QUESTIONS REPORT
for ILT 37 RO BANK VER 4

1. 001A3.06 001

Unit 1 is at 100% power with the following conditions:

- Rods are in manual.
- Control Bank D is at 225 steps.
- Median Tavg is 568.5°F.
- Tref is 571.0°F.

Subsequently, the operator places the ROD CONTROL BANK SELECTOR SWITCH in AUTO.

Which one of the following completes the statement below?

Rod Speed will indicate __(1)__ and Control Bank D will __(2)__ .

	(1)	(2)
A.	40 steps per minute	remain at 225 steps
B.	40 steps per minute	begin to move out
C. ✔	8 steps per minute	remain at 225 steps
D.	8 steps per minute	begin to move out

Distracter Analysis:

A. Incorrect	1. Incorrect. See C.1. Plausible because, rod motion begins at 1.5 degree mismatch between Median Tave and Tref with a constant rod speed of 8 step per minute until it surpasses a 1.5 degree dead band and begins to increase linearly between a 3 degree (8spm) and 5 degree (72spm) mismatch. Novice students often omit this dead band when predicting rod speed. 571 - 568.5 = 2.5 (incorrectly applying the 1.5 degree deadband results in) 2.5 - 1.5 = 1 degree. 1 degree = 40 steps per minutes
	2. Correct. see C.2
B. Incorrect.	1. Incorrect. See A.1.
	2. Incorrect. See C.2. Plausible because temperature difference is 2.5 degrees. Auto rod control normally would pull rods until temp difference is 1 degree. Only because rods are above 220 steps on bank D do they not move.
C. Correct.	1. Correct. Auto rod speed is 8 steps per minute from 1.5 - 3 degrees off of Tref, then from 3 - 5 degrees it increases linearly to 72 steps per min.
	2. Correct. Rod stop at >220 steps prevents automatic rod withdraw.
D. Incorrect.	1. Correct. See C.1.
	2. Incorrect. See B.2.

QUESTIONS REPORT
for ILT 37 RO BANK VER 4

K/A: 001A3.06	Control Rod Drive System - Ability to monitor automatic operation of the CRDS, including: RCS temperature and pressure.
Importance Rating:	3.9 / 3.9
Technical Reference:	FSD-A181007, Rx Protection, v18 OPS 52201E, Rod Control, v2
References provided:	None
Learning Objective:	DEFINE AND EVALUATE the operational implications of abnormal plant or equipment conditions associated with the operation of the Rod Control System components and equipment to include the following (OPS-52201E05): • Normal Control Methods
Question History:	NEW
K/A match:	Candidate must monitor and evaluate RCS temperature and determine to correct response of automatic rod control based on those conditions.
SRO justification:	N/A

2. 001AG2.4.6 002

The following conditions exist on Unit 1:

At 1000:

- Rod control is in AUTO.
- TI-408A, Tavg - Tref deviation, indicates 0°F and stable.
- Pressurizer level is stable.
- Reactor Power is approximately 75% and stable.
- Control Bank D step counters are at 144 steps.

At 1002:

- TI-408A, Tavg - Tref deviation, indicates +2°F and rising.
- Pressurizer level is slowly rising.
- Pressurizer spray valves have throttled open.
- Reactor Power is approximately 76% and slowly rising.
- Control Bank D step counters are at 150 steps and stepping out.
- There is no load change in progress.

Which one of the following completes the statement below?

The event in progress is an __(1)__ and the action required is to __(2)__ .

A. 1) uncontrolled continuous Control Rod withdrawal

   2) trip the reactor and enter EEP-0, Reactor Trip or Safety Injection

B. ✔ 1) uncontrolled continuous Control Rod withdrawal

   2) place the rod control mode selector switch to MANUAL and verify that rod motion stops

C. 1) inadvertent RCS boration

   2) trip the reactor and enter EEP-0, Reactor Trip or Safety Injection

D. 1) inadvertent RCS boration

   2) place the rod control mode selector switch to MANUAL and match Tavg with Tref by inserting rods

Distracter Analysis:

A. Incorrect.

1. Correct. See B.1.

2. Incorrect. See B.1. Plausible since the stated action if rods do not cease moving once they have been placed in manual IAW AOP-19. Also, a conservative action may be chosen to trip the reactor, but this would not be in accordance with AOP-19.0 for this situation, nor would it be necessary.

B. Correct.

1. A CRW is taking place as indicated by the Tavg/Tref meter value going up above +1.5 and continuing to increase. This shows rods should actually be moving to lower the high temperature.

2. Per AOP-19, and the action is to place rods in Manual if they are stepping while in AUTO.

C. Incorrect.

1. Incorrect. See B.1. Since for an inadvertent boration, Tavg/Tref mismatch would be less than -1.5 (with rods to be moving outward) and power would be less than 75% instead of 76%. Plausible, since rods would be moving out and Tavg/Tref mismatch could be increasing (which would cause Przr level to rise and spray valves to throttle open) with an inadvertent boration.

2. Incorrect. See A.2.

D. Incorrect.

1. Incorrect. See C.1.

2. Incorrect. See B.2. Per AOP-19, and the action is to place rods in Manual if they are stepping while in AUTO and for this type of failure the action would be to match Tavg with Tref by inserting rods. Since this is not the failure mechanism, this is not a correct answer. Plausible since if an inadvertent RCS boration was in progress, then this action would be correct.

QUESTIONS REPORT
for ILT 37 RO BANK VER 4

K/A: 001AG2.4.6	Control Rod Drive System - Knowledge of EOP mitigation strategies.
Importance Rating:	3.7/4.7
Technical Reference:	AOP-19, Malfunction of Rod Control System, v29
References provided:	None
Learning Objective:	EVALUATE plant conditions and DETERMINE if any system components need to be operated while performing AOP-19, Malfunction of Rod Control System. (OPS-52520S06)
Question History:	BANK - AOP-19.0-52520S06 2
K/A match:	Requires the applicant to know the mitigation strategy of AOP-19. There are no EOPs for Control Rod Drive System. Per discussion with Chief Examiner, AOP strategy is satisfactory.
SRO Justification:	N/A

Step	Action/Expected Response	Response Not Obtained

NOTE: Steps 1 and 2 are IMMEDIATE OPERATOR actions.

__ **1 Verify NO load change in progress.**

1 Check for cause of load change.

1.1 IF load rejection in progress or has occurred, THEN go to FNP-1-AOP-17.0, RAPID LOAD REDUCTION.

1.2 IF secondary leakage is indicated, THEN go to FNP-1-AOP-14.0, SECONDARY SYSTEM LEAKAGE.

__ **2 IF unexplained rod motion occurring, THEN stop rod motion.**

2.1 IF rod control in AUTO, THEN place rod control in MANUAL.

2.1 IF rod control in MANUAL, THEN place rod control in AUTO

NOTE: In AUTO rod control, rods will step OUT if TAVG less than TREF by at least 1.5 degrees, and Rods will step IN if TAVG greater than TREF by at least 1.5 degrees.

2.1.1 IF AUTO rod motion due to TAVG/TREF mismatch, THEN verify rod motion stops when TAVG is within 1 degree of TREF

2.2 IF unexplained rod motion NOT stopped, THEN perform the following.

2.2.1 Trip the reactor

2.2.2 Go to FNP-1-EEP-0, REACTOR TRIP OR SAFETY INJECTION

__Page Completed

3. 003K6.02 003

Unit 1 is at 45% power with the following conditions:

- DC2, RCP #1 SEAL LKOF FLOW HI, is in alarm.
- 1C RCP #1 seal leakoff flow is 6.5 gpm.
- DC5, 1C RCP #2 SEAL LKOF FLOW HI, is **NOT** in alarm.

Which one of the following describes actions required in accordance with AOP-4.1, Abnormal Reactor Coolant Pump Seal Leakage?

A. Trip the reactor, secure 1C RCP and close the seal leakoff valve.

B. ✔ Perform a controlled shutdown while monitoring seal flows and temperatures for degradation, then secure 1C RCP and close the seal leakoff valve.

C. Continued power operation is allowed, maintain 6-13 gpm seal injection flow, monitor 1C RCP seal flows and temperatures for degradation.

D. Continue power operation for a maximum of 24 hours, maintain >9 gpm seal injection flow, inform OPS Director to obtain vendor and engineering support.

Per AOP-4.1 Step 9, based on the indications in the stem, a controlled shutdown is required.

Distracter Analysis:

A. Incorrect. See B. Plausible since this is the action if #1 seal leakoff exceeds 8 gpm.

B. Correct. Correct per AOP-4.1. This is correct for #1 seal leakage of between 6 - 8 gpm and #2 seal leakage not in alarm.

C. Incorrect. See B. Plausible since this is the action if #1 seal leakoff was less than 6 gpm and DC5 not in alarm. Contacting the Ops Mgr would need to be performed also.

D. Incorrect. See B. Plausible since this is the action if #1 seal leakoff was less than 6 gpm and DC5 not in alarm. The 9 gpm seal injection is if a shutdown was necessary and is not correct if seal injection is < 6 gpm. The 24 hours is to allow the #2 seal to seat but the applicant could think it allows time for vendor action on #1 seal.

QUESTIONS REPORT
for ILT 37 RO BANK VER 4

K/A: 003K6.02	Reactor Coolant Pump System (RCPS) - Knowledge of the effect of a loss or malfunction on the following will have on the RCPS: RCP seals and seal water supply
Importance Rating:	2.7/3.1
Technical Reference:	FNP-1-AOP-4.1, Abnormal Reactor Coolant Pump Seal Leakage
References provided:	None
Learning Objective:	Given a set of plant conditions, ANALYZE those conditions and DETERMINE what actions are required to be performed with a possible RCP #1 seal failure. (OPS-52522A05)
Question History:	BANK - AOP-4.1-52522A05 2
K/A match:	Requires the applicant to know that the effect of the #1 seal failure on the 1C RCP is that the Reactor must be shutdown and the RCP secured
SRO justification:	N/A

UNIT 1

FNP-1-AOP-4.1
10-02-2013
Revision 11.0

FARLEY NUCLEAR PLANT

ABNORMAL OPERATING PROCEDURE

FNP-1-AOP-4.1

ABNORMAL REACTOR COOLANT PUMP SEAL LEAKAGE

PROCEDURE USAGE REQUIREMENTS NMP-AP-003	SECTIONS
Continuous Use	ALL
Reference Use	
Information Use	

SAFETY RELATED

Approved:

David L Reed (for)

Operations Manager

Date Issued: 10/13/13

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A. Purpose

To provide operational guidance to respond to abnormal reactor coolant pump seal leakoff flows

B. Symptoms and Entry Conditions

This procedure is entered when one of the following reactor coolant pump conditions occur.

a. Operator determination that a loss of all seal cooling to one or more RCPs has occurred.

b. Annunciator DC2, RCP #1 SEAL LKOF FLOW HI, is in alarm. Alarm set point is 5.0 GPM. (annunciator has REFLASH capability)

c. Annunciator DC1, RCP #1 SEAL LKOF LO, is in alarm. Alarm set point is 0.95 GPM. (annunciator has REFLASH capability)

d. Annunciators DA5, DB5, OR DC5; 1A(1B,1C) RCP #2 SEAL LKOF FLOW HI, is in alarm. Alarm setpoint is 0.75 GPM

e. Annunciator DC3 RCP #1 SEAL LO ΔP is in alarm. (annunciator has REFLASH capability)

Step	Action/Expected Response	Response NOT Obtained

NOTE:
- If seal cooling is lost, it will be necessary to trip the RCP(s) within two minutes for a seal leak rate of 5 gpm reducing to 42 seconds for a seal leak rate of 7 gpm, to ensure that the RCP(s) stop rotating prior to actuation of the shutdown seal. (#1 seal leak rate is defined as #1 seal leakoff flow plus #2 seal leakoff flow).
- WHEN transitioning to FNP-1-EEP-0, REACTOR TRIP OR SAFETY INJECTION, AND at the Shift Supervisors direction, it is ACCEPTABLE for the OATC to complete the Immediate Operator Actions of FNP-1-EEP-0, while another team member verifies the reactor trip, and completes the applicable sections of FNP-1-AOP-4.1, ABNORMAL REACTOR COOLANT PUMP SEAL LEAKAGE.
- After transitioning to FNP-1-EEP-0, REACTOR TRIP OR SAFETY INJECTION, and completion of the immediate operator actions; periodic monitoring of the reactor coolant pump should continue in order to isolate seal leakoff valves when the affected pump has come to a complete stop.
- Do not restart an affected RCP until the cause of the seal malfunction has been determined and corrected.
- If the seal package reaches 250°F, it is likely the shutdown seal has actuated and must replaced.

