Task No.:	015005H401
Task Title:	Take an Excore NI Channel Out Of Service at Power (OWP-RP-26)	JPM No.:	2018 NRC Exam Simulator JPM CR g
K/A Reference:	015 A4.03 RO 3.8 SRO 3.9		**ALTERNATE PATH - NO**

Examinee: ______________________ NRC Examiner: ____________________

Facility Evaluator: ______________________ Date: ________

Method of testing:

Simulated Performance: ______ Actual Performance: X

Classroom ______ Simulator X Plant ________

Evaluator Note:	**The candidates should be briefed outside of the Simulator prior to performing this JPM. Provide them with a copy of OWP-RP-26, Reactor Protection .** **This will allow them to review the procedure and perform a task preview of the steps to remove the NI channel from service. Expect that the candidates will take about 5-10 minutes to complete this review.** ***Additionally – A second person should be available to monitor and silence annunciators not caused by the evolution.***

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 Unit is operating at 100 percent power • NI-44 has failed low

Initiating Cue:	The CRS has directed you to remove NI-44 from service per OWP-RP-26.

Task Standard: NI-44 removed from service in accordance with OWP-RP-26

Required Materials: OWP-RP-26, Rev. 17

General References: OWP-RP-26, Rev. 17

Time Critical Task: No

Validation Time: 15 minutes

Critical Step Justification	
Step 4	Placing rod bank selector switch to manual prevents inadvertent reactivity event with unnecessary auto rod movement.
Step 6	Must select correct switch and correct switch position for channel to defeat upper detector comparator
Step 7	Must select correct switch and correct switch position for channel to restore rod control system to allow auto rod control
Step 8	Must select correct switch and correct switch position for channel to defeat comparison of NI channels

2018 NRC Exam - SIMULATOR SETUP

Simulator Operator

- Reset to IC-171
- Password "NRC2018"
- Go to RUN
- Silence and Acknowledge annunciators

GO TO FREEZE and inform the lead examiner the Simulator is ready. DO NOT GO TO RUN until directed by the lead examiner. (The examiner has provided to the candidate with initial conditions and the initiating cues prior to placing the simulator in RUN.)

To recreate the IC setup for this JPM:

- Initial Simulator IC was IC-19
- Go to run
- Insert IMF NIS08D 0.0, PRNIS Channel 44 failed low
- Create Trigger 1

  Irf nis032 (1 0 0) disconnect

  NOTE: Running Trigger 1 will simulate disconnecting P312 from J312 at the rear of N44 Drawer A.

- Silence Acknowledge and Reset Annunciators
- Freeze and Snap these conditions to your exam IC

START TIME: ____________

Performance Step: 1 Obtain procedure (Provided by Examiner)

Standard: Obtains OWP-RP-26

Comment:

OWP-RP-26 Sheet 1

Performance Step: 2 Sheet 1 contains information on which component the OWP is written for, the scope, applicable requirements, precautions, the component lineup, testing requirements, testing action, component lineups restore, remarks and reviewed by.

Standard: Reads sheet 1 to ensure the correct component and scope is for N-44, reviews precautions, testing required on redundant equipment while NI-44 is inoperable and actions to restore to operability.

Comment:

Evaluator Cue:	**If needed, “LCO actions have already been addressed.”**

OWP-RP-26 Sheet 2

Performance Step: 3 NOTE: This OWP must be performed in order to prevent possible spurious rod motion or level control swings.

Standard: Reads and place keeps Notes or Cautions prior to performing step.

Comment:

OWP-RP-26 Sheet 2 continued

✓ **Performance Step: 4** On Main Control Board Check position:

- Rod Bank Selector switch – MANUAL ***(critical portion)***

Standard: Places Rod Bank Selector Switch in MANUAL.

-Voices OMM-001, Att. 13, Normal Bands and Trip Limits

-Control Band: Tavg within +/- 2°F of Tref

-Trip Limits: Tavg exceed +/- 10°F of Tref

Comment:

OWP-RP-26 Sheet 2 continued

Performance Step: 5 On Main Control Board check position:

FW Reg BYP Valve Controllers:

- FK-479.1 – MANUAL
- FK-489.1 – MANUAL
- FK-499.1 - MANUAL

Standard: Verifies all three SG FW Reg Bypass controllers are in MANUAL:

FK-479.1 ☐

FK-489.1 ☐

FK-499.1. ☐

Comment:

OWP-RP-26 Sheet 2 continued

✓ **Performance Step: 6** On Detector Current Comparator Drawer position:

- Upper Section Switch – to PR N44
- Lower Section Switch – to PR N44

Standard: Selects PR N44 on UPPER SECTION SWITCH ☐

Selects PR N44 on LOWER SECTION SWITCH ☐

Evaluator Note:	**Channel Defeat lights on drawer will illuminate.**

Comment:

OWP-RP-26 Sheet 2 continued

✓ **Performance Step: 7** On Miscellaneous Control and Indication Panel position:

- Rod Stop Bypass Switch – to Bypass PR N44
- Power Mismatch Bypass Switch – to PR N44

Standard: Selects BYPASS PR N44 on ROD STOP BYPASS SWITCH ☐

Selects BYPASS PR N44 on POWER MISMATCH BYPASS SWITCH ☐

Comment:

OWP-RP-26 Sheet 2 continued

✓ **Performance Step: 8** On Comparator and Rate Drawer position:

Comparator Channel Defeat Switch – to N44.

Standard: Selects N44 on the COMPARATOR CHANNEL DEFEAT switch ☐

Evaluator Note:	Defeat light on drawer illuminates. ALB-013-4-5, PR CH DEV annunciator alarm clears.

Comment:

OWP-RP-26 Sheet 2 continued

Performance Step: 9 NOTE: The purpose of the sign installed below is to alert personnel of tripped bistables that may not be obvious at the NI drawer. The wording in quotations is the recommended wording, but similar words may also be used.

Standard: Reads and place keeps note prior to performing step

Comment:

OWP-RP-26 Sheet 2 continued

Performance Step: 10 Sign stating “Bistables Tripped - OWP-RP in Affect”

Standard: Locates sign and places it in an obvious position on the NI drawer for NI-44.

Comment:

OWP-RP-26 Sheet 3

Performance Step: 11 NOTE: Concurrent verification is preferred in the following step.

At the rear of N44 Drawer A, disconnect P312 from J312

Contact Maintenance to disconnect leads

Standard: Calls Maintenance to disconnect cable at rear of N44 Drawer A and requests that second I&C person accompanies person lifting leads to perform Concurrent verification

Evaluator / Simulator Operator Cue:	**If candidate calls for Maintenance - acknowledge request with proper communications.** *** Inform the applicant that time compression is being used for I&C to report to MCR and that I&C is ready to disconnect leads.** **(Contact Simulator Operator to run Trigger 1 to simulate lifting leads)** **NOTE: The applicant may request that the step to disconnect the cable is initialed prior to continuing.** **IF SO then cue them to assume that the step is initialed.**

Simulator Operator:	**Run Trigger 1 (remote function nis032)** **This file simulates disconnecting P312 from J312.** **After the file is completed wait 10 seconds then report back that the disconnect P312 from J312 has been completed.**

Comment:

OWP-RP-26 Sheet 3 continued

Performance Step: 12 On completion of the above lineup, check the following.
On TSLB-4
PR P-8 NC44N (Window 3-4) ENERGIZED

Standard: Locates window 3-4 on TSLB-4 and initials “ENERGIZED” line

Comment:

OWP-RP-26 Sheet 3 continued

Performance Step: 13 On TSLB-4
PR P-7/P-10 NC44M (Window 4-4) ENERGIZED

Standard: Locates window 4-4 on TSLB-4 and initials “ENERGIZED” line

Comment:

OWP-RP-26 Sheet 3 continued

Performance Step: 14 On TSLB-4
PR LO PWR HI FLUX NC 44P (Window 5-4) ENERGIZED

Standard: Locates window 5-4 on TSLB-4 and initials “ENERGIZED” line

Comment:

OWP-RP-26 Sheet 3 continued

Performance Step: 15 On TSLB-4
PR LO PWR HI FLUX NC 44R (Window 6-4) ENERGIZED

Standard: Locates window 6-4 on TSLB-4 and initials “ENERGIZED” line

Comment:

OWP-RP-26 Sheet 3 continued

Performance Step: 16 On TSLB-4
PR HI FLUX RATE NC 44U/K (Window 7-4) ENERGIZED

Standard: Locates window 7-4 on TSLB-4 and initials “ENERGIZED” line

Comment:

OWP-RP-26 Sheet 3 continued

Performance Step: 17 On BYPASS PERMISSIVE LIGHTS Panel.
PR OVERPWR ROD WTHDRWL BLK BYPASS CHAN IV
(Window 3-8) ENERGIZED

Standard: Locates window 3-8 on BYPASS PERMISSIVE LIGHTS Panel and initials “ENERGIZED” line

Comment:

OWP-RP-26 Sheet 4

Performance Step: 18 On ERFIS Computer - After status lights have been checked, perform the following using the DR function.

ANM0123M - PWR RNG CHANNEL N44 Q3 1-MIN AVG

DELETED FROM PROCESSING

Standard: Uses the DR function on the ERFIS Computer and removes ANM0123M - PWR RNG CHANNEL N44 Q3 1-MIN AVG from processing

Comment:

OWP-RP-26 Sheet 4 continued

Performance Step: 19 On MAIN CONTROL BOARD: Circle appropriate position as determined by plant conditions.

ROD BANK SELECTOR Switch MAN/AUTO+

Standard: Checks Rod Bank Selector Switch position

(can circle MAN after cue provided)

Evaluator Cue:	**The applicant may determine that AUTO rod control can be accomplished - CUE them prior to obtaining OP-104, Rod Control.** **The CRS directs that the Rod Bank Selector Switch be left in MANUAL to support other plant activities.**

Comment:

OWP-RP-26 Sheet 4 continued

Performance Step: 20 FW Reg Byp Valve Controllers:

Circle appropriate position as determined by plant conditions:

FK-479.1 MAN/AUTO+

FK-489.1 MAN/AUTO+

FK-499.1 MAN/AUTO+

Standard: (Per current plant conditions)

Circles MAN for:

FK-479.1 MAN/AUTO+

FK-489.1 MAN/AUTO+

FK-499.1 MAN/AUTO+

Comment:

OWP-RP-26 Sheet 4 continued

Performance Step: 21 Reports to CRS

Standard: Reports to CRS that N44 has been removed from service in accordance with OWP-RP-26

Evaluator Cue:	**The CRS acknowledges that N44 has been removed from service in accordance with OWP-RP-26**

Comment:

Evaluator Cue:	**After lineup has been completed and the report provided to CRS this JPM is complete.** **Announce: I have the shift. END OF JPM** **Contact the Simulator Operator to place the Simulator in FREEZE.**

STOP TIME: _______________

Simulator Operator:	**When directed by the Evaluator place the Simulator in FREEZE.** **Note: When the Simulator is reset the ERFIS computer will reset and there is NO NEED to restore the point the candidate took out of processing.**

Job Performance Measure No.: 2018 NRC Exam Simulator JPM CR g

Place An Excore NI Channel Out Of Service in accordance with OWP-RP-26

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 Unit is operating at 100 percent power • NI-44 has failed low

Initiating Cue:	• The CRS has directed you to remove NI-44 from service per OWP-RP-26.

Facility:	Harris Nuclear Plant	Task No.:	301064H401
Task Title:	Respond to an Instrument Air Header Rupture at 50% power (AOP-017)	JPM No.:	2018 NRC Exam Simulator JPM CR h
K/A Reference:	APE 065 AA2.06 RO 3.6 SRO 4.2	**ALTERNATE PATH - NO**	

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 Unit is operating at 50% power during a startup • Startup is on hold due to chemistry concerns

Initiating Cue:	You are the OATC. Your directions are to maintain current plant conditions.

Evaluator Note:	***Prior to starting this JPM position a second board operator at the Shift Managers desk. The second board operator will take no actions during the initiating event prior to the Reactor Trip and completion of EOP-E-0 immediate actions. AFTER the immediate actions are completed by the candidate the second board operator will be introduced by the Evaluator and will be stabilizing the unit by controlling AFW and silencing annunciators not related to the initiating event.***

Task Standard:	Trips the Reactor and carries out immediate actions of EOP-E-0 and then continues the actions directed by AOP-017 for low air pressure
Required Materials:	AOP-017, Rev 40
General References:	AOP-017, Rev 40
Time Critical Task:	No
Validation Time:	15 min

CRITICAL STEP JUSTIFICATION	
Step 4	Identification of the need to trip the Reactor and carrying out the immediate actions of E-0 will place the plant in a known stable condition.
Step 16	The controllers listed in this attachment are positioned as specified by the operator at a point directed by the procedure main body, in order to ensure that the controlled devices will remain in an appropriate condition after restoring air pressure. At that point in the event, the operator can recover the systems in a controlled manner.
Step 17	Maintaining PRZ Pressure in a stable band allows the operator minimize the impact of the loss of air to the RCS in order to recover the systems in a controlled manner.
Step 18	The controllers listed in this attachment are positioned as specified by the operator at a point directed by the procedure main body, in order to ensure that the controlled devices will remain in an appropriate condition after restoring air pressure. At that point in the event, the operator can recover the systems in a controlled manner.
Step 19	The controllers listed in this attachment are positioned as specified by the operator at a point directed by the procedure main body, in order to ensure that the controlled devices will remain in an appropriate condition after restoring air pressure. At that point in the event, the operator can recover the systems in a controlled manner.

SIMULATOR SETUP

Simulator Operator

- Reset to IC-172
- Password "NRC2018"
- Plant status board updated per IC-5 data
- Initial conditions Reactor ~50% power
- Go to RUN
- Silence and Acknowledge annunciators

GO TO FREEZE and inform the lead examiner the Simulator is ready. DO NOT GO TO RUN until directed by the lead examiner. (The examiner has provided to the candidate with initial conditions and the initiating cues prior to placing the simulator in RUN.)

NOTE: Since the candidate will be using the Simulator copy of AOP-017 ensure that replacement copies are made prior to starting the JPM. REPLACE THE ENTIRE PROCEDURE AFTER EACH CANDIDATE COMPLETES THIS JPM.

To recreate the IC setup for this JPM:

- Initial Simulator IC was IC-5
- Go to run
- Disable 'A' and 'B' Air Compressors by shutting compressor discharge valves
- On Trigger 1 place a trip of the 'C' Air Compressor and an Instrument Air Header Rupture (severity of 100%)
  - ifr air002 (1 0 0) 0 0 0 (Air Comp 1A Disc Valve shut)
  - ifr air003 (1 0 0) 0 0 0 (Air Comp 1B Disc Valve shut)
  - imf air02 (1 0 0) 100 00:05:00 0 (Air header leak 100% 5 min ramp)
- On Trigger 2 place commands to turn off All Air Compressors
  - irf air012 (2 0 0) LOCKED_OFF (Air Comp 1A Locked Off)
  - irf air013 (2 0 0) LOCKED_OFF (Air Comp 1B Locked Off)
  - irf air020 (2 0 0)STOP (Air Compressor C Stop)
- On Trigger 3 place commands to Vent IA header per request by candidate (AFTER Instrument Air pressure is < 35 psig)
  - irf air024 (3 0 0) 100 0 0 (Opens IA-814 to 100%)

Simulator Operator:	**When directed by Lead Examiner go to Run** **10-15 seconds after the candidate assumes the watch, insert Trigger 1**

START TIME: ____________

Performance Step: 1

Responds to Instrument Air Header alarms

ALB-02-8-5, Computer Alarm Air Systems

- IF the alarm screen is checked the alarm is due to too many Air Compressors running

Standard: Diagnoses loss of Instrument air, enters AOP-017

Comment:

AOP-017, Note prior to Step 1

Performance Step: 2

- This procedure contains no immediate actions.
- FW regulating valves receive a shut signal when pressure falls to 60 psig on the Control Air header.
- PI-9751.1, Instrument Air Header Pressure, may not be indicative of pressure throughout the Instrument Air System. The plant should be monitored closely for possible spurious valve operations due to low system pressure.

Standard: Operator reads and placekeeps at any procedure note or caution

Comment:

AOP-017, Section 3.0 Step 1

Performance Step: 3 MAINTAIN BOTH of the following:

- ALL Steam Generator levels greater than 30% (YES)
- Main Feedwater flow to ALL Steam Generators (YES/NO)

NOTE: Depending on how long it takes the operator to get to this step (evaluating Air Compressors, dispatching AO's ect.), Main Feedwater could be lost and/or SG levels could be < 30% Narrow Range.

Standard: Determines all SG levels can/cannot be maintained greater 30% and Feedwater flow continues

Comment:

AOP-017, Section 3.0 Step 1 RNO

✓ **Performance Step: 4** TRIP the Reactor AND PERFORM EOP-E-0 while continuing with this AOP.

Standard: Trips the Reactor and begins to carry out the Immediate Actions of EOP-E-0 prior to an Automatic Reactor Trip occurring

- Verify the Reactor tripped (YES)
- Verify the Turbine tripped (YES)
- Emergency Buses energized from Offsite or the Diesels (YES)
- Safety Injection actuated or required (NO)

Evaluator Cue:	**Once the immediate actions of EOP-E-0 have been completed then inform the candidate that "Additional operators will perform actions of EOP-E-0, the CRS directs you to continue on with actions of AOP-017."**

Comment:

AOP-017, Section 3.0 Step 2

Performance Step: 5 CHECK Instrument Air pressure MAINTAINED ABOVE 35 PSIG.

Standard: Determines Instrument Air pressure is <35 psig

Evaluator / Simulator Operator Note:	**Candidates may direct AO's to check Instrument Air compressors and look for air leaks.** **Acknowledge any of the requests.**

Comment:

AOP-017, Section 3.0 Step 2.a RNO

Performance Step: 6 **PERFORM** the following:

a. PERFORM Attachment 8, Loss Of Instrument Air Pressure.

Standard: Transitions and implements AOP-017, Attachment 8, Loss Of Instrument Air Pressure

Comment:

AOP-017, Attachment 8 NOTE Prior to Step 1

Performance Step: 7 Depressurizing Instrument Air precludes spurious valve actuations.

Standard: Operator reads and placekeeps at any procedure note or caution

Comment:

AOP-017, Attachment 8, Step 1

Performance Step: 8 CHECK Instrument Air pressure LESS THAN 35 PSIG at any time during the event.

Standard: Reviews MCB indications or ERFIS trends and determines IA pressure is below 35 psig

Comment:

AOP-017, Attachment 8, Step 2

Performance Step: 9 STOP ALL air compressors.

Standard: Directs field operator to stop all air compressors.

Simulator Operator:	**When contacted, acknowledge direction to secure all Air Compressors – RUN TRG-2**

Comment:

AOP-017, Attachment 8, Step 3.a

Performance Step: 10 VENT Instrument Air System until depressurized.

a. TRACK valve status using OPS-NGGC-1308.

Standard: Reads step that local actions for valve manipulations must be documented and tracked using the appropriate tracking procedures.

Comment: **Note: The candidate may comment that they know these local actions performed to vent IA system should be document on AD-OP-ALL-0204, Attachment 2, Configuration Control Card which has replaced OPS-NGGC-1308.**

AOP-017 has not been updated to the new AD-OP-ALL procedure yet.

AOP-017, Attachment 8 NOTE Prior to Step 3.b

Performance Step: 11

Suggested vent points:
- Instrument Air Receiver or Breathing Air Receiver drains
- Any Instrument Air drain or vent
- Drawing 2165-S-0801 may be used to identify additional vent and drain points

Standard: Operator reads and placekeeps at any procedure note or caution

Comment:

AOP-017, Attachment 8, Step 3.b

Performance Step: 12

VENT Instrument Air System until depressurized.

b. VENT the system using multiple vent points.

Standard: Contacts TB AO to perform local actions to vent IA system. Verifies Instrument air system is completely depressurized by the rupture.

Comment:

Simulator Operator:	**IF contacted to vent the IA system, acknowledge direction to do this task and then – RUN TRG-3** **Monitor IA pressure and report back when pressure has lowered to 0 psig.** **NOTE: IA pressure will continue to lower to 0 psig if the system is vented or not**

AOP-017, Attachment 8, Step 4

Performance Step: 13 VERIFY SHUT ALL MSIVs and MSIV bypasses

Standard: Checks all three MSIVs and bypasses SHUT

SG 'A' MSIV 1MS-80 ☐ Bypass 1MS-81 ☐
SG 'B' MSIV 1MS-82 ☐ Bypass 1MS-83 ☐
SG 'C' MSIV 1MS-84 ☐ Bypass 1MS-85 ☐

Comment:

AOP-017, Attachment 8 NOTE Prior to Step 5

Performance Step: 14 The fail positions of critical valves controlled by Instrument Air can be determined from:

- Drawing 2165-S-0801
- Attachment 1, Fail Positions for Major Valves Controlled by Instrument Air

Standard: Operator reads and placekeeps at any procedure note or caution

Comment:

AOP-017, Attachment 8, Step 5

Performance Step: 15 REFER TO Attachment 2, Positioning MCB Controllers, AND PLACE listed controllers in the status indicated.

Standard: Transitions and implements AOP-017, Attachment 2, Positioning MCB Controllers

Comment:

AOP-017, Attachment 2, Step 1

✓ **Performance Step: 16** PLACE the following MCB controllers in MANUAL with ZERO demand:

- **FK-122.1, CHARGING FLOW**
- PK-464.1, STEAM DUMP HEADER PRESSURE CONTROLLER
- FK-605A1, RHR HEAT XCHG A BYPASS FLOW CONT
- FK-605B1, RHR HEAT XCHG B BYPASS FLOW CONT
- **PK-444C.1, LOOP A (PRZ Normal Spray)**
- **PK-444D.1, LOOP B (PRZ Normal Spray)**

Standard: Places each controller to MANUAL and lowers the demand to zero

- **FK-122.1, CHARGING FLOW** ☐
- PK-464.1, STEAM DUMP HEADER PRESSURE CONTROLLER
- FK-605A1, RHR HEAT XCHG A BYPASS FLOW CONT
- FK-605B1, RHR HEAT XCHG B BYPASS FLOW CONT
- **PK-444C.1, LOOP A (PRZ Normal Spray)** ☐
- **PK-444D.1, LOOP B (PRZ Normal Spray)** ☐

Comment: **Performance Step 16 items that are BOLDED and have a check box (3) are the CRITICAL STEPS.**

AOP-017, Attachment 2, Step 2

✓ **Performance Step: 17** **MAINTAIN** PZR pressure:

a. PLACE MCB controller PK444A, PRZ PRESS CONTROL, in MANUAL.
b. CONTROL PK444A OUTPUT between 15 and 35% (adjusted for C PZR HTR CONTROL).
c. MAINTAIN PZR pressure stable (within applicable control band).

Standard: Places controller to MANUAL and adjusts the demand output between 15 and 35%

(IAW OMM-001 Attachment 13 Control Bands and Trip Limits)

Control Band is 2210-2260 PSIG

Trip Limits: Low – 2050 PSIG, High – 2350 PSIG

Comment:

AOP-017, Attachment 2, Step 3

✓ **Performance Step: 18**

PLACE the following MCB controllers in MANUAL with ZERO demand:

- **FK-478, MAIN FW A REGULATOR**
- **FK-488, MAIN FW B REGULATOR**
- **FK-498, MAIN FW C REGULATOR**
- FK-479.1, MN FW A REG BYP
- FK-489.1, MN FW B REG BYP
- FK-499.1, MN FW C REG BYP

Standard:

Places each controller to MANUAL and lowers the demand to zero

- **FK-478, MAIN FW A REGULATOR** ☐
- **FK-488, MAIN FW B REGULATOR** ☐
- **FK-498, MAIN FW C REGULATOR** ☐
- FK-479.1, MN FW A REG BYP
- FK-489.1, MN FW B REG BYP
- FK-499.1, MN FW C REG BYP

Comment:

Performance Step 18 items that are BOLDED and have a check box (3) are the CRITICAL STEPS.

AOP-017, Attachment 2, Step 4

✓ **Performance Step: 19**

PLACE the following MCB controllers in MANUAL with 100% demand:

- HC-186.1, RCP SEAL WTR INJ FLOW
- HC-603A1, RHR HEAT XCHG A OUT FLOW CONT
- HC-603B1, RHR HEAT XCHG B OUT FLOW CONT

Standard:

Places each controller to MANUAL and raises the demand to 100%

- HC-186.1, RCP SEAL WTR INJ FLOW ☐
- HC-603A1, RHR HEAT XCHG A OUT FLOW CONT ☐
- HC-603B1, RHR HEAT XCHG B OUT FLOW CONT ☐

Examiner Cue:	**When candidate exits Attachment 2** **Announce: I have the shift, END of JPM** **Contact the Simulator Operator and place the Simulator in FREEZE.**

Comment:

STOP TIME: ________________

Simulator Operator:	**When directed by Lead Examiner go to Freeze**

VERIFICATION OF COMPLETION

Job Performance Measure No.: 2018 NRC Exam Simulator JPM CR h

Respond to a rupture in the Instrument Air Header at 50% power

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 Unit is operating at 50% power during a startup • Startup is on hold due to chemistry concerns

Initiating Cue:	• You are the OATC. • Your directions are to maintain current plant conditions.

Facility:	Harris Nuclear Station	Task No.:	344058H504, 344059H504
Task Title:	Manually isolate the SG “C” PORV and SHUT the SG “C” TDAFW Pump steam supply MOV	JPM No.:	2018 NRC Exam Inplant JPM i
K/A Reference:	APE 037 G2.1.30 RO 4.4 SRO 4.0	**ALTERNATE PATH - NO**	

Examinee: NRC Examiner:

Facility Evaluator: Date:

Method of testing:

Simulated Performance: X Actual Performance: ______

Classroom ______ Simulator ______ Plant X

READ TO THE EXAMINEE

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

Initial Conditions:	• The Unit was initially at 100% power when tube leakage developed in ‘C’ SG • The Reactor is now shutdown and the crew is currently performing AOP-016, Excessive Primary Leakage, Attachment 11, Plant Shutdown Actions for Primary-To-Secondary Leakage Action Level 2 and 3 • While attempting to isolate SG ‘C’, the SG ‘C’ PORV failed to fully SHUT from the MCB • SG ‘C’ pressure is 1015 psig

Initiating Cue:	• You are the Turbine Building AO and have been directed to locally shut 1MS-63, the SG “C” PORV block valve, per AOP-016, Attachment 11, Step 12.b RNO and report completion to the MCR

Task Standard: 1MS-63 (MS Line C PORV Isol Vlv) and 1MS-72 (MS "C" to Aux FW Turbine) manually shut

Required Materials: PPE is optional for AOP performance.
Locked valve key.

General References: AOP-016, EXCESSIVE PRIMARY LEAKAGE, Attachment 11, Rev 56

Handout: AOP-016, Attachment 11 step 12

Time Critical Task: No

Validation Time: 15 minutes

CRITICAL STEP JUSTIFICATION	
Steps 2 & 3	Terminates an uncontrolled release of radioactivity to the environment.

SIMULATOR SETUP

N/A – Inplant JPM

BEFORE YOU START THIS JPM

INPLANT JPM SAFETY CONSIDERATIONS:

CAUTION: EQUIPMENT MAY AUTO START OR MAY BE ENERGIZED

- SIMULATE ONLY - DO NOT OPERATE ANY ACTUAL PLANT EQUIPMENT!!!

Before entering the performance location of this JPM, ensure you **AND** the candidate have the proper PPE for the area you are going to go to or will travel through to get there.
Avoid contacting any plant equipment.
Follow ALARA practices in the RCA.
Do NOT remove ladders from their storage locations. Have the candidate simulate obtaining and using a ladder if one would be needed during the actual performance of this task.

NOTE:	**Add one minute for Take a Minute Core 4 checks.**

Evaluator:	**Provide candidate a copy of AOP-016, Attachment 11, Pages 47 – 49 with Step 12.a marked as complete and 12.b and 12.b RNO circled.**

Start time begins when the candidate is briefed outside of the Blue Heaven Conference Room

Log Start Time: ______________

AOP-016, Attachment 11, Step 12.b RNO

Performance Step: 1 WHEN leaking SG Pressure is less than 1145 PSIG, then verify the associated SG PORV SHUT.

Standard:

- Notes SG “C” Pressure < 1145 PSIG in Initial Conditions.

Comment:

AOP-016, Attachment 11, Step 12.b RNO

√ **Performance Step: 2** IF leaking SG(s) PORV(s) can NOT be SHUT, THEN LOCALLY SHUT the leaking SG(s) PORV Block valve(s).

Standard:

- Locates SG "C" PORV manual isolation valve 1MS-63.
- Simulates/discusses unlocking and rotating the valve handwheel in the clockwise direction until it is shut.
- Identifies rising stem is lowering while valve is shutting

Simulates contacting the MCR to report that 1MS-63 is shut.

