Shift RHR from the Torus Cooling/Spray Modes to the LPCI Injection Mode

Job Position(s): ☒ RO ☒ SRO

Source: ☒ New ☐ Bank ☐ Modified _____ (Facility ID No. for Bank or Modified)

K/A Reference:

Method of testing: ☐ Simulated/Walk-thru Performance [Classroom/Plant]

☒ Actual Performance [Simulator/Lab]

Type: (Check all that apply)

☐ Administrative Topics	☒ Control Room Systems	☐ In-Plant Systems
☒ Alternate Path	☒ Emergency/Abnormal	☒ ESF
☐ Low-Power/Shutdown	☐ Time Critical	

Task Standard: E1150-F028A, Div 1 RHR Torus Isolation Valve is shut, Division 2 RHR is injecting to the RPV, and RPV water level is increasing.

Validation Time: 10 Minutes

Simulator Setup:

Small break LOCA (High Drywell Pressure, RPV Level < 173 inches)

Division 2 RHR Operating in Torus Cooling and Torus Spray modes.

Ensure E1150-F017B, Div 2 LPCI Otbd Iso Vlv is closed.

Division 1 RHR out of service.

Fail OPEN E1150-F024B Div 2 RHR Torus Cooling Isolation.

Required Materials:

23.205, Residual Heat Removal System

General References:

23.205, Residual Heat Removal System

29.100.01 Sheet 1, RPV Control

29.100.01 Sheet 2, Primary Containment Control

Initial Conditions:

A LOCA has occurred.

Division 2 RHR operating in the Torus Cooling and Torus Spray modes IAW 29.100.01 Sheet 2, Primary Containment Control and 23.205, Residual Heat Removal System.

Division 1 RHR is not available.

RPV water level was being maintained with CRD IAW 29.100.01 Sheet 1, RPV Control but additional injection is now required.

Initiating Cue:

Shift Div 2 RHR from the Torus Cooling/Spray mode to the LPCI Injection mode.

Performance Information

Critical Steps are annotated by "**c**" and italicized text.

	ELEMENTS	STANDARDS
	NOTE TO EVALUATOR: The applicant may elect to secure Torus Cooling/Spray in accordance with Sections 9.6 and 8.6 of SOP 23.205, although the only step critical to completing the assigned task will be to shut E1150-F028B. The following steps are included for this contingency. Completion of steps 8.6.2.4 and 5 below will satisfy completion of the steps necessary to satisfy the alternate path.	
	9.6.8.a Close E1150-F027B, Div 2 RHR Torus Spray Iso.	a. Red light OFF and green light ON for E1150-F027B.
	8.6.2 Torus Cooling Shutdown	
	1 Throttle closed E1150-F024B, Div 2 RHR Torus Clg Iso	Attempts to shut E1150-F024B Div 2 RHR Torus Cooling Isolation, observes that valve does not operate and reports same to CRS.
	CUE If applicant seeks guidance, then ask for a recommendation. The applicant should recommend shutting E1150-F028B before shutting down the pump and should also realize that it will not be necessary to shutdown the pump. If the applicant requests to shut E1150-F028B, then grant permission to do so.	
	4. Place Keylock switch for E1150-F028B, Div 2 RHR Torus Iso Vlv, in OPER.	Keylock switch for E1150-F028B, Div 2 RHR Torus Iso Vlv, in OPER.
c	*5. Close E1150-F028B, Div 2 RHR Torus Iso Vlv.*	*Red light OFF and green light ON for E1150-F028B*
	NOTE TO EVALUATOR: The applicant may elect to not shutdown the pumps and proceed to section 9.4. The remaining steps of section 8.6 are not necessary to complete the task. If the pumps are shutdown then restarting them becomes a critical step.	
	2. Shutdown operating RHR Pumps used for Torus Cooling.	Red light OFF and green light ON for E112-C002B and C002D
	3. Open or verify full open E1150-F007B, Div 2 RHR Pmps Min Flow Vlv.	Red light ON and green light OFF for E1150-F007B

ELEMENTS	STANDARDS
6. Place Keylock switch for E1150-F028B, Div 2 RHR Torus Iso Vlv, in LOCK.	Keylock switch for E1150-F028B, Div 2 RHR Torus Iso Vlv, in LOCK.

NOTE TO EVALUATOR: The following steps are from SOP 23.205, Residual Heat Removal System, Section 9.4. The applicant may also refer to the LPCI Manual Initiation"hard card" (Enclosure B of 23.205).
NOTE TO EVALUATOR: The following two steps should require no actions by the applicant as the pumps will already be in operation unless shutdown per section 8.6. If pumps are not running then step 2.c below becomes critical.