___ 1	**[CA] Verify at least one method of RCP seal cooling to all RCPs in progress.** • Seal Injection • CCW to Thermal Barrier Heat Exchanger	1 Perform the following: 1.1 Shutdown the affected RCP(s) as follows: [] Manually trip the reactor, AND go to FNP-1-EEP-0, REACTOR TRIP OR SAFETY INJECTION. {CMT 0003908} [] WHEN the reactor is shutdown, THEN stop the affected RCP(s). 1.2 IF 1A or 1B RCP is secured, THEN close the pressurizer spray valve for the affected RCP. [] PK444C for 1A RCP [] PK444D for 1B RCP

Step 1 continued on next page.

Step	Action/Expected Response	Response NOT Obtained
		1.3 WHEN the RCP has come to a complete stop as indicated by minimum RCS flow in the affected loop, THEN close the appropriate RCP SEAL LEAKOFF VALVE. [] Q1E21HV8141A [] Q1E21HV8141B [] Q1E21HV8141C 1.4 WHEN affected RCP has been removed from service, THEN refer to FNP-1-AOP-4.0, LOSS OF REACTOR COOLANT FLOW. 1.5 Go to procedure and step in effect.
___ 2	**Determine seal leak off flow condition for affected RCP.**	
	2.1 Check #1 seal leakoff flow less than 5 gpm. N1E21FR154A RCP SEAL LKOF HIGH RANGE [] 1A RCP #1 SEAL LKOF [] 1B RCP #1 SEAL LKOF [] 1C RCP #1 SEAL LKOF	2.1 Go to step 4.
	2.2 Check #1 seal leakoff flow greater than .95 GPM RCP SEAL LEAKOFF LOW RANGE [] 1A RCP FI-156B [] 1B RCP FI-155B [] 1C RCP FI-154B	2.2 Go to Step 11.

Step 2 continued on next page.

Step	Action/Expected Response	Response NOT Obtained
	2.3 Check #2 seal leakoff flow less than .75 gpm. (alarm setpoint is .75 gpm.) [] Ann DA5 1A RCP #2 SEAL LEAKOFF FLOW HI From N1E21FSH160-N [] Ann DB5 1B RCP #2 SEAL LEAKOFF FLOW HI From N1E21FSH159-N [] Ann DC5 1C RCP #2 SEAL LEAKOFF FLOW HI From N1E21FSH158-N	2.3 Go to step 20.
___ 3	**Check #1 seal differential pressure.**	
	3.1 ΔP is GREATER than 210 psid for affected RCP. [] 1A RCP #1 Seal ΔP indicator N1E21PI156A [] 1B RCP #1 Seal ΔP indicator N1E21PI155A [] 1C RCP #1 Seal ΔP indicator N1E21PI154A	3.1 Go to step 27.
	3.2 Go to procedure and step in affect.	
___ 4	**[CA] Check #1 seal leakoff GREATER than 6 gpm.**	4 Check the status of #2 SEAL LKOF HI Annunciator (DA5, DB5 or DC5) for affected RCP. 4.1 Annunciator in ALARM go to step 5. 4.2 Annunciator in CLEAR go to step 10.

Step	Action/Expected Response	Response NOT Obtained
___ 5	[CA] Check #1 seal leakoff LESS than 8 gpm.	5 Perform the following: 5.1 Shutdown the affected reactor coolant pump as follows: [] Manually trip the reactor, AND go to FNP-1-EEP-0, REACTOR TRIP OR SAFETY INJECTION INJECTION. {CMT 0003908} [] WHEN the reactor is shutdown, THEN stop the affected RCP(s).{CMT 0003908} 5.2 IF 1A or 1B RCP is secured, THEN close the pressurizer spray valve for the affected RCP. [] PK444C for 1A RCP [] PK444D for 1B RCP 5.3 WHEN the RCP has come to a complete stop as indicated by minimum RCS flow in the affected loop, THEN close the appropriate RCP SEAL LEAKOFF VALVE. [] Q1E21HV8141A [] Q1E21HV8141B [] Q1E21HV8141C 5.4 WHEN affected RCP has been removed from service, THEN refer to FNP-1-AOP-4.0, LOSS OF REACTOR COOLANT FLOW. 5.5 Go to procedure and step in effect.

Step	Action/Expected Response	Response NOT Obtained
___ 6	[CA] CHECK #2 SEAL LKOF HI Annunciator (DA5, DB5 or DC5) for affected RCP -CLEAR.	6 Perform the following: 6.1 IF #1 SEAL LEAKOFF less than 7.25 gpm, THEN go to step 7. 6.2 IF #1 SEAL LEAKOFF greater than 7.25 gpm, THEN perform the following. 6.2.1 Shutdown the affected reactor coolant pump as follows: [] Manually trip the reactor, AND go to FNP-1-EEP-0, REACTOR TRIP OR SAFETY INJECTION. {CMT 0003908} [] WHEN the reactor is shutown, THEN stop the affected RCP(s).{CMT 0003908} 6.2.2 IF 1A or 1B RCP is secured, THEN close the pressurizer spray valve for the affected RCP. [] PK444C for 1A RCP [] PK444D for 1B RCP 6.2.3 WHEN the RCP has come to a complete stop as indicated by minimum RCS flow in the affected loop, THEN close the appropriate RCP SEAL LEAKOFF VALVE. [] Q1E21HV8141A [] Q1E21HV8141B [] Q1E21HV8141C

Step 6 continued on next page.

Step	Action/Expected Response	Response NOT Obtained
		6.2.4 WHEN affected RCP has been removed from service, THEN refer to FNP-1-AOP-4.0, LOSS OF REACTOR COOLANT FLOW. 6.2.5 Go to procedure and step in effect.

NOTE:
- The following step determines total flow through the #1 seal to ensure degradation of the #1 seal is not being masked by a simultaneous failure of the #2 seal.
- IF the RCP #2 SEAL LEAKOFF FLOW HI DA5, DB5 OR DC5 annunciator is in alarm, THEN trending of RCDT level increase over time, while only an approximation, is the only available method of estimating #2 seal leakoff flow for the step below. FIGURE 2 is provided for reference and was copied from PCB-1-VOL2-CRV28B.

Step	Action/Expected Response	Response NOT Obtained
___ 7	**[CA] Monitor RCDT level increase to approximate #2 SEAL LEAKOFF rate, while continuing with this procedure.**	
	7.1 Check the combination of #1 SEAL LEAKOFF AND #2 SEAL LEAKOFF remains less than 8 gpm.	7.1 Shutdown the affected reactor coolant pump as follows: 7.1.1 Manually trip the reactor, AND go to FNP-1-EEP-0, REACTOR TRIP OR SAFETY INJECTION. {CMT 0003908} 7.1.2 WHEN the reactor is shutdown, THEN stop the affected RCP(s).{CMT 0003908}

Step 7 continued on next page.

Step	Action/Expected Response	Response NOT Obtained
		7.1.3 IF 1A or 1B RCP is secured, THEN close the pressurizer spray valve for the affected RCP. [] PK444C for 1A RCP [] PK444D for 1B RCP 7.1.4 WHEN the RCP has come to a complete stop as indicated by minimum RCS flow in the affected loop, THEN close the appropriate RCP SEAL LEAKOFF VALVE. [] Q1E21HV8141A [] Q1E21HV8141B [] Q1E21HV8141C 7.1.5 WHEN affected RCP has been removed from service, THEN refer to FNP-1-AOP-4.0, LOSS OF REACTOR COOLANT FLOW. 7.1.6 Go to procedure and step in effect.

Step	Action/Expected Response	Response NOT Obtained

****

CAUTION: To prevent potential seal damage, neither seal injection nor CCW cooling should be restored to a RCP which has lost both seal injection and CCW cooling

****

NOTE: Refer to the Integrated Plant Computer page 1RCP, RCP Temperature Summary, for RCP seal water temperatures.

___ 8 **[CA] CHECK RCP lower seal water bearing and seal water outlet temperatures stabilizes less than 225°F.**

Monitor the following computer points for the affected pump.

[] TE0132 RCP A SEAL WATER OUTLET TEMP
[] TE0131 RCP A LOWER SEAL WATER BRG TEMP
[] TE0129 RCP B SEAL WATER OUTLET TEMP
[] TE 128 RCP B LOWER SEAL WATER BRG TEMP
[] TE0126 RCP C SEAL WATER OUTLET TEMP
[] TE0125 RCP C LOWER SEAL WATER BRG TEMP

8 Shutdown the affected reactor coolant pump as follows:

8.1 Manually trip the reactor, AND go to FNP-1-EEP-0, REACTOR TRIP OR SAFETY INJECTION. {CMT 0003908}

8.2 WHEN the reactor is shutdown, THEN stop the affected RCP(s).{CMT 0003908}

8.3 IF 1A or 1B RCP is secured, THEN close the pressurizer spray valve for the affected RCP.

[] PK444C for 1A RCP
[] PK444D for 1B RCP

8.4 WHEN the RCP has come to a complete stop as indicated by minimum RCS flow in the affected loop, THEN close the appropriate RCP SEAL LEAKOFF VALVE.

[] Q1E21HV8141A
[] Q1E21HV8141B
[] Q1E21HV8141C

8.5 WHEN affected RCP has been removed from service, THEN refer to FNP-1-AOP-4.0, LOSS OF REACTOR COOLANT FLOW.

Step 8 continued on next page.

Step	Action/Expected Response	Response NOT Obtained
		8.6 Go to procedure and step in effect.

NOTE: The intent of the following step is to have the Unit shutdown within 8 hours in order to secure the affected RCP(s).