Evaluator Cue:	**1MS-63 has stopped rotating in the clockwise direction and flow noise through the valve has ceased.** **Acknowledge report that 1MS-63 is shut** **MCR informs you that 1MS-72 will not shut and the TDAFW pump is operating. You are to locally isolate 1MS-72, MS Line C to Steam Driven AFW Turbine MOV per Attachment 11, Step 12.d RNO (2).** **IF asked the breaker for 1MS-72 is open you are to manually shut 1MS-72, 'C' SG TDAFW Steam Supply valve.**

Comment:

AOP-016, Attachment 11 – Step 12.d

√ **Performance Step: 3** SHUT leaking SG(s) steam supply valve to TDAFW pump:

- SG C: 1MS-72 SB

Standard:

- Locates 1MS-72
- Simulates depressing the clutch lever
- Simulates rotating the handwheel in the clockwise direction until it stops rotating.
- States that indication pointer is pointing to closed

Evaluator Cue:	• **The clutch lever is depressed.** • **The handwheel has stopped turning in the clockwise direction.** • **Indicator is showing "closed"**

Comment:

Performance Step: 4 **Report task completion to Control Room.**

Standard: Simulates contacting the MCR to report that 1MS-63 and 1MS-72 are closed.

Evaluator Cue:	**Acknowledge report. Evaluation on this JPM is complete.**

Comment:

STOP TIME: ________________

VERIFICATION OF COMPLETION

Job Performance Measure No.: 2018 NRC Exam Inplant JPM i

Manually isolate the SG “C” PORV and SHUT the SG “C” TDAFW Pump steam supply MOV

In accordance with AOP-016 Attachment 11

Examinee’s Name:

Date Performed:

Facility Evaluator:

Number of Attempts:

Time to Complete:

Question Documentation:

Question:

Response:

Result: SAT ______ UNSAT ______

Examiner’s Signature: ______________________________ Date: ____________________

BEFORE YOU START THIS JPM

<u>INPLANT JPM SAFETY CONSIDERATIONS:</u>

CAUTION: EQUIPMENT MAY AUTO START OR MAYBE ENERGIZED

- SIMULATE ONLY - DO NOT OPERATE <u>ANY</u> ACTUAL PLANT EQUIPMENT!!!

Before entering the performance location of this JPM, ensure you **<u>AND</u>** the examiner have the proper PPE for the area you are going to go to or will travel through to get there.
Avoid contacting any plant equipment.
Follow ALARA practices in the RCA.
Do NOT remove ladders from their storage locations. Simulate obtaining and using a ladder if one would be needed during the actual performance of this task.

Initial Conditions:	• The Unit was initially at 100% power when tube leakage developed in ‘C’ SG • The Reactor is now shutdown and the crew is currently performing AOP-016, Excessive Primary Leakage, Attachment 11, Plant Shutdown Actions for Primary-To-Secondary Leakage Action Level 2 and 3 • While attempting to isolate SG ‘C’, the SG ‘C’ PORV failed to fully SHUT from the MCB • SG ‘C’ pressure is 1015 psig

Initiating Cue:	• You are the Turbine Building AO and have been directed to locally shut 1MS-63, the SG “C” PORV block valve, per AOP-016, Attachment 11, Step 12.b RNO and report completion to the MCR

Facility:	Harris Nuclear Plant	Task No.:	061012H104
Task Title:	Reset the Turbine-Driven AFW Pump Mechanical Overspeed	JPM No.:	2018 NRC Exam In-Plant JPM j
K/A Reference:	061 A2.04 RO 3.4 SRO 3.8		**ALTERNATE PATH - NO**

Examinee: ____________________ NRC Examiner: ____________________

Facility Evaluator: ____________________ Date: ________

Method of testing:

Simulated Performance: X Actual Performance: _______

Classroom _______ Simulator _______ Plant X

READ TO THE EXAMINEE

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

Initial Conditions:	• The plant was manually tripped from 100% power due to a loss of the 'A' MFW pump. • DP-1B-SB is available • The Turbine-driven AFW pump is needed for plant cooldown but the pump tripped on overspeed. • The cause of the overspeed trip has been identified and corrected. • Main Steam to TDAFW Pump isolation valves 1MS-70 and 1MS-72 are shut. • The Mechanical Overspeed Trip Linkage is currently in the tripped position

Initiating Cue:	• You are the RAB AO. • The CRS has directed you to reset the Turbine-driven AFW pump mechanical overspeed trip linkage in accordance with OP-137, Auxiliary Feedwater System, Section 8.4. • All Initial Conditions are met.

Evaluator:	**At this time provide the student with a copy of OP-137, Section 8.4** **OP-137, Attachment 6 is posted locally and is acceptable procedural guidance for this task**

NOTE: Expect that the entry and exit from the RCA will add time to complete this JPM.

Task Standard:	The Turbine-driven AFW pump turbine trip and throttle valve is latched.
Required Materials:	Standard PPE
General References:	OP-137, Auxiliary Feedwater System, Rev. 45
Handout:	OP-137, Section 8.4, and Attachment 6, Rev. 45 Note: OP-137, Attachment 6 is also locally mounted on wall as an operator aid
Time Critical Task:	No
Validation Time:	15 minutes

SIMULATOR SETUP

N/A

This is an In-Plant JPM

CRITICAL STEP JUSTIFICATION	
Step 9	If the connecting rod is not properly positioned and locked in place the over speed reset cannot be accomplished.
Step 10	If the tappet nut is not held down properly and in the correct sequence the over speed trip cannot be reset.

BEFORE YOU START THIS JPM

<u>IN-PLANT JPM SAFETY CONSIDERATIONS:</u>

CAUTION: EQUIPMENT MAY AUTO START OR MAY BE ENERGIZED

- SIMULATE ONLY - DO NOT OPERATE <u>ANY</u> ACTUAL PLANT EQUIPMENT!!!

Before entering the performance location of this JPM, ensure you **<u>AND</u>** the candidate have the proper PPE for the area you are going to go to or will travel through to get there.
Avoid contacting any plant equipment.
Follow ALARA practices in the RCA.
Do NOT remove ladders from their storage locations. Have the candidate simulate obtaining and using a ladder if one would be needed during the actual performance of this task.

NOTE:	**Add one minute for Take a Minute Core 4 checks.**

Start time begins when the candidate is briefed outside the Waste Process Building 276' Elevation conference Room

START TIME: ____________

Reviews OP-137, Section 8.4 prior to task performance

OP-137, Section 8.4.1 Initial Conditions #1

Performance Step: 1 Mechanical Over speed Trip Linkage in the tripped position.

Standard:

Reviews OP-137, Section 8.4 prior to task performance

Inspects Mechanical over speed trip linkage and determines that the linkage is in the tripped position, and initials INITIAL CONDITION #1

(cause of the over speed trip was identified and corrected which was part of initial conditions provided in the JPM)

Evaluator Cue:	**The trip hook and latch lever are not engaged.**

Comment:

OP-137, Section 8.4.1 Initial Conditions
Note prior to initial conditions #2

Performance Step: 2 **NOTE:** Loss of B-SB DC Power is not considered "normal operation" in the following initial condition. If B-SB DC Power has been lost and cannot be restored then the following initial condition does not apply.

Standard: Reads and placekeeps the note

Comment:

OP-137, Section 8.4.1 Initial Conditions #2

Performance Step: 3 During normal operations, the cause of any over speed trip of the turbine-driven AFW pump has been investigated and corrected prior to resuming the operation of the pump.

Standard: Reads and initials Initial Condition #2

(cause of the over speed trip was identified and corrected which was part of initial conditions provided in the JPM)

Comment:

OP-137 Section 8.4.2 NOTES prior to step 1

Performance Step: 4 NOTE: Attachment 6 diagram may be used as a reference for nomenclature.

NOTE: If any of the following information is changed, Attachment 6 and local pump information should also be changed.

Standard: Operator reads and placekeeps notes

Comment:

OP-137 Section 8.4.2 step 1

Performance Step: 5 Verify the following valves are shut:

- 1MS-70 SA, MAIN STEAM B TO AUX FW TURBINE
- 1MS-72 SB, MAIN STEAM C TO AUX FW TURBINE

Standard: Status provided in Initial Conditions.

Evaluator's Cue:	**If the candidate contacts the MCR for status on 1MS-70 and 1MS-72 or is starting to go to the physical location of these Main Steam valves provide this cue:** **1MS-70 and 1MS-72 are shut** **(as provided on cue sheet)**

Comment:

OP-137 Section 8.4.2 step 2.a

Performance Step: 6 **IF** DP-1B-SB 125V DC Power is available,
THEN PERFORM the following steps:
CHECK the local red indicating lamp for TURBINE OVERSPEED TRIP is ON

Standard: Verifies that the red lamp is lit for the TURBINE OVERSPEED TRIP on the local control panel.

Evaluator's Cue:	(Lamp is located on Aux Feedwater Control Panel 1AF-E002) **The red TURBINE OVERSPEED TRIP lamp is lit.**

Comment:

OP-137 Section 8.4.2 step 2.b

Performance Step: 7 VERIFY the flat side of the tappet nut is aligned toward the tappet lever.

Standard: Verifies flat side of the tappet nut aligned toward the tappet lever.

Evaluator's Cue:	**The flat side of tappet nut is aligned toward the tappet lever.**

Comment:

OP-137 Section 8.4.2 NOTES prior to step 2.c

Performance Step: 8 NOTE: The next two Steps must be coordinated to ensure proper reset of the Trip and Throttle valve.

NOTE: If the local red indicating lamp for AFW TURBINE MECH O/S TRIP does not extinguish, it is an indication that one of the limit switches did not reset, and further investigation may be warranted.

Standard: Reads and placekeeps the notes

Comment:

OP-137 Section 8.4.2 step 2.c

√ **Performance Step: 9** PULL the connecting rod toward the Trip and Throttle valve until the rod locks in place AND the local red indicating lamp for TURBINE OVERSPEED TRIP is OFF.

Standard: Locates connecting rod and pulls it toward the trip/throttle valve.

Verifies rod locked in place AND the local red indicating lamp for TURBINE OVERSPEED TRIP is OFF.

Evaluator's Cue:	**The connecting rod is locked in place and the red indicating lamp for TURBINE OVERSPEED TRIP is OFF.** (Light is located on Aux Feedwater Control Panel 1AF-E002)

Comment:

OP-137 Section 8.4.2 step 2.d

√ **Performance Step: 10** PRESS DOWN AND HOLD the tappet nut in the fully seated position while releasing the connecting rod.

Standard: Presses down and holds the tappet nut in the fully seated position until the connecting rod is released.

Evaluator's Cue:	**The tappet remains fully seated and the connecting rod is locked in place.**

Comment:

OP-137 Section 8.4.2 step 2.e

Performance Step: 11 VERIFY the Trip and Throttle valve operator in the shut position by observing the T & T VALVE OPER CLOSED light on the Aux Feedwater Control Panel 1AF-E002.

Standard: Verifies trip/throttle valve operator is shut by observing indicating lights on local panel 1AF-E002.

Evaluator's Cue:	**The green shut light is ON and the red open light is OFF.** **(If necessary: Valve stem indication is at the shut position.)**

Comment:

OP-137 Section 8.4.2 step 2.f

Performance Step: 12 VERIFY the flat side of the tappet nut is against the tappet lever and fully seated.

Standard: Verifies flat side of the tappet nut against the tappet lever and fully seated.

Evaluator's Cue:	**The flat side of tappet nut is against the tappet lever and fully seated.**

Comment:

OP-137 Section 8.4.2 step 2.g

Performance Step: 13 VERIFY the latch lever is being held up by the trip hook.

Standard: Verifies latch lever is being held up by the trip hook.

Evaluator's Cue:	**The latch is being held up by the trip hook.**

Comment:

OP-137 Section 8.4.2 step 2.h

Performance Step: 14 VERIFY the AFW TURBINE MECH O/S TRIP light is extinguished on the AFW Control Panel 1AF-E002

Standard: Verifies TURBINE OVERSPEED TRIP light status on Panel 1AF-E002.

Evaluator's Cue:	**The TURBINE OVERSPEED TRIP light is extinguished.**

Comment:

OP-137 Section 8.4.2 step 2.i

Performance Step: 15 Notify the Control Room that the mechanical over speed linkage is reset and inform them they can now open the Trip and Throttle valve.

Standard: Simulates notifying the Control Room.

Evaluator's Cue:	**Acknowledge report.** **END OF JPM**

Comment:

STOP TIME: ______________

Job Performance Measure No.: 2018 NRC Exam In-Plant JPM j

Reset the Turbine-Driven AFW Pump Mechanical Overspeed
In accordance with OP-137, Auxiliary Feedwater System

Examinee's Name:

Date Performed:

Facility Evaluator:

Number of Attempts:

Time to Complete:

Question Documentation:

Question:

Response:

Result: SAT ______ UNSAT ______

Examiner's Signature: ______________________________ Date: ____________________

BEFORE YOU START THIS JPM

IN-PLANT JPM SAFETY CONSIDERATIONS:

CAUTION: EQUIPMENT MAY AUTO START OR MAYBE ENERGIZED

- SIMULATE ONLY - DO NOT OPERATE ANY ACTUAL PLANT EQUIPMENT!!!

Before entering the performance location of this JPM, ensure you **AND** the examiner have the proper PPE for the area you are going to go to or will travel through to get there.
Avoid contacting any plant equipment.
Follow ALARA practices in the RCA.
Do NOT remove ladders from their storage locations. Simulate obtaining and using a ladder if one would be needed during the actual performance of this task.

Initial Conditions:	• The plant was manually tripped from 100% power due to a loss of the 'A' MFW pump. • DP-1B-SB is available • The Turbine-driven AFW pump is needed for plant cooldown but the pump tripped on overspeed. • The cause of the overspeed trip has been identified and corrected. • Main Steam to TDAFW Pump isolation valves 1MS-70 and 1MS-72 are shut. • The Mechanical Overspeed Trip Linkage is currently in the tripped position

Initiating Cue:	• You are the RAB AO. • The CRS has directed you to reset the Turbine-driven AFW pump mechanical overspeed trip linkage in accordance with OP-137, Auxiliary Feedwater System, Section 8.4. • All Initial Conditions are met.

8.4. Resetting the Turbine-Driven AFW Pump Mechanical Over Speed Trip Linkage

8.4.1. Initial Conditions

1. Mechanical Over speed Trip Linkage in the tripped position. ______

NOTE: Loss of B-SB DC Power is not considered "normal operation" in the following initial condition. If B-SB DC Power has been lost and cannot be restored then the following initial condition does not apply.

2. During normal operations, the cause of any over speed trip of the turbine-driven AFW pump has been investigated and corrected prior to resuming the operation of the pump. ______

8.4.2. Procedural Steps

NOTE: Attachment 6 diagram may be used as a reference for nomenclature.
NOTE: If any of the following information is changed, Attachment 6 and local pump information should also be changed.

1. **VERIFY** the following valves are shut:
   - 1MS-70 SA, MAIN STEAM B TO AUX FW TURBINE ______
   - 1MS-72 SB, MAIN STEAM C TO AUX FW TURBINE ______

2. **IF** DP-1B-SB 125V DC Power is available,
   THEN PERFORM the following steps:
   a. **CHECK** the local red indicating lamp for AFW TURBINE MECH O/S TRIP is ON. ______
   b. **VERIFY** the flat side of the tappet nut is aligned toward the tappet lever. ______

8.4.2 Procedural Steps (continued)

> **NOTE:** The next two Steps must be coordinated to ensure proper reset of the Trip and Throttle valve.
>
> **NOTE:** If the local red indicating lamp for AFW TURBINE MECH O/S TRIP does not extinguish, it is an indication that one of the limit switches did not reset, and further investigation may be warranted.

c. **PULL** the connecting rod toward the Trip and Throttle valve until the rod locks in place **AND** the local red indicating lamp for AFW TURBINE MECH O/S TRIP is OFF. _______

d. **PRESS DOWN AND HOLD** the tappet nut in the fully seated position while releasing the connecting rod. _______

e. **VERIFY** the Trip and Throttle valve operator in the shut position by observing the T & T VALVE OPER CLOSED light on the Turbine Driven Auxiliary Feedwater Control Panel 1AF-E002. _______

f. **VERIFY** the flat side of the tappet nut is against the tappet lever and fully seated. _______

g. **VERIFY** the latch lever is being held up by the trip hook. _______

h. **VERIFY** the AFW TURBINE MECH O/S TRIP light is extinguished on the Turbine Driven Auxiliary Feedwater Control Panel 1AF-E002. _______

i. **OPEN** the Trip and Throttle valve from the MCB. _______

3. **IF** DP-1B-SB 125V DC Power is NOT available,
THEN PERFORM the following steps:

a. **ENGAGE** the TDAFW Trip and Throttle Valve manual operator. _______

b. **ROTATE** the hand-wheel in the SHUT direction until the Latch Lever is in the normal position (angled up). _______

c. **VERIFY** the flat side of the tappet nut is aligned toward the tappet lever. _______

8.4.2 Procedural Steps (continued)

> **NOTE:** The next two Steps must be coordinated to ensure proper reset of the Trip and Throttle valve.

d. **PULL** the connecting rod toward the Trip and Throttle valve until the rod locks in place. ______

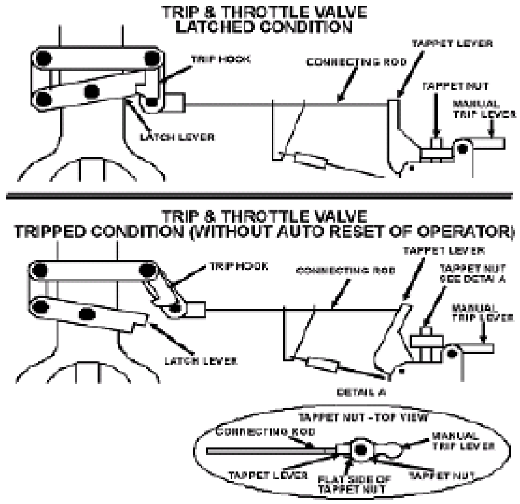
e. **PRESS DOWN AND HOLD** the tappet nut in the fully seated position while releasing the connecting rod. ______

f. **VERIFY** the flat side of the tappet nut is against the tappet lever and fully seated. ______

g. **VERIFY** the latch lever is being held up by the trip hook. ______

4. **IF** TDAFW pump operation is desired,
THEN GO TO Section 5.5 or 8.7. ______

Attachment 6 - Resetting the TDAFW Pump Mechanical Overspeed Trip Linkage
Sheet 1 of 2



<u>DP-1B-SB 125V DC Power Available</u>

1. **Verify** shut 1MS-70 and 1MS-72. _______
2. **Check** the local red indicating lamp for AFW TURBINE MECH O/S TRIP is ON. _______
3. **Verify** the flat side of the tappet nut is aligned towards the tappet lever. _______

NOTE:	The next two Steps must be coordinated to ensure proper reset of the Trip and Throttle Valve.
NOTE:	If the local red indicating lamp for AFW TURBINE MECH O/S TRIP does not extinguish, it is an indication that one of the limit switches did not reset, and further investigation may be warranted.

4. **Pull** the connecting rod toward the Trip and Throttle valve until the rod locks in place and the local red indicating lamp for AFW TURBINE MECH O/S TRIP is OFF. _______
5. **Press down and hold** the tappet nut in the fully seated position while releasing the connecting rod. _______
6. **Verify** the Trip and Throttle valve operator in the shut position by observing the T & T VALVE OPER CLOSED light on the Turbine Driven Auxiliary Feedwater Control Panel 1AF-E002. _______
7. **Verify** the flat side of the tappet nut is against the tappet lever and fully seated. _______
8. **Verify** the latch lever is being held up by the trip hook. _______
9. **Verify** the AFW TURBINE MECH O/S TRIP light is extinguished on the Turbine Driven Auxiliary Feedwater Control Panel 1AF-E002. _______
10. **Open** the Trip and Throttle Valve from the MCB. _______

Facility:	Harris Nuclear Plant	Task No.:	012010H101
Task Title:	Perform Local Actions For Placing a Tavg/ΔT Channel In TEST	JPM No.:	2018 NRC Exam In-plant JPM k
K/A Reference:	012 A4.04 RO 3.3 SRO 3.3		**ALTERNATE PATH - NO**

Examinee: ____________________ NRC Examiner: ____________________

Facility Evaluator: ____________________ Date: ________

Method of testing:

Simulated Performance: X Actual Performance: ______

Classroom ______ Simulator ______ Plant X

READ TO THE EXAMINEE	
I will explain the initial conditions, which steps to simulate or discuss, and provide initiating cues. When you complete the task successfully, the objective for this Job Performance Measure will be satisfied.	
Initial Conditions:	The unit is operating at 100% power when Loop 1 Hot Leg temperature input to Tavg and OTΔT failed low.

Initiating Cue:	• To meet Technical Specifications, the CRS is directing you to perform the local actions of OWP-RP-01 for troubleshooting and tripping bi-stables for Loop 1 Tavg/ΔT. • Trip status lights for all other channels are de-energized • Rod Control has been placed in Manual. • Your directions are to do the PIC Room part of OWP-RP-01, Channel I. • Position the Master Test Switches in Test for troubleshooting. • Inform the Control Room when all switches have been positioned to allow the Control Room to complete the actions required in the Control Room.

Evaluator:	**Provide candidate with a copy of the procedure now to review prior to getting to location of actions performed in this JPM**.

Task Standard: Place all Channel I PIC Cabinet Master Test switches and bistables in the Test position.

Required Materials: MCRS Key Locker PIC Cabinet Key PIC Key 26, 27, 28, 29, or 30

General References: OWP-RP-01, Reactor Protection Rev 17

Time Critical Task: No

Validation Time: 20 minutes

SIMULATOR SETUP

- N/A Evaluation will be performed by Simulating in plant activities.
- Cues will be provided to the candidate by the examiner.

Critical Step Justification	
Step 6	Must locate then place Master Test switch SW1 to proper position to perform testing and troubleshooting
Step 7	Must locate then place Master Test switch SW2 to proper position to perform testing and troubleshooting
Step 8	Must locate then place Master Test switch SW4 to proper position to perform testing and troubleshooting
Step 9	Must locate then place Master Test switch SW5 to proper position to perform testing and troubleshooting
Step 10	Must locate then place switch for BS1 to proper position to perform testing and troubleshooting
Step 11	Must locate then place switch for BS2 to proper position to perform testing and troubleshooting
Step 12	Must locate then place switch for BS3 to proper position to perform testing and troubleshooting
Step 13	Must locate then place switch for BS1 to proper position to perform testing and troubleshooting
Step 14	Must locate then place switch for BS2 to proper position to perform testing and troubleshooting
Step 15	Must locate then place switch for BS3 to proper position to perform testing and troubleshooting
Step 16	Must locate then place switch for BS4 to proper position to perform testing and troubleshooting

BEFORE YOU START THIS JPM

IN-PLANT JPM SAFETY CONSIDERATIONS:

CAUTION: EQUIPMENT MAY AUTO START OR MAY BE ENERGIZED

- SIMULATE ONLY - DO NOT OPERATE ANY ACTUAL PLANT EQUIPMENT!!!

Before entering the performance location of this JPM, ensure you **AND** the candidate have the proper PPE for the area you are going to go to or will travel through to get there.

Avoid contacting any plant equipment.
Follow ALARA practices in the RCA.
Do NOT remove ladders from their storage locations. Have the candidate simulate obtaining and using a ladder if one would be needed during the actual performance of this task.

NOTE:	Add one minute for Take a Minute Core 4 checks.

Start time begins when the candidate is briefed outside of the Blue Heaven Conference Room

START TIME: ____________

Performance Step: 1 **OBTAIN PROCEDURE and KEY FROM MCR KEY LOCKER**

Standard: Reviews provided OWP-RP-01 and refers to Section for Tavg/ΔT Channel I. Goes to MCR to obtain PIC Cabinet Key 26, 27, 28, 29 or 30 from the MCR Safety Key Locker.

Comment:

OWP-RP-01, Step 6

Performance Step: 2 PRECAUTION: To prevent a Reactor Trip, prior to removing a channel from service, verify the corresponding Trip Status lights for the other channels are de-energized.

Standard: Reviews precaution

Initial cue stated - **The corresponding Trip Status lights for the other channels are de-energized.**

Comment:

OWP-RP-01 TAVG/ΔT Protection Channel I - On MCB

Performance Step: 3 NOTE: The Rod Bank Selector should be restored last.

** For the purposes of this OWP, MAN can be any position on the Rod Bank Selector Switch except AUTO.

Standard: Reviews note

Comment:

OWP-RP-01

Performance Step: 4 On Main Control Board Place the Rod Bank Selector to MAN

Standard: Per initial conditions provided in this JPM the Rod Bank Selector is in MAN.

Evaluator Cue:	**If asked or if the candidate is heading for the Control room ask their intentions then state that the Control room reports rod bank selector is in manual.**

Comment:

Evaluator Note:	**There is a PIC room layout drawing in the PIC room that indicates where each cabinet is located. Additionally, the cabinet doors are hinged to open to the right. Since it is very difficult to see what the candidate is performing photos of the cabinet layout and close ups of the individual cards are included. If unable to view the candidates activities use the photos and ask them to show you which switches and how the switches will be manipulated.**

OWP-RP-01

Performance Step: 5

NOTE: Master Test switches may be positioned to TEST for troubleshooting. They are not required to be in TEST to meet Tech Specs. Operating these switches before operating the bistable switches aids in troubleshooting by maintaining system conditions the same as they were when the trouble occurred.

Concurrent verification is preferred while tripping bistable.