9.4.2 Detailed Procedure

1. Perform the following at H11-P601:	
a. Close or verify closed the following valves: • E1150-F006A, Div 1 RHR Pump A SDC Suct Iso Vlv. • E1150-F006C, Div 1 RHR Pump C SDC Suct Iso Vlv.	a. Red light OFF and green light ON for E1150-F006A and F006C
b. Open or verify open the following valves: • E1150-F004A, Div 1 RHR Pump A Torus Suct Iso. • E1150-F004C, Div 1 RHR Pump C Torus Suct Iso.	b. Red light ON and green light OFF for E1150-F004A and F004C
c. Start the following pumps: • E1102-C002A, Div 1 RHR Pump A. • E1102-C002C, Div 1 RHR Pump C.	c. Red light ON and green light OFF for E112-C002A and C002C

ELEMENTS	STANDARDS
2. Perform the following at H11-P602:	
a. Close or verify closed the following valves: • E1150-F006B, Div 2 RHR Pump B SDC Suct Iso Vlv. • E1150-F006D, Div 2 RHR Pump D SDC Suct Iso Vlv.	a. Red light OFF and green light ON for E1150-F006B and F006D
b. Open or verify open the following valves: • E1150-F004B, Div 2 RHR Pump B Torus Suct Iso. • E1150-F004D, Div 2 RHR Pump D Torus Suct Iso.	b. Red light ON and green light OFF for E1150-F004B and F004D
c. Start the following pumps: • E1102-C002B, Div 2 RHR Pump B. • E1102-C002D, Div 2 RHR Pump D.	c. Red light ON and green light OFF for E112-C002B and C002D
3. Close B3105-F031A(B), N(S) RR Pump Discharge Vlv, for loop where injection is desired.	Red light OFF and green light ON for B3105-F031B
4. If E1150-F010, RHR Crosstie Vlv, is closed, open E1150-F010, RHR Crosstie Vlv, as follows unless otherwise directed by the CRS: a. Place E1150-F010, Operate Permissive Keylock switch, in OPER. b. Open E1150-F010, RHR Crosstie Vlv.	Red light ON and green light OFF for E1150-F010D

	ELEMENTS	STANDARDS
	NOTE TO EVALUATOR: Unless E1150-F028B was shut earlier while securing Torus Cooling, this begins the alternate path portion of the JPM. RPV level will not increase until E1150-F028B is shut since all flow is being diverted to the Torus. E1150-F015B will already be open due to the auto initiation signal being present. E1150-F017B will have been closed earlier to control level and will need to be reopened. Applicant should recognize need to open E1150-F017B and if asked, grant permission to open, grant	
c	5. When Reactor pressure is less than 461 psig, open E1150-F015B, Div 2 LPCI Inbd Iso Vlv.	Red light ON and green light OFF for E1150-F015B
	Recognizes need to open E1150-F017B, Div 2 LPCI Otbd Iso Vlv	*Red light ON and green light OFF for E1150-F017B*
	6. When E11-R603A (B), RHR Loop A (B) Flow Indicator, is > 3000 gpm, verify E1150-F007A (B), Div 1 (2) RHR Pmps Min Flow Vlv, closes.	Red light OFF and green light ON for E1150-F007B
	NOTE TO EVALUATOR: The below actions assume E1150-F024B and F028B were not closed earlier. If performed earlier and RPV level is increasing the JPM may be terminated at this time. The preferred RPV level band is 173-214 inches.	
	7. Verify LPCI System operation by monitoring the following Control Room indications: • E11-R603A (B), RHR Loop A (B) Flow Indicator, and E11-R608A (B), Loop A (B) Flow Recorder, indicate >10,000 gpm. • B21-R604A or B, Reactor Water Level Indicators, increasing. • B21-R623A or B, Post Accident Monitor Pressure/Level Recorder, increasing.	• *Observes that RPV water level is NOT increasing.* • Determines that all flow is still going to the Torus through E1150-F024B. • Attempts to shut E1150-F024B Div 2 RHR Torus Cooling Isolation. • Reports failure of F024B to close.

	ELEMENTS	STANDARDS
	CUE	
	If applicant seeks guidance, then ask for a recommendation. The applicant should recommend shutting the E1150-F028B. If the applicant requests to shut E1150-F028B, then grant permission to do so.	
	Place Keylock switch for E1150-F028B, Div 2 RHR Torus Iso Vlv, in OPER.	Keylock switch for E1150-F028B, Div 2 RHR Torus Iso Vlv, in OPER.
c	*Close E1150-F028B, Div 2 RHR Torus Iso Vlv.*	*Red light OFF and green light ON for E1150-F028B* *Observes that RPV water level is increasing.*

Terminating cue: Terminate the JPM when E1150-F028B is shut and RPV level is increasing.

EXAMINEE CUE SHEET

Initial Conditions:

A LOCA has occurred.

Division 2 RHR operating in the Torus Cooling and Torus Spray modes IAW 29.100.01 Sheet 2, Primary Containment Control and 23.205, Residual Heat Removal System.

Division 1 RHR is not available.

RPV water level was being maintained with CRD IAW 29.100.01 Sheet 1, RPV Control but additional injection is now required.

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