___	9 **[CA] Perform a controlled shutdown of the unit in accordance with the appropriate Unit Operating Procedures concurrent with the remainder of this procedure.** 9.1 Maintain GREATER than 9 gpm seal injection flow to the affected RCP while the pump is running.	

Step 9 continued on next page.

4. 004A1.07 004

Unit 1 is at 100% power with the following conditions:

- PK-145, LP LTDN PRESS, demand is failing to 0% in automatic.

Which one of the following completes the statements below?

Letdown flow will _(1)_ .

The operator is required to take action to adjust letdown flow, not to exceed a MAXIMUM of _(2)_ .

	(1)	(2)
A. ✔	increase	135 gpm
B.	increase	125 gpm
C.	decrease	135 gpm
D.	decrease	125 gpm

Distracter Analysis:

A. Correct .

1. Correct. PCV-145 opens when PK-145 demand goes to 0%.

2. Correct. DE5 - The normal flow rate for letdown is 60 GPM and the maximum is 135 GPM.

B. Incorrect.

1. Correct. See A.1

2. Incorrect. See A.2. Plausible since this is the alarm setpoint for Charging header high flow.

C. Incorrect.

1. Incorrect. See A.1. Plausible If applicant fails to recall that the controller is human factored and works opposite of the standard valve controller.

2. Correct. See A.2

D. Incorrect.

1. Incorrect. See C.1

2. Incorrect. See B.2.

K/A:004A1.07	Chemical and Volume Control System - Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating the CVCS controls including: Maximum specified letdown flow.
Importance Rating:	2.7 / 3.1
Technical Reference:	FNP-1-ARP-1.4, v54.1
References provided:	None
Learning Objective:	STATE the symptoms and PREDICT the impact a loss or malfunction of Chemical and Volume Control System components will have on the operation of the Chemical and Volume Control System (OPS-52101F02).
Question History:	NEW
K/A match:	Candidate must predict a letdown flow change based on a component failure and recall maximum letdown flow limit.
SRO justification:	N/A

Excess Letdown Flow Divert Valve (8143)

A two-position switch (VCT/RCDT) controls the valve. Valve position indication lights are located above the switch. In the RCDT position, the actuation air solenoid valve is energized to position the divert valve to the RCDT. In the VCT position, the solenoid is de-energized and the valve is positioned to direct flow to the VCT.

Excess Letdown Flow Control Valve (HCV-137)

This valve is controlled by REMOTE/MANUAL setpoint station HIK-137. Fully open corresponds to a station setpoint setting of 0%.

Seal Injection Flow Control Valve (HCV-186)

This valve is controlled by REMOTE/MANUAL setpoint station HIK-186. Fully open corresponds to a station setpoint setting of 100%.

Letdown Heat Exchanger Discharge Temperature Control Valve TV-3083 (also called TCV-144 and TCV-3083)

The control valve is controlled from a MANUAL/AUTO (MA) station TK-144. In AUTO control, the MA station potentiometer should be set at 3.30, which corresponds to 100°F. The setpoint is variable from 50°F to 200°F (which corresponds to 0.0 to 10.0 on the potentiometer). In MANUAL control, an output of 100% corresponds to the valve being fully closed. Both Unit's have procedural guidance for controlling Letdown Temperature on TV-3083 manual bypass valve OR by placing TV-3083 operator on the manual jacking device.

Pressure Control Valve (PCV-145)

This valve is controlled by MA station PK-145. In AUTO control, the MA station should be set to maintain between 260 and 450 psig. The setpoint is variable from 0 to 600 psig (which corresponds to 0.0 to 10.0 on the potentiometer). In MANUAL control, a controller output of 100% corresponds to the valve being fully closed.

LOCATION DE5

SETPOINT: 140 GPM

ORIGIN: Flow Bistable FB-150 from Flow Transmitter (Q1E21FT150)

E5	LTDN HX OUTLET FLOW HI

PROBABLE CAUSE

1. All three Letdown Orifice Isolation Valves open.
2. LP LTDN PRESS PK-145 failed open.

AUTOMATIC ACTION

NONE

NOTES:
- **The normal flow rate for letdown is 60 GPM and the maximum is 135 GPM. FSAR Table 9.3.5** ☐
- **At 135°F ann DF1 should alarm and TCV-143 should divert to the VCT.** ☐

OPERATOR ACTION

1. Monitor the following:
   - LTDN HX Outlet Flow (FI-150) ☐
   - LTDN HX Outlet Press (PI-145). ☐
2. Ensure proper orifice isolation valve selection. ☐
3. IF LP LTDN PRESS PK-145 has failed, THEN place valve controller in manual and attempt to reduce letdown flow below 135 GPM. ☐
4. IF proper letdown flow can NOT be maintained, THEN close LTDN ORIF ISO 45 (60) GPM Q1E21HV8149A, B, and C. ☐

NOTE: Transients that will require boration or dilution should be avoided if letdown has been secured. ☐

5. IF a ramp is in progress, THEN place turbine load on HOLD. ☐
6. Go to FNP-1-AOP-16.0, CVCS MALFUNCTION to address the loss of letdown flow. ☐

References: A-177100, Sh. 205; D-175039, Sh. 1&2; U-176019; PLS Document U-258631; PCN B-87-1-4353

5. 004K1.06 005

Unit 1 is at 100% power with the following conditions:

- An Auto makeup has just started.
- FK-113, BORIC ACID MKUP FLOW, is set to 5.0.
- FK-168, PRI WTR MKUP FLOW, is set to 7.5.
- MKUP MODE SELECTOR switch is in AUTO.
- MKUP MODE CONT switch RED light is LIT.

Which one of the following completes the statement below?

FCV114A, MKUP TO VCT, will _____ .

A. open fully

B. ✔ remain closed

C. modulate open based on FK-113 pot setting

D. modulate open based on FK-168 pot setting

Distracter Analysis:

A. Incorrect. See B. Plausible because during a dilution this would be a correct answer, 114A would fully open.

B. Correct. Because the auto makeup is blended flow(boron) and FCV114A remains closed. Per SOP-2.3.

C. Incorrect. See B. Plausible because FCV113A will modulate open based on FK-113 setting - This is a true statement for a different valve that operates during the makeup.

D. Incorrect. Plausible since FCV114B will modulate open based on FK-168 setting - This is a true statement for a different valve that operates during the makeup.

QUESTIONS REPORT
for ILT 37 RO BANK VER 4

K/A: 004K1.06	Chemical and Volume Control System - Knowledge of the physical connections and/or cause-effect relationships between the CVCS and the following systems: Makeup system to VCT
Importance Rating:	3.1 / 3.1
Technical Reference:	FNP-1-SOP-2.3, CVCS Rx Makeup, v59.3
References provided:	None
Learning Objective:	RELATE AND IDENTIFY the operational characteristics including design features, capacities and protective interlocks for the components associated with the Reactor Makeup Control and Chemical Addition System, to include the following (OPS-40301G02): [...] • Makeup to VCT, FCV-114A [...]
Question History:	NEW
K/A match:	Candidate must have knowledge of cause-effect of auto makeup in VCT and determine, based on conditions, how the makeup system will react.
SRO justification:	N/A

NOTE

The expected reactivity changes should be verified by observing VCT level, Tavg, SR SUR, IR SUR, and Control Rod Motion. The make-up system operation should be stopped and corrective action taken if any change is excessive or in the wrong direction. ☐

4.1.8 **Verify**[ss1] proper automatic operation of the reactor makeup control system as follows:

4.1.8.1 WHEN VCT level decreases to 20%, THEN **verify** that makeup begins by observing the following:

- MKUP TO CHG PUMP SUCTION HDR Q1E21FCV113B open. ☐
- Boric acid flow on FI-113 and reactor makeup flow on FI-168 are at the pre-selected rates as displayed on MAKEUP FLOW TO CHG/VCT. ☐
- VCT level increasing. ☐

4.1.8.2 WHEN VCT level increases to 40%, THEN **verify** that makeup stops by observing the following:

- BORIC ACID TO BLENDER Q1E21FCV113A closed. ☐
- MKUP TO CHG PUMP SUCTION HDR Q1E21FCV113B closed. ☐
- RMW TO BLENDER Q1E21FCV114B closed. ☐
- Boric acid flow on FI-113 and reactor makeup water flow on FI-168 Return To zero as displayed on MAKEUP FLOW TO CHG/VCT indicator. ☐

6. 005K5.02 006

Unit 1 has just entered Mode 4 with the following conditions:

- RCS cooldown is in progress for a refueling outage.

Which one of the following completes the statement below?

Per SOP-7.0, Residual Heat Removal System, use only one train of RHR for cooldown when RCS temperature is >225°F to prevent _____ .

A. excessive heatup of the CCW system

B. exceeding maximum RCS cooldown rate

C. loss of both RHR pumps due to steam voiding on a Safety Injection

D. violating low temperature overpressure protection (LTOP) requirements

SOP-7.0
3.24 Operation of a train of RHR aligned in cooldown operation when RCS temperature is greater than 225°F will result in the associated train of ECCS being declared inoperable. One train of ECCS must be operable in Mode 4 (TS 3.5.3). (RER C101206101).
n

Distracter Analysis:

A. Incorrect. See C. Plausible because this is part of P&L 3.4 and the applicant could reason that since the "Off Service" train of RHR is normally used for cooldown, excessive heatup could be an issue because the off service train would have a lower heat load..

B. Incorrect - See C. Plausible since two trains would significantly increase cooldown capability.

C. Correct - Per P&L 3.24

D. Incorrect - See C. Plausible. LTOP is not used for cooldown but the requirement for LTOP (2 relief valves aligned) coupled with single train cooldown requirement above 225°F makes this is a common misconception about LTOP (Low temperature Over Pressure) as to when it is required to be aligned and how many trains must be aligned. (Note prior to step 4.5.1)

QUESTIONS REPORT
for ILT 37 RO BANK VER 4

K/A: 005K5.02	Residual Heat Removal System (RHRS) - Knowledge of the operational implications of the following concepts as they apply the RHRS: Need for adequate subcooling
Importance Rating:	3.4 / 3.5
Technical Reference:	FNP-1-SOP-7.0, RHR, v103.0
References provided:	None
Learning Objective:	RECALL AND DISCUSS the Precautions and Limitations (P&L), Notes and Cautions (applicable to the “Reactor Operator”) found in the following procedures (OPS-52101K06). [...] • SOP-7.0, Residual Heat Removal System [...]
Question History:	NEW
K/A match:	Candidate must recall a caution from RHR procedure that warns of making both RHR trains inoperable due to temperature of water in the suction lines causing vapor lock of the pumps.(loss of Subcooling)
SRO justification:	N/A

3.14 At Refueling Cavity levels greater than or equal to 153'8", water can enter the Refueling Cavity Ventilation ductwork resulting in a spill in containment.

3.15 RCS Level Monitoring System level transmitter, N1B13LT2965A, has an auto ranging switching circuit associated with its output. The indication on LI 2965A is invalid when cavity level is greater than 136'.

3.16 When RCS pressure is less than 50 psig, the time operating at greater than 3300 gpm through the cold leg injection lines should be minimized to reduce the potential for pipe thinning from possible cavitation downstream of the orifices. (Ref. ABN 95-0-0722).