Standard:

Reviews note and Initiating Cue to determine that Master Test Switches are to be placed in TEST for troubleshooting

Evaluator Cue:	**For this JPM only, assume that concurrent verification is being performed and that verifier agrees with all actions you plan to take.**

Comment:

OWP-RP-01

✓ **Performance Step: 6**

In PIC 1 on Card C1-861: SW1 (TS/412F) Master Test Switch for TS/412D in TEST

Standard:

Locates Card C1-861 and places SW1 in TEST position (UP)

Evaluator Cue:	**SW1 IS IN THE UP - TEST POSITION.** (Toggle switch 1 of 7 on Card C1-861 image from top to bottom)

Comment:

OWP-RP-01

✓ **Performance Step: 7** In PIC 1 on Card C1-861: SW2 (TS/412G) Master Test Switch for TS/412B1 in TEST

Standard: Locates Card C1-861 and places SW2 in TEST position (UP)

Evaluator Cue: **SW2 IS IN THE UP - TEST POSITION.**
(Toggle switch 2 of 7 on Card C1-861 image from top to bottom)

Comment:

OWP-RP-01

✓ **Performance Step: 8** In PIC 1 on Card C1-863: SW4 (TS/412R) Master Test Switch for TS/412B2 in TEST

Standard: Locates Card C1-863 and places SW4 in TEST position (UP)

Evaluator Cue: **SW4 IS IN THE UP - TEST POSITION.**
(Toggle switch 4 of 7 on Card C1-863 image from top to bottom)

Comment:

OWP-RP-01

✓ **Performance Step: 9** In PIC 1 on Card C1-863: SW5 (TS/412S) Master Test Switch for TS/412B3

Standard: Locates Card C1-863 and places SW5 in TEST position (UP)

Evaluator Cue: **SW5 IS IN THE UP - TEST POSITION.**
(Toggle switch 5 of 7 on Card C1-863 image from top to bottom)

Comment:

OWP-RP-01

✓ **Performance Step: 10** In PIC 1 on Card C1-821: BS1 (TB/412D1 Low Tavg) in TEST

Standard: Locates Card C1-821 and places BS1 in TEST position (UP)

Evaluator Cue:	**BS1 IS IN THE UP - TEST POSITION and the red test light is lit.** (Toggle switch 1 of 3 on Card C1-821 image from top to bottom)

Comment:

OWP-RP-01

✓ **Performance Step: 11** In PIC 1 on Card C1-821: BS2 (TB/412D2 High Tavg) in TEST

Standard: Locates Card C1-821 and places BS2 in TEST position (UP)

Evaluator Cue:	**BS2 IS IN THE UP - TEST POSITION and the red test light is lit.** (Toggle switch 2 of 3 on Card C1-821 image from top to bottom)

Comment:

OWP-RP-01

✓ **Performance Step: 12** In PIC 1 on Card C1-821: BS3 (TB/412E Low Low Tavg) in TEST

Standard: Locates Card C1-821 and places BS3 in TEST position (UP)

Evaluator Cue:	**BS3 IS IN THE UP - TEST POSITION and the red test light is lit.** (Toggle switch 3 of 3 on Card C1-821 image from top to bottom)

Comment:

OWP-RP-01

✓ **Performance Step: 13** In PIC 1 on Card C1-822: BS1 (TB/412B1 OP∆T) in TEST

Standard: Locates Card C1-822 and places BS1 in TEST position (UP)

Evaluator Cue:	**BS1 IS IN THE UP - TEST POSITION and the red test light is lit.** (Toggle switch 1 of 4 on Card C1- 822 image from top to bottom)

Comment:

OWP-RP-01

✓ **Performance Step: 14** In PIC 1 on Card C1-822: BS2 (TB/412B2 OPΔT C-4) in TEST

Standard: Locates Card C1-822 and places BS2 in TEST position (UP)

Evaluator Cue:	**BS2 IS IN THE UP - TEST POSITION and the red test light is lit.** (Toggle switch 2 of 4 on Card C1-822 image from top to bottom)

Comment:

OWP-RP-01

✓ **Performance Step: 15** In PIC 1 on Card C1-822: BS3 (TB/412C1 OTΔT) in TEST

Standard: Locates Card C1-822 and places BS3 in TEST position (UP)

Evaluator Cue:	**BS3 IS IN THE UP - TEST POSITION and the red test light is lit.** (Toggle switch 3 of 4 on Card C1-822 image from top to bottom)

Comment:

OWP-RP-01

✓ **Performance Step: 16** In PIC 1 on Card C1-822: BS4 (TB/412C2 OTΔT C-3) in TEST

Standard: Locates Card C1-822 and places BS4 in TEST position (UP)

Evaluator Cue:	**BS4 IS IN THE UP - TEST POSITION and the red test light is lit.** (Toggle switch 4 of 4 on Card C1-822 image from top to bottom)

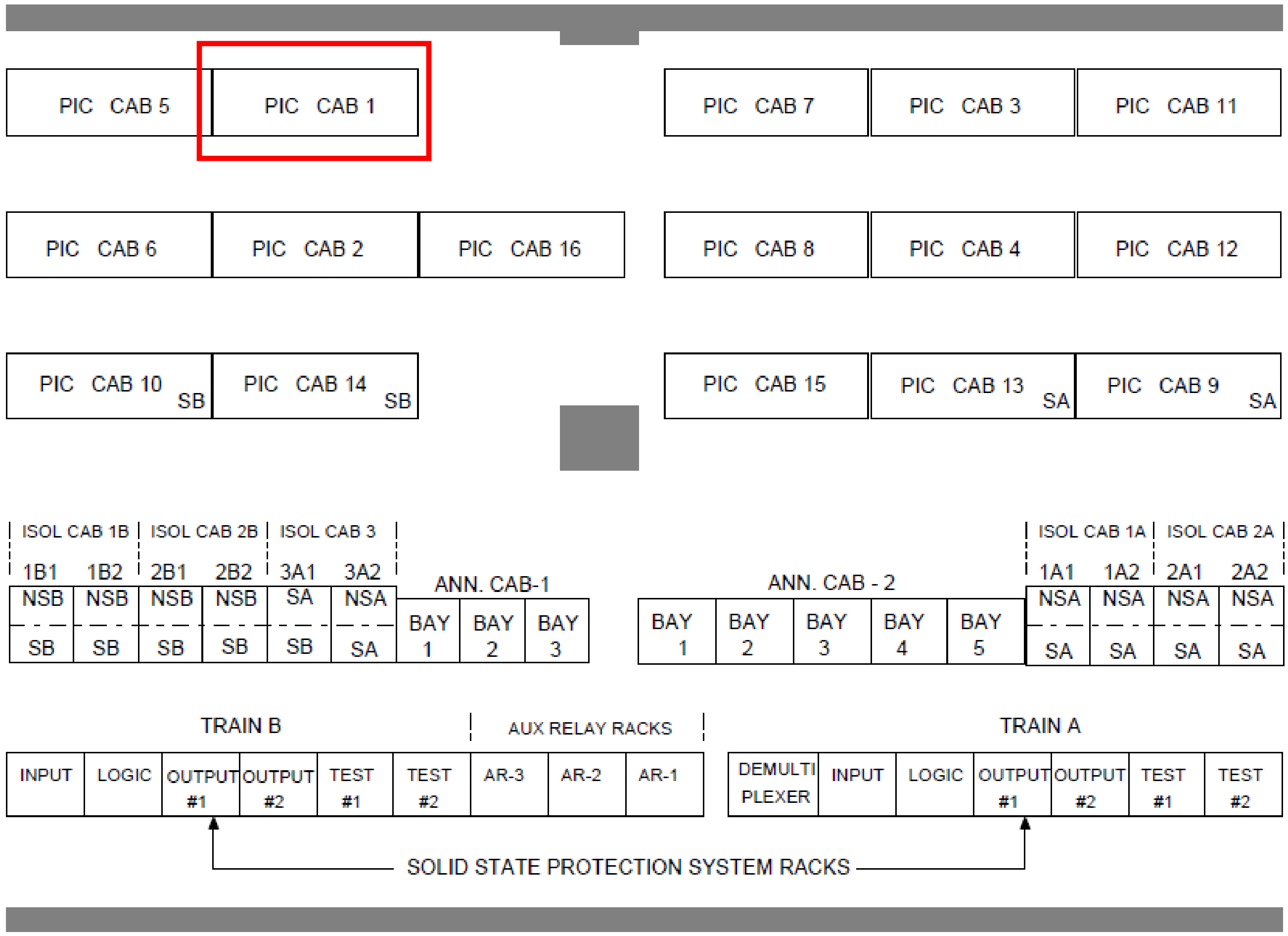
Standard: Reports to or contacts MCR to inform them that the test switches have been positioned IAW OWP-RP-01 for Tavg/ΔT Protection Channel I

Evaluator Cue:	**MCR acknowledges completion of the OWP section. MCR will verify correct bi-stables and complete OWP.** **After communications are complete announce: END OF JPM** **NOTE: Prior to leaving the area ensure any cabinets opened during the performance of this JPM are properly secured.**

Comment:

STOP TIME: ______________

KEY


PIC CAB 5
PIC CAB 1
PIC CAB 7
PIC CAB 3
PIC CAB 11
PIC CAB 6
PIC CAB 2
PIC CAB 16
PIC CAB 8
PIC CAB 4
PIC CAB 12
PIC CAB 10 SB
PIC CAB 14 SB
PIC CAB 15
PIC CAB 13 SA
PIC CAB 9 SA
ISOL CAB 1B
ISOL CAB 2B
ISOL CAB 3
1B1 1B2 2B1 2B2 3A1 3A2
NSB NSB NSB NSB SA NSA
SB SB SB SB SB SA
ANN. CAB-1
BAY 1 BAY 2 BAY 3
ANN. CAB - 2
BAY 1 BAY 2 BAY 3 BAY 4 BAY 5
ISOL CAB 1A
ISOL CAB 2A
1A1 1A2 2A1 2A2
NSA NSA NSA NSA
SA SA SA SA
TRAIN B
AUX RELAY RACKS
TRAIN A
INPUT
LOGIC
OUTPUT #1
OUTPUT #2
TEST #1
TEST #2
AR-3
AR-2
AR-1
DEMULTI PLEXER
INPUT
LOGIC
OUTPUT #1
OUTPUT #2
TEST #1
TEST #2
SOLID STATE PROTECTION SYSTEM RACKS

KEY

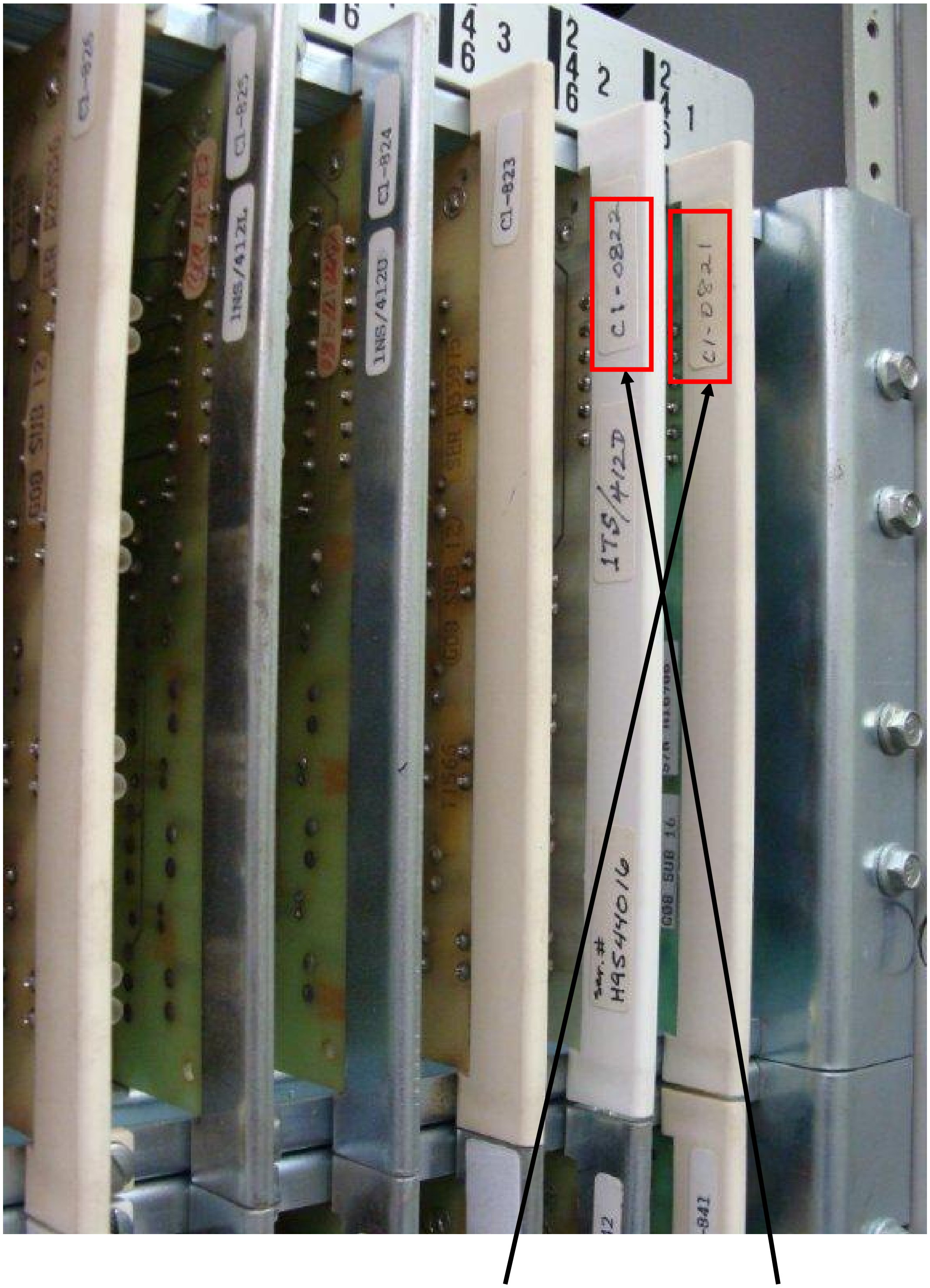
Card C1-861 (far right card) Card C1-863 (third from right)

In PIC 1, this where the label locations are at for the cards and these are the 2 cards they should be manipulating switches on

KEY

On the other side of the cards are rows of switches.
The switches are numbered SW1 – SW7 from top to bottom.
UP is TEST, DOWN is NORMAL

KEY



The above cards are Bi-stable cards C1-0821 (far right) and C1-0822

KEY

Opposite side of cards C1-0821 and C1-0822 are the Bi-stable switches. The switches are labeled 1-4 from top to bottom UP is TEST, DOWN is NORMAL
When in TEST the RED light above the associated switch will light.

Job Performance Measure No.: 2018 NRC Exam In-plant JPM k

Perform Local Actions For Placing an OTΔT Channel In TEST
(In accordance with OWP-RP-01, Reactor Protection)

Examinee's Name:

Date Performed:

Facility Evaluator:

Number of Attempts:

Time to Complete:

Question Documentation:

Question:

Response:

Result: SAT ______ UNSAT ______

Examiner's Signature: ______________________ Date: ______________

BEFORE YOU START THIS JPM

IN-PLANT JPM SAFETY CONSIDERATIONS:

CAUTION: EQUIPMENT MAY AUTO START OR MAYBE ENERGIZED

- SIMULATE ONLY - DO NOT OPERATE ANY ACTUAL PLANT EQUIPMENT!!!

Before entering the performance location of this JPM, ensure you **AND** the examiner have the proper PPE for the area you are going to go to or will travel through to get there.

Avoid contacting any plant equipment.
Follow ALARA practices in the RCA.
Do NOT remove ladders from their storage locations. Simulate obtaining and using a ladder if one would be needed during the actual performance of this task.

Initial Conditions:	The unit is operating at 100% power when Loop 1 Hot Leg temperature input to Tavg and OTΔT failed low.

Initiating Cue:	• To meet Technical Specifications, the CRS is directing you to perform the local actions of OWP-RP-01 for troubleshooting and tripping bi-stables for Loop 1 Tavg/ΔT. • Trip status lights for all other channels are de-energized • Rod Control has been placed in Manual. • Your directions are to do the PIC Room part of OWP-RP-01, Channel I. • Position the Master Test Switches in Test for troubleshooting. • Inform the Control Room when all switches have been positioned to allow the Control Room to complete the actions required in the Control Room.

Facility:	Harris Nuclear Plant	Task No.:	001004H101
Task Title:	Perform A Manual Shutdown Margin Calculation	JPM No.:	2018 NRC Exam Admin JPM RO A1-1
K/A Reference:	G 2.1.25 RO 3.9 SRO 4.2	**Alternate Path - NO**	

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, discuss or perform, 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 operating at 92% power for 2 weeks. OST-1005, Control Rod and Rod Position Indicator Exercise Quarterly Interval Modes 1 – 3, was just performed. One rod in Control Bank 'B' was determined to be immovable/stuck. • Core burnup is 350 EFPD • RCS boron concentration is 600 ppm • POWERTRAX is **NOT** available

Initiating Cue:	The CRS has entered Tech Spec 3.1.1.1 and has directed you to complete OST-1036, Shutdown Margin Calculation Modes 1-5, Section 7.3, Manual SDM Calculation (Modes 1 and 2) for current plant conditions. **NOTE: For the purposes of the examination, there will be no independent verification. Notify evaluator when you have determined Total Shutdown Margin.**

Task Standard: OST-1036, Attachment 3, Manual SDM Calculation (Modes 1 and 2), completed with SDM of 2370 $\pm$ 100 pcm **(tolerance based on total number of curves used and their division readability)**

Required Materials: Calculator, ruler

General References: OST-1036, Shutdown Margin Calculation Modes 1-5 (Rev. 53)
Curve Book (Cycle 21)

Handouts: JPM Cue Sheets Pages 12 - 15
OST-1036, Shutdown Margin Calculation Modes 1-5 (Rev. 53), pg 21, 26 and 27

Time Critical Task: No

Validation Time: 20 minutes

Critical Step Justification	
Step 4	Must determine correct rod insertion limit based on curve value. The number of rod steps will be an input to the calculation.
Step 7	Must determine correct power defect based on curve value. The power defect will provide one of the inputs to the calculation.
Step 8	Must determine the correct rod worth based on curve value. The rod worth will provide one of the inputs to the calculation.
Step 11	The total shutdown margin was the task that the CRS directed applicant to perform.

START TIME: ____________

OST-1036

Performance Step: 1 OBTAIN PROCEDURE

Standard: Reviews Procedure

Evaluator Cue:	**Provide OST-1036 Section 7.3 and Attachment 3.**

Comment:

Evaluator Note:	**NOTE: The curve numbers provided in this JPM are numbers from the 2018 NRC Exam Frozen Procedures Curve Book folder.**

OST-1036 Section 7.3.1

Performance Step: 2 Enter the absolute value for each parameter on Attachment 3.

Standard: Reviews Attachment 3 and determines value for each parameter.

Comment:

OST-1036 Attachment 3 Step 1

Performance Step: 3 Enters Reactor Power Level

Standard: Refers to given conditions and enters 92% and place keeps Attachment 3

Comment:

OST-1036 Attachment 3 Step 2

✓ **Performance Step: 4** Determine Rod Insertion Limit for power level

Standard: Refers to Curve F-21-1 and determines TS limit for RIL to be 171 steps on Bank D (166 – 176 steps, tolerance based on curve division readability) and place keeps Attachment 3

Comment:

OST-1036 Attachment 3 Step 3

Performance Step: 5 Enters core Burn Up

Standard: Refers to given conditions and enters 350 EFPD and place keeps Attachment 3

Comment:

OST-1036 Attachment 3 Step 4

Performance Step: 6 Enters RCS Boron Concentration

Standard: Refers to initial conditions and enters 600 ppm and place keeps Attachment 3

Comment:

Evaluator Note:	**ATT 3, STEP 5 IS NOT IDENTIFIED AS A PERFORMANCE STEP SINCE THIS VALUE IS PART OF ATT 3 THE CANDIDATE WILL PLACE KEEP THE STEP.**

OST-1036 Attachment 3 Step 6

✓ **Performance Step: 7** Determines Power Defect for current power level

Standard: Refers to Curve C-21-3 and determines power defect to be 2560 ± 50 pcm (tolerance based on curve division readability) and place keeps Attachment 3

Evaluator Note:	**Determination of power defect to be** 2560 ± 50 pcm **is the critical aspect of Step 6.**

Comment:

OST-1036 Attachment 3 Step 7

✓ **Performance Step: 8** Determines Rod Worth for RIL position determined above

Standard: Refers to Curve A-21-11 and determines rod worth to be 400 ± 50 pcm (tolerance based on rod position tolerance from performance step 4 and curve division readability) and place keeps Attachment 3

Comment:

OST-1036 Attachment 3 Step 8.a

Performance Step: 9 Determines the number of stuck or untrippable rods not inserted in the core.

Standard: Refers to given conditions and determines step 8.a is not applicable and N/A's in the blanks for steps 8.a.(1) and 8.a(2).

Comment:

OST-1036 Attachment 3 Step 8.b

Performance Step: 10 Enters worth of any additional immovable or untrippable rods

Standard: Refers to given conditions and enters 1724 pcm in the first blank, zeroes in the next 4, and 1724 in the (d) blank

Comment:

OST-1036 Section 7.3.2 Attachment 3 Step 9

✓ **Performance Step: 11** Determines Total Shutdown Margin:

Perform the calculation listed on Attachment 3 Item 9 for the required SDM boron concentration for the projected conditions.

Standard: Refers to Attachment 3 Item 9 to document SDM

Determines Total Shutdown Margin to be **2370 ± 100** pcm (tolerance based on total of all curves used and their division readability) and place keeps Attachment 3

Comment:

OST-1036 Section 7.3.3

Performance Step: 12 Perform an independent verification of Attachment 3.

Standard: Contacts evaluator to perform independent verification per initial conditions

Comment:

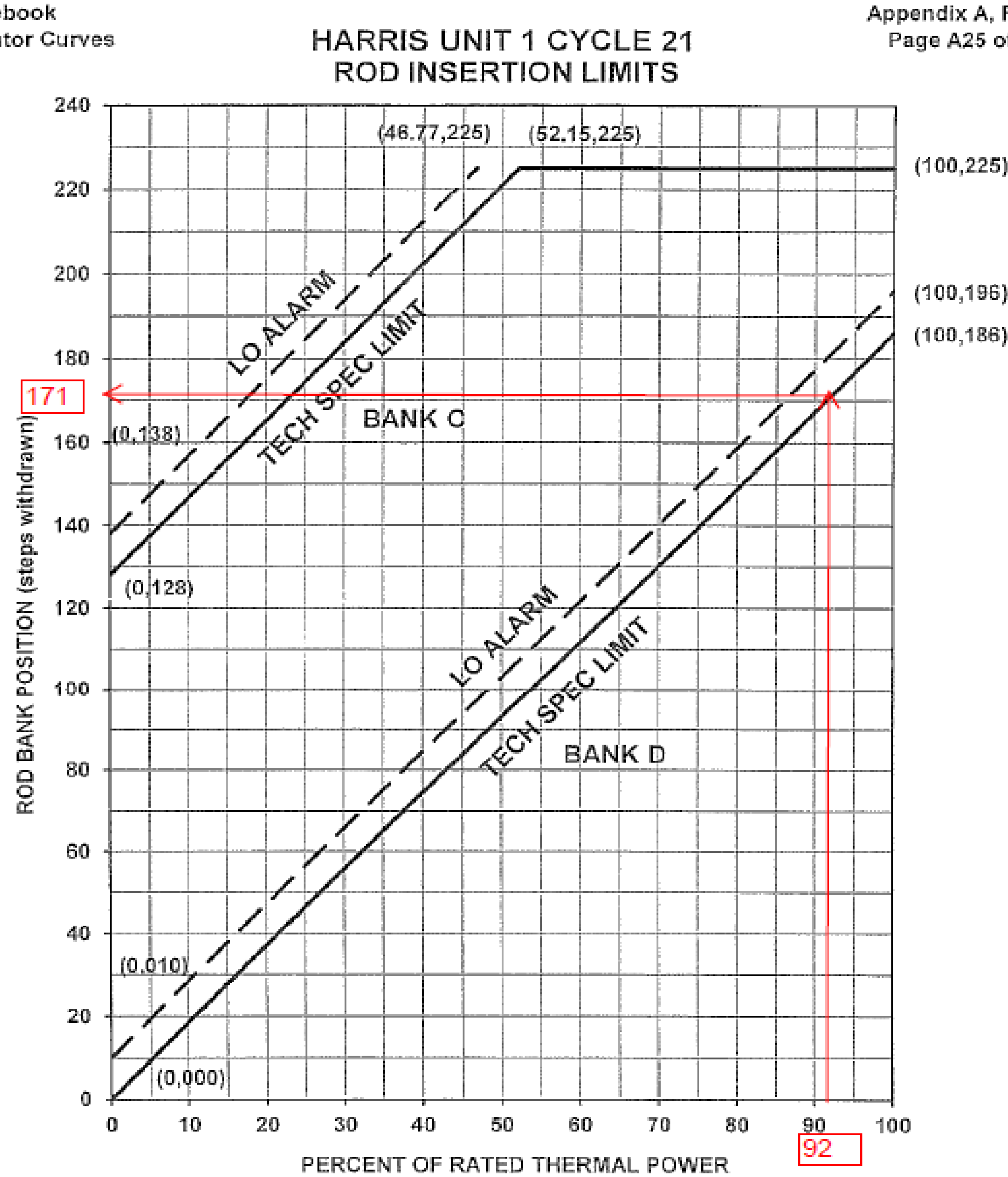
Evaluator Cue:	**When independent verification of OST-1036, Attachment 3, Manual SDM Calculation is requested.** **END OF JPM**

STOP TIME: ____________

KEY

HNP Cycle 21
Curvebook
Operator Curves

HNP-F/NFSA-0269
Appendix A, Rev 0
Page A25 of A25

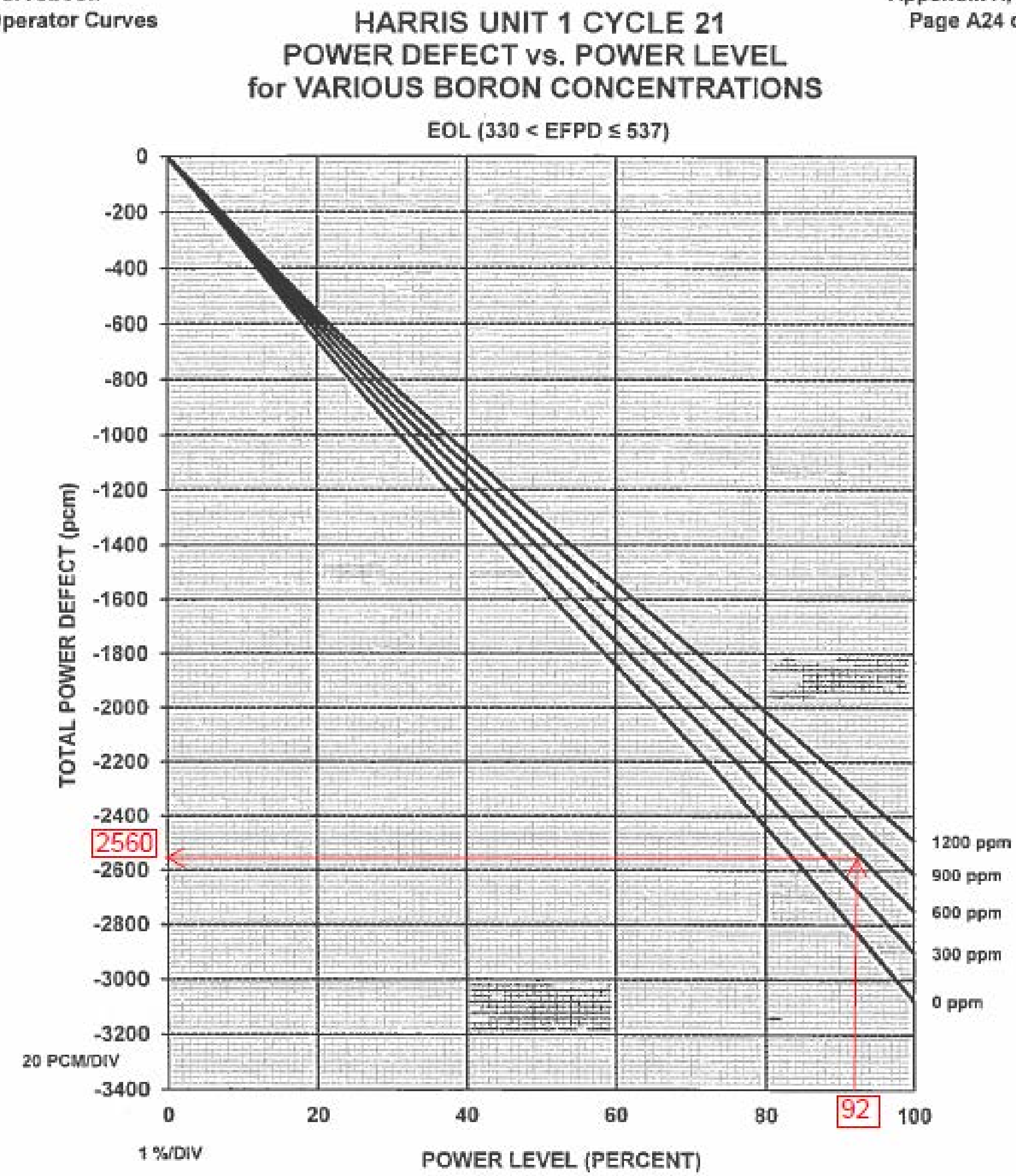


CURVE NO.	F-21-1	REV NO.	0
ORIGINATOR	Joshua Chen	DATE	10/05/2016
SUPERVISOR	Noah White	DATE	10/11/2016
SHIFT MANAGER	Tim English	DATE	10/11/16

KEY

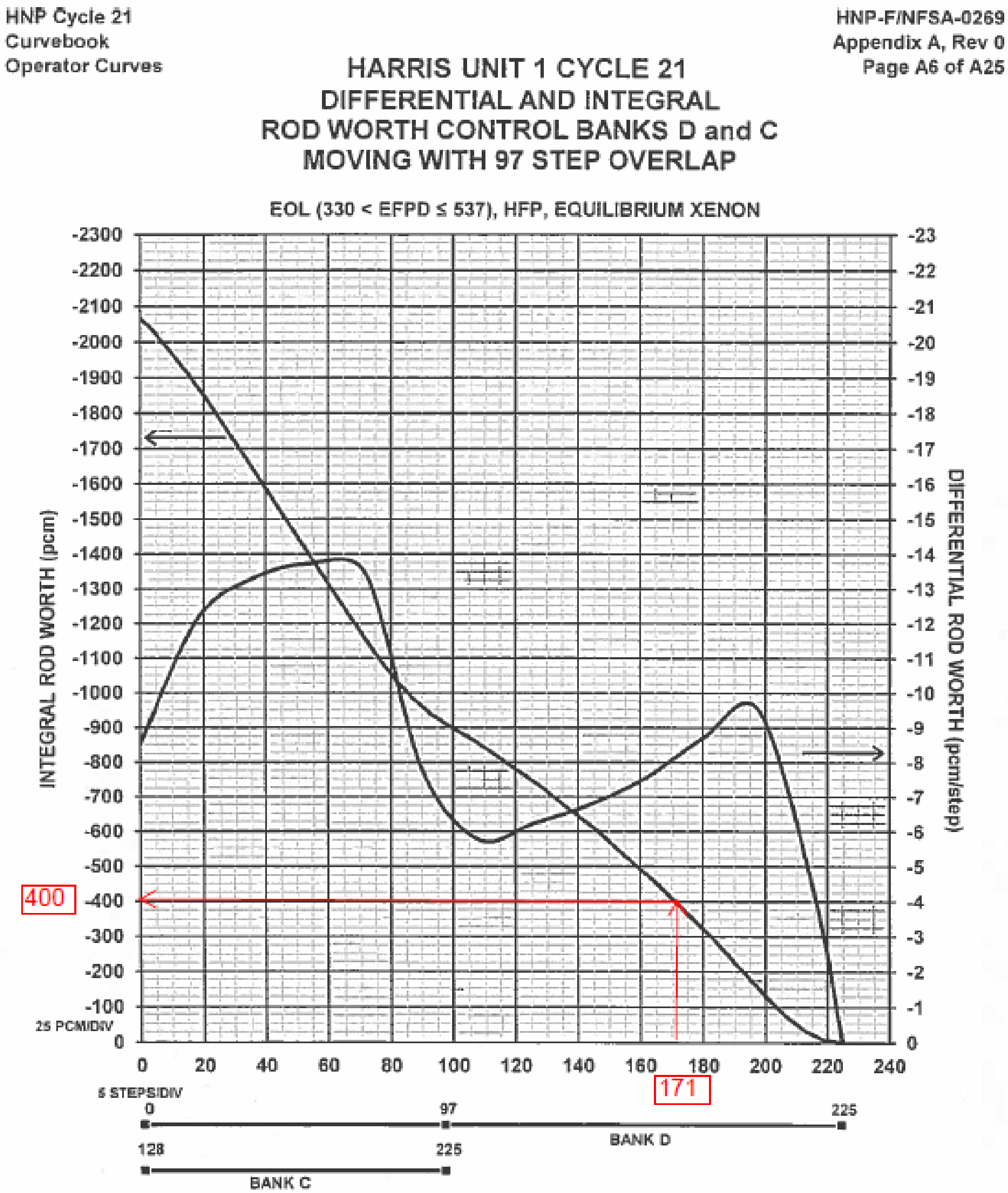
HNP Cycle 21
Curvebook
Operator Curves

HNP-F/NFSA-0269
Appendix A, Rev 0
Page A24 of A25



CURVE NO.	C-21-3	REV NO.	0
ORIGINATOR	JOSHUA CHEN	DATE	10/08/2016
SUPERVISOR	NOAH WHITE	DATE	10/11/2016
SHIFT MANAGER	TIM ENGLISH	DATE	10/11/16

KEY



CURVE NO.	A-21-11	REV NO.	0
ORIGINATOR	JOSHUA CHEN	DATE	10/08/2016
SUPERVISOR	NOAH WHITE	DATE	10/11/2016
SHIFT MANAGER	TIM ENGLISH	DATE	10/11/16

EXAMINER CALCULATION KEY

(SHADED AREA BELOW INDICATES DATA ALREADY PROVIDED)

Manual SDM Calculation (Modes 1 and 2)

1. Reactor power level. **92** %

2. Rod insertion limit for the above power level

   171 (166-176) steps on bank **D**

3. Burn up (POWERTRAX/MCR Status Board). **350** EFPD

4. Present RCS Boron Concentration **600** ppm

NOTE: Use absolute values of numbers obtained from curves.