3.17 In order to prevent exceeding 110% of RHR design discharge pressure during an RCS over pressurization event; the minimum allowable flowrate, for Unit 1, is 1750 gpm when the RHR loop is aligned to the RCS. This limitation would not be applicable when RCS over pressurization is not feasible (i.e., with the reactor vessel head removed, midloop, Reactor Vessel Cover installed, etc.
Reference: Westinghouse letter ALA-95-580).

3.18 When operating an RHR pump at a reduced flowrate, the time operating less than 2750 gpm should be minimized, when practical, to reduce thrust loading of the RHR pump thrust bearing. (IN 93-08; NMS-93-0181)

3.19 Indicated RHR flow is less than actual as temperature increases above 120°F. FE605A & B is calibrated for 100°F. For example at 300°F and 3000 gpm indicated there is a negative bias of 2.42% of full scale (5000 gpm) or an actual flow of 3121 gpm. (REA 95-0886, Rev. 1)

3.20 The Technical Specification maximum lift pressure for the RHR pump suction relief valves (Q1E11V015A&B [8708A&B]) is 450 psig. Due to setpoint tolerances, lift could occur as low as 427 psig.

3.21 If in Mode 6, then maintain greater than or equal to 3000 gpm flow in the RHR loop required to be in operation.

3.22 The RHR HX DISCH VLV (603) AND RHR HX BYP VLV (605) should NOT be closed at the same time while the RHR pump is running since this will isolate the RHR pump miniflow path FCV-602. This will cause the RHR pump to be running against shutoff head.

3.23 If possible when securing an RHR pump for the last time prior to Mode 4 entry, the pump shaft should be observed locally for smooth coast down of the pump. If the shaft exhibits jerky motion, stops abruptly, or unusual scraping or grinding noises are heard, it could be an indication of casing ring cap screws in contact with the pump impeller. SS should be notified immediately
(IN 2003-03, Vogtle LER 2-2002-01).

3.24 Operation of a train of RHR aligned in cooldown operation when RCS temperature is greater than 225°F will result in the associated train of ECCS being declared inoperable. One train of ECCS must be operable in Mode 4 (TS 3.5.3).
(RER C101206101)

CAUTION

Ensure RCS temperature is less than 350°F and RCS pressure less than 375 psig before aligning the RHR system to the RCS. ☐

4.5 Placing A Train RHR System in Cooldown Operation from ECCS Standby Alignment:

NOTES

To satisfy ITS 3.4.12 (LTOP), steps 4.5.1 through 4.5.10 are the steps required to align RHR reliefs (overpressure mitigation) to the RCS. Align both trains for cooldown alignment prior to exceeding step 4.5.10 to ensure LTOP conditions are established prior to starting a RHR pump. Cooldown in one loop can occur during the start of an RHR pump resulting in the cold leg temperature dropping to less than 275°F momentarily. ☐

Using OFF SERVICE train for cooldown is preferred. ☐

Attachment 1, Controlling RHR Temperature During Cooldown Operation, may be used without referring to this procedure section under the following conditions:

(a) RHR has been previously aligned for cooldown per section 4.5. ☐

(b) Temperature change of one or both RHR loops is desired. ☐

4.5.1 **Verify** the following have been completed for the RHR Train being aligned:

- RHR system preparation for cooldown (Section 4.1) ☐
- CCW is aligned for cooldown on RHR per FNP-1-SOP-23.0, Component Cooling Water System. ☐

NOTE

The intent of defeating the SI auto start from an RHR pump is to ensure at least one RHR Train remains OPERABLE for ITS 3.5.3. ☐

4.5.2 IF required, THEN **defeat** the 1A RHR Pump SI auto start per Appendix 11. ☐

4.5.3 **Verify** stopped 1A RHR PUMP. ☐

4.5.4 **Verify** closed 1A RHR HX DISCH VLV HIK 603A. ☐

4.5.5 **Verify** closed 1A RHR HX BYP FLOW FK 605A. ☐

4.5.6 **Close** RWST TO 1A RHR PUMP Q1E11MOV8809A. ☐

4.5.7 **Verify** closed the following valves:

- CTMT SUMP TO 1A RHR PUMP Q1E11MOV8811A. ☐
- CTMT SUMP TO 1A RHR PUMP Q1E11MOV8812A. ☐

3.3 To avoid thermal shock, flow through the RHR system must be initiated slowly. Initial flow should always be established by slowly cracking open the RHR heat exchanger bypass valves. IF RCS temperature is greater than or equal to 235°F and the RHR system is to be operated in the cooldown lineup, THEN the RHR pump should be heated up slowly. (Westinghouse ESBU-TB-96-03)

3.4 Prior to starting cooldown, ensure sufficient service water is available to CCW Heat Exchangers to prevent excessive heatup of CCW system.

3.5 During cooldown, limit the cooldown rate as follows:

3.5.1 Do not exceed cooldown limits specified in the Technical Specifications.

3.5.2 Do not exceed CCW heat exchanger outlet temperature of 120°F.

3.6 When the temperature of any RCS Cold leg is at or below 275°F, then Two RHR relief valves with lift settings of less than or equal to 450 psig shall be operable and their isolation valves, Q1E11MOV8701A & Q1E11MOV8701B and Q1E11MOV8702A & Q1E11MOV8702B shall be open; (LCO 3.4.12) or open a vent path greater than or equal to 2.85 square inches.

3.7 Prior to starting or stopping a RHR pump with the RCS under solid plant pressure control LP LTDN PRESS PK 145 must be placed in MANUAL control to prevent RCS pressure fluctuations.

3.8 Monitor RCS boron concentration to ensure adequate shutdown margin is maintained.

3.9 During solid plant pressure control with letdown from RHR, maintain RHR TO LTDN HX Q1E21HCV142 open as far as possible using HIK-142.

3.10 The only time both 1A and 1B RHR Hx to CVCS letdown isolation valves 1-RHR-V-8720A (Q1E11V013A) and 1-RHR-V-8720B (Q1E11V013B) may be open at the same time is during the shifting of LP letdown from one train of RHR to the other.

3.11 Frequent starting may damage RHR pump motors. Limit pump starts as follows:

3.11.1 Two successive starts from ambient.

3.11.2 One start from rated temperature.

3.11.3 Subsequent starts: allow 15 minutes running time or 45 minutes idle time between starts.

3.12 Leakage of RCS loop check valves may result in pressurization of the RHR system piping. Venting of this pressure to the RWST is not an acceptable means of relieving such pressure since this would result in a direct flow path from the RCS to outside of containment.

3.13 Annunciators CG1 and CG2 are interlocked with 1A and 1B RHR pump supply breakers such that the alarms are disabled unless the associated breaker is racked in AND closed.

7. 006A4.01 007

Unit 1 was operating at 100% with the following conditions:

- 1B Charging pump is aligned to 'B' Train.
- 1B Charging pump is running.

Subsequently, an LOSP with a concurrent Safety Injection occurs and the following conditions exist:

- 22 seconds after the actuation, EB1, CHG PUMP OVERLOAD TRIP, comes into alarm.
- The AMBER light on the handswitch for the 1C Charging pump is illuminated.

Which one of the following completes the statement below?

1B Charging pump _____.

A. must be manually started

B. will start from the LOSP sequencer

C. will remain running throughout the event per design

D. ✔ will start due to 1C Charging Pump tripping on overload

SOP-2.1:
3.32 If the on-service charging pump trips on overload, the off-service charging pump for the particular train which has two operable charging pumps will automatically start.

3.33 If 1A (1C) Charging Pump trips on overload or is racked out, 1B Charging Pump will automatically start upon safety injection or loss of offsite power.

Distracter Analysis:

A. incorrect. See D. Plausible if the applicant is unfamiliar with the sequencer timing / auto-starts and believes that the timing sequence given causes the 1B charging pump not to start automatically. The logic diagram shows that the B chg pump will auto start if, at the time of the SI/LOSP the aligned train Chg pump is either racked out or is tripped. There is also another path on the same logic diagram that shows with a 1 sec TDDO that goes to an OR box, that if the aligned train Chg pump trips, the 1B Chg pump will Auto start due to the tripped Chg pump. If a candidate does not understand the logic in detail, it is plausible that the 1B Chg pump would not auto start and would have to be manually started in this situation. This is also plausible if the Chg pump that tripped were the 1A Chg vs the 1C Chg pump since the 1B Chg pump is aligned to B Train. At FNP, several components such as CCW pumps and SFP components are labeled differently for the train they are aligned to (1A CCW pump is B Train,1A SFP pump is B Train...)

B. Incorrect. See D. Plausible because the sequencer will only start the 1B charging pump if the 1C charging pump breaker is racked out or has tripped on overload. After 22 seconds have passed the sequencer will be at about step 2 of returning equipment to service. Once a step is complete, the sequencer signal is no longer available to start any other component on a previous step. Charging pumps come off step 1 and this will occur about 17 seconds into the event.

C. Incorrect. See D. Plausible if the applicant fails to evaluate the LOSP then this would be a correct answer if only a SI signal is received.

D. Correct. The sequencer sequences on the 1C chg pump (unless it is racked out, then it would sequence on the 1B) after about 17 seconds (approx.12 secs for DG to start and tie on, no more than 5 secs for sequencer to start load.). Then, an overload trip of 1C will cause 1B chg pump (when aligned to same train) to auto start. In this case B Train is on service so 1B chg pump is aligned to the B train with 1C Chg pump.

QUESTIONS REPORT
for ILT 37 RO BANK VER 4

K/A: 006A4.01	Emergency Core Cooling System (ECCS) - Ability to manually operate and/or monitor in the control room: Pumps
Importance Rating:	4.1 / 3.9
Technical Reference:	CVCS LP OPS-52101F FNP-1-ARP-1.5 EB1 SOP-2.1, CHEMICAL AND VOLUME CONTROL SYSTEM PLANT STARTUP AND OPERATION version 84
References provided:	None
Learning Objective:	STATE the symptoms and PREDICT the impact a loss or malfunction of Chemical and Volume Control System components will have on the operation of the Chemical and Volume Control System (OPS-52101F02)
Question History:	FNP 07
K/A match:	Requires the applicant to monitor the auto start of the 1B Charging pump due the 1C Charging pump trip.
SRO justification:	N/A

3.21 Activity levels on the reactor coolant filter, RCP seal water injection filter, and RCP seal water return filter should be limited to the amount recommended by the Chemistry and Health Physics Supervisor.

3.22 1B CHG pump should be aligned to the same service water train, CCW train, and electrical train.

3.23 During solid plant operations with letdown from RHR established, letdown pressure should be maintained less than 600 psig (PI-145).

3.24 Seal Water Return To VCT ISO, Q1E21V196, must remain locked closed in Modes 1, 2, 3 & 4.

3.25 In Modes 5 and 6, as a minimum, one of the following boron injection flow paths shall be OPERABLE (TR 13.1.2):

3.25.1 A flow path from the boric acid tanks via a boric acid transfer pump to a charging pump to the RCS if only the boric acid storage tank is OPERABLE.

3.25.2 A single flow path from the RWST via a charging pump to the RCS if only the RWST is OPERABLE.

3.26 In Modes 1, 2, 3 and 4, two of the following boron injection flow paths shall be OPERABLE (TR 13.1.3):

3.26.1 The flow path from the boric acid tanks via a boric acid transfer pump and a charging pump to the RCS.

3.26.2 Two flow paths from the Refueling Water Storage Tank via charging pumps to the RCS.

3.27 In Modes 5 and 6, at least one charging pump in the boron injection flow path required by Precaution 3.26 shall be OPERABLE and capable of being powered from an OPERABLE emergency bus.

3.28 In Modes 1, 2, 3 and 4, at least two charging pumps shall be OPERABLE (TR 13.1.5).

3.29 In Modes 4 with RCS cold legs $\leq$ 275°F and > 200°F, only two charging pumps shall be capable of injecting into the RCS, except as permitted by Technical Specification 3.4.12.

3.30 In Modes 5 and 6 with RCS cold legs $\leq$ 200°F and > 180°F, only two charging pumps shall be capable of injecting into the RCS, except as permitted by Technical Specification 3.4.12.

3.31 In Modes 5 and 6 with RCS cold legs $\leq$ 180°F, only one charging pump shall be capable of injecting into the RCS, except as permitted by Technical Specification 3.4.12.

3.32 If the on-service charging pump trips on overload, the off-service charging pump for the particular train which has two operable charging pumps will automatically start.

3.33 If 1A (1C) Charging Pump trips on overload or is racked out, 1B Charging Pump will automatically start upon safety injection or loss of offsite power.

3.34 In order to maintain a train operable with the dedicated pump/breaker inoperable AND racked in, the cell switch should be jumpered for the swing breaker to ensure the swing breaker will close on an auto start signal with the dedicated pump breaker racked in. Additionally, a link should be opened in the auto start circuitry of the dedicated pump to prevent an auto start of the dedicated train breaker. This arrangement should remain in place until such time the dedicated breaker is declared operable or surveillance testing is started. (AI 2008205335)

3.35 It is desired to operate a complete cycle through one charging flowpath. The Control Room Log [V1]or the UOP-2.2 or UOP-2.4 that was used for the last refueling shutdown may be consulted for previous lineup. Charging flowpath should be alternated between cycles (e.g., normal for one cycle, alternate charging for the next cycle).

3.36 ZAS injection will result in a continuous RCS dilution by as much as 1.7 gallons per hour which could result in a rise of TAVG if not compensated for by boration, rod insertion, or increasing fission product poison inventory.

3.37 Any throttle valve adjustments should be verified acceptable per SR 3.5.5.1 by performing FNP-1-STP-8.0, RCP Seal Injection Leakage Test, OR FNP-1-STP-8.1 if HCV-186 is bypassed, twice within four hours. One FNP-1-STP-8.0, OR FNP-1-STP-8.1 if HCV-186 is bypassed, should be performed with the "strongest" charging pump supplying flow and one FNP-1-STP-8.0, OR FNP-1-STP-8.1 if HCV-186 is bypassed, with the "weakest" charging pump supplying flow. The "strongest" and "weakest" charging pump can be determined by comparing data in the Surveillance Test Data Book. (Engineering Support should be contacted if assistance is required in making this determination.) If not feasible to run FNP-1-STP-8.0, OR FNP-1-STP-8.1 if HCV-186 is bypassed, using either the strongest or weakest pump (i.e. pump not capable of running or breaker racked out), the surveillance should be run with the two available charging pumps and an admin LCO used for the inoperable pump to ensure FNP-1-STP-8.0, OR FNP-1-STP-8.1 if HCV-186 is bypassed, is run when the pump is returned to service.

3.38 Any time the letdown flow path is changed (diverting TCV-143, changing mixed bed or cation bed or BTRS line up); RCS filter radiation level may drastically change. (OR 2-99-325)

3.39 Normally only one or two letdown orifices are in service. During periods of reduced RCS pressure, it is permissible to place a third letdown orifice in service provided letdown flow does not exceed 135 gpm or 260 – 450 psig.

8. 007A1.03 008

The following conditions exist on Unit 1:

- PI-455, PRZR PRESS, is 1400 psig.
- PI-472, PRT PRESS, is 30 psig.
- Q1B31PCV444B, PZR PORV, is leaking by to the PRT.

Which one of the following completes the statements below?

The temperature indicated on TI-463, PORV, is approximately _(1)_.

Per SOP-1.2, Reactor Coolant Pressure Relief System, the NORMAL method to cooldown the PRT is using _(2)_.

Reference Provided

	(1)	(2)
A.	280°F	spray from RMWST and drain to the RCDT
B✔	280°F	recirculation through the RCDT heat exchanger
C.	535°F	spray from RMWST and drain to the RCDT
D.	535°F	recirculation through the RCDT heat exchanger

Per SOP-1.2, Step 4.1 the normal method to cooldown is using recirculation.

Distracter Analysis:

A. Incorrect.

1. Correct. See B.1.

2. Incorrect. See B.2.Plausible if the applicant does not recall the normal method to cooldown the PRT. There are two methods to cooldown the PRT. A.2. is the Alternate method which increases waste water.

B. Correct.

1. Correct. Per Steam Tables.

2. Correct, Per SOP-1.2 Step 4.1.

C. Incorrect.

1. Incorrect. See B.1. Plausible if the applicant believes that the temperature of the steam in the Pressurizer is the same temperature as the steam entering the PRT. 535°F is the approximate saturation temperature for 900 psia. This was the error made at the TMI accident.

2. Incorrect. See A.2.

D. Incorrect.

1. Incorrect. See C.1.

2. Correct. See B.2.

K/A:007A1.03	Pressurizer Relief Tank/Quench Tank System (PRTS) - Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating the PRTS controls including: Monitoring quench tank temperature
Importance Rating:	2.6 / 2.6
Technical Reference:	SOP-1.2, Reactor Coolant Press Relief System, v32.2
References provided:	Steam Tables
Learning Objective:	SELECT AND ASSESS the Pressurizer System instrument/equipment response expected when performing Pressurizer System evolutions, including the Normal Condition, the Failed Condition, Associated Alarms, Associated Trip Setpoints, to include the components found on Figure 3, Pressurizer and Pressurizer Relief Tank (OPS-52101E07).
Question History:	MOD BANK
K/A match:	Candidate is required to predict steam temperature entering the PRT (monitor) and recall cooldown method required by procedure that would prevent exceeding design limits.
SRO justification:	N/A

4.0 INSTRUCTIONS

4.1 PRESSURIZER RELIEF TANK NORMAL COOLDOWN

NOTE: Completion of applicable (*) steps is indicated by initialing on procedure Sign-off List SOP-l.2A.

* 4.l.l Verify reactor coolant drain tank pumps are stopped.

* 4.l.2 Select CLOSE and then AUTO on RCDT LCV, Q1G21LCV1003 selector switch (MCB).

* 4.l.3 Close RCDT RECIRC ISO, N1G21HV7144 (N1G21V106) (LWP).

* 4.l.4 Close RCDT PUMP SUCT VLV, N1G21HV7127 (N1G21V006) (LWP).

* 4.l.5 Open PRT DRN ISO N1B13HV8031 (MCB).

* 4.l.6 Open RCDT PUMP DISCH TO PRT, N1G21HV7141 (N1G21V020).

* 4.l.7 Start RCDT pump A(B).

* 4.l.8 WHEN PRT temperature decrease has stabilized, THEN perform the following:

- Stop RCDT pump A(B)
- Place RCDT pump A(B)in pull to lock.

* 4.l.9 Close PRT DRAIN ISO, N1B13HV8031 (MCB).

* 4.l.10 Close RCDT PUMP DISCH TO PRT, N1G21HV7141 (N1G21V020) (LWP).

* 4.l.11 Open RCDT RECIRC ISO, N1G21HV7144 (N1G21V106) (LWP).

* 4.l.12 Open RCDT PUMP SUCT VLV, N1G21HV7127 (N1G21V006) (LWP).

* 4.1.13 Select OPEN and then AUTO on RCDT LCV Q1G21LCV1003 selector switch (MCB).

4.2 PRESSURIZER RELIEF TANK ALTERNATE COOLDOWN

4.2.1 Check closed the following PRT N_2 SUPPLY ISO valves (MCB):

- PRT N_2 SUPPLY ISO, Q1B13HV8047
- PRT N_2 SUPPLY, Q1B13HV8033

Using RMWST

4.2.2 Open the following RMW TO PRT ISO valves (MCB):

- RMW TO PRT ISO, Q1B13HV8028
- RMW TO PRT ISO, N1B13HV8030

4.2.3 WHEN PRT level is approximately 90%, THEN close the following RMW TO PRT ISO valves:

- RMW TO PRT ISO, Q1B13HV8028
- RMW TO PRT ISO, N1B13HV8030

4.2.4 Align RCDT to pump down the PRT

4.2.4.1 Verify all RCDT pumps are stopped.

4.2.4.2 Close the following:

- RCDT OUTLET ISO, N1G21HV7127.
- RCDT RECIRC ISO, N1G21HV7144.

4.2.4.3 IF RCDT discharge to RHT is desired, THEN perform the following:

A. Verify closed RCDT DISCH TO WHT, Q1G21V009 (1-LWP-V-7137).

B. Verify open RCDT PUMP DISCH TO RHT ISO, Q1E21V315 (1-CVC-V-8551).

4.2.4.4 IF RCDT discharge to WHT is desired, THEN perform the following:

A. Close RCDT PUMP DISCH TO RHT ISO, Q1E21V315 (1-CVC-V-8551)

B. Open RCDT DISCH TO WHT, Q1G21V009 (1-LWP-V-7137).

4.2.5 Open PRT DRN ISO, N1B13HV8031.

QUESTIONS REPORT
for BANK

1. Unit 2 was operating at 100% power when a Reactor Trip occurs and the following conditions exist:

   - Q2B13PSV8010A, PZR SAFETY, has failed OPEN.
   - Pressurizer pressure is 1020 psig.
   - PRT pressure rises to 55 psig.
   - Core Exit Thermocouples read 560°F.

   Which one of the following completes the statements below?

   Temperature on TI-469, SAFETY VLVS, will indicate approximately _(1)_.

   Pressurizer level will be _(2)_.

Reference provided

	(1)	(2)
A.	546°F	rising
B.	546°F	lowering
C.	320°F	lowering
D. ✔	320°F	rising

9. 007EK2.02 009

Unit 1 is operating at 100% power with the following conditions:

- The RX TRIP ACTUATION handswitch is placed in TRIP.

Which one of the following completes the statement below?

The Reactor Trip Breakers' Shunt Trip coils _(1)_ and the UV relays _(2)_.

	(1)	(2)
A.	energize	energize
B. ✔	energize	de-energize
C.	de-energize	energize
D.	de-energize	de-energize

Plausibility:

Novice operators often confuse protection relay operation. Phase A is de-energize to actuate, Phase B is energize to actuate, SI components require power to actuate slave relays (energize to actuate). This question is elevated above LOD-1 because of the multitude of actuation schemes present and the RTB's use of both.