5. Total worth of all control and shutdown banks, minus the worth of the most reactive rod for Fuel Cycle 21.

   7054 pcm
   (a)

6. Cycle 19 Power defect for the power level recorded in Step 1. (Refer to Curves C-X-1 to C-X-3).

   Curve used **C-21-3** **2560 ± 50** pcm
   (b)

NOTE: HFP curves are used for power levels of 10% or greater.

7. Inserted control rod worth at the rod insertion limit recorded in Step 2. (Refer to Curves A-X-6 to A-X-11)

   Curve used **A-21-11** **400 ± 50** pcm
   (c)

8. Worth of any additional immovable or untrippable rods (for each stuck rod, use the most reactive single rod worth (1724 pcm).

   1724 pcm
   (d)

9. Determine the Total Shutdown Margin using the following formula:

Total SDM C_B =	7054	-	**2560 ± 50**	-	**400 ± 50**	-	**1724**
(e)	(a)		(b)		(c)		(d)

2370 ± 100 pcm
(p)

VERIFICATION OF COMPLETION

Job Performance Measure No.: 2018 NRC Exam Admin JPM RO A1-1
Perform A Manual Shutdown Margin Calculation
OST-1036

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 operating at 92% power for 2 weeks. OST-1005, Control Rod and Rod Position Indicator Exercise Quarterly Interval Modes 1 – 3, was just performed. One rod in Control Bank ‘B’ was determined to be immovable/stuck. • Core burnup is 350 EFPD • RCS boron concentration is 600 ppm • POWERTRAX is **NOT** available

Initiating Cue:	The CRS has entered Tech Spec 3.1.1.1 and has directed you to complete OST-1036, Shutdown Margin Calculation Modes 1-5, Section 7.3, Manual SDM Calculation (Modes 1 and 2) for current plant conditions. Write the Total Shutdown Margin in the blank provided below. **NOTE: For the purposes of the examination, there will be no independent verification. Notify evaluator when you have determined Total Shutdown Margin.**

Name: ____

Date: ____________________

Total Shutdown Margin is __________________ **pcm.**

7.3. Manual SDM Calculation (Modes 1 and 2)

NOTE:	A fully inserted control or shutdown bank rod does not impact Shutdown Margin. (Tech Spec 3.1.1.1)

1. **ENTER** the absolute value for each parameter on Attachment 3. _______
2. **PERFORM** the calculation listed on Attachment 3 Item 9 for the required SDM boron concentration for the projected conditions. _______
3. **PERFORM** an independent verification of Attachment 3. _______
4. **VERIFY** that total SDM recorded on Attachment 3 is 1770 pcm or greater. _______

Attachment 3 - Manual SDM Calculation (Modes 1 and 2)
Sheet 1 of 2

NOTE: A fully inserted control or shutdown bank rod does not impact Shutdown Margin. (Tech Spec 3.1.1.1)

1. **RECORD** Reactor power level. __________ % ______

2. **RECORD** Rod insertion limit for the above power level

   __________ steps on bank __________ ______

3. **RECORD** Burn up (POWERTRAX/MCR Status Board). __________ EFPD ______

4. **RECORD** Present RCS Boron Concentration. __________ ppm ______

NOTE: Use absolute values of numbers obtained from curves.

5. **OBSERVE** that the total worth of all control and shutdown banks, minus the worth of the most reactive rod for Fuel Cycle 21 is:

   _7054_ pcm
   (a) ______

6. **DETERMINE** Cycle 21 Power defect for the power level recorded in Step 1, from Curves C-X-1 through C-X-3.

   Curve Used __________

   Power defect = __________ pcm
   (b) ______

NOTE: HFP curves are used for power levels of 10% or greater.

7. **DETERMINE** inserted control rod worth at the rod insertion limit recorded in Step 2, using Curves A-X-6 to A-X-11.

   Curve Used __________

   Inserted Rod Worth = __________ pcm
   (c) ______

Attachment 3 - Manual SDM Calculation (Modes 1 and 2)
Sheet 2 of 2

8. **IF** any rod is known to be stuck or untrippable
AND is **NOT** completely inserted in the core,
THEN PERFORM the following:

   a. **IF** more than 5 rods are stuck,
   THEN:

      (1) **STOP** the calculation. ______

      (2) **NOTIFY** Reactor Engineering. ______

> **NOTE:** Each rod (up to five total) is assigned a Stuck Rod Pair worth (SRP) value of 1724 pcm as determined by AREVA calculations with added conservatism.
>
> The single Most Reactive Rod worth (MRR) is 1085 pcm. However, to account for an unknown stuck rod, the first stuck rod is also assigned the same SRP value of 1724 pcm as subsequent stuck rods.
>
> Example: 1 stuck rod = 1724, 3 stuck rods = 1724 + 1724 + 1724

   b. **DETERMINE** the worth of any known stuck or untrippable rods from Table:

# Stuck Rods	1	2	3	4	5
Reactivity	1724	1724	1724	1724	1724

______ + ______ + ______ + ______ + ______ = ______ (d) ______

Verify

9. DETERMINE the Total Shutdown Margin (p) using the following formula:

7054 (a) - ______ (b) - ______ (c) - ______ (d) = ______ Total SDM (p) ______

Facility:	Harris Nuclear Plant	Task No.:	301005H401
Task Title:	Determine Rod Misalignment Using Thermocouples	JPM No.:	2018 NRC Exam Admin JPM RO A1-2
K/A Reference:	G 2.1.7 RO 4.4 SRO 4.7	**Alternate Path - NO**	

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, discuss, or perform and provide initiating cues. When you complete the task successfully, the objective for this Job Performance Measure will be satisfied.	
Initial Conditions:	• The plant was at 95% power, with a load reduction in progress. During the down power DRPI indication for rod F08 showed a difference of 24 steps higher than the group demand. • The load reduction has been stopped and AOP-001 was entered. • ALB-013-8-5, Computer Alarm Rod Dev/Seq NIS Power Range Tilts is the only MCB alarm received. • I&C investigated and found no obvious electrical problems.

Initiating Cue:	The CRS has directed you to calculate the temperature difference between thermocouple(s) adjacent to the misaligned rod and the average of symmetric thermocouple(s), using Attachment 2 of AOP-001 and the provided T/C Core Maps. After performing the calculation evaluate the results and circle the response below then return your results to the evaluator.

Task Standard: Correctly calculate averages of symmetric TC to rod F08 and determine DRPI malfunction is occurring iaw AOP-001.

Required Materials: Calculator

General References: AOP-001, Attachment 1, Attachment 2, Rev. 48

Handouts: JPM Cue Sheets Pages 12,13
AOP-001, Attachments 1 and 2, Rev. 48

Time Critical Task: No

Validation Time: 20 minutes

Critical Task Justification	
Step 1	If the wrong thermocouples are used then none of the results will be correct
Step 3	If the wrong values are selected then none of the results will be correct
Step 4	If the calculations for the averages were incorrect the results will be incorrect
Step 5	If the differences are calculated incorrectly then the candidate may come to the wrong conclusion for AOP-001Tech Specs

Start Time: __________.

AOP-001 Attachment 2 Step 1

✓ **Performance Step: 1** DETERMINE THERMOCOUPLE LOCATION(S) ADJACENT TO THE MISALIGNED ROD USING THE CORE GRID MAP (SHEET 1).

Standard: Using the core grid map (Attachment 2, page 1 of 3), Determines affected thermocouples to be E07, E08, F09, and G08.

Comment: **Note, page 47, AOP-001: E07 does not have symmetric thermocouple locations per Attachment 2.**

AOP-001 Attachment 2 Step 2

Performance Step: 2 CIRCLE LOCATION(S) IN TABLE ABOVE.

Standard: Circles E08, F09, and G08 on the table
(Attachment 2, page 2 of 3).
Recognizes from the Note that E07 has no symmetric locations

Comment:

AOP-001 Attachment 2 Step 3

✓ **Performance Step: 3**

RECORD the following in the table below:

- Adjacent TC number
- Adjacent TC value using the RVLIS Console, ERFIS, or OSI-PI
- Symmetric TC numbers (not including adjacent TCs)
- Symmetric TC values for all OPERABLE TCs using the RVLIS Console, ERFIS, or OSI-PI

Standard:

Locates RVLIS Console and accesses T/C CORE MAP for Train A and Train B. **(Printout of RVLIS core map provided in handout)**

Records value for Affected TC E07(640°F) and Notes it does not have any Symmetric TC's.

Records value for Affected TC E08 (648°F) and Symmetric TCs H05 (644°F), H11 (652°F), and L08 (642°F).

Records value for Affected TC F09 (644°F) and Symmetric TCs G06 (640°F), and J10 (650°F).

Records value for Affected TC G08 (646°F) and Symmetric TC H09 (642°F).

Comment:

AOP-001 Attachment 2 Step 4

✓ **Performance Step: 4** DETERMINE THE AVERAGE OF SYMMETRIC THERMO-COUPLES, FOR EACH ADJACENT THERMOCOUPLE.

Standard:

Determines (652 + 642 + 644)/3 = 646°F for E08's Symmetric TCs

Determines (640 + 650)/2 = 645°F for F09's Symmetric TCs

Determines (642°F) for G08's Symmetric TC

Comment:

EXAMINERS NOTE:	**If the candidate includes the adjacent TCs with the Symmetric TC numbers the averages will be wrong and the end result will be that a wrong final difference will be given:** Determines (646.5°F) for E08's Symmetric TCs Determines (644.7°F) for F09's Symmetric TCs Determines (642°F) for G08's Symmetric TCs

AOP-001 Attachment 2 Step 5

✓ **Performance Step: 5**

COMPARE EACH ADJACENT THERMOCOUPLE VALUE LISTED TO ITS SYMMETRIC THERMOCOUPLE AVERAGE FOR INDICATION OF A MISALIGNED ROD. (REFER TO ATTACHMENT 1.)

Standard:

Critical to calculate the maximum difference of **4°F** for TC G08

2°F for TC E08

1°F for TC F09

4°F for TC G08

Using AOP-001, Attachment 1 determines since the difference between thermocouples adjacent to the misaligned rod and the average of symmetric thermocouples is < 10°F that a malfunction of Digital Rod Position Indication (DRPI) is occurring.

Circles 1. A malfunction of Digital Rod Position Indication (DRPI) is occurring.

Comment:

Evaluator Cue:	**CRS acknowledges calculations and report.**

Terminating Cue:	Difference between each affected thermocouple and it's symmetric thermocouples has been calculated. Evaluation of this JPM is complete.

Stop Time: _________

KEY

MALFUNCTION OF ROD CONTROL AND INDICATION SYSTEM

Attachment 2 - Adjacent and Symmetric Thermocouple Locations

Sheet 1 of 3

THERMOCOUPLE LOCATIONS

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
A								T							
B					T	R		R		RT					
C							R	T	R		R	T			
D			T	R	T	R				R		R			
E			R	T	R		$\boxed{T}$	$\boxed{T}$		T	R	T		T	
F		R	T*	R	T	R		R	$\boxed{T}$	R	T	R	T	R	
G	T	T	R			T	R	$\boxed{T}$	R				R		T
H		R	T		T	R		T	T	R	T		T	R	T
J		T	R				R		R	T		T*	R		
K		R	T	R	T	R		RT		R	T	R		R	
L					R	T		T			R	T	R	T	
M			T	R		R			T	R	T	R			
N				T	R	T	R	T**	R	T					
P						R	T	RT		R					
R							T								

R - Control Rod

T - Thermocouple

T* - Thermocouple(s) abandoned by EC 47997 (core location[s] F03, J12)

T** - Thermocouple(s) abandoned by EC 76393 (core location[s] N08)

KEY

MALFUNCTION OF ROD CONTROL AND INDICATION SYSTEM

Attachment 2 - Adjacent and Symmetric Thermocouple Locations
Sheet 2 of 3

NOTE

- B10, E07, H08, K08, and P08 have no symmetric locations.
- Symmetric thermocouples are those in the same row.

SYMMETRIC LOCATIONS

GRID	I		II		III		IV	
TRAIN	A	B	A	B	A	B	A	B
	A08				H15			
		G01		G15			R07	
S L	B05			E14		L14		
Y O		C08	H13				N08**	H03
M C		D03	C12				N04	M03
M A	E04	D05		E12	M11	L12		
E T			H11	E08		L08		H05
T I		F05	F11	E10	K11		K05	L06
R O		F03*	F13			N10	N06	K03
I N	G06		F09			J10		
C S		G08			H09			
	G02						J02	P07
					M09	J12*		

* - Thermocouple(s) abandoned by EC 47997 (core location[s] F03, J12)

** - Thermocouple(s) abandoned by EC 76393 (core location[s] N08)

☐ **1.** **DETERMINE** thermocouple location(s) adjacent to the misaligned rod using core grid map (Sheet 1).

☐ **2.** **CIRCLE** location(s) in Table above.

KEY

T/C CORE MAP **(DATA SHEET 1)** **TRAIN B** MSG # 245

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
A																A
B										632						B
C								636								C
D			636		650											D
E								648		642		640		632		E
F			50		644											F
G	642							646							640	G
H			649		644											H
J										650		50				J
K			640													K
L						644		642				644		632		L
M			636													M
N										640						N
P							636									P
R																R
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	

TRAIN A

T/C CORE MAP MSG # 245

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
A								636								A
B					636											B
C												632				C
D																D
E				636			640									E
F									644		648		644			F
G		642				640										G
H								640	642		652		640		640	H
J		642														J
K					640			644			648					K
L																L
M											644					M
N				636		640		50								N
P								640								P
R							636									R
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	

KEY

MALFUNCTION OF ROD CONTROL AND INDICATION SYSTEM

Attachment 2 - Adjacent and Symmetric Thermocouple Locations
Sheet 3 of 3

3. **RECORD** the following in the table below:

☐ • Adjacent TC number(s)

☐ • Adjacent TC value(s) using the RVLIS Console, ERFIS, or OSI-PI

☐ • Symmetric TC number(s) (**NOT** including adjacent TCs)

☐ • Symmetric TC value for all OPERABLE TCs using the RVLIS Console, ERFIS, or OSI-PI

☐ 4. **DETERMINE** the average of symmetric thermocouples, for each adjacent thermocouple.

Adjacent TC		Symmetric TC		Symmetric TC Average
Number	Value	Number	Value	
E08	648	H11	652	646
		L08	642	
		H05	644	
F09	644	G06	640	645
		J10	650	
G08	646	H09	642	642

☐ 5. **COMPARE** each adjacent thermocouple value listed to its symmetric thermocouple average for indication of a misaligned rod (**REFER TO** Attachment 1).

--END OF ATTACHMENT 2--

Job Performance Measure No.: 2018 NRC Admin Exam RO A1-2
Determine Rod Misalignment Using Thermocouples
AOP-001

Examinee's Name:

Date Performed:

Facility Evaluator:

Number of Attempts:

Time to Complete:

Question Documentation:

Question:

Response:

Result: SAT ______ UNSAT ______

Examiner's Signature: ______________________ Date: ______________

Initial Conditions:	• The plant was at 95% power, with a load reduction in progress. During the down power DRPI indication for rod F08 showed a difference of 24 steps higher than the group demand. • The load reduction has been stopped and AOP-001 was entered. • ALB-013-8-5, Computer Alarm Rod Dev/Seq NIS Power Range Tilts is the only MCB alarm received. • I&C investigated and found no obvious electrical problems.

Initiating Cue:	The CRS has directed you to calculate the temperature difference between thermocouple(s) adjacent to the misaligned rod and the average of symmetric thermocouple(s), using Attachment 2 of AOP-001 and the provided T/C Core Maps. After performing the calculation evaluate the results and circle the response below then return your results to the evaluator.

Name: ____

Date: ____________________

Circle the correct response that applies:

1. A malfunction of Digital Rod Position Indication (DRPI) is occurring
2. A Rod Misalignment is occurring

T/C CORE MAP **(DATA SHEET 1)** **TRAIN B** MSG # 245

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
A																A
B										632						B
C								636								C
D			636		650											D
E								648		642		640		632		E
F			50		644											F
G	642							646							640	G
H			649		644											H
J										650		50				J
K			640													K
L						644		642				644		632		L
M			636													M
N										640						N
P							636									P
R																R
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	

TRAIN A

T/C CORE MAP MSG # 245

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
A								636								A
B					636											B
C												632				C
D																D
E				636			640									E
F									644		648		644			F
G		642				640										G
H								640	642		652		640		640	H
J		642														J
K					640			644			648					K
L																L
M											644					M
N				636		640		50								N
P								640								P
R							636									R
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	

MALFUNCTION OF ROD CONTROL AND INDICATION SYSTEM

Attachment 1 - Indications of Misaligned Rod

Sheet 1 of 1

The table below indicates the variation in plant parameters which may be indicative of rod misalignment. This variation refers to relative changes in indication from a reference condition at which the suspect rod's position was known to be properly aligned. The reference case may be taken from prior operating records, or it may be updated each time the proper rod positioning is verified by in-core measurements. In general, greater misalignment will cause larger variations. Variations in NI channel indication are also affected by the core location of the suspect rod. For example, a misaligned rod that is closest to the N-44 detector should indicate that N-44 flux parameters are abnormal when compared with flux parameters of the other Power Range NI channels. If the parameters below exhibit no abnormal variations with an individual DRPI differing from its group step counter demand position by more than 12 steps, it is probably a rod position indication problem. Quadrant Power Tilt Ratio can be determined by accessing 'GD QPTR' or 'QPTR' and using the highest of ANM9112U - QPTR UPPER RATIO (ANM0112M-118M) or ANM9113L - QPTR LOWER RATIO (ANM0113M-119M).

PLANT PARAMETER	VALUE INDICATIVE OF ROD MISALIGNMENT
Quadrant Power Tilt Ratio (QPTR)	Greater than 1.02
Power Range Instrumentation	Greater than 2% difference between any two channels (**REFER TO** Attachment 4)
Delta Flux Indicators	Greater than 2% difference between any two channels (**REFER TO** Attachment 4)
Core Outlet Thermocouples	Greater than 10°F difference between thermocouples adjacent to the misaligned rod and the average of symmetric thermocouples (**PERFORM** Attachment 2)
Axial Flux Traces (in-core movable detector)	**CONSULT** Reactor Engineering **AND EVALUATE** using in-core movable detectors per EST-922, Control Rod Position Determination Via Incore Instrumentation

--END OF ATTACHMENT 1--

MALFUNCTION OF ROD CONTROL AND INDICATION SYSTEM

Attachment 2 - Adjacent and Symmetric Thermocouple Locations

Sheet 1 of 3

THERMOCOUPLE LOCATIONS

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
A								T							
B					T	R		R		RT					
C							R	T	R		R	T			
D			T	R	T	R				R		R			
E			R	T	R		T	T		T	R	T		T	
F		R	T*	R	T	R		R	T	R	T	R	T	R	
G	T	T	R			T	R	T	R				R		T
H		R	T		T	R		T	T	R	T		T	R	T
J		T	R				R		R	T		T*	R		
K		R	T	R	T	R		RT		R	T	R		R	
L					R	T		T			R	T	R	T	
M			T	R		R			T	R	T	R			
N				T	R	T	R	T**	R	T					
P						R	T	RT		R					
R							T								

R - Control Rod

T - Thermocouple

T* - Thermocouple(s) abandoned by EC 47997 (core location[s] F03, J12)

T** - Thermocouple(s) abandoned by EC 76393 (core location[s] N08)

MALFUNCTION OF ROD CONTROL AND INDICATION SYSTEM

Attachment 2 - Adjacent and Symmetric Thermocouple Locations

Sheet 2 of 3

NOTE

- B10, E07, H08, K08, and P08 have no symmetric locations.
- Symmetric thermocouples are those in the same row.

SYMMETRIC LOCATIONS

GRID	I		II		III		IV	
TRAIN	A	B	A	B	A	B	A	B
	A08				H15			
		G01		G15			R07	
S L	B05			E14		L14		
Y O		C08	H13				N08**	H03
M C		D03	C12				N04	M03
M A	E04	D05		E12	M11	L12		
E T			H11	E08		L08		H05
T I		F05	F11	E10	K11		K05	L06
R O		F03*	F13			N10	N06	K03
I N	G06		F09			J10		
C S		G08			H09			
	G02						J02	P07
					M09	J12*		

* - Thermocouple(s) abandoned by EC 47997 (core location[s] F03, J12)

** - Thermocouple(s) abandoned by EC 76393 (core location[s] N08)

☐ 1. **DETERMINE** thermocouple location(s) adjacent to the misaligned rod using core grid map (Sheet 1).

☐ 2. **CIRCLE** location(s) in Table above.

MALFUNCTION OF ROD CONTROL AND INDICATION SYSTEM

Attachment 2 - Adjacent and Symmetric Thermocouple Locations

Sheet 3 of 3

3. **RECORD** the following in the table below:

☐ • Adjacent TC number(s)

☐ • Adjacent TC value(s) using the RVLIS Console, ERFIS, or OSI-PI

☐ • Symmetric TC number(s) (**NOT** including adjacent TCs)

☐ • Symmetric TC value for all OPERABLE TCs using the RVLIS Console, ERFIS, or OSI-PI

☐ 4. **DETERMINE** the average of symmetric thermocouples, for each adjacent thermocouple.

Adjacent TC		Symmetric TC		Symmetric TC Average
Number	Value	Number	Value	
________	________			________
________	________			________
________	________			________
________	________			________

☐ 5. **COMPARE** each adjacent thermocouple value listed to its symmetric thermocouple average for indication of a misaligned rod (**REFER TO** Attachment 1).

--END OF ATTACHMENT 2--

Facility:	Harris Nuclear Plant	Task No.:	015004H201
Task Title:	Perform the Quadrant Power Tilt Ratio Surveillance	JPM No.:	2018 NRC Exam Admin JPM RO A2
K/A Reference:	G2.2.12 RO 3.7 SRO 4.1	**Alternate Path - NO**	

Examinee: ____________________ NRC Examiner: ____________________

Facility Evaluator: ____________________ Date: ____________________

Method of testing:

Simulated Performance: ______ Actual Performance: X

Classroom X Simulator ______ Plant ______

READ TO THE EXAMINEE	
I will explain the initial conditions, which steps to simulate or discuss, and provide initiating cues. When you complete the task successfully, the objective for this Job Performance Measure will be satisfied.	
Initial Conditions:	• The plant was operating at 90% power when a rod in Control Bank 'A' (P-10) dropped. • The crew is performing AOP-001, MALFUNCTION OF ROD CONTROL AND INDICATION SYSTEM. • There are NO deficiency tags on PR NIs. • ERFIS points ANM9112U and ANM9113L have a BAD quality code. HNP IT has been notified and they are evaluating the ERFIS points.

Initiating Cue:	The CRS has given you permission to perform a manual QPTR iaw OST-1039, CALCULATION OF QPTR. Perform section 7.3.1 through 7.3.9. The Power Range NIS indications are provided. After performing the calculation return your results to the evaluator. **NOTE: For the purposes of the examination, there will be no independent verification. Show values of your work.**

Task Standard: Correctly determines maximum QPTR of 1.0474 +/- 0.0005 iaw OST-1039

Required Materials: Calculator

General References: OST-1039, CALCULATION OF QPTR, Revision 17

Handouts:

- OST-1039
- Curve F-20-8, Power Range NI – Current and Voltage Setpoints Table
- JPM Cue Sheets Pages 12 - 16

Time Critical Task: No

Validation Time: 20 minutes

Critical Step Justification	
Step 5	Must accurately transcribe the NI Upper and Lower readings to the data table. The calculation will yield an unsatisfactory QPTR.
Step 6	Must accurately transcribe the NI Upper and Lower normalized currents from the curve into the data table. The calculation will yield an unsatisfactory QPTR.
Step 8	Must accurately determine the correct calculation based on collecting and inputting either provided data or visual inspection data. The calculation will yield an unsatisfactory QPTR.
Step 9	Must accurately determine the correct calculation based on collecting and inputting the visual inspection data. The calculation will yield an unsatisfactory QPTR.
Step 10	Must accurately determine the highest Upper or Lower Normalized Fraction. The calculation will yield an unsatisfactory QPTR.
Step 13	Must identify that the QPTR Lower is the most outside the required band which will make this overall results unsatisfactory.

Start Time: __________.

Evaluator Note:	**NOTE: The NI curve numbers provided in this JPM are numbers from the 2018 NRC Exam Frozen Procedures Curve Book folder.**

Procedure Note: Precaution and Limitation 3.1.1 has guidance if performing this OST with one Power Range Channel inoperable.

Performance Step: 1 Completes Prerequisites section:

- Ensure instrumentation needed for the performance of this test is free of deficiencies that affect instrument indication.
- Ensure the most recent Curve F-x-8 is used in the performance of this procedure. (Reference 9.5.7 and 9.5.1)
- Obtain CRS permission to perform this OST.
- Obtain necessary tools and equipment from the following list
  - o IBM PC or compatible

Standard:

- Logs F-20-8 revision number : 4
- Initials/signs all blocks

Comment:

Performance Step: 2

- IF Quadrant Power Tilt Ratio Calculation Computer Program is used, THEN PERFORM the following:
  - MARK Step 7.1. Step 2 N/A.
  - MARK Section 7.3 N/A.
  - PERFORM Section 7.2.
- IF manual calculation of the Quadrant Power Tilt Ratio is used, THEN PERFORM the following:
  - MARK Section 7.2 N/A.
  - PERFORM Section 7.3.

Standard:

- Marks Section 7.2 N/A
- Proceeds to Section 7.3

Comment:

OST-1039 Section 7.3 Note prior to step 1

Performance Step: 3 **NOTE: The detector current meters on each power range channel drawer are designated as left-upper, right-lower.**

Standard: Reads and place keeps note

Comment:

OST-1039 Section 7.3, Step 1

Performance Step: 4 Prior to reading the value of detector current, VERIFY the meter range/rate switch is in the 400 μA/SLOW position.

Standard: Prior to reading the value of detector current, VERIFIES the Meter Range/Rate switch is in the 400 μA/SLOW position.