Distracter Analysis:

A. Incorrect	1. Correct. See FSD statement above.
	2. Incorrect. Plausible because it would be correct if referencing the trip coils
B. Correct	1. Correct See FSD statement above.
	2. Correct See FSD statement above.
C. Incorrect	1. Incorrect : Plausible because it would be correct if referencing the UV coils
	2. Incorrect See A.2
D. Incorrect	1. Incorrect See C.1
	2. Incorrect See B.2

K/A: 007EK2.02	Reactor Trip - Knowledge of the interrelations between a reactor trip and the following: Breakers, relays and disconnects
Importance Rating:	2.6 / 2.8
Technical Reference:	FSD A181007, Rx Protection, v18
References provided:	None
Learning Objective:	RECALL AND DESCRIBE the operation and function of the following reactor trip signals, permissives, control interlocks, and engineered safeguards actuation signals associated with the Reactor Protection System (RPS) and Engineered Safeguards Features (ESF) to include setpoint, coincidence, rate functions (if any), reset features, and the potential consequences for improper conditions to include those items in the following tables (OPS-52201I07): • Table 1, Reactor Trip Signals
Question History:	BANK - RX PROT-40302F02 001
K/A match:	Question requires knowledge of reactor trip relays and how they initiate a reactor trip.
SRO justification:	N/A

10. 007K4.01 010

Which one of the following completes the statements below?

The PRT level is normally maintained at _(1)_ .

The PRT is maintained with a _(2)_ cover gas.

A. (1) 16% to provide adequate capacity for PORV discharge
   (2) Nitrogen

B. (1) 16% to provide adequate capacity for PORV discharge
   (2) Hydrogen

C. ✔ (1) 70% to provide adequate volume to cool PORV discharge
   (2) Nitrogen

D. (1) 70% to provide adequate volume to cool PORV discharge
   (2) Hydrogen

SOP-1.2
4.3.1.2 WHEN desired PRT level is reached (normally 70%),
THEN close the following:

Distracter Analysis:

A. Incorrect.	1. Incorrect. See C.1. Plausible because this is the location of the sparger and not the normal level. The applicant may reason that volume is needed to not overfill the PRT instead of cooling water.
	2. Correct. See C2.
B. Incorrect.	1. Incorrect. See A.1.
	2. Incorrect. Plausible since the RCDT, another tank located near the PRT in Containment uses H2 as a cover gas. The VCT also uses Hydrogen as a cover gas.
C. Correct.	1. Per Step 4.3.1.2 of SOP-1.2
	2. Per FSAR 5.5.11.1
D. Incorrect.	1. Correct. See C.1.
	2. Incorrect. See B.2.

QUESTIONS REPORT
for ILT 37 RO BANK VER 4

K/A: 007K4.01	Pressurizer Relief Tank/Quench Tank System (PRTS) - Knowledge of PRTS design feature(s) and/or interlock(s)which provide for the following: Quench tank cooling.
Importance Rating:	2.6 /2.9
Technical Reference:	SOP-1.2, Reactor Coolant Press Relief Sys, v32.2, FSAR Chapter 5, v24
References provided:	None
Learning Objective:	RECALL AND DISCUSS the Precautions and Limitations (P&L), Notes and Cautions (applicable to the “Reactor Operator”) found in the following Procedures (OPS-52101E08): [...] • SOP-1.2, Reactor Coolant Pressure Relief System
Question History:	NEW
K/A match:	Candidate is required to know level of PRT required for it to perform its design function for cooling a steam discharge
SRO justification:	N/A

3.0 PRECAUTIONS AND LIMITATIONS

3.1 PRT temperature should not exceed l20°F during normal plant operation.

3.2 Maintain a nitrogen overpressure of 0.5 to 3 psig in the PRT to prevent the formation of an explosive hydrogen - oxygen mixture.

3.3 PRT pressure should not exceed 6 psig during normal plant operations.

3.4 Maintain PRT level between 68-78 % during normal operations.

3.5 Do not exceed PRT rupture disc pressure of l00 psig.

3.6 At least one of the two reactor vessel head vent system paths, consisting of two valves in series powered from the Auxiliary Building DC Distribution System, shall be OPERABLE and closed in Modes 1-4. (TR 13.4.3)

3.7 While stroking the upstream valve (Q1B13SV2214A or Q1B13SV2214B), MCB closed indication could be momentarily lost on the downstream valve (Q1B13SV2213A or Q1B13SV2213B) due to minor water hammer. This phenomenon is common and documented for Plant Farley and for other plants, and has been evaluated to have no detrimental impact. {CR 2007103114}

3.8 While stroking the downstream valve (Q1B13SV2213A or Q1B13SV2213B), MCB closed indication could be momentarily lost on the upstream valve (Q1B13SV2214A or Q1B13SV2214B) due to rapid depressurization across the upstream valve. This phenomenon is documented for Plant Farley and has been evaluated to have no detrimental impact. {CR 2007103114}

4.3 FILLING AND DRAINING THE PRT

4.3.1 Filling the PRT

4.3.1.1 Open the following RMW TO PRT ISO valves (MCB):

- RMW TO PRT ISO, Q1B13HV8028
- RMW TO PRT ISO, N1B13HV8030

4.3.1.2 WHEN desired PRT level is reached (normally 70%), THEN close the following:

- RMW TO PRT ISO, Q1B13HV8028
- RMW TO PRT ISO, N1B13HV8030

NOTE: The bottom of the PRT sparger is 12" = ~500 gallons = ~5%. The sparger is a 12" perforated pipe that sits 12" off the bottom of the PRT. The top of the sparger is at 24" = ~1400 gallons = ~16%. The level doesn't have to be below the bottom of the sparger because the pipe is perforated on all sides, but it may be desirable.

4.3.2 Draining the PRT Using an RCDT Pump

4.3.2.1 Verify closed the following:

- PRT VENT LINE TO GDT ISO, Q1B13V064 (1-RC-V-8025), 121'
- PRT VENT TO #7 & #8 GDT ISO Q1G22V237 (1-GWD-V-7935), 83'

4.3.2.2 Verify closed N_2/H_2 SUPPLY TO #7 & #8 GDT ISO, Q1G22V040 (1-GWD-V-7849).

CAUTION: PRT pressure must be maintained > 0.5 psi while draining.

4.3.2.3 IF needed to maintain pressure while draining the PRT, OR draining is to support performance of Sections 4.5 or 4.6, THEN perform the following:

4.3.2.3.1 Open N_2 SUPP TO PRT ISO, Q1G22V215 (1-GWD-V-7920).

4.3.2.3.2 Verify PRT N_2 PRESS REG, Q1B13V042 (1-RC-PCV-8034) adjusted to obtain 3 psig in the PRT.

11. 008AK2.01 011

Unit 1 is operating at 100% reactor power when the following occurs:

- Pressure Relief Tank (PRT) parameters are:
  – Temperature rising.
  – Pressure rising.
  – Level rising.
- Pressurizer Level is 60% and rising.

Which one of the following states:

The event occurring

AND

the maximum pressure the PRT will rise to?

A. • LCV-460, LTDN LINE ISOL, has failed CLOSED.

• 150 psig.

B. • Q2B13PSV8010B, PZR SAFETY, has failed OPEN.

• 150 psig.

C. • LCV-460, LTDN LINE ISOL, has failed CLOSED.

• 100 psig.

D. ✓ • Q2B13PSV8010B, PZR SAFETY, has failed OPEN.

• 100 psig.

Added Pressurizer level and trend to stem **based on NRC comment.**
This addresses concern of long term effects with no operator action.
Between a safety lifting and letdown isolating, only a safety lifting will cause both indications at this point in time.

Per D175037, SH 2:
The PRZR Safeties relieve to the PRT.

SOP-1.2: Step 3.5
Do not exceed PRT rupture disc pressure of l00 psig.

Distracter Analysis:

A. Incorrect.

1. Incorrect. See D.1. Plausible if the applicant thinks that there is a relief upstream of LCV-460 that will lift if the valve goes shut. They could confuse this with the conditions associated with PCV-145 failing shut. There is a relief valve downstream of the Letdown orifice isolation valves but upstream of several other letdown isolations valves such as HV 8152 and HV 8175A&B. See D-17039 SH1 and 2 and ARP-1.4. If Letdown were stopped, Pressurizer level would rise. When FCV-122 is demanded close in AUTO it will still have a flow of 18 gpm. This, along with seal injection, would cause Pressurizer level to rise.

2. Incorrect. See D.2. Plausible since a number of relief setpoints are 150 psig and the applicant could confuse the rupture disc setpoint with other relief setpoints. The seal return line relief is set at 150 psig.

B. Incorrect.

1. Correct. See D.1.

2. Incorrect. See A.2.

C. Incorrect.

1. Incorrect. See A.1.

2. Correct. See D.1.

D. Correct.

1. Correct. The PRZR Safeties relieve to the PRT.

2. Correct. The rupture disc ruptures at 100 psig.

QUESTIONS REPORT
for ILT 37 RO BANK VER 4

K/A: 008AK2.01	Pressurizer (PZR) Vapor Space Accident (Relief Valve Stuck Open) - Knowledge of the interrelations between the Pressurizer Vapor Space Accident and the following: Valves.
Importance Rating:	2.7/2.7
Technical Reference:	D175037-0002, RCS, v34 FNP-1-SOP-1.2, Reactor Coolant Pressure Relief System, v32.2
References provided:	None
Learning Objective:	SELECT AND ASSESS the Pressurizer System instrument/equipment response expected when performing Pressurizer System evolutions, including the Normal Condition, the Failed Condition, Associated Alarms, Associated Trip Setpoints, to include the components found on Figure 3, Pressurizer and Pressurizer Relief Tank (OPS-52101E07).
Question History:	MOD BANK
K/A match:	Requires the applicant to evaluate the conditions of a vapor space leak and recognize that is caused by an open Pressurizer Safety Valve.
SRO justification:	N/A

3.0 PRECAUTIONS AND LIMITATIONS

3.1 PRT temperature should not exceed l20°F during normal plant operation.

3.2 Maintain a nitrogen overpressure of 0.5 to 3 psig in the PRT to prevent the formation of an explosive hydrogen - oxygen mixture.

3.3 PRT pressure should not exceed 6 psig during normal plant operations.

3.4 Maintain PRT level between 68-78 % during normal operations.

3.5 Do not exceed PRT rupture disc pressure of l00 psig.

3.6 At least one of the two reactor vessel head vent system paths, consisting of two valves in series powered from the Auxiliary Building DC Distribution System, shall be OPERABLE and closed in Modes 1-4. (TR 13.4.3)

3.7 While stroking the upstream valve (Q1B13SV2214A or Q1B13SV2214B), MCB closed indication could be momentarily lost on the downstream valve (Q1B13SV2213A or Q1B13SV2213B) due to minor water hammer. This phenomenon is common and documented for Plant Farley and for other plants, and has been evaluated to have no detrimental impact. {CR 2007103114}

3.8 While stroking the downstream valve (Q1B13SV2213A or Q1B13SV2213B), MCB closed indication could be momentarily lost on the upstream valve (Q1B13SV2214A or Q1B13SV2214B) due to rapid depressurization across the upstream valve. This phenomenon is documented for Plant Farley and has been evaluated to have no detrimental impact. {CR 2007103114}

LOCATION DE3

SETPOINT: 165 ± 2°F

E3	LTDN ORIF ISO VLV REL LINE TEMP HI

ORIGIN: Temperature Bistable TB-141 from Temperature Element (N1E21TE141-N)

PROBABLE CAUSE

1. LTDN ORIF OUTLET REL VLV, Q1E21V255, leaking or lifted.
2. LP LTDN PRESS PK-145 malfunction.

AUTOMATIC ACTION

NONE

OPERATOR ACTION

CAUTION: If actual VCT level is low, refer to annunciator DF3. (SOER 97-1) ☐

1. Monitor the LTDN ORIF ISO REL line to PRT Temperature (TI-141) and LTDN HX Outlet Press (PI- l45). ☐

2. IF the high temperature is due to LP LTDN press PK-145 malfunctions, THEN place valve controller in manual and adjust as required. ☐

3. IF temperature continues to rise rapidly indicating a lifted relief valve, THEN close LTDN ORIF ISO 45 (60) GPM Q1E21HV8149A, B AND C. ☐

NOTE: Transients that will require boration or dilution should be avoided if letdown has been secured. ☐

4. IF a ramp is in progress, THEN place turbine load on HOLD. ☐

5. Go to FNP-1-AOP-16.0, CVCS MALFUNCTION to address the loss of letdown flow. ☐

References: A-177100, Sh. 203; D-175039, Sh. 1; U-176024; PLS Document

Table 2 - INSTRUMENTATION AND CONTROL (Cont'd)

NUMBER	NAME	FUNCTION
FT-122	Charging Line Flow controller	Throttles from 18-120 gpm on FCV-122 (Auto)
FT-150	Letdown Flow	Hi alarm at 135 gpm
8155	Nitrogen to VCT Regulator	Maintain 18 psig
8156	Hydrogen to VCT Regulator	Maintain 18 psig
8157	VCT to WPS Gas Inlet Regulator	Maintain 20 psig
8116A/B	RHR Hx discharge relief	Relieve at 220 psig
8117	Letdown Orifice Outlet Relief	Relieve at 600 psig
8119	Letdown Relief	Relieve at 300 psig
8120	VCT Relief	Relieve at 75 psig
8121	Seal Water Return Relief	Relieve at 150 psig
8123	Charging Pump Miniflow Relief	Relieve at 150 psig

QUESTIONS REPORT

for Questions

1.

Unit 1 is operating at 50% power. Given the following conditions:

- Pressurizer pressure is 2235 psig.
- Pressurized Relief Tank (PRT) pressure is 10.2 psig and rising.
- PRT temperature is 125°F and rising.
- PRT level is 81% and rising slowly.
- One pressurizer PORV is blowing by its seat.

Which one of the following describes the effect on the PRT and PORV downstream piping of the PORV blowing by for a sustained period of time?

(Assume no operator action)

A. • The PRT pressure will increase to a maximum of 100 psig.
   • PORV downstream temperature will rise to 500-650°F.

B. • The PRT pressure will increase to 150 psig.
   • PORV downstream temperature will rise to a maximum of 200-350°F.

C✓ • The PRT pressure will increase to a maximum of 100 psig.
   • PORV downstream temperature will rise to a maximum of 200-350°F.

D. • The PRT pressure will increase to 150 psig.
   • PORV downstream temperature will rise to 500-650°F.

12. 008K3.03 012

Unit 1 is operating at 100% when the following conditions occur:

- The "On Service" Train of CCW has been lost.

Which one of the following completes the statement below?

The RCP _(1)_ radial bearing temperatures will rapidly rise and _(2)_ is the **MINIMUM** bearing temperature at which the RCPs must be secured.

	(1)	(2)
A.	pump	195°F
B. ✔	motor	195°F
C.	pump	260°F
D.	motor	260°F

ARP - DD3: CCW FLOW FROM RCP OIL CLRS LO

PROBABLE CAUSE

1. LOSS of Component Cooling Water.

[...]

NOTE: On a complete Loss of CCW Flow to RCP Motor Bearing Oil Coolers, the bearing temperature will exceed 195°F in approximately 2 minutes.

OPERATOR ACTION

[..]

4. IF any RCP Motor Bearing Temperature exceeds 195°F, THEN:

A. IF the Reactor is critical, THEN trip the reactor.
B. Stop the RCP.
C. Perform the actions required by FNP-1-EEP-0, REACTOR TRIP OR SAFETY INJECTION.
[...]

Distracter Analysis:

A. Incorrect.	1. Incorrect. See B.1. Plausible since the applicant may not recall that seal injection also cools the pump radial bearing. If this were not true, this would be a correct answer.
	2. Correct. See B.2.
B. Correct.	1. CCW cools the RCP motor bearing.
	2. Per DD3, 195°F is the RCP trip temperature.
C. Incorrect.	1. Incorrect. See A.1.
	2. Incorrect. See B.2. Plausible since this is the alarm setpoint for 1A and 1B RCP Phase 3 stator temps which will cause annunciator KK5 (MTR STATOR TEMP PNL ALARM) to alarm.
D. Incorrect.	1. Correct. See B.1.
	2. Incorrect. See C.2.

K/A: 008K3.03	Component Cooling Water System - Knowledge of the effect that a loss or malfunction of the CCWS will have on the following: RCP
Importance Rating:	4.1 / 4.2
Technical Reference:	FNP-1-ARP-1.4, v54.1
References provided:	None
Learning Objective:	NAME AND EXPLAIN the RCP Trip Criteria, to include the following subjects (OPS-52101D06): • RCP Vibration and Temperature Limitations [...]
Question History:	MOD BANK
K/A match:	Requires applicant to know that the effect of a loss of CCW to the RCP oil cooler is that it will cause the motor bearing temperature to rise and to know what the trip criteria is.
SRO justification:	N/A

LOCATION DD3

SETPOINT: 100 + 10 GPM
- 0

ORIGIN:
1. Flow Switch (Q1P17FISL3048A-N)
2. Flow Switch (Q1P17FISL3048B-N)
3. Flow Switch (Q1P17FISL3048C-N)

D3
CCW FLOW FROM RCP OIL CLRS LO

PROBABLE CAUSE

NOTE: Following entry into Mode 6 during a refueling outage, it is common to receive alarm DD3 due to low discharge pressure on the O/S pump when aligned to the SFP and RHR HXs, and the RHR seal and charging pump oil coolers.
AI 2009203964 ☐

1. Loss of Component Cooling Water.
2. Loss of Component Cooling Water Flow to the RCP's due to Phase "B" isolation signal.
3. Improper valve lineup.

AUTOMATIC ACTION

NONE

OPERATOR ACTION

1. Determine the cause of the alarm. ☐

2. IF a loss of Component Cooling Water has occurred, THEN perform the actions required by FNP-1-AOP-9.0, LOSS OF COMPONENT COOLING WATER. ☐

3. Closely monitor the RCP's Motor Bearing Temperatures. ☐

NOTE: On a complete Loss of CCW Flow to RCP Motor Bearing Oil Coolers, the bearing temperature will exceed 195°F in approximately 2 minutes. ☐

4. IF any RCP Motor Bearing Temperature exceeds 195°F, THEN:
   A. IF the Reactor is critical, THEN trip the reactor. ☐
   B. Stop the RCP. ☐
   C. Perform the actions required by FNP-1-EEP-0, REACTOR TRIP OR SAFETY INJECTION. ☐
   D. Perform action of FNP-1-AOP-4.0, LOSS OF REACTOR COOLANT FLOW as time allows. ☐

5. Correct the cause of the alarm and return flow to normal. ☐

References: A-177100, Sh. 198; B-175968, Pg. 6 & 7; D-175002, Sh. 2; U-258242

LOCATION KK5

SETPOINT: As lsited on pages 2 and 3

ORIGIN: Temperature Monitoring Panel

K5
MTR STATOR TEMP PNL ALARM

PROBABLE CAUSE

1. High Motor Stator Temperature at one of the monitored points.
2. Open RTD.
3. Shorted RTD.

AUTOMATIC ACTION

NONE

OPERATOR ACTION

NOTE: • **A shorted RTD will display a temperature less than -100°F when read.** ☐

• **An open RTD will have a blank display when read.** ☐

1. Determine the motor with the alarm condition by checking the front panel LED'S. ☐
2. IF possible, THEN start a standby component and remove alarming component from service. ☐
3. IF a standby component is NOT available, THEN notify the Shift Supervisor of the alarm condition and let him evaluate the plant conditions and recommend a course of action to be taken. ☐
4. Periodically monitor Stator and determine if temperature is increasing or has stabilized. ☐
5. Notify appropriate personnel to investigate and repair. ☐
6. IF elevated phase temperatures exist on the CW Pump Motors, THEN consideration should be given to checking the RTD terminal connections. (AI 2008204555) ☐

References: A-177100, Sh. 495; D-172871, Sh. 3 & 4; D-l70242

LOCATION KK5

REACTOR COOLANT PUMP MOTOR TEMPERATURES (°F)			
		ALARM SET POINT	MFG. MAX. SAFE TEMP
1A	PHASE 1	275	302
	PHASE 2	280	302
	PHASE 3	260	302
1B	PHASE 1	270	302
	PHASE 2	270	302
	PHASE 3	260	302
1C	PHASE 1	270	302
	PHASE 2	270	302
	PHASE 3	270	302

CONDENSATE PUMP MOTOR TEMPERATURES (°F)			
		ALARM SET POINT	MFG. MAX. SAFE TEMP
1A	PHASE 1	275	311
	PHASE 2	275	311
	PHASE 3	275	311
1B	PHASE 1	275	311
	PHASE 2	275	311
	PHASE 3	275	311
1C	PHASE 1	275	311
	PHASE 2	275	311
	PHASE 3	275	311

References: D-170280, Rev. 3; U-214849; U-161114; Phase 1 Test Result Data Sheet, Doc. no. 020650304-312; MWR 159048

Lower Motor Guide Bearing

The lower guide bearing consists of a babbit-on-steel, pivoted pad guide bearing and provides radial support for the motor. The bearing operates against a .5 percent carbon alloy steel journal.

The entire lower guide bearing assembly has been located in the 25-gallon lower oil pot, which also contains an integral heat exchanger. The oil cooler receives cooling from CCW.

Thrust Bearing, Upper Motor Guide Bearing, and Oil Lift System

Refer to Figure 8. The upper bearing consists of a combination double, Kingsbury type thrust bearing (suitable for up or down thrust) and a radial guide bearing. The babbit-on-steel thrust bearing shoes are mounted on equalizing pads. The pads distribute the thrust load equally to all shoes. The radial bearing, providing radial support for the motor, consists of a babbit-on-steel, pivoted-pad type bearing. Both the radial bearing and thrust bearing operate against an alloy steel journal and thrust runner combination that is shrunk on the shaft.

The entire upper bearing assembly has been located in the upper 240-gallon oil pot. A heat exchanger cooled by CCW mounts on the side of the motor and cools the oil.