Evaluator Note:	This information is on the JPM Cue Sheet

Comment:

OST-1039 Section 7.3, Step 2

✓ **Performance Step: 5** RECORD on Attachment 2, in column A, the upper and lower detector currents from all operable power range channels as read on the Nuclear Instrumentation Cabinet.

Standard: Transposes readings from PRNIS images onto Attachment 2.

Comment:

OST-1039 Section 7.3, Step 3

✓ **Performance Step: 6** RECORD on Attachment 2, in column B, the 100% power normalized current for each channel from Curve F-x-8.

Standard: Transposes TOP and BOTTOM 100% current values from the Curve Book provided.

Comment:

OST-1039 Section 7.3, Note prior to Step 4

Performance Step: 7 NOTE: When recording all fractions and ratios, record to four decimal places, dropping the fifth and subsequent decimal places.

Standard: Reads and place keeps note

Comment:

OST-1039 Section 7.3, Step 4

✓ **Performance Step: 8** Divide values in Column A by the respective normalized current in Column B and record the result in Column C as the Normalized Fraction.

Standard: Divides each Upper and Lower reading by the respective 100% normalized current value and records in Column C.

Comment:

OST-1039 Section 7.3, Step 5

✓ **Performance Step: 9**

CALCULATE the average value for the upper and the lower Normalized Fractions as follows:

- ADD the Normalized Fraction in each section of column C, recording the sum in the space provided.
- DIVIDE the sum obtained in Step 7.3.5.a by the number of operable NI channels, recording the result in column D of Attachment 2.

Standard:

Adds all Normalized Fractions for the same plane and records the sum in the space provided.

Divides by the sum by four and records result in Column D.

Comment:

OST-1039 Section 7.3, Step 6

✓ **Performance Step: 10**

Using the formula and values from Attachment 2, CALCULATE the Upper and Lower Ratios.

Standard:

- Divides the Maximum Normalized Fraction by the Average Normalized Fraction on each plane.
- Determines the UPPER ratio is ≥ 1.02
- Determines the LOWER ratio is ≥ 1.02

Evaluator Note:	**The applicant may inform the CRS as soon as any calculation is > 1.02. If so, acknowledge and direct applicant to complete Attachment 2.**

Comment:

OST-1039 Section 7.3, Step 7

Performance Step: 11 PERFORM independent verification of all calculations made on Attachment 2.

Standard: Requests Independent Verifier.

Evaluator Cue: **If necessary, repeat Initiating Cue: For the purpose of this examination, there will be no independent verification of your work.**

Comment: **Candidate may choose to check calculations.**

OST-1039 Section 7.3, Note prior to Step 8

Performance Step: 12 NOTE: The upper ratio or the lower ratio, whichever is greater, is the quadrant power tilt ratio (QPTR).

Standard: Reads and place keeps note

Comment:

OST-1039 Section 7.3, Step 8

✓ **Performance Step: 13** RECORD QPTR:

Standard: Records QPTR value as **1.0474**, 1.0469 to 1.0479 (N43 LOWER)
Identifies Lower as the one most above the 1.02 limit

Comment: **Acceptable band is +/- .0005.**
UPPER calculated band is 1.0291 to 1.0301
LOWER calculated band is 1.0469 to 1.0479

OST-1039 Section 7.3, Step 9

Performance Step: 14 CHECK QPTR is less than or equal to 1.02.

Standard: **Identifies Upper and Lower QPTR's are greater than 1.02 and QPTR is unacceptable**

Comment:

Terminating Cue:	**Once OST-1036 has been completed through 7.3.9** **Evaluation on this JPM is complete.**

STOP Time: __________.

KEY

CHECK QPTR is less than or equal to 1.02 (circle) YES / **NO**

UPPER DETECTOR	A UPPER DETECTOR CURRENT	B UPPER 100% POWER NORMALIZED CURRENT	C UPPER NORMALIZED FRACTION (NOTE 1)	D AVERAGE UPPER NORMALIZED FRACTION
N-41	145.6	150.5	0.9674	0.9467
N-42	162.5	172.8	0.9403	
N-43	189.8	194.7	0.9748	
N-44	138.4	153.0	0.9045	
		SUM	3.7870	

$$\text{Upper Ratio} = \frac{\text{Maximum Upper Normalized Fraction}}{\text{Average Upper Normalized Fraction}} = \frac{0.9748}{0.9467} = 1.0296^{*}$$

* Standard for this calculation is ± 0.0005, 1.0291 to 1.0301

LOWER DETECTOR	A LOWER DETECTOR CURRENT	B LOWER 100% POWER NORMALIZED CURRENT	C LOWER NORMALIZED FRACTION (NOTE 1)	D AVERAGE LOWER NORMALIZED FRACTION
N-41	159.6	167.1	0.9551	0.9400
N-42	172.1	191.1	0.9005	
N-43	205.3	208.5	0.9846	
N-44	165.2	179.6	0.9198	
		SUM	3.7600	

$$\text{Lower Ratio} = \frac{\text{Maximum Lower Normalized Fraction}}{\text{Average Lower Normalized Fraction}} = \frac{0.9846}{0.9400} = \mathbf{1.0474}^{**}$$

** Standard for this calculation is ± 0.0005, 1.0469 to 1.0479

VERIFICATION OF COMPLETION

Job Performance Measure No.: 2018 NRC Exam Admin JPM RO A2
Perform a Quadrant Power Tilt Ratio Surveillance

Examinee's Name:

Date Performed:

Facility Evaluator:

Number of Attempts:

Time to Complete:

Question Documentation:

Question:

Response:

Result: SAT ______ UNSAT ______

Examiner's Signature: ______________________ Date: ______________

Initial Conditions:	• The plant was operating at 90% power when a rod in Control Bank 'A' (P-10) dropped. • The crew is performing AOP-001, MALFUNCTION OF ROD CONTROL AND INDICATION SYSTEM. • There are NO deficiency tags on PR NIs. • ERFIS points ANM9112U and ANM9113L have a BAD quality code. HNP IT has been notified and they are evaluating the ERFIS points.

Initiating Cue:	The CRS has given you permission to perform a manual QPTR iaw OST-1039, CALCULATION OF QPTR. Perform section 7.3.1 through 7.3.9. The Power Range NIS indications are provided. After performing the calculation return your results to the evaluator. **For the purposes of the examination, there will be no independent verification. Show values of your work.**

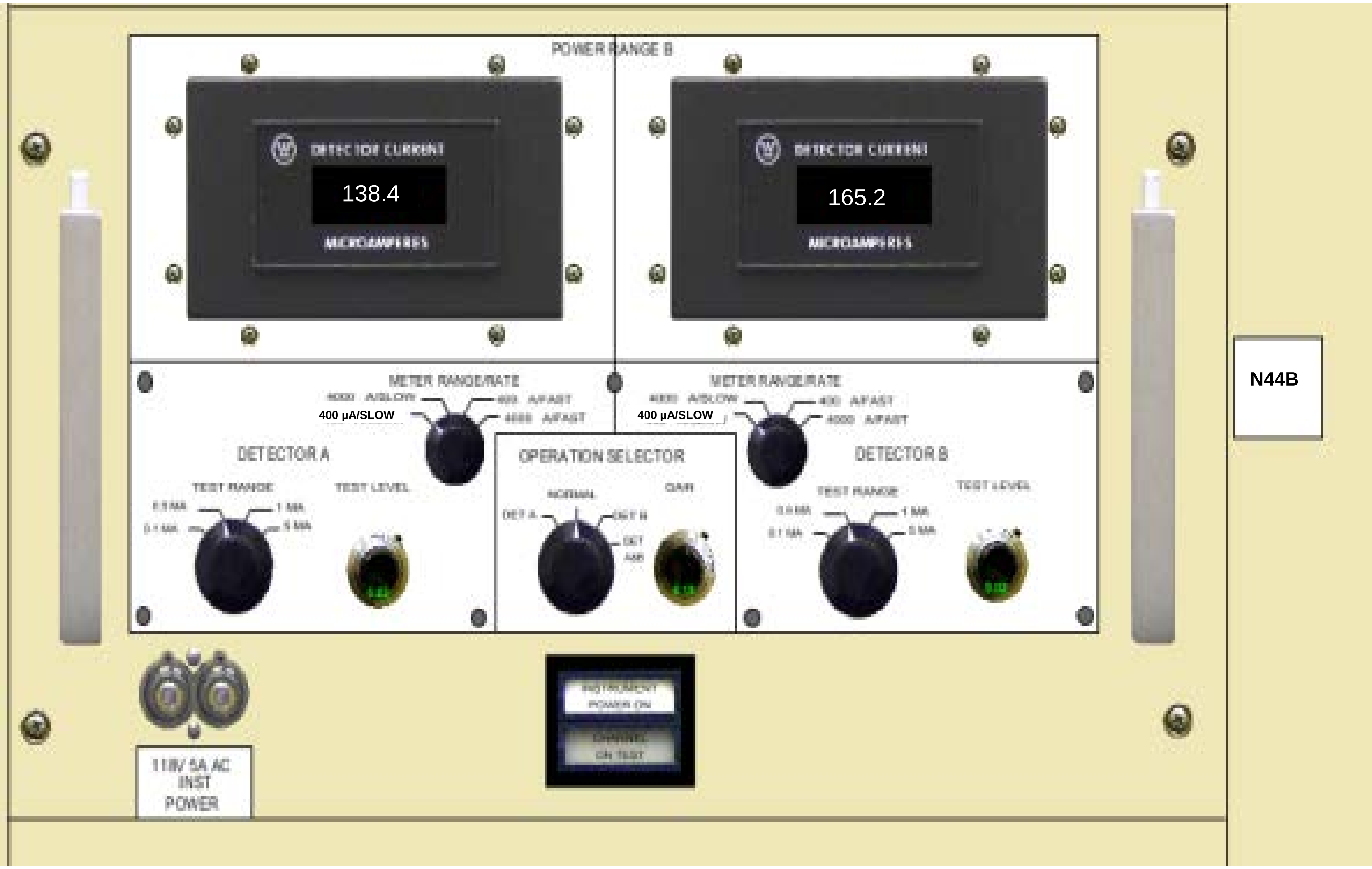
Name: ____

Date: ____________________


POWER RANGE B
DETECTOR CURRENT
145.6
MICROAMPERES
DETECTOR CURRENT
159.6
MICROAMPERES
METER RANGE/RATE
400 µA/SLOW
DETECTOR A
TEST RANGE
TEST LEVEL
OPERATION SELECTOR
NORMAL
GAIN
DET A
DET B
METER RANGE/RATE
400 µA/SLOW
DETECTOR B
TEST RANGE
TEST LEVEL
N41B
118V 5A AC
INST
POWER


POWER RANGE B
DETECTOR CURRENT
162.5
MICROAMPERES
DETECTOR CURRENT
172.1
MICROAMPERES
METER RANGE/RATE
400 μA/SLOW
DETECTOR A
TEST RANGE
TEST LEVEL
OPERATION SELECTOR
NORMAL
DET A
DET B
GAIN
METER RANGE/RATE
400 μA/SLOW
DETECTOR B
TEST RANGE
TEST LEVEL
N42B
INST
POWER


POWER RANGE B
DETECTOR CURRENT
189.8
MICROAMPERES
DETECTOR CURRENT
205.3
MICROAMPERES
METER RANGE/RATE
400 µA/SLOW
METER RANGE/RATE
400 µA/SLOW
DETECTOR A
TEST RANGE
TEST LEVEL
OPERATION SELECTOR
NORMAL
DET A
DET B
GAIN
DETECTOR B
TEST RANGE
TEST LEVEL
118V 5A AC
INST
POWER
N43B


POWER RANGE B
DETECTOR CURRENT
138.4
MICROAMPERES
DETECTOR CURRENT
165.2
MICROAMPERES
METER RANGE/RATE
400 μA/SLOW
DETECTOR A
TEST RANGE
TEST LEVEL
OPERATION SELECTOR
NORMAL
GAIN
DET A
DET B
METER RANGE/RATE
400 μA/SLOW
DETECTOR B
TEST RANGE
TEST LEVEL
INSTRUMENT POWER ON
CHANNEL ON TEST
118V 5A AC INST POWER
N44B

Facility:	Harris Nuclear Plant	Task No.:	119013H304
Task Title:	Using survey maps determine stay times	JPM No.:	2018 NRC Exam Admin JPM RO A3
K/A Reference:	G.2.3.4 RO 3.2 SRO 3.7		**Alternate Path - NO**
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:	Two Operators are being assigned to hang a clearance on 1CS-38, Letdown PCV Isol vlv and perform work in a radiological area. The clearance includes the following valves: • 1CS-35 • 1CS-36 • 1CS-37 • 1CS-38 • 1CS-39 • 1CS-40 • 1CS-43 Operator 1 has an accumulated annual Whole Body dose of 1750 mrem (Duke Energy Progress). Operator 2 has an accumulated annual Whole Body dose of 700 mrem (Duke Energy Progress) and worked at Nine Mile Point earlier this year where he accumulated 2550 mrem. In accordance with PD-RP-ALL-0001, Radiation Worker Responsibilities, the Radiation Protection Manager has authorized Operator 2 a dose extension to the maximum limit that his signature authority is allowed. The ALARA group has determined that additional shielding is not warranted for this work.
Initiating Cue:	Using the supplied survey map, determine the maximum allowable individual stay times for each Operator that would prevent exceeding the Duke Energy Annual Administrative dose limit while performing these activities. Do not consider dose received during transit. The calculated dose should be ONLY what they would receive while working at the valves for the clearance. Complete the information below and return to the evaluator when complete.

Task Standard: Calculation of stay times based on survey maps, two hours for Operator 1, one hour and twelve minutes for Operator 2.

Required Materials: Survey map A45
RAB 236' LETDOWN & LETDOWN REHEAT HX & VG Map 21
SFD-5-S-1304

General References: PD-RP-ALL-0001 “Radiation Worker Responsibilities” Section 5.2 (Rev. 7)

LIMIT = 2 rem Duke Energy Progress dose not to exceed 3.4 rem total dose if non- Duke Energy Progress dose for the current year has been determined.

Handouts:
- PD-RP-ALL-0001
- JPM Cue Sheets Pages 7 - 12

Time Critical Task: No

Validation Time: 15 minutes

Critical Task Justification	
Step 1	Must determine dose rates in order to calculate stay time
Step 2	Must determine available dose to determine stay time.
Step 3	IF incorrect calculation of stay time is made the individuals could exceed their dose limits.

START TIME: ____________

Evaluator Note:	**NOTE: PD-RP-ALL-0001, Radiation Worker Responsibilities, Rev 7 is available in the 2018 NRC Exam Frozen Procedures PD-RP-ALL- RADIATION PROTECTION folder.** **The order of performance does not matter**

✓ **Performance Step: 1** Using Radiological Survey Record Map A45 and RAB 236' LETDOWN & LETDOWN REHEAT HX & VG Map 21, determines dose rates in the area where the clearance will be applied

Standard: Identifies that General Area Dose Rates are 125 mrem/hr

Comment:

✓ **Performance Step: 2** Determine the remaining dose for the year for each individual

Standard:

Operator 1: **250 mrem**
2000 mrem - 1750 mrem = 250 mrem

Operator 2: **150 mrem**
3400 mrem - 700 mrem (DEP) - 2550 mrem (NMP) = 150 mrem

Comment:

✓ **Performance Step: 3** Determine stay time for each operator (based on 1st Operator reaching 2 Rem and the 2nd Operator reaching 3.4 Rem - for the year)

Standard:

Operator 1: **2 hours**

250 mrem ÷ 125 mrem/hr = 2 hours

Operator 2: **1 hour and 12 minutes**

150 mrem ÷ 125 mrem/hr = 1 hour and 12 minutes

Comment:

Terminating Cue:	**After the stay time has been calculated, this JPM is complete.** **END OF JPM**

STOP TIME: ______________

Initial Conditions:	Two Operators are being assigned to hang a clearance on 1CS-38, Letdown PCV Isol vlv and perform work in a radiological area. The clearance includes the following valves: • 1CS-35 • 1CS-39 • 1CS-36 • 1CS-40 • 1CS-37 • 1CS-43 • 1CS-38 Operator 1 has an accumulated annual Whole Body dose of 1750 mrem (Duke Energy Progress). Operator 2 has an accumulated annual Whole Body dose of 700 mrem (Duke Energy Progress) and worked at Nine Mile Point earlier this year where he accumulated 2550 mrem. In accordance with PD-RP-ALL-0001, Radiation Worker Responsibilities, the Radiation Protection Manager has authorized Operator 2 a dose extension to the maximum limit that his signature authority is allowed. The ALARA group has determined that additional shielding is not warranted for this work.

Initiating Cue:	Using the supplied survey map, determine the maximum allowable individual stay times for each Operator that would prevent exceeding the Duke Energy Annual Administrative dose limit while performing these activities. Do not consider dose received during transit. The calculated dose should be ONLY what they would receive while working at the valves for the clearance. Complete the information below and return to the evaluator when complete.

Name: ______________________________

Date: ________________

Record the maximum allowable stay time calculations below to the nearest hour and minute.

Operator 1: ____________________ Operator 2: ____________________

Facility:	Harris Nuclear Plant	Task No.:	341010H302
Task Title:	Perform Review of Daily Surveillance Requirements Log	JPM No.:	2018 NRC Exam Admin JPM SRO A1-1
K/A Reference:	G 2.1.18 RO 3.6 SRO 3.8	**Alternate Path - NO**	

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, discuss, or perform 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 operating at 100% power on Tuesday at 2300 • EDG "A" is synchronized to the grid for a post-maintenance test and has been running at 6.3 MW for 30 minutes. • The Daily Surveillance Logs (OST-1021, Attachment 3) have been completed. • ERFIS Pressurizer Pressures are unavailable.

Initiating Cue:	Review the OST-1021, Attachment 3 logs. At the conclusion of your review, list any discrepancies or problems if applicable and identify the Tech Spec and applicable actions. Be prepared to discuss any findings with the evaluator.

Task Standard: All errors and TS actions identified

Required Materials: Perform in a location with TS or electronic access to TS available and PLP-114, Rev 26.

General References:
- OST-1021, DAILY SURVEILLANCE REQUIREMENTS, DAILY INTERVAL, MODE 1 AND 2
- Technical Specifications

Handouts:
- Copy of a completed OST-1021, Attachment 3.
- Substitute the following incorrect data:
  - Page 26 instruction line item 1 – N/A this line. Make 3 of the RCS Loop flows out of spec. There are 4 wrong things with this – there should be an initial in line item 1 not an N/A. Then the 3 channels should be identified as out of spec. There should also be a Tech Spec determination based on the out of spec readings.
  - Page 29 the Condensate Storage Tank Level (both channels) progressively lowering from 63/64% to 59/60% throughout the day. The readings are out of spec and there should also be a Tech Spec determination.
  - Page 33 the Aux RSVR Level (both channels) 249.7 ft / 249.7 ft. The readings are out of spec and there should also be a Tech Spec determination.

Time Critical Task: No

Validation Time: 25 minutes

Critical Step Justification	
Step 1	Critical to comply with Technical Specification requirements.
Step 2	Critical to comply with Technical Specification requirements.
Step 3	Critical to comply with Technical Specification requirements.

Start Time: __________.

Evaluator Cue:

- **If necessary, after the applicant discusses each finding: What action, if any, is required relative to this reading?**

Evaluator Note:	**Only the incorrect items in the logs are identified in the JPM Steps.**

√ **Performance Step: 1** Review OST-1021, Attachment 3 for approval.

Standard:

Page 26

- Instruction line item 1 – Should not be N/A. EST-708 needs to be performed due to several RCS flow readings not meeting Acceptance Criteria. (not critical)
- Identifies ONE of the three of the RCS Loop flows out of spec.
  - The 0800 - 1100 reading for FI-414 reads 98.6 which is lower than 99.3%
  - The 0800 - 1100 reading for FI-426 reads 98.9 which is lower than 99.3%
  - The 2000 - 2300 reading for FI-415 reads 98.9 which is lower than 99.3%
- Determines the required action for Technical Specification compliance:
  - Perform EST-708 due to the RCS flow readings not meeting Acceptance Criteria. (As directed by Instruction 1 at top of page.)

    OR
  - TS 3.2.5.c; 2 hrs to restore, or reduce thermal power to less than 5% of RTP w/in next 6 hrs

Comment:

√ **Performance Step: 2** Review OST-1021, Attachment 3 for approval.

Standard:

Page 29
- Determines that the 2000 – 2300 reading for both Condensate Storage Tank Levels are below Acceptance Criteria.
- TS 3.7.1.3; within 4 hrs restore CST to operable status, or HSB in next 6 hrs; HSD in following 6 hrs.

Comment:

√ **Performance Step: 3** Review OST-1021, Attachment 3 for approval.

Standard:

Page 33
- Determines that the 0800 - 1100 reading for Aux RSVR Level are 249.7 and 249.8 ft which is below the 250 ft Acceptance Criteria.
- TS 3.7.5.a; HSB in next 6 hrs; CSD in following 30 hrs.

Comment:

Terminating Cue:	**After all findings have been reviewed: Evaluation on this JPM is complete.**

Stop Time: __________.

KEY

Discrepancies or problems identified:

Page 26

- Instruction line item 1 – Should not be N/A. EST-708 needs to be performed due to several RCS flow readings not meeting Acceptance Criteria.
- Identifies three of the RCS Loop flows out of spec.
  - o The 0800 - 1100 readings for FI-414 reads 98.6 which is lower than 99.3%
  - o The 0800 - 1100 readings for FI-426 reads 98.9 which is lower than 99.3%
  - o The 2000 - 2300 reading for FI-415 reads 98.9 which is lower than 99.3%
- Perform EST-708 due to the RCS flow readings not meeting Acceptance Criteria. (As directed by Instruction 1 at top of page.)
- TS 3.2.5.c. RCS total flow rate ≥ 293,540 gpm after subtraction for instrument uncertainty.
  - o ACTION: With any of the above parameters not within its specified limit, restore the parameter to within its limit within 2 hours or reduce THERMAL POWER to less than 5% of RATED THERMAL POWER within the next 6 hours.

Page 29

- Determines the 2000 – 2300 reading for both Condensate Storage Tank Levels are below Acceptance Criteria.
- TS 3.7.1.3 The condensate storage tank (CST) shall be OPERABLE with a contained water volume of at least 270,000 gallons of water, which is equivalent to 62% indicated level.
  - o With the CST inoperable, within 4 hours either:
  - o a. Restore the CST to OPERABLE status or be in at least HOT STANDBY within the next 6 hours and in HOT SHUTDOWN within the following 6 hours, or
  - o b. Demonstrate the OPERABILITY of the Emergency Service Water System as a backup supply to the auxiliary feedwater pumps and restore the CST to OPERABLE status within 7 days or be in at least HOT STANDBY within the next 6 hours and in HOT SHUTDOWN within the following 6 hours.

Page 33

- Identifies that the 0800 - 1100 reading for both Aux RSVR Levels are below Acceptance Criteria.
- TS 3.7.5.a - The ultimate heat sink shall be OPERABLE with:
  - o A minimum auxiliary reservoir water level at or above elevation 250 feet Mean Sea Level, USGS datum, and a minimum main reservoir water level at or above 206 feet Mean Sea Level, USGS datum,
  - o ACTION: With the requirements of the above specification not satisfied, be in at least HOT STANDBY within 6 hours and in COLD SHUTDOWN within the following 30 hours.

VERIFICATION OF COMPLETION

Job Performance Measure No.: 2018 NRC Admin Exam SRO A1-1
Perform Review of Daily Surveillance Requirements Log
OST-1021

Examinee's Name:

Date Performed:

Facility Evaluator:

Number of Attempts:

Time to Complete:

<u>Question Documentation:</u>

Question:

Response:

Result: SAT ______ UNSAT ______

Examiner's Signature: ______________________________ Date: ____________________

Initial Conditions:	• The plant is operating at 100% power on Tuesday at 2300 • EDG “A” is synchronized to the grid for a post-maintenance test and has been running at 6.3 MW for 30 minutes. • The Daily Surveillance Logs (OST-1021, Attachment 3) have been completed. • ERFIS Pressurizer Pressures are unavailable.

Initiating Cue:	Review the OST-1021, Attachment 3 logs. At the conclusion of your review, list any discrepancies or problems if applicable and identify the Tech Spec and applicable actions. Be prepared to discuss any findings with the evaluator.

Name: ______________________________

Date: ___________

IF any discrepancies or problems are identified, list page number and discrepancy here:

Facility:	Harris Nuclear Plant	Task No.:	301005H401
Task Title:	Determine Rod Misalignment Using Thermocouples and Evaluate Tech Specs	JPM No.:	2018 NRC Exam Admin JPM SRO A1-2
K/A Reference:	G 2.1.7 RO 4.4 SRO 4.7	**Alternate Path - NO**	

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, discuss, or perform and provide initiating cues. When you complete the task successfully, the objective for this Job Performance Measure will be satisfied.

Initial Conditions:	• The plant was at 95% power, with a load reduction in progress. During the down power DRPI indication for rod F08 showed a difference of 24 steps higher than the group demand. • The load reduction has been stopped and AOP-001 was entered. • ALB-013-8-5, Computer Alarm Rod Dev/Seq NIS Power Range Tilts is the only MCB alarm received. • I&C investigated and found no obvious electrical problems.

Initiating Cue:	With the information provided complete Attachment 2 of AOP-001, calculate the temperature difference between thermocouple(s) adjacent to the misaligned rod and the average of symmetric thermocouple(s). After performing the calculation evaluate the results and circle the response below. List any Technical Specifications and the associated LCO action(s) that may apply. When complete return your results to the evaluator.

Task Standard:	Correctly calculate averages of symmetric TC. Correct Tech Spec and LCO action is identified.
Required Materials:	Calculator
General References:	AOP-001, Attachment 1, Attachment 2, Rev. 48 Technical Specifications
Handouts:	JPM Cue Sheets Pages 13,14 AOP-001, Attachments 1 and 2, Rev. 48
Time Critical Task:	No
Validation Time:	20 minutes

Critical Task Justification	
Step 1	If the wrong thermocouples are used then none of the results will be correct
Step 3	If the wrong values are selected then none of the results will be correct
Step 4	If the calculation for the averages were incorrect the results will be incorrect
Step 5	If the differences are calculated incorrectly then the candidate may come to the wrong conclusion for Tech Specs
Step 6	If the wrong Tech Spec Action is selected an LCO action could be exceeded

Start Time: __________.

AOP-001 Attachment 2 Step 1

✓ **Performance Step: 1** DETERMINE THERMOCOUPLE LOCATION(S) ADJACENT TO THE MISALIGNED ROD USING THE CORE GRID MAP (SHEET 1).

Standard: Using the core grid map (Attachment 2, page 1 of 3), Determines affected thermocouples to be E07, E08, F09, and G08.

Comment: **Note, page 47, AOP-001: E07 does not have symmetric thermocouple locations per Attachment 2.**

AOP-001 Attachment 2 Step 2

Performance Step: 2 CIRCLE LOCATION(S) IN TABLE ABOVE.

Standard: Circles E08, F09, and G08 on the table
(Attachment 2, page 2 of 3).
Recognizes from the Note that E07 has no symmetric locations

Comment:

AOP-001 Attachment 2 Step 3

✓ **Performance Step: 3**

RECORD the following in the table below:

- Adjacent TC number
- Adjacent TC value using the RVLIS Console, ERFIS, or OSI-PI
- Symmetric TC numbers (not including adjacent TCs)
- Symmetric TC values for all OPERABLE TCs using the RVLIS Console, ERFIS, or OSI-PI

Standard:

Locates RVLIS Console and accesses T/C CORE MAP for Train A and Train B. **(Printout of RVLIS core map provided in handout)**

Records value for Affected TC E07(640°F) and Notes it does not have any Symmetric TC's.

Records value for Affected TC E08 (648°F) and Symmetric TCs H05 (644°F), H11 (652°F), and L08 (642°F).

Records value for Affected TC F09 (644°F) and Symmetric TCs G06 (640°F), and J10 (650°F).

Records value for Affected TC G08 (646°F) and Symmetric TC H09 (642°F).

Comment:

AOP-001 Attachment 2 Step 4

✓ **Performance Step: 4** DETERMINE THE AVERAGE OF SYMMETRIC THERMO-COUPLES, FOR EACH ADJACENT THERMOCOUPLE.

Standard:

Determines (652 + 642 + 644)/3 = 646°F for E08's Symmetric TCs

Determines (640 + 650)/2 = 645°F for F09's Symmetric TCs

Determines (642°F) for G08's Symmetric TC

Comment:

EXAMINERS NOTE:	**If the candidate includes the adjacent TCs with the Symmetric TC numbers the averages will be wrong and the end result will be that a wrong final difference will be given:** Determines (646.5°F) for E08's Symmetric TCs Determines (644.7°F) for F09's Symmetric TCs Determines (642°F) for G08's Symmetric TCs

AOP-001 Attachment 2 Step 5

✓ **Performance Step: 5**

COMPARE EACH ADJACENT THERMOCOUPLE VALUE LISTED TO ITS SYMMETRIC THERMOCOUPLE AVERAGE FOR INDICATION OF A MISALIGNED ROD. (REFER TO ATTACHMENT 1.)

Standard:

Critical to calculate the maximum difference of **4°F** for TC G08

2°F for TC E08

1°F for TC F09

4°F for TC G08

Using AOP-001, Attachment 1 determines since the difference between thermocouples adjacent to the misaligned rod and the average of symmetric thermocouples is < 10°F that a malfunction of Digital Rod Position Indication (DRPI) is occurring.

Circles 1. A malfunction of Digital Rod Position Indication (DRPI) is occurring.

Comment:

Technical Specifications

✓ **Performance Step: 6**

OBTAIN AND EVALUATE TECHNICAL SPECIFICATIONS

Standard:

Obtains Technical Specifications and refers to LCO 3.1.3.2

Determines that ACTION a. is applicable. (See page 11)

Evaluator Cue:	**After the candidate has completed the calculation for the thermocouples and performed a Technical Specification evaluation.** **END OF JPM**

Terminating Cue:	Difference between each affected thermocouple and its symmetric thermocouples has been calculated and the Technical Specifications evaluation completed .

Stop Time: __________

KEY

MALFUNCTION OF ROD CONTROL AND INDICATION SYSTEM

Attachment 2 - Adjacent and Symmetric Thermocouple Locations

Sheet 1 of 3

THERMOCOUPLE LOCATIONS

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
A								T							
B					T	R		R		RT					
C							R	T	R		R	T			
D			T	R	T	R				R		R			
E			R	T	R		T	T		T	R	T		T	
F		R	T*	R	T	R		R	T	R	T	R	T	R	
G	T	T	R			T	R	T	R				R		T
H		R	T		T	R		T	T	R	T		T	R	T
J		T	R				R		R	T		T*	R		
K		R	T	R	T	R		RT		R	T	R		R	
L					R	T		T			R	T	R	T	
M			T	R		R			T	R	T	R			
N				T	R	T	R	T**	R	T					
P						R	T	RT		R					
R							T								

R - Control Rod

T - Thermocouple

T* - Thermocouple(s) abandoned by EC 47997 (core location[s] F03, J12)

T** - Thermocouple(s) abandoned by EC 76393 (core location[s] N08)

KEY

MALFUNCTION OF ROD CONTROL AND INDICATION SYSTEM

Attachment 2 - Adjacent and Symmetric Thermocouple Locations
Sheet 2 of 3

NOTE

- B10, E07, H08, K08, and P08 have no symmetric locations.
- Symmetric thermocouples are those in the same row.

SYMMETRIC LOCATIONS

GRID	I		II		III		IV	
TRAIN	A	B	A	B	A	B	A	B
	A08				H15			
		G01		G15			R07	
S L	B05			E14		L14		
Y O		C08	H13				N08**	H03
M C		D03	C12				N04	M03
M A	E04	D05		E12	M11	L12		
E T			H11	E08		L08		H05
T I		F05	F11	E10	K11		K05	L06
R O		F03*	F13			N10	N06	K03
I N	G06		F09			J10		
C S		G08			H09			
	G02						J02	P07
					M09	J12*		

* - Thermocouple(s) abandoned by EC 47997 (core location[s] F03, J12)

** - Thermocouple(s) abandoned by EC 76393 (core location[s] N08)

☐ 1. **DETERMINE** thermocouple location(s) adjacent to the misaligned rod using core grid map (Sheet 1).

☐ 2. **CIRCLE** location(s) in Table above.

KEY

T/C CORE MAP **(DATA SHEET 1)** **TRAIN B** MSG # 245

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
A																A
B										632						B
C								636								C
D			636		650											D
E								648		642		640		632		E
F			50		644											F
G	642							646							640	G
H			649		644											H
J										650		50				J
K			640													K
L						644		642				644		632		L
M			636													M
N										640						N
P							636									P
R																R
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	

TRAIN A

T/C CORE MAP MSG # 245

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
A								636								A
B					636											B
C												632				C
D																D
E				636			640									E
F									644		648		644			F
G		642				640										G
H								640	642		652		640		640	H
J		642														J
K					640			644			648					K
L																L
M											644					M
N				636		640		50								N
P								640								P
R							636									R
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	

KEY

MALFUNCTION OF ROD CONTROL AND INDICATION SYSTEM

Attachment 2 - Adjacent and Symmetric Thermocouple Locations
Sheet 3 of 3

3. **RECORD** the following in the table below:

- ☐ Adjacent TC number(s)
- ☐ Adjacent TC value(s) using the RVLIS Console, ERFIS, or OSI-PI
- ☐ Symmetric TC number(s) (**NOT** including adjacent TCs)
- ☐ Symmetric TC value for all OPERABLE TCs using the RVLIS Console, ERFIS, or OSI-PI

☐ 4. **DETERMINE** the average of symmetric thermocouples, for each adjacent thermocouple.

Adjacent TC		Symmetric TC		Symmetric TC Average
Number	Value	Number	Value	
E08	648	H11	652	646
		L08	642	
		H05	644	
F09	644	G06	640	645
		J10	650	
G08	646	H09	642	642

☐ 5. **COMPARE** each adjacent thermocouple value listed to its symmetric thermocouple average for indication of a misaligned rod (**REFER TO** Attachment 1).

--END OF ATTACHMENT 2--

KEY

1. A malfunction of Rod Position Indication (DRPI) is occurring

REACTIVITY CONTROL SYSTEMS
POSITION INDICATION SYSTEMS - OPERATING

LIMITING CONDITION FOR OPERATION

3.1.3.2 The Digital Rod Position Indication System and the Demand Position Indication System shall be OPERABLE and capable of determining the shutdown and control rod positions within ± 12 steps.

APPLICABILITY: MODES 1 and 2.

ACTION:

a. With a maximum of one digital rod position indicator per bank inoperable either:

1. Determine the position of the nonindicating rod(s) indirectly by the movable incore detectors at least once per 8 hours and immediately after any motion of the nonindicating rod which exceeds 24 steps in one direction since the last determination of the rod's position, or

2. Reduce THERMAL POWER to less than 50% of RATED THERMAL POWER within 8 hours.

b. With a maximum of one demand position indicator per bank inoperable either:

1. Verify that all digital rod position indicators for the affected bank are OPERABLE and that the most withdrawn rod and the least withdrawn rod of the bank are within a maximum of 12 steps of each other at least once per 8 hours, or

2. Reduce THERMAL POWER to less than 50% of RATED THERMAL POWER within 8 hours.

SURVEILLANCE REQUIREMENTS

4.1.3.2 Each digital rod position indicator shall be determined to be OPERABLE by verifying that the Demand Position Indication System and the Digital Rod Position Indication System agree within 12 steps at the frequency specified in the Surveillance Frequency Control Program except during time intervals when the rod position deviation monitor is inoperable, then compare the Demand Position Indication System and the Digital Rod Position Indication System at least once per 4 hours.

SHEARON HARRIS - UNIT 1 | 3/4 1-17 | Amendment No. 154

Job Performance Measure No.: 2018 NRC Admin Exam SRO A1-2

Determine Rod Misalignment Using Thermocouples and Evaluate Technical Specifications

AOP-001

Examinee's Name:

Date Performed:

Facility Evaluator:

Number of Attempts:

Time to Complete:

Question Documentation:

Question:

Response:

Result: SAT ______ UNSAT ______

Examiner's Signature: ______________________ Date: ______________

Initial Conditions:	• The plant was at 95% power, with a load reduction in progress. During the down power DRPI indication for rod F08 showed a difference of 24 steps higher than the group demand. • The load reduction has been stopped and AOP-001 was entered. • ALB-013-8-5, Computer Alarm Rod Dev/Seq NIS Power Range Tilts is the only MCB alarm received. • I&C investigated and found no obvious electrical problems.

Initiating Cue:	With the information provided complete Attachment 2 of AOP-001, calculate the temperature difference between thermocouple(s) adjacent to the misaligned rod and the average of symmetric thermocouple(s). After performing the calculation evaluate the results and circle the response below. List any Technical Specifications and the associated LCO action(s) that may apply. When complete return your results to the evaluator.

Name: ____

Date: ____________________

Circle the correct response that applies:

1. A malfunction of Digital Rod Position Indication (DRPI) is occurring
2. A Rod Misalignment is occurring

Technical Specification(s) and applicable LCO's that apply: ______________________

____

____

____

T/C CORE MAP **(DATA SHEET 1)** **TRAIN B** MSG # 245

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
A																A
B										632						B
C								636								C
D			636		650											D
E								648		642		640		632		E
F			50		644											F
G	642							646							640	G
H			649		644											H
J										650		50				J
K			640													K
L						644		642				644		632		L
M			636													M
N										640						N
P							636									P
R																R
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	

TRAIN A

T/C CORE MAP MSG # 245

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
A								636								A
B					636											B
C												632				C
D																D
E				636			640									E
F									644		648		644			F
G		642				640										G
H								640	642		652		640		640	H
J		642														J
K					640			644			648					K
L																L
M											644					M
N				636		640		50								N
P								640								P
R							636									R
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	

MALFUNCTION OF ROD CONTROL AND INDICATION SYSTEM

Attachment 1 - Indications of Misaligned Rod
Sheet 1 of 1

The table below indicates the variation in plant parameters which may be indicative of rod misalignment. This variation refers to relative changes in indication from a reference condition at which the suspect rod's position was known to be properly aligned. The reference case may be taken from prior operating records, or it may be updated each time the proper rod positioning is verified by in-core measurements. In general, greater misalignment will cause larger variations. Variations in NI channel indication are also affected by the core location of the suspect rod. For example, a misaligned rod that is closest to the N-44 detector should indicate that N-44 flux parameters are abnormal when compared with flux parameters of the other Power Range NI channels. If the parameters below exhibit no abnormal variations with an individual DRPI differing from its group step counter demand position by more than 12 steps, it is probably a rod position indication problem. Quadrant Power Tilt Ratio can be determined by accessing 'GD QPTR' or 'QPTR' and using the highest of ANM9112U - QPTR UPPER RATIO (ANM0112M-118M) or ANM9113L - QPTR LOWER RATIO (ANM0113M-119M).

PLANT PARAMETER	**VALUE INDICATIVE OF ROD MISALIGNMENT**
Quadrant Power Tilt Ratio (QPTR)	Greater than 1.02
Power Range Instrumentation	Greater than 2% difference between any two channels (**REFER TO** Attachment 4)
Delta Flux Indicators	Greater than 2% difference between any two channels (**REFER TO** Attachment 4)
Core Outlet Thermocouples	Greater than 10°F difference between thermocouples adjacent to the misaligned rod and the average of symmetric thermocouples (**PERFORM** Attachment 2)
Axial Flux Traces (in-core movable detector)	**CONSULT** Reactor Engineering **AND EVALUATE** using in-core movable detectors per EST-922, Control Rod Position Determination Via Incore Instrumentation

--END OF ATTACHMENT 1--

MALFUNCTION OF ROD CONTROL AND INDICATION SYSTEM

Attachment 2 - Adjacent and Symmetric Thermocouple Locations
Sheet 1 of 3

THERMOCOUPLE LOCATIONS

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
A								T							
B					T	R		R		RT					
C							R	T	R		R	T			
D			T	R	T	R				R		R			
E			R	T	R		T	T		T	R	T		T	
F		R	T*	R	T	R		R	T	R	T	R	T	R	
G	T	T	R			T	R	T	R				R		T
H		R	T		T	R		T	T	R	T		T	R	T
J		T	R				R		R	T		T*	R		
K		R	T	R	T	R		RT		R	T	R		R	
L					R	T		T			R	T	R	T	
M			T	R		R			T	R	T	R			
N				T	R	T	R	T**	R	T					
P						R	T	RT		R					
R							T								

R - Control Rod

T - Thermocouple

T* - Thermocouple(s) abandoned by EC 47997 (core location[s] F03, J12)

T** - Thermocouple(s) abandoned by EC 76393 (core location[s] N08)

MALFUNCTION OF ROD CONTROL AND INDICATION SYSTEM

Attachment 2 - Adjacent and Symmetric Thermocouple Locations

Sheet 2 of 3

NOTE

- B10, E07, H08, K08, and P08 have no symmetric locations.
- Symmetric thermocouples are those in the same row.

SYMMETRIC LOCATIONS

GRID	I		II		III		IV	
TRAIN	A	B	A	B	A	B	A	B
	A08				H15			
		G01		G15			R07	
S L	B05			E14		L14		
Y O		C08	H13				N08**	H03
M C		D03	C12				N04	M03
M A	E04	D05		E12	M11	L12		
E T			H11	E08		L08		H05
T I		F05	F11	E10	K11		K05	L06
R O		F03*	F13			N10	N06	K03
I N	G06		F09			J10		
C S		G08			H09			
	G02						J02	P07
					M09	J12*		

* - Thermocouple(s) abandoned by EC 47997 (core location[s] F03, J12)

** - Thermocouple(s) abandoned by EC 76393 (core location[s] N08)

☐ 1. **DETERMINE** thermocouple location(s) adjacent to the misaligned rod using core grid map (Sheet 1).

☐ 2. **CIRCLE** location(s) in Table above.

MALFUNCTION OF ROD CONTROL AND INDICATION SYSTEM

Attachment 2 - Adjacent and Symmetric Thermocouple Locations
Sheet 3 of 3

3. **RECORD** the following in the table below:

- ☐ • Adjacent TC number(s)
- ☐ • Adjacent TC value(s) using the RVLIS Console, ERFIS, or OSI-PI
- ☐ • Symmetric TC number(s) (**NOT** including adjacent TCs)
- ☐ • Symmetric TC value for all OPERABLE TCs using the RVLIS Console, ERFIS, or OSI-PI

☐ 4. **DETERMINE** the average of symmetric thermocouples, for each adjacent thermocouple.

Adjacent TC		Symmetric TC		Symmetric TC Average
Number	Value	Number	Value	

☐ 5. **COMPARE** each adjacent thermocouple value listed to its symmetric thermocouple average for indication of a misaligned rod (**REFER TO** Attachment 1).

--END OF ATTACHMENT 2--

Facility:	Harris Nuclear Plant	Task No.:	015004H201
Task Title:	Perform the Quadrant Power Tilt Ratio Surveillance	JPM No.:	2018 NRC Exam Admin JPM SRO A2
K/A Reference:	G2.2.12 RO 3.7 SRO 4.1	**Alternate Path - NO**	

Examinee: ______________________ NRC Examiner: ________________

Facility Evaluator: ______________________ Date: ________________

Method of testing:

Simulated Performance: ______ Actual Performance: __X__

Classroom __X__ Simulator ______ Plant ______

READ TO THE EXAMINEE

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

Initial Conditions:	• The plant was operating at 90% power when a rod in Control Bank 'A' (rod P-10) dropped. • The crew is performing AOP-001, Malfunction Of Rod Control And Indication System. • ERFIS points ANM9112U and ANM9113L have a BAD quality code. HNP IT has been notified and they are evaluating the ERFIS points.

Initiating Cue:	The CRS has given you permission to perform a manual QPTR in accordance with OST-1039, CALCULATION OF QPTR. Perform section 7.3.1 through 7.3.9 and evaluate the actions, if any, of the applicable Technical Specification. The Power Range NIS indications are provided. **For the purposes of the examination, there will be no independent verification. Show values of your work.**

Task Standard: Correctly determines maximum QPTR of 1.0474 +/- 0.0005 IAW OST-1039
Correct Tech Spec actions are identified.

Required Materials: Calculator

General References: OST-1039, CALCULATION OF QPTR, Revision 17
Technical Specifications

Handouts:

- OST-1039
- Curve F-20-8, Power Range NI – Current and Voltage Setpoints Table
- JPM Cue Sheets Pages 14 - 18
- Technical Specifications

Time Critical Task: No

Validation Time: 20 minutes

Critical Step Justification	
Step 5	Must accurately transcribe the NI Upper and Lower readings to the data table. The calculation will yield an unsatisfactory QPTR.
Step 6	Must accurately transcribe the NI Upper and Lower normalized currents from the curve into the data table. The calculation will yield an unsatisfactory QPTR.
Step 8	Must accurately determine the correct calculation based on collecting and inputting either provided data or visual inspection data. The calculation will yield an unsatisfactory QPTR.
Step 9	Must accurately determine the correct calculation based on collecting and inputting the visual inspection data. The calculation will yield an unsatisfactory QPTR.
Step 10	Must accurately determine the highest Upper or Lower Normalized Fraction. The calculation will yield an unsatisfactory QPTR.
Step 13	Must identify that the QPTR Lower is the most outside the required band which will make this overall results unsatisfactory.
Step 15	Must accurately identify associated Technical Specifications with a QPTR that has exceeded the limits specified in HNP Technical Specifications.

Start Time: __________.

Evaluator Note:	**NOTE: The NI curve numbers provided in this JPM are numbers from the 2018 NRC Exam Frozen Procedures Curve Book folder.**

Procedure Note: Precaution and Limitation 3.1.1 has guidance if performing this OST with one Power Range Channel inoperable.

Performance Step: 1 Completes Prerequisites section:

- Ensure instrumentation needed for the performance of this test is free of deficiencies that affect instrument indication.
- Ensure the most recent Curve F-x-8 is used in the performance of this procedure. (Reference 9.5.7 and 9.5.1)
- Obtain CRS permission to perform this OST.
- Obtain necessary tools and equipment from the following list
  - o IBM PC or compatible

Standard:

- Logs F-20-8 revision number : 4
- Initials/signs all blocks

Comment:

Performance Step: 2

- IF Quadrant Power Tilt Ratio Calculation Computer Program is used, THEN PERFORM the following:
  - MARK Step 7.1. Step 2 N/A.
  - MARK Section 7.3 N/A.
  - PERFORM Section 7.2.
- IF manual calculation of the Quadrant Power Tilt Ratio is used, THEN PERFORM the following:
  - MARK Section 7.2 N/A.
  - PERFORM Section 7.3.

Standard:

- Marks Section 7.2 N/A
- Proceeds to Section 7.3

Comment:

OST-1039 Section 7.3 Note prior to step 1

Performance Step: 3 **NOTE: The detector current meters on each power range channel drawer are designated as left-upper, right-lower.**

Standard: Reads and place keeps note

Comment:

OST-1039 Section 7.3, Step 1

Performance Step: 4 Prior to reading the value of detector current, VERIFY the meter range/rate switch is in the 400 μA/SLOW position.

Standard: Prior to reading the value of detector current, VERIFIES the Meter Range/Rate switch is in the 400 μA/SLOW position.

Evaluator Note:	**This information is on the JPM Cue Sheet**

Comment:

OST-1039 Section 7.3, Step 2

✓ **Performance Step: 5** RECORD on Attachment 2, in column A, the upper and lower detector currents from all operable power range channels as read on the Nuclear Instrumentation Cabinet.

Standard: Transposes readings from PRNIS images onto Attachment 2.

Comment:

OST-1039 Section 7.3, Step 3

✓ **Performance Step: 6** RECORD on Attachment 2, in column B, the 100% power normalized current for each channel from Curve F-x-8.

Standard: Transposes TOP and BOTTOM 100% current values from the Curve Book provided.

Comment:

OST-1039 Section 7.3, Note prior to Step 4

Performance Step: 7 NOTE: When recording all fractions and ratios, record to four decimal places, dropping the fifth and subsequent decimal places.

Standard: Reads and place keeps note

Comment:

OST-1039 Section 7.3, Step 4

✓ **Performance Step: 8** Divide values in Column A by the respective normalized current in Column B and record the result in Column C as the Normalized Fraction.

Standard: Divides each Upper and Lower reading by the respective 100% normalized current value and records in Column C.

Comment:

OST-1039 Section 7.3, Step 5

✓ **Performance Step: 9**

CALCULATE the average value for the upper and the lower Normalized Fractions as follows:

- ADD the Normalized Fraction in each section of column C, recording the sum in the space provided.
- DIVIDE the sum obtained in Step 7.3.5.a by the number of operable NI channels, recording the result in column D of Attachment 2.

Standard:

Adds all Normalized Fractions for the same plane and records the sum in the space provided.

Divides by the sum by four and records result in Column D.

Comment:

OST-1039 Section 7.3, Step 6

✓ **Performance Step: 10**

Using the formula and values from Attachment 2, CALCULATE the Upper and Lower Ratios.

Standard:

- Divides the Maximum Normalized Fraction by the Average Normalized Fraction on each plane.
- Determines the UPPER ratio is ≥ 1.02
- Determines the LOWER ratio is ≥ 1.02

Evaluator Note:	**The applicant may inform the CRS as soon as any calculation is > 1.02. If so, acknowledge and direct applicant to complete Attachment 2.**

Comment:

OST-1039 Section 7.3, Step 7

Performance Step: 11 PERFORM independent verification of all calculations made on Attachment 2.

Standard: Requests Independent Verifier.

Evaluator Cue: **If necessary, repeat Initiating Cue: For the purpose of this examination, there will be no independent verification of your work.**

Comment: **Candidate may choose to check calculations.**

OST-1039 Section 7.3, Note prior to Step 8

Performance Step: 12 NOTE: The upper ratio or the lower ratio, whichever is greater, is the quadrant power tilt ratio (QPTR).

Standard: Reads and place keeps note

Comment:

OST-1039 Section 7.3, Step 8

✓ **Performance Step: 13** RECORD QPTR:

Standard: Records QPTR value as **1.0474**, 1.0469 to 1.0479 (N43 LOWER)

Identifies Lower as the one most above the 1.02 limit

Comment: **Acceptable band is +/- .0005.**

UPPER calculated band is 1.0291 to 1.0301

LOWER calculated band is 1.0469 to 1.0479

OST-1039 Section 7.3, Step 9

Performance Step: 14 CHECK QPTR is less than or equal to 1.02.

Standard: **Identifies Upper and Lower QPTR's are greater than 1.02 and QPTR is unacceptable**

Comment:

✓ **Performance Step: 15** Identify the Technical Specification LCOs that would be in effect.

Standard: Identifies that Technical Specification 3.2.4, Quadrant Power Tilt Ratio has been exceeded

- Identifies the following ACTION statements to be implemented and the required time limitation (see page 12)
  - o 3.2.4.a.1 1 hour

a. With the QUADRANT POWER TILT RATIO determined to exceed 1.02 but less than or equal to 1.09:

1. Calculate the QUADRANT POWER TILT RATIO at least once per hour until either:

a) The QUADRANT POWER TILT RATIO is reduced to within its limit, or

b) THERMAL POWER is reduced to less than 50% of RATED THERMAL POWER.

  - o 3.2.4.a.2 2 hours, reduce thermal power to $\leq$ 85%
    - (5% x 3% = 15% 100% - 15% = 85%)

2. Within 2 hours either:

a) Reduce the QUADRANT POWER TILT RATIO to within its limit, or

b) Reduce THERMAL POWER at least 3% from RATED THERMAL POWER for each 1% of indicated QUADRANT POWER TILT RATIO in excess of 1 and similarly reduce the Power Range Neutron Flux-High Trip Setpoints within the next 4 hours.

  - o 3.2.4.a.3 24 hours

3. Verify that the QUADRANT POWER TILT RATIO is within its limit within 24 hours after exceeding the limit or reduce THERMAL POWER to less than 50% of RATED THERMAL POWER within the next 2 hours and reduce the Power Range Neutron Flux-High Trip Setpoints to less than or equal to 55% of RATED THERMAL POWER within the next 4 hours; and

Evaluator Note:	Technical Specification 3.2.4.a.4 is not required to be identified since no direction is provided in the cue for raising thermal power.

Comment:

Terminating Cue:	**After the calculation and Tech Spec Evaluation has been completed:** **Evaluation on this JPM is complete.**

STOP Time: __________.

KEY

CHECK QPTR is less than or equal to 1.02 (circle) YES / **NO**

UPPER DETECTOR	A UPPER DETECTOR CURRENT	B UPPER 100% POWER NORMALIZED CURRENT	C UPPER NORMALIZED FRACTION (NOTE 1)	D AVERAGE UPPER NORMALIZED FRACTION
N-41	145.6	150.5	0.9674	0.9467
N-42	162.5	172.8	0.9403	
N-43	189.8	194.7	0.9748	
N-44	138.4	153.0	0.9045	
		SUM	3.7870	

$$\text{Upper Ratio} = \frac{\text{Maximum Upper Normalized Fraction}}{\text{Average Upper Normalized Fraction}} = \frac{0.9748}{0.9467} = 1.0296^{*}$$

* Standard for this calculation is ± 0.0005, 1.0291 to 1.0301

LOWER DETECTOR	A LOWER DETECTOR CURRENT	B LOWER 100% POWER NORMALIZED CURRENT	C LOWER NORMALIZED FRACTION (NOTE 1)	D AVERAGE LOWER NORMALIZED FRACTION
N-41	159.6	167.1	0.9551	0.9400
N-42	172.1	191.1	0.9005	
N-43	205.3	208.5	0.9846	
N-44	165.2	179.6	0.9198	
		SUM	3.7600	

$$\text{Lower Ratio} = \frac{\text{Maximum Lower Normalized Fraction}}{\text{Average Lower Normalized Fraction}} = \frac{0.9846}{0.9400} = \mathbf{1.0474^{**}}$$

** Standard for this calculation is ± 0.0005, 1.0469 to 1.0479

KEY

POWER DISTRIBUTION LIMITS

3/4.2.4 QUADRANT POWER TILT RATIO

LIMITING CONDITION FOR OPERATION

3.2.4 The QUADRANT POWER TILT RATIO shall not exceed 1.02.

APPLICABILITY: MODE 1, above 50% of RATED THERMAL POWER*.

ACTION:

a. With the QUADRANT POWER TILT RATIO determined to exceed 1.02 but less than or equal to 1.09:

1. Calculate the QUADRANT POWER TILT RATIO at least once per hour until either:

   a) The QUADRANT POWER TILT RATIO is reduced to within its limit, or

   b) THERMAL POWER is reduced to less than 50% of RATED THERMAL POWER.

2. Within 2 hours either:

   a) Reduce the QUADRANT POWER TILT RATIO to within its limit, or

   b) Reduce THERMAL POWER at least 3% from RATED THERMAL POWER for each 1% of indicated QUADRANT POWER TILT RATIO in excess of 1 and similarly reduce the Power Range Neutron Flux-High Trip Setpoints within the next 4 hours.

3. Verify that the QUADRANT POWER TILT RATIO is within its limit within 24 hours after exceeding the limit or reduce THERMAL POWER to less than 50% of RATED THERMAL POWER within the next 2 hours and reduce the Power Range Neutron Flux-High Trip Setpoints to less than or equal to 55% of RATED THERMAL POWER within the next 4 hours; and

4. Identify and correct the cause of the out-of-limit condition prior to increasing THERMAL POWER; subsequent POWER OPERATION above 50% of RATED THERMAL POWER may proceed provided that the QUADRANT POWER TILT RATIO is verified within its limit at least once per hour for 12 hours or until verified acceptable at 95% or greater RATED THERMAL POWER.

*See Special Test Exceptions Specification 3.10.2.

VERIFICATION OF COMPLETION

Job Performance Measure No.: 2018 NRC Exam Admin JPM SRO A2
Perform a Quadrant Power Tilt Ratio Surveillance

Examinee's Name:

Date Performed:

Facility Evaluator:

Number of Attempts:

Time to Complete:

Question Documentation:

Question:

Response:

Result: SAT ______ UNSAT ______

Examiner's Signature: ______________________ Date: ______________

Initial Conditions:	• The plant was operating at 90% power when a rod in Control Bank 'A' (P-10) dropped. • The crew is performing AOP-001, MALFUNCTION OF ROD CONTROL AND INDICATION SYSTEM. • ERFIS points ANM9112U and ANM9113L have a BAD quality code. HNP IT has been notified and they are evaluating the ERFIS points.

Initiating Cue:	The CRS has given you permission to perform a <u>manual</u> QPTR in accordance with OST-1039, CALCULATION OF QPTR. Perform section 7.3.1 through 7.3.9 and evaluate the actions, if any, of the applicable Technical Specification. (write response below). The Power Range NIS indications are provided. **For the purposes of the examination, there will be no independent verification. Show values of your work.**

Name: ____

Date: ____________________

Technical Specification(s) and applicable LCO(s) that apply: ______________________

____

____

____

____

____

____

____

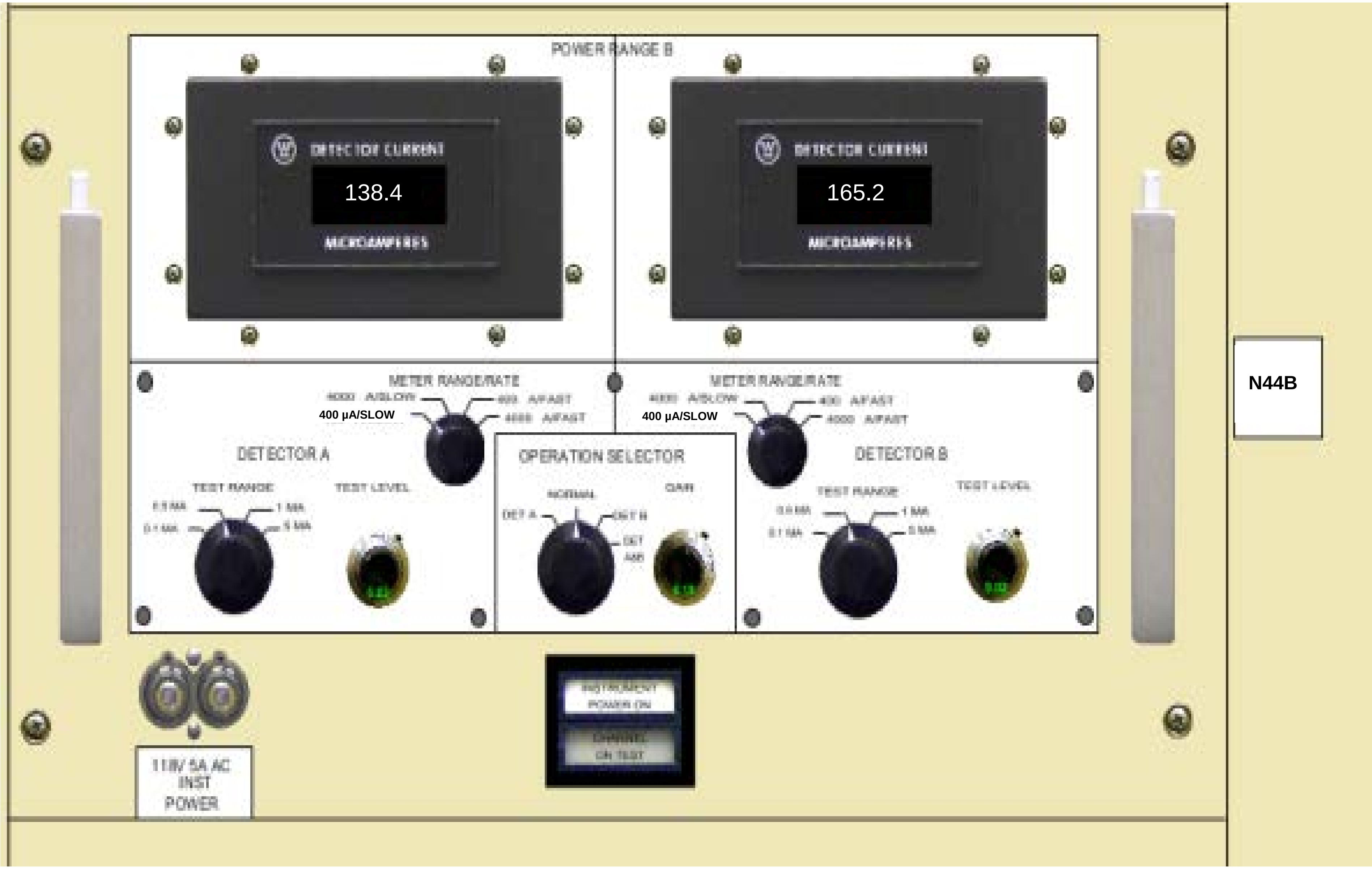
____

____


POWER RANGE B
DETECTOR CURRENT
145.6
MICROAMPERES
DETECTOR CURRENT
159.6
MICROAMPERES
METER RANGE/RATE
400 µA/SLOW
DETECTOR A
TEST RANGE
TEST LEVEL
OPERATION SELECTOR
NORMAL
GAIN
DETECTOR B
N41B
118V 5A AC
INST
POWER


POWER RANGE B
DETECTOR CURRENT
162.5
MICROAMPERES
DETECTOR CURRENT
172.1
MICROAMPERES
N42B
METER RANGE/RATE
400 μA/SLOW
DETECTOR A
TEST RANGE
TEST LEVEL
OPERATION SELECTOR
NORMAL
GAIN
DET A
DET B
METER RANGE/RATE
400 μA/SLOW
DETECTOR B
TEST RANGE
TEST LEVEL
118V 5A AC
INST
POWER


POWER RANGE B
DETECTOR CURRENT
189.8
MICROAMPERES
DETECTOR CURRENT
205.3
MICROAMPERES
N43B
METER RANGE/RATE
400 µA/SLOW
DETECTOR A
TEST RANGE
TEST LEVEL
OPERATION SELECTOR
NORMAL
DET A
DET B
GAIN
METER RANGE/RATE
400 µA/SLOW
DETECTOR B
TEST RANGE
TEST LEVEL
118V 5A AC
INST
POWER


POWER RANGE B
DETECTOR CURRENT
138.4
MICROAMPERES
DETECTOR CURRENT
165.2
MICROAMPERES
METER RANGE/RATE
400 µA/SLOW
DETECTOR A
TEST RANGE
TEST LEVEL
OPERATION SELECTOR
NORMAL
GAIN
DET A
DET B
METER RANGE/RATE
400 µA/SLOW
DETECTOR B
TEST RANGE
TEST LEVEL
INSTRUMENT POWER ON
CHANNEL ON TEST
118V 5A AC INST POWER
N44B

Facility:	Harris Nuclear Plant	Task No.:	341021H102
Task Title:	Complete review and approval of OP-120.07, Attachment 3 Waste Gas Decay Tank Release Log	JPM No.:	2018 NRC Exam Admin JPM SRO A3
K/A Reference:	G.2.3.6 RO 2.0 SRO 3.8	**Alternate Path - NO**	

Examinee: ______________________ NRC Examiner: ________________

Facility Evaluator: ______________________ Date: ________

Method of testing:

Simulated Performance: ______ Actual Performance: X

Classroom X Simulator ______ Plant ______

READ TO THE EXAMINEE	
I will explain the initial conditions, which steps to simulate or discuss, and provide initiating cues. When you complete the task successfully, the objective for this Job Performance Measure will be satisfied.	
Initial Conditions:	The plant is operating at 100% power. OP-120.07, Section 8.39, Venting a Gas Decay Tank with Waste Gas System in Service, is in progress. OP-120.07, Attachment 3, Waste Gas Decay Tank Release Log, pre-release section has just been completed.

Initiating Cue:	You are the CRS and have been asked to review and approve the just completed copy of OP-120.07, Attachment 3. Completely review the procedure and note any problems in the spaces provided.

Task Standard: All errors (4) identified (3 critical steps)

Required Materials: None

General References: OP-120.07, Section 8.39, Venting a Gas Decay Tank with Waste Gas System in Service
OP-120.07, Attachment 3, Waste Gas Decay Tank Release Log

Handout: Completed Batch Gaseous Effluent Permit
Partially completed OP-120.07, Section 8.39 with the errors incorporated.
Partially completed OP-120.07, Attachment 3 with the errors incorporated.

Time Critical Task: No

Validation Time: 15 minutes

Critical Step Justification	
Step 3	Must determine proper estimated release duration in order to ensure the actual gaseous release time is accurate. **(Item 1)**
Step 4	Must determine that the RCDT Vent position steps disposition are correctly performed to ensure the actual dose release rates are properly monitored. **(Item 2)**
Step 5	Must determine the High (Max) Setpoint is correctly entered into RM-11 in order to ensure the actual dose release rates is not masked by an improperly calibrated alarm setpoint. **(Item 3)**

START TIME: ____________

Performance Step: 1 Reviews the completed OP-120.07, Section 8.39 and Attachment 3 for a Waste Gas Decay Tank Release.

Standard: Ensures proper conditions, signatures/initials, and may verify the current revision of the procedure

Comment:

Performance Step: 2 Reviews the completed OP-120.07 and determines that the Vent Stack 5 flow rate does not match the process flow rate on 3546-1 WPB WRGM Effluent from the RM-11.

Standard: **Attachment 3 (Sheet 1 of 3 number 3) – Vent Stack 5 flow rate is <u>incorrectly transcribed (120,000 cfm) from the RM-11, 3546-1 WPB WRGM Effluent reading for process flow N (2.86E+05 cfm)</u>**

Comment:

✓ **Performance Step: 3** Reviews the completed OP-120.07 and determines that the estimated release duration time is incorrect.

Standard: **ITEM 1: Attachment 3 (Sheet 1 of 3 number 12) – Estimated Release Duration is <u>incorrectly transcribed from the table in OP-120.07 section 8.39.2</u>**

Comment:

✓ **Performance Step: 4** Review the completed OP-120.07 and determines that RCDT Vent position is incorrectly N/A'd

Standard: **ITEM 2: Attachment 3 (Sheet 1 of 3 number 15) – RCDT Vent position is incorrectly N/A'd based on the OP-120.07 section in progress per the initial conditions.**

Comment:

✓ **Performance Step: 5** Review RM-11 RM-WV-3546-1 WRGM screen displays and compares reading to values from the Batch Gaseous Effluent Permit Pre-release data and determines the High (Max) Setpoint is incorrectly entered in to RM-11.

Standard: **ITEM 3: Attachment 3 (Sheet 2 of 3 number 19) – REM-3546-1 WRGM Permit Values are incorrectly transcribed from page 1 of 5 of the batch gaseous Effluent Permit provided by chemistry.**

Comment:

Performance Step: 6 Review the completed OP-120.07

Standard: Returns the procedure unsigned and has identified three errors during the review for pre-release approval.

Comment:

Evaluator Note and Terminating Cue:	**When the procedure is returned: Evaluation on this JPM is complete.**

STOP TIME: ______________

OP-120.07 Attachment 3 Incorrect Flow Rate documented:

Attachment 3 - Waste Gas Decay Tank Release Log

Sheet 1 of 3

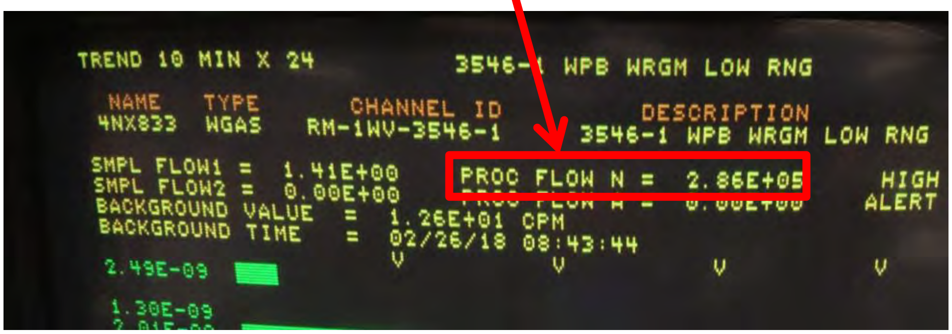
Batch Gaseous Effluent Permit Number G-2018-0051

PRE-RELEASE

Release Point: WPB VENT STACKS 5 Release Type: Batch

Tank Temperature: 10°C Estimate Release Flow Rate: 15 CFM

1. GDT to be vented J
2. Estimate Start Date/Time 3/5/18 2000
3. Vent Stack 5 Flow Rate 120,000



OP-120.07Attachment 3 Incorrect ITEM 1:

8. Pressure Indicator: PI-1055.
9. Initial Pressure 70 psig.
10. Estimated Final Gas Decay Tank Pressure 0 PSIG.
11. Estimated Δp 70.
12. Estimated Release Duration 197 min.

OP-120.07 Section 8.39.2 step 11

11. RECORD the Estimated Release Duration (Log Item 12) using the table listed below (round tank pressure up to higher pressure): M

Estimated Tank ΔP	Duration of Release (min)
100	262
95	250
90	236
85	223
80	210
75	197
70	184
65	171
60	158
55	144
50	131
45	118
40	105
35	92
30	79
25	66
20	53
15	39
10	26
5	13
0	0

M

OP-120.07Attachment 3 Incorrect ITEM 2:

NOTE: The following two steps are not applicable when Section 8.12 is being performed.

15. RCDT VENT ISOL 1ED-164 (AEP-1) is SHUT. N/A DM
Print/Sign

16. RCDT VENT ISOL 1ED-164 (AEP-1) is VERIFIED SHUT. N/A DM
Print/Sign

OP-120.07 Section 8.39.2 step 20

20. **WHEN** it has been determined that the Stability Class is predicted to be satisfactory in the next 4 to 6 hours,
OR Stability Class is NOT required,
THEN REQUEST MCR to shut the RCDT VENT ISOL 1ED-164 (AEP-1). (Log Item 15 and Log Item 16)

OP-120.07 Attachment 3 step 15 and 16

NOTE: The following two steps are not applicable when Section 8.12 is being performed.

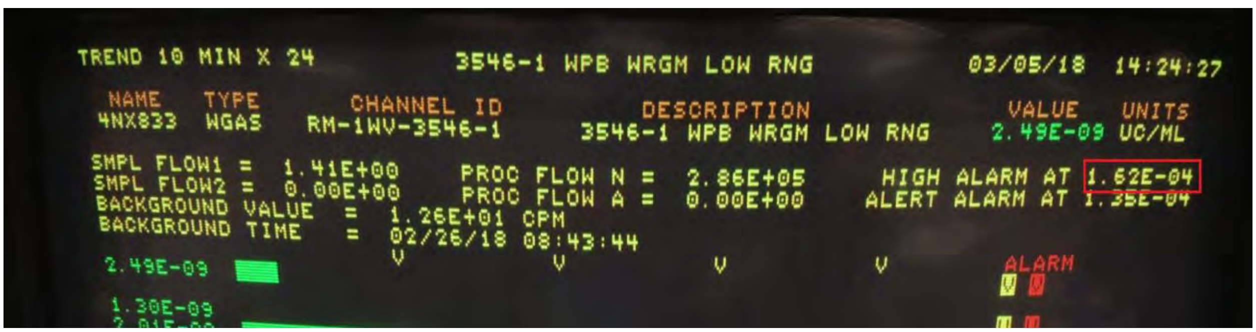
15. RCDT VENT ISOL 1ED-164 (AEP-1) is SHUT. Opie Rator Opie Rator
Print/Sign

16. RCDT VENT ISOL 1ED-164 (AEP-1) is VERIFIED SHUT. Indy V. Refier Indy V Refier
Print/Sign

OP-120.07Attachment 3 Incorrect ITEM 3:

19. REM-3546-1 WRGM Permit Values entered on RM-11: Opie Rator Opie Rator
Print/Sign

20. REM-3546-1 WRGM Permit Values IV by: Indy V. Refier Indy V Refier
Print/Sign



Duke Energy OpenEMS Gas Permit Pre-Release Data Page 1 of 5

Part II: Pre - Release Calculations

Monitor Setpoints

Monitor Name:	RM-1WV-3546-1	RM-1WV-3546-1
Max Setpoint:	1.69E-04 uCi/cc	1.86E+04 uCi/sec
Alert Setpoint:	1.35E-04 uCi/cc	1.49E+04 uCi/sec
Background:	0.000e+00 uCi/cc	

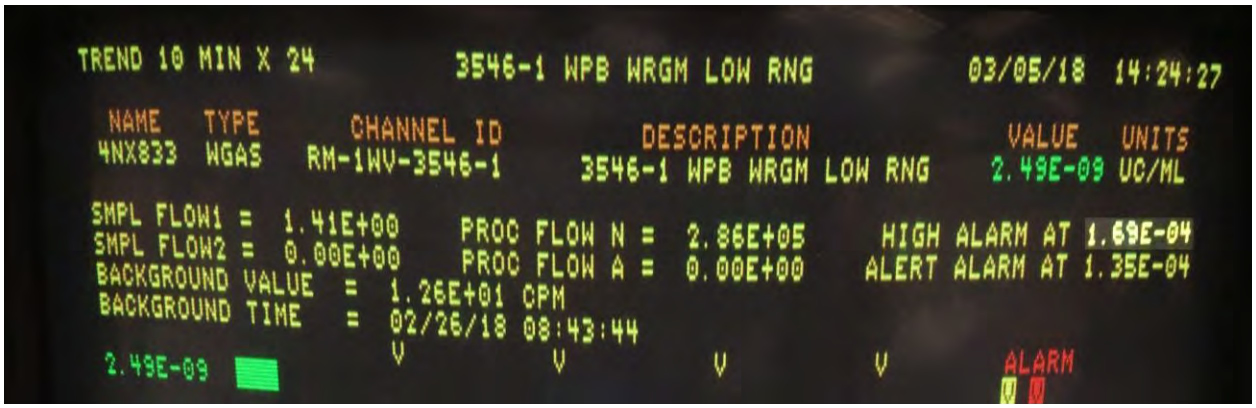
Flags: RM-1WV-3546-1: Continuous concurrent permit used for setpoint calculations - G-2018-0049

OP-120.07 Section 8.39.2 step 26

26. IF the RM-3546-1 WRGM is operable,
THEN PERFORM the following substeps:

a. Using the RM-11 Supervisor Key, ENTER the four WRGM Permit values listed on the Batch Gaseous Effluent Permit Vent Stack 5 Attachment as follows:

Using keypad, ENTER the High Alarm Permit Value (4NX833). (example, enter 516-4 for 5.16 E-04) ________



b. SIGN the Waste Gas Decay Tank Vent Log indicating that correct WRGM Permit values have been entered. (Log Item 19) ________

c. PERFORM independent verification that the correct WRGM values have been entered from the Batch Gaseous Effluent Permit Vent Stack 5 Attachment into the RM-11. (Log Item 20) ________

OP-120.07 Attachment 3 step 19 and 20

19. REM-3546-1 WRGM Permit Values entered on RM-11: Opie Rator *Opie Rator*
Print/Sign

20. REM-3546-1 WRGM Permit Values IV by: Indy V. Refier *Indy V Refier*
Print/Sign

Job Performance Measure No.: 2018 NRC Exam Admin JPM SRO A3 - Complete review and approval of OP-120.07, Attachment 3 Waste Gas Decay Tank Release Log

OP-120.07, Attachment 3

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 operating at 100% power. OP-120.07, Section 8.39, Venting a Gas Decay Tank with Waste Gas System in Service, is in progress. OP-120.07, Attachment 3, Waste Gas Decay Tank Release Log, pre-release section has just been completed.

Initiating Cue:	You are the CRS and have been asked to review and approve the just completed copy of OP-120.07, Attachment 3. Completely review the procedure and note any problems in the spaces provided.

NAME ____ DATE ______________________

IF any discrepancies were identified in the review of OP-120.07 list them on the lines below

____

____

____

____

____

____

____

____

FORM NO. 90402
REV. 2/08

Radiochemistry Laboratory Analysis Request Form

VAULT FILE # 18-10540

SAMPLE #: 170888

Sample Collection Information

SAMPLE DESCRIPTION: WGDT-3 COLLECTED BY: BB

COLLECT START DATE/TIME: ______ COLLECT STOP DATE/TIME: 3-4-18 / 1005

Required Analysis

☒ - GAMMA SCAN ☐ - E BAR ☐ - DAC ☐ - GROSS ALPHA

☐ - IODINE DOSE EQ. ☐ - LLD ☒ - TRITIUM ☐ - GROSS BETA

Gaseous Sample Information

☐ - PARTICULATE FILTER FLOW RATE: 4 ☒ - LPM ☐ - CFM ☐ - CFH

☐ - IODINE CARTRIDGE FLOW TIME: ______ HOURS 10 MINUTES

☒ - BUBBLE TRITIUM VOLUME: 40000 CC

☒ - GROSS GAS 1260 VOL. 1 LITER = 1000 cc 1 CUBIC FOOT = 28320 cc

Liquid / Misc. Sample Information

GAMMA SCAN	TRITIUM	GROSS ALPHA		GROSS BETA	
VOLUME	VOLUME (ml)	VOL. (ml)	MASS (mg)	VOL. (ml)	MASS (mg)
	3.0				

Analytical Results

GAMMA SCAN

DATE	TIME	SPECT. NO.	DET. NO.	GEOM. NO.	TOTAL ACTIVITY	INIT.
3-4-18	1022	—	3	60	1.781E-6 µci/cc	BB

GROSS ALPHA / BETA

DATE	TIME	INST.	α ACTIVITY	α ERROR	β ACTIVITY	β ERROR	UNITS	INIT.

TRITIUM

DATE	TIME	INST. #	TRITIUM ACTIVITY	TRITIUM ERROR	UNITS	INIT.
3-4-18	1005	3110	2.388E-7	8.679E-9	µci/ml	BB

COMMENTS H_2 – 2.77 pressure 70 #
O_2 – <0.5

DUKE ENERGY

3/4/2018 14:38:45

HNP_Unit_1
Tritium Activity Analysis Report

Description	:
Unit	: 1
Sample Point	: Waste Gas Decay Tank J
Sample Date	: 3/4/2018 10:05
Analysis Date	: 3/4/2018
Gross Count Rate	: 164.74 cpm
Bkgd Count Rate	: 5.30 cpm
Sample Count Time	: 20 min
Bkgd Count Time	: 20 min
Analysis Volume	: 3 mL
Counter Efficiency	: 0.3489
Activity Multiplier	: 1.1
Bubbler Flow Rate	: 4 lpm
Bubbler Time	: 10 mins
Bubbler Gas Volume	: 3.920E+04 cc's
Bubbler Efficiency	: 0.58
Bubbler Vacuum	: 0 in Hg
DAC Fraction	: 1.192E-02
MDCR	: 2.9 cpm
MDA	: 3.937E-09 uCi/cc
Activity	: 2.385E-07 uCi/cc +/- 8.628E-09 uCi/cc

3/4/2018 10:39:48 Page 1 of 3

DUKE ENERGY Apex

Analysis Report for 170888

Sample Identification	:170888
Sample Description	: WGDT J
Procedure	: WGDT J 1260cc geometry
Sample Type	: Effluent Samples
Facility	: HNP_Unit_1
Unit	: 1
Sample Point	: Waste Gas Decay Tank J
Sample Taken On	: 4-Mar-2018 10:05:00
Acquisition Started	: 4-Mar-2018 10:22:50
Decay Time	: 0 00:17:50
Sample Size	: 1.260E+03 cc
Efficiency Calibration Date	: 15-Jan-2016 15:48:23
Efficiency Approval Date	: 31-Oct-2017 08:15:23
Energy Calibration Date	: 20-Feb-2018 14:04:07
Energy Slope	: 0.5001 keV/channel
Offset	: -0.215 keV
Quad Coefficient	: -5.416E-09

Detector Name	: DET03
Geometry	: 60
Nuclide Library	: KEYLINE_NOBLEGAS
Activity Multiplier	: 1.00
Live Time	: 1000.0 seconds
Real Time	: 1000.2 seconds
Dead Time	: 0.02 %
Peak Locate Threshold	: 5.00
Energy Tolerance	: 1.000 keV
Nuclide Confidence ID	: 0.20
Peak Area Range	: 62 - 4096 channels
Peak Search Version	: PEAK V16.10
Peak Analysis Version	: PEAK V16.10
MDA Version	: Std MDA v2.4
NID Version	: NID+Interf v2.6

PEAK ANALYSIS REPORT

Peak No.	Energy (keV)	Net Peak Area	Continuum Counts	FWHM (keV)	Peak Centroid	Peak Width	% Error 1 Sigma	Nuclide
1	81.02	600	106	1.01	162.43	11	4.3	Xe-133

Analysis Report for 170888 3/4/2018 10:39:48 Page 2 of 3

NUCLIDE LINE IDENTIFICATION REPORT

Nuclide Name	Id Confid	Halflife	Energy (keV)	Yield (%)	Efficiency (%)	Activity (uCi/cc)		Activity Uncertainty
Nuclide Type: FG								
Xe-133	1.00	5.25 days	79.60 *	0.22	2.583E+00			
			80.99	36.50	2.647E+00	1.781E-06		1.117E-07
			160.60 *	0.06	3.357E+00			
			303.10 *	0.01	2.202E+00			
			330.78 *	0.00	2.042E+00			
			384.10 *	0.62	1.788E+00			
	Xe-133 Interference Corrected Final Weighted Mean					1.781E-06	+/-	1.117E-07

Nuclide confidence index threshold = 0.20
Errors quoted at 1.000 sigma
* = Energy line not used for Weighted Mean Activity Determination.

NID SUMMARY REPORT

Sample Identification	: 170888		
Sample Description	: WGDT J		
Procedure	: WGDT J 1260cc geometry		
Facility	: HNP_Unit_1		
Unit	: 1	Detector Name	: DET03
Sample Point	: Waste Gas Decay Tank J	Geometry	: 60
Sample Taken On	: 4-Mar-2018 10:05:00	Nuclide Library	: KEYLINE_NOBLEGAS
Acquisition Started	: 4-Mar-2018 10:22:50	Live Time	: 1000.0 seconds
Decay Time	: 0 00:17:50	Real Time	: 1000.2 seconds
Sample Size	: 1.260E+03 cc	Dead Time	: 0.02 %

Nuclide Name	Nuclide Type	Halflife	Nuclide Id Confidence	Wt mean Activity (uCi/cc)	Wt mean Activity Uncertainty 1 Sigma	Comments
Xe-133	FG	5.25 days	1.00	1.781E-06	1.117E-07	
		Total Gamma Activity		1.781E-06		

Errors quoted at 1.000 sigma

Analysis Report for 170848 3/4/2018 10:39:48 Page 3 of 3

UNIDENTIFIED PEAK REPORT

No Unidentified Peaks Present

DUKE ENERGY | EMS Effluent Management Software

Page 1 of 5
Monday, Mar 5, 2018 2:38:05PM
Duke Energy
Harris Nuclear Plant

Gas Permit Pre-Release Data

Permit Number: G-2018-0051
Permit State: Open
Limits Exceeded: 0

Part I: Pre - Release Data

Release Type: Batch
Release Source: WGDT J - Batch Gas
Discharge Point: Waste Process Bldg Stack 5
Release Mode: Ground

Permit Issued: 03/05/2018 14:33

Unplanned Release: No

Estim. Release Start: 5-Mar-2018 18:00:00
Estim. Release End: 5-Mar-2018 21:03:45
Estim. Duration: 183.75 min

Estim. Release Flowrate: 1.5000E+01 cfm
Estim. Release Volume: 2.7562E+03 ft^3
Initial Pressure: 7.0000E+01 psi
Final Pressure: 0.0000E+00 psi
Temperature: 10 C

Part II: Pre - Release Calculations

KPI Parameter	KPI Goal	Permit Activity	Permit % of Goal	YTD Activity	YTD % of Goal
Gaseous Noble Gas (Ci)		< 0.01	0.00 %	15.79	0.00 %
Gaseous Tritium (Ci)		< 0.01	0.00 %	27.58	0.00 %
Gaseous Part & Iodines (uCi)		0.00	0.00 %	20.51	0.00 %

Monitor Setpoints

Monitor Name:	RM-1WV-3546-1	RM-1WV-3546-1
Max Setpoint:	1.69E-04 uCi/cc	1.86E+04 uCi/sec
Alert Setpoint:	1.35E-04 uCi/cc	1.49E+04 uCi/sec
Background:	0.000e+00 uCi/cc	

Flags: RM-1WV-3546-1: Continuous concurrent permit used for setpoint calculations - G-2018-0049

[Server]: NUCVEMSH1 [Database]: HNP OpenEMS

Gas Permit Pre-Release Data Report — Monday, Mar 5, 2018 2:38:05PM Page 2 of 5

Permit Number: G-2018-0051

Sample Information

Type	Name	Description	Sample Type
Sample Import	170888-T	Sample Date: 4-Mar-2018 10:05	N
Sample Import	170888	Sample Date: 4-Mar-2018 10:05	N

Isotopic Identification

Nuclide	Type	Pre-Dispersion Concentration (uCi/cc)	Release Rate (uCi/s)	Estimated Activity Released (Ci)
H-3	O	2.385E-07	1.688E-03	1.861E-05
Xe-133	N	1.781E-06	1.261E-02	1.390E-04
Totals:		2.020E-06		1.576E-04

Nuclide Types : N=Noble Gas, **P**=Particulate, **R**=Radioiodine, **O**=Other

[Server]: NUCVEMSH1 [Database]: HNP OpenEMS

Gas Permit Pre-Release Data Report — Monday, Mar 5, 2018 2:38:05PM Page 3 of 5

Permit Number: G-2018-0051

Noble Gas Dose for Site Boundary Locations

Receptor	Total Body Dose (mRem)	Skin Dose (mRem)	Gamma Air (mRad)	Beta Air (mRad)	Total Body Dose Rate (mRem/year)	Skin Dose Rate (mRem/year)
SW 2.14 km (Site Bdy) / Child	2.333E-08	5.510E-08	2.801E-08	8.332E-08	6.673E-05	1.576E-04

Max Receptor Dose Rate (mRem/yr) from this Release for Particulates / Iodines / Tritium

Receptor Name: SW 2.14 km (Site Bdy) / Child — **Age Group:** Child
Location: SW 2.14 km (Site Bndry) — **Organ:** Liver
Pathway: Inhalation

Age Group	Bone	Liver	Total Body	Thyroid	Kidney	Lung	GI-LLI
Child	0.000E+00	3.404E-05	3.404E-05	3.404E-05	3.404E-05	3.404E-05	3.404E-05

Max Receptor Dose (mRem) from this Release for Particulates / Iodine / Tritium

Receptor Name: SW 2.14 km (Max Ind) / Child — **Age Group:** Child
Location: SW 2.14 km (Max Ind) — **Organ:** Liver
Pathway: Cow Milk, Ground Plane, Inhalation, Meat, Vegetation

Age Group	Bone	Liver	Total Body	Thyroid	Kidney	Lung	GI-LLI
Child	0.000E+00	7.411E-08	7.411E-08	7.411E-08	7.411E-08	7.411E-08	7.411E-08

[Server]: NUCVEMSH1 [Database]: HNP OpenEMS

Gas Permit Pre-Release Data Report — Monday, Mar 5, 2018 2:38:05PM Page 4 of 5

Permit Number: G-2018-0051

Dose Limit Calculations

Limit Name	Organ	Calculated Value	Limit Value	Units	% Limit
Cumulative Beta Air Dose-Qtr Receptor: SW 2.14 km (Site Bdy) / Child	Beta Air	1.846E-02	10.00	mRad	0.18
Cumulative Beta Air Dose-Annual Receptor: SW 2.14 km (Site Bdy) / Child	Beta Air	1.847E-02	20.00	mRad	0.09
Cumulative Gamma Air Dose-Qtr Receptor: SW 2.14 km (Site Bdy) / Child	Gamma Air	6.181E-03	5.00	mRad	0.12
Cumulative Gamma Air Dose-Annual Receptor: SW 2.14 km (Site Bdy) / Child	Gamma Air	6.187E-03	10.00	mRad	0.06
NG Skin Dose Rate Receptor: SW 2.14 km (Site Bdy) / Child	NG Skin	8.583E-01	3,000.00	mRem/yr	0.03
NG Total Body Dose Rate Receptor: SW 2.14 km (Site Bdy) / Child	NG Total Body	2.550E-01	500.00	mRem/yr	0.05
Cumulative NG Total Body Dose-Annual Receptor: SW 2.14 km (Site Bdy) / Child	NG Total Body	5.896E-03	25.00	mRem	0.02
Part/Iodine/Trit Org Dose Rate Receptor: SW 2.14 km (Site Bdy) / Child	Lung	1.155E-01	1,500.00	mRem/yr	< 0.01
Cumulative Part/Iodine/Trit Org Dose-Qtr Receptor: SW 2.14 km (Max Ind) / Child	GI-Lli	4.499E-02	7.50	mRem	0.60
Cumulative Part/Iodine/Trit Org Dose-Annual Receptor: SW 2.14 km (Max Ind) / Child	GI-Lli	1.101E-01	15.00	mRem	0.73

Note: Limits Exceeded are in bold

Dose Projection Calculations

Limit Name	Organ	Calculated Value	Limit Value	Units	% Limit
31 Day Proj Beta Air Dose Receptor:SW 2.14 km (Site Bdy) / Child	Beta Air	3.728E-03	0.40	mRad	0.93
31 Day Proj Gamma Air Dose Receptor:SW 2.14 km (Site Bdy) / Child	Gamma Air	1.255E-03	0.20	mRad	0.63
Part/Iod/Trit Org Dose Project Receptor:SW 2.14 km (Max Ind) / Child	GI-Lli	2.206E-02	0.30	mRem	7.36

Note: Limits Exceeded are in bold

[Server]: NUCVEMSH1 [Database]: HNP OpenEMS

Gas Permit Pre-Release Data Report | Monday, Mar 5, 2018 2:38:05PM Page 5 of 5

Permit Number: G-2018-0051

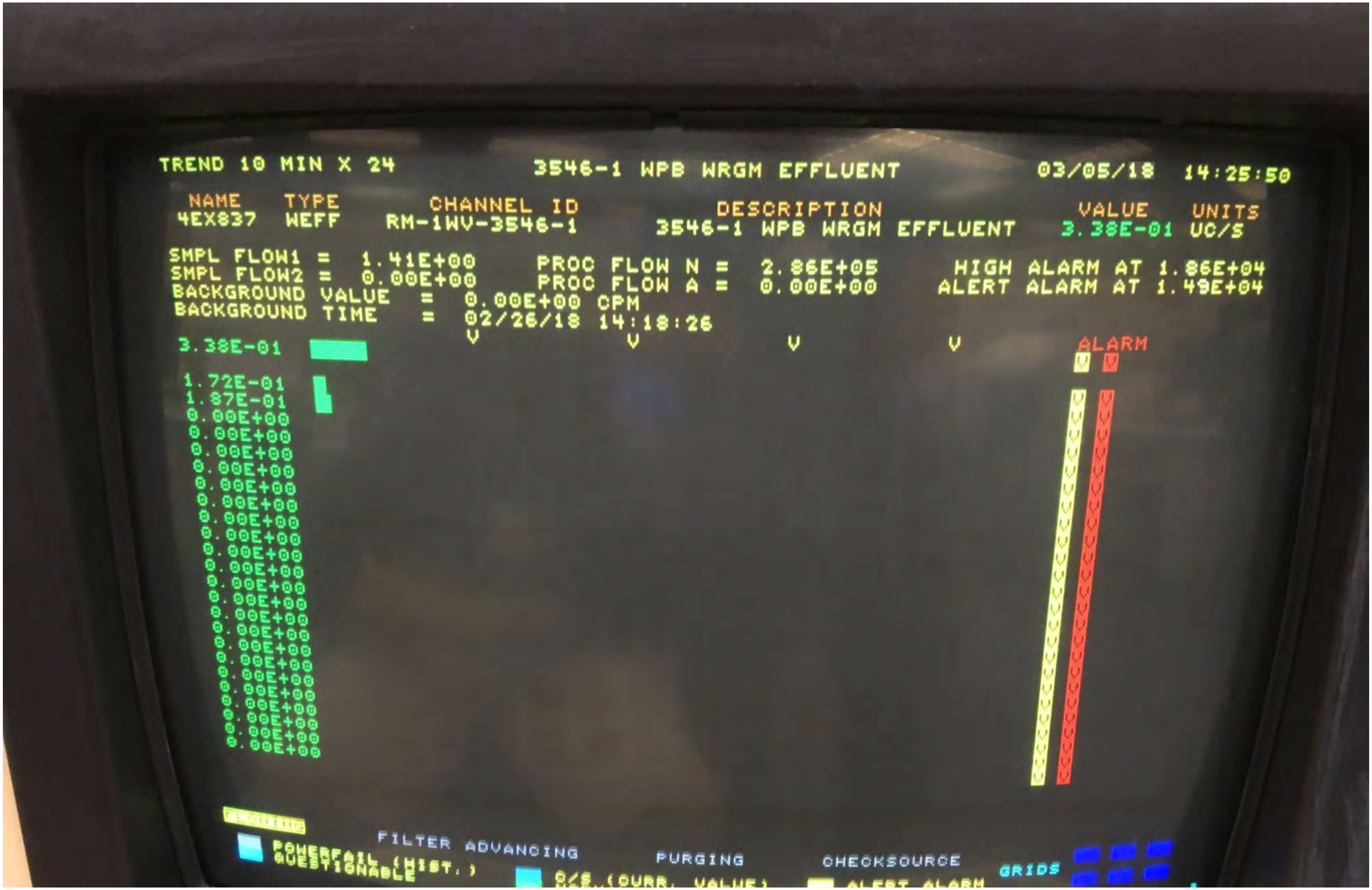
Performed By: ______________ **Date:** 3-5-18
Technician

Reviewed By: ______________ **Date:** 3-5-18
E&C Supervisor / Designee

Approved By: ______________ **Date:** ______
Shift Manager / Designee

[Server]: NUCVEMSH1 [Database]: HNP OpenEMS


TREND 10 MIN X 24
3546 WPB EXH STACK 5
03/05/18 14:27:42
NAME 4EE797
TYPE GEFF
CHANNEL ID REM-*1WV-3546
DESCRIPTION 3546 WPB EXH STACK 5
VALUE 3.52E+02
UNITS UC/S
SMPL FLOW1 = 3.00E+00
SMPL FLOW2 = 0.00E+00
PROC FLOW N = 2.86E+05
PROC FLOW A = 0.00E+00
HIGH ALARM AT 1.86E+04
ALERT ALARM AT 1.49E+04
BACKGROUND VALUE = 0.00E+00 CPM
BACKGROUND TIME = 02/26/18 13:29:10
3.52E+02
ALARM
FLOWING
FILTER ADVANCING
PURGING
CHECKSOURCE
GRIDS
POWERFAIL (HIST.)
QUESTIONABLE
C/S (CURR. VALUE)
NORMAL
ALERT ALARM
HIGH ALARM
KEYPAD
PRINTER OFF-LINE
RM-11 #2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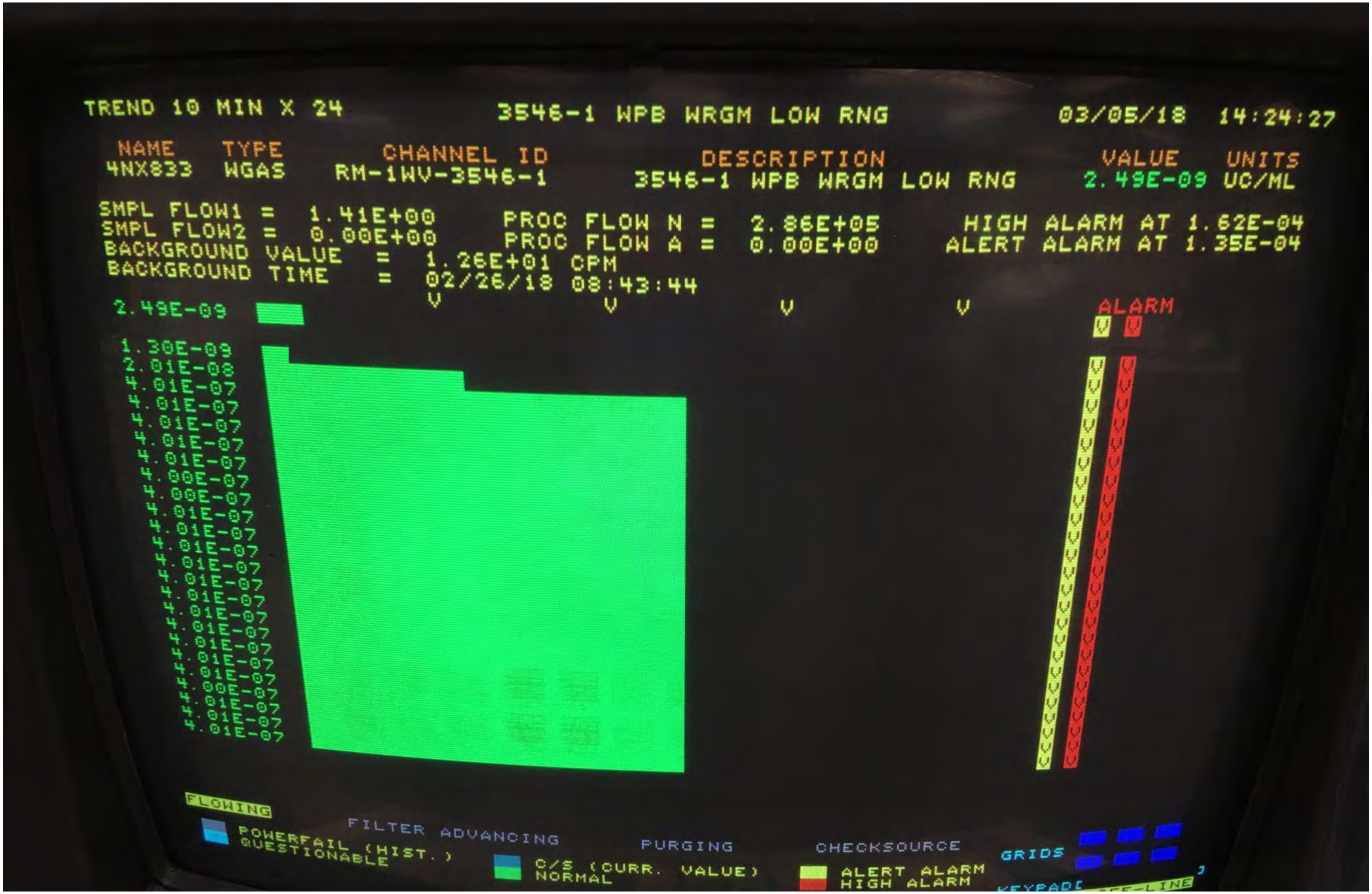
03/05/18 14:25:50
NAME TYPE CHANNEL ID DESCRIPTION VALUE UNITS
4EX837 WEFF RM-1WV-3546-1 3546-1 WPB WRGM EFFLUENT 3.38E-01 UC/S
SMPL FLOW1 = 1.41E+00
SMPL FLOW2 = 0.00E+00
PROC FLOW N = 2.86E+05
PROC FLOW A = 0.00E+00
HIGH ALARM AT 1.86E+04
ALERT ALARM AT 1.49E+04
BACKGROUND VALUE = 0.00E+00 CPM
BACKGROUND TIME = 02/26/18 14:18:26
ALARM
3.38E-01
1.72E-01
1.87E-01
0.00E+00
FILTER ADVANCING
PURGING
CHECKSOURCE
GRIDS


TREND 10 MIN X 24
3546 WPB EXH STACK 5
03/05/18 14:27:07
NAME TYPE CHANNEL ID DESCRIPTION VALUE UNITS
4GG793 GAS REM-*1WV-3546 3546 WPB EXH STACK 5 2.58E-06 UC/ML
SMPL FLOW1 = 3.00E+00 PROC FLOW N = 2.86E+05 HIGH ALARM AT 1.69E-04
SMPL FLOW2 = 0.00E+00 PROC FLOW A = 0.00E+00 ALERT ALARM AT 1.35E-04
BACKGROUND VALUE = 1.47E+01 CPM
BACKGROUND TIME = 02/26/18 13:29:11
2.58E-06
ALARM
2.24E-06
2.25E-06
2.15E-06
2.17E-06
2.19E-06
2.20E-06
2.22E-06
2.24E-06
2.25E-06
2.23E-06
2.25E-06
2.27E-06
2.28E-06
2.30E-06
2.28E-06
2.30E-06
2.31E-06
2.14E-06
2.15E-06
2.17E-06
2.19E-06
2.20E-06
2.22E-06
2.24E-06
FLOWING
FILTER ADVANCING
PURGING
CHECKSOURCE
GRIDS
POWERFAIL (HIST.)
QUESTIONABLE
O/S (CURR. VALUE)
NORMAL
ALERT ALARM
HIGH ALARM
KEYPAD
PRINTER OFF-LINE
RM-11 #2


TREND 10 MIN X 24
3546-1 WPB WRGM LOW RNG
03/05/18 14:24:27
NAME TYPE CHANNEL ID DESCRIPTION VALUE UNITS
4NX833 WGAS RM-1WV-3546-1 3546-1 WPB WRGM LOW RNG 2.49E-09 UC/ML
SMPL FLOW1 = 1.41E+00
SMPL FLOW2 = 0.00E+00
PROC FLOW N = 2.86E+05
PROC FLOW A = 0.00E+00
HIGH ALARM AT 1.62E-04
ALERT ALARM AT 1.35E-04
BACKGROUND VALUE = 1.26E+01 CPM
BACKGROUND TIME = 02/26/18 08:43:44
2.49E-09
ALARM
1.30E-09
2.01E-08
4.01E-07
4.01E-07
4.01E-07
4.01E-07
4.01E-07
4.00E-07
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4.01E-07
4.01E-07
4.01E-07
4.01E-07
4.00E-07
4.01E-07
4.01E-07
4.01E-07
FLOWING
FILTER ADVANCING
PURGING
CHECKSOURCE
GRIDS
POWERFAIL (HIST.)
QUESTIONABLE
C/S (CURR. VALUE)
NORMAL
ALERT ALARM
HIGH ALARM

Facility:	Harris Nuclear Plant	Task No.:	345010H602
Task Title:	Determine Initial Protective Action Recommendations	JPM No.:	2018 NRC Exam Admin JPM SRO A4
K/A Reference:	G2.4.44 RO 2.4 SRO 4.4	**Alternate Path - NO**	
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, discuss or perform, and provide initiating cues. When you complete the task successfully, the objective for this Job Performance Measure will be satisfied.	
Initial Conditions:	**This is a TIME CRITICAL JPM.** A General Emergency has just been declared with the following conditions: • A LOCA inside Containment has occurred • Safety Injection has actuated but flow has NOT been established • Core Cooling CSFST is RED • The crew is implementing EOP-FR-C.1, Response to Inadequate Core Cooling • An unisolable pathway from Containment to the environment exists • The Dose Assessment Team projects 1200 mRem TEDE and 6000 mRem CDE at the Site Boundary • Wind direction is from 150˚

Initiating Cue:	Using the information provided, determine the initial Protective Action Recommendations.

Task Standard: Protective Action Recommendations determined within 15 minutes.

Required Materials: None

General References: PEP-110 EAL Matrix
PEP-110 Rev. 27

Handouts:
- PEP-110 Rev. 27
- PEP-110 EAL Matrix
- JPM Cue Sheet Page 6

Time Critical Task: YES – 15 minutes for classification.

Validation Time: 15 minutes for classification

CRITICAL STEP JUSTIFICATION	
Step 2	Protective Action Recommendations prevent or minimize exposure to the general public. Protective Action Recommendations are made to the State and County agencies that are responsible for implementing protective actions for the general public whenever PAGs are exceeded.
Step 4	Protective Action Recommendations must be determined within 15 minutes of the classification of a General Emergency.

Evaluator Cue:	**Start Time for this portion of JPM begins when the individual has been briefed.**

START TIME: ____________

Performance Step: 1 OBTAIN PEP-110.

Standard : Obtains PEP-110

Comments:

✓ **Performance Step: 2** Determine Protective Action Recommendations

Standard :

Uses PEP-110 and determines Table 1 applies:

- **Evacuate 2 mile radius**
- **Evacuate 10 miles downwind: Subzones A, B, E, L, M, N**
- **Shelter remaining subzones: C, D, F, G, H, I, J, K**

Recommend the consideration of KI use by the public - YES

Comments:

Performance Step: 3 Verify Protective Action Recommendations

Standard : Reviews PEP-110 to verify Protective Action Recommendations
Completes PAR and turns in results to the Evaluator

Comments:

✓ **Performance Step: 4** Verify Classification Completion Time

Standard : Stop minus start time less than or equal to 15 minutes

Comments:

Examiners Cue:	**After the candidate returns this JPM PAR record the stop time and then announce:** **END of JPM.**

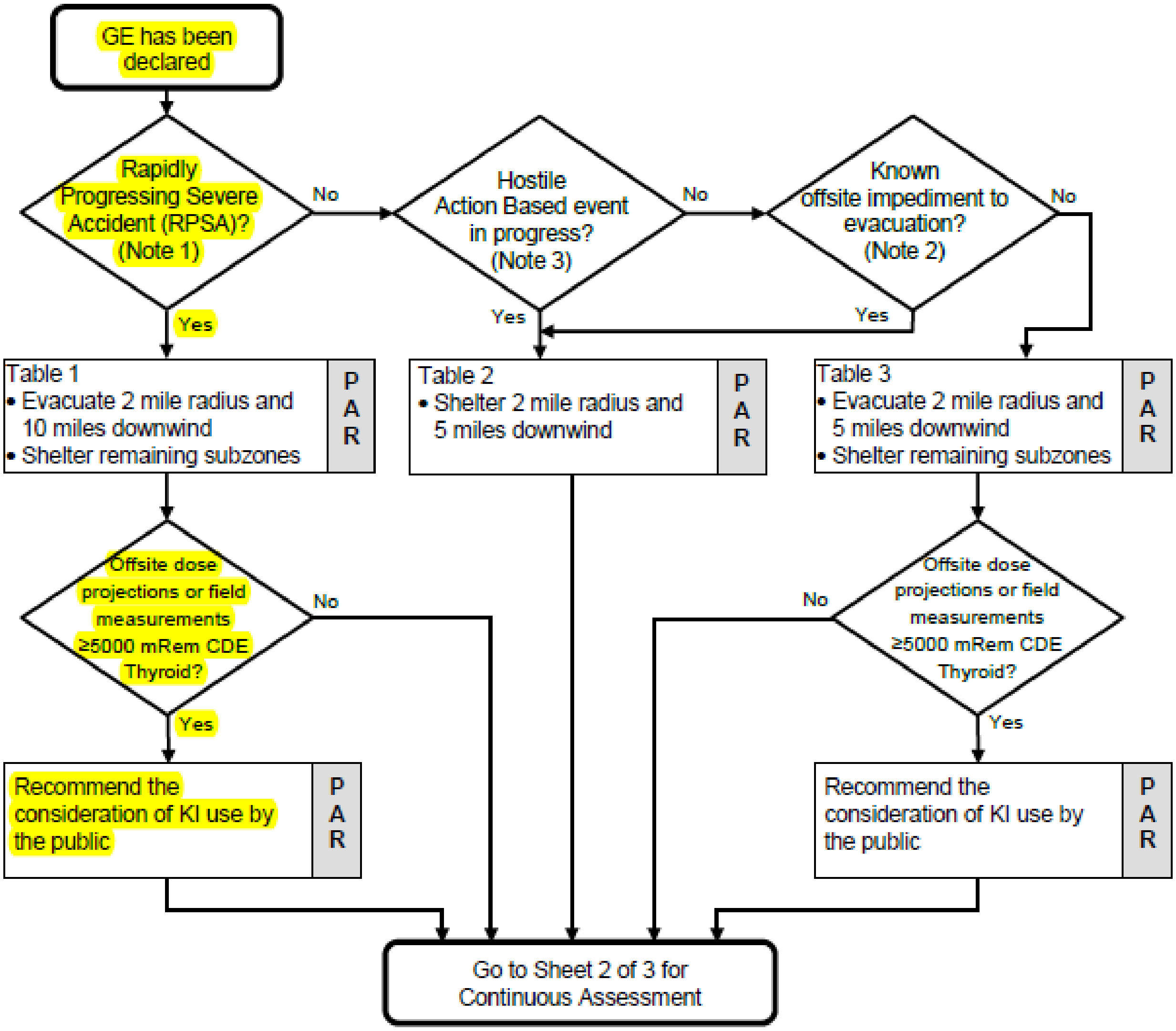
STOP TIME:

START TIME ____________________

STOP TIME ____________________

Stop minus start time less than or equal to 15 minutes ____________________

Attachment 3 – Protective Action Recommendation Process
Sheet 1 of 3



Attachment 3 – Protective Action Recommendation Process

Sheet 3 of 3

General Flowchart Notes

Note 1: Rapidly Progressing Severe Accident (RPSA) criteria include the following:

1. First PAR after GE declaration; **AND**
2. Loss of Containment Barrier per EAL Table F-1; **AND**
3. Either of the following (a. **OR** b.):
   a. Containment radiation >600 Rem/hr (RM-01CR-3589SA or RM-01CR-3590SB); **OR**
   b. Radiological release exceeding 1000 mRem TEDE or 5000 mRem thyroid CDE at the site boundary as indicated by meeting EAL RG1.1, RG 1.2, or RG 1.3.

IF RPSA conditions can **NOT** be confirmed, **THEN** answer NO.

Note 2: Offsite agencies have provided prior knowledge of offsite impediments to evacuation (such as flooding, bridge/road closures, adverse weather, traffic control not in place, etc.) **AND SPECIFICALLY REQUESTED** that the site **NOT** issue an evacuation PAR.

Note 3: Hostile Action Based (HAB) notification has been received from a member of the Security Organization that a security condition, threat, or hostile action is occurring.

Note 4: A short-term release is one that can be accurately projected to be less than three hours and controlled by the licensee. This consideration would typically apply to controlled venting of containment.

Note 5: Plant conditions exist which would require the classification of a General Emergency per the EALs.

Table 1
Rapidly Progressing Severe Accident (RPSA)
2 Mile Radius and 10 Miles Downwind

	Wind Direction (From °)	Evacuate Subzones	Shelter Subzones
	011°-034°	A, H, I, J, K	B, C, D, E, F, G, L, M, N
	035°-056°	A, I, J, K, M	B, C, D, E, F, G, H, L, N
	057°-079°	A, I, J, K, L, M	B, C, D, E, F, G, H, N
	080°-101°	A, J, K, L, M	B, C, D, E, F, G, H, I, N
	102°-124°	A, J, K, L, M, N	B, C, D, E, F, G, H, I
	125°-146°	A, B, L, M, N	C, D, E, F, G, H, I, J, K
150°	147°-191°	A, B, E, L, M, N	C, D, F, G, H, I, J, K
	192°-214°	A, B, E, N	C, D, F, G, H, I, J, K, L, M
	215°-236°	A, B, C, E, F	D, G, H, I, J, K, L, M, N
	237°-259°	A, B, C, E, F, G	D, H, I, J, K, L, M, N
	260°-281°	A, B, C, D, F, G, H	E, I, J, K, L, M, N
	282°-304°	A, C, D, F, G, H	B, E, I, J, K, L, M, N
	305°-326°	A, C, D, F, G, H, K	B, E, I, J, L, M, N
	327°-347°	A, D, G, H, I, K	B, C, E, F, J, L, M, N
	348°-010°	A, D, H, I, K	B, C, E, F, G, J, L, M, N

Table 2
Shelter - 2 Mile Radius and 5 Miles Downwind

Wind Direction (From °)	Shelter Subzones	No Action Subzones
327° - 010°	A,D,K	B,C,E,F,G,H,I,J,L,M,N
011° - 056°	A,K	B,C,D,E,F,G,H,I,J,L,M,N
057° - 124°	A,K,L	B,C,D,E,F,G,H,I,J,M,N
125° - 191°	A,B,L	C,D,E,F,G,H,I,J,K,M,N
192° - 214°	A,B	C,D,E,F,G,H,I,J,K,L,M,N
215° - 259°	A,B,C	D,E,F,G,H,I,J,K,L,M,N
260° - 281°	A,C	B,D,E,F,G,H,I,J,K,L,M,N
282° - 304°	A,C,D	B,E,F,G,H,I,J,K,L,M,N
305° - 326°	A,D	B,C,E,F,G,H,I,J,K,L,M,N

Table 3
Evacuate - 2 Mile Radius and 5 Miles Downwind

Wind Direction (From °)	Evacuate Subzones	Shelter Subzones
327° - 010°	A,D,K	B,C,E,F,G,H,I,J,L,M,N
011° - 056°	A,K	B,C,D,E,F,G,H,I,J,L,M,N
057° - 124°	A,K,L	B,C,D,E,F,G,H,I,J,M,N
125° - 191°	A,B,L	C,D,E,F,G,H,I,J,K,M,N
192° - 214°	A,B	C,D,E,F,G,H,I,J,K,L,M,N
215° - 259°	A,B,C	D,E,F,G,H,I,J,K,L,M,N
260° - 281°	A,C	B,D,E,F,G,H,I,J,K,L,M,N
282° - 304°	A,C,D	B,E,F,G,H,I,J,K,L,M,N
305° - 326°	A,D	B,C,E,F,G,H,I,J,K,L,M,N

VERIFICATION OF COMPLETION

Job Performance Measure No.: 2018 NRC Exam Admin JPM SRO A4
Determine Initial Protective Action Recommendations
PEP-110 and EP-EAL

Examinee's Name:

Date Performed:

Facility Evaluator:

Number of Attempts:

Time to Complete:

Question Documentation:

Question:

Response:

Result: SAT ______ UNSAT _______

Examiner's Signature: ________________________________ Date: ____________________

Name: ______________________________________

Date: _______________

Initial Conditions:	**This is a TIME CRITICAL JPM.** A General Emergency has just been declared.

Initiating Cue:	Using the information provided, determine the initial Protective Action Recommendations.

A General Emergency has just been declared with the following conditions:

- A LOCA inside Containment has occurred
- Safety Injection has actuated but flow has NOT been established
- Core Cooling CSFST is RED
- The crew is implementing EOP-FR-C.1, Response to Inadequate Core Cooling
- An unisolable pathway from Containment to the environment exists
- The Dose Assessment Team projects 1200 mRem TEDE and 6000 mRem CDE at the Site Boundary
- Wind direction is from 150˚

Protective Action Recommendations:

Evauate:____
____
____
____

Shelter:____
____
____
____

Recommend the consideration of KI use by the public: YES / NO (circle one)