Oil circulates through the upper bearings and oil cooler by means of a series of passages drilled in the thrust runner. The series of drilled passages cause the thrust runner to act like a centrifugal pump.

In order to reduce starting torque, the thrust bearing shoes receive oil from the oil lift system before starting the motor. The oil "lifts" the thrust shoes away from the thrust runner.

The thrust bearing oil lift system includes: a 10-hp, drip-proof, three-phase, 60-cycle, 600-volt, 1800-rpm motor and oil pump; a 0 to 5000-psi pressure gauge; a pressure switch; check valves; filter; relief valve; and orifice blocks. The oil lift motor and pump mount externally on the upper part of the motor casing and normally are controlled remotely from the MCB.

A permissive interlock in the RCP motor starting circuit does not allow the motor to be started until the oil lift pressure has reached a preset value (600 psi). Oil lift pressure can be read locally at the oil lift pump by manually depressing the block valve release push button and then reading the pressure on the local gauge. The lift pump should be run for at least 2 minutes prior to starting the RCP. After the RCP has been in operation for at least 1 minute, the oil lift pump

QUESTIONS REPORT
for Questions

1. Unit 1 is operating at 100% power.

   The following occurs:

   - MOV-3052, CCW TO RCP CLRS, closes.
   - DD3, CCW FLOW FROM RCP OIL CLRS LO, comes in to alarm.

   Which one of the following completes the statements below?

   The most limiting components for this event are the RCP __(1)__.

   The RCPs will be required to be stopped within approximately __(2)__.

   A. ✔ 1) Motor Bearings

      2) 2 minutes

   B. 1) Motor Bearings

      2) 60 minutes

   C. 1) Pump Lower Radial Bearings

      2) 2 minutes

   D. 1) Pump Lower Radial Bearings

      2) 60 minutes

13. 010A4.03 013

Unit 1 is operating at 100% power and the following conditions exist:

- PCV-444B, PRZR PORV, has failed open.
- MOV-8000B, PRZR PORV ISO, is closed with the power removed.

Subsequently, a rupture occurs on the 1A SG and EEP-3.0, Steam Generator Tube Rupture, is in progress with the following conditions:

- The operating crew is at the step to reduce RCS pressure.
- Normal Pressurizer Spray is NOT available.

Which one of the following completes the statements below?

Per EEP-3.0, the required method of RCS pressure reduction is using __(1)__ .

If required, PCV-444B __(2)__ be used for the RCS pressure reduction.

	(1)	(2)
A.	Auxiliary Spray	CAN
B.	one Pressurizer PORV	CAN
C.	Auxiliary Spray	CANNOT
D. ✔	one Pressurizer PORV	CANNOT

EEP-3

17.1 IF normal pressurizer spray available, THEN open all available normal pressurizer spray valves. 1A(1B) LOOP SPRAY VLV [] PK 444C [] PK 444D	17.1 Proceed to Step 18. OBSERVE CAUTIONS AND NOTES PRIOR TO STEP 18.

NOTE: Prior to Step 8.3
[...]
A failed open PORV must not be unisolated.
[...]

18.2 Reduce RCS pressure by opening one pressurizer PORV until one of the following three conditions occurs, then stop RCS pressure reduction.

Distracter Analysis:

A. Incorrect.

1. Incorrect. See D.1. Plausible since Aux spray will lower RCS pressure, and is normally preferred since there is no loss of RCS inventory during use, but is not available due to the fact that a SI has actuated and letdown is not available to support aux spray operation. In step 31 after the SI is reset and to control RCS pressure reduction, if there is no Spray valve available, then Aux Spray is used for the pressure reduction. Since this method is used in EEP-3.0 for different circumstances then the question asks, this makes Aux spray plausible.

2. Correct. See D.2.Plausible since this is true for a leaking PORV.

B. Incorrect.

1. Correct. See D.1.

2. Incorrect. See A.2.

C. Incorrect.

1. Incorrect. See A.1.

2. Correct. See D.2

D. Correct.

1. Correct. Per Step 18.2. Reduce RCS pressure by opening one pressurizer PORV [...]

2. Correct. Per the note prior to step 18. Any pressurizer PORV previously isolated due to excessive seat leakage only, may be unisolated if needed to make an RCS pressure reduction [...].

QUESTIONS REPORT
for ILT 37 RO BANK VER 4

K/A: 010A4.03	Pressurizer Pressure Control System - Ability to manually operate and/or monitor in the control room: PORV and block valves
Importance Rating:	4.0/3.8
Technical Reference:	Tech Specs, v193 FNP-1-EEP-3, SGTR, v27
References provided:	None
Learning Objective:	EVALUATE plant conditions and DETERMINE if any system components need to be operated while performing EEP-3, Steam Generator Tube Rupture. (OPS-52530D06)
Question History:	NEW
K/A match:	Requires the applicant to know whether or not the Block Valve/PORV can be operated for a pressure reduction in EEP-3.
SRO justification:	N/A

Step	Action/Expected Response	Response NOT Obtained

NOTE: The purpose of the following step is to establish an available PORV flowpath for SGTR mitigation. A failed open PORV must not be unisolated. A leaking PORV which is isolated with power available to the isolation valve should remain isolated until needed for RCS pressure reduction. Any leaking PORV should be re-isolated when not in use.

	8.3 Check at least one PRZR PORV ISO - OPEN.	8.3 Open any PRZR PORV ISO not required to isolate an open or leaking PORV.

****

CAUTION: If offsite power is lost after SI reset, manual action may be required to restart safeguards equipment.

****

___ 9	**Verify SI - RESET.** [] MLB-1 1-1 not lit (A TRN) [] MLB-1 11-1 not lit (B TRN)	9 Perform the following: 9.1 IF any train will NOT reset using the MCB SI RESET pushbuttons, THEN place the affected train S821 RESET switch to RESET. (SSPS TEST CAB.) 9.2 IF a failure exists in SSPS such that SI cannot be reset, THEN reset SI using FNP-1-SOP-40.0, RESPONSE TO INADVERTENT SI AND INABILITY TO RESET OR BLOCK SI, Appendix 2.
___10	**Verify PHASE A CTMT ISO - RESET.** [] MLB-2 1-1 not lit [] MLB-2 11-1 not lit	

Step	Action/Expected Response	Response NOT Obtained
___15	**Check ruptured SG(s) pressure - STABLE OR RISING.**	15 Perform the following. 15.1 Maintain RCS cold legs cooldown rate less than 100°F in any 60 minute period. 15.2 Dump steam from intact SGs to maintain ruptured SG pressure at least 250 psig above pressure of intact SGs used for cooldown. 15.3 IF ruptured SG(s) pressure NOT maintained greater than 250 psig above pressure of intact SGs used for cooldown, THEN go to FNP-1-ECP-3.1, SGTR WITH LOSS OF REACTOR COOLANT SUBCOOLED RECOVERY DESIRED.
___16	**Check SUB COOLED MARGIN MONITOR indication - GREATER THAN 36°F{65°F} SUBCOOLED IN CETC MODE.**	16 Go to FNP-1-ECP-3.1, SGTR WITH LOSS OF REACTOR COOLANT SUBCOOLED RECOVERY DESIRED.
___17	**Reduce RCS pressure to minimize break flow and refill pressurizer.** 17.1 IF normal pressurizer spray available, THEN open all available normal pressurizer spray valves. 1A(1B) LOOP SPRAY VLV [] PK 444C [] PK 444D	17.1 Proceed to Step 18. OBSERVE CAUTIONS AND NOTES PRIOR TO STEP 18.

Step 17 continued on next page.

Step	Action/Expected Response	Response NOT Obtained
17.2	Reduce RCS pressure with maximum available spray until ANY of the following conditions occur, then stop RCS pressure reduction. • RCS pressure less than ruptured SG(s) pressure AND pressurizer level greater than 13%{43%} OR • RCS pressure within 300 PSI of ruptured SG(s) pressure AND pressurizer level greater than 43%{50%} OR • Pressurizer level greater than 73%{66%} OR • SUBCOOLED MARGIN MONITOR indication less than 16°F{45°F} subcooled in CETC mode.	
17.2.1	Verify both normal pressurizer spray valves - CLOSED. 1A(1B) LOOP SPRAY VLV [] PK 444C [] PK 444D	17.2.1 Stop 1A AND 1B RCPs to stop spray flow. RCP [] 1A [] 1B
17.2.2	Verify auxiliary spray valve - CLOSED. RCS PRZR AUX SPRAY [] Q1E21HV8145	17.2.2 Isolate auxiliary spray line. CHG PMPS TO REGENERATIVE HX [] Q1E21MOV8107 closed [] Q1E21MOV8108 closed
17.2.3	Proceed to Step 20. OBSERVE CAUTION PRIOR TO STEP 20.	

Step	Action/Expected Response	Response NOT Obtained

****

CAUTION: The PRT may rupture causing abnormal containment conditions while using pressurizer PORVs.

****

****

CAUTION: To prevent pressurizer PORV failure, cycling of pressurizer PORVs should be minimized.

****

NOTE:
- Reactor vessel steam voiding may occur during pressure reduction while on natural circulation. This will cause a rapid rise in pressurizer level.
- Any pressurizer PORV previously isolated due to excessive seat leakage only, may be unisolated if needed to make an RCS pressure reduction. The leaking PORV must be re-isolated once the desired pressure is reached.

Step	Action/Expected Response	Response NOT Obtained
18	**Reduce RCS pressure using pressurizer PORV to minimize break flow and refill pressurizer.**	
18.1	Check pressurizer PORV - AT LEAST ONE AVAILABLE	18.1 IF no equipment available for RCS pressure reduction, THEN go to FNP-1-ECP-3.3, SGTR WITHOUT PRESSURIZER PRESSURE CONTROL.

Step 18 continued on next page.

Step	Action/Expected Response	Response NOT Obtained
18.2	Reduce RCS pressure by opening one pressurizer PORV until one of the following three conditions occurs, then stop RCS pressure reduction. • RCS pressure less than ruptured SG pressure AND pressurizer level greater than 13%{43%} OR • Pressurizer level greater than 73%{66%} OR • SUBCOOLED MARGIN MONITOR indication less than 16°F{45°F} subcooled in CETC mode.	
18.2.1	Verify both PRZR PORVs - CLOSED.	18.2.1 Close PRZR PORV ISO for any open PRZR PORV.
18.2.2	Verify both normal pressurizer spray valves - CLOSED. 1A(1B) LOOP SPRAY VLV [] PK 444C [] PK 444D	18.2.2 Stop 1A AND 1B RCPs to stop spray flow. RCP [] 1A [] 1B
___19	**Check RCS pressure - RISING.** 1C(1A) LOOP RCS WR PRESS [] PI 402A [] PI 403A	19 Perform the following. 19.1 Close PRZR PORV ISOs. 19.2 IF RCS pressure continues to fall, THEN go to FNP-1-ECP-3.1, SGTR WITH LOSS OF REACTOR COOLANT SUBCOOLED RECOVERY DESIRED.

14. 010K6.01 014

Unit 1 is operating at 100% power when the following occurs:

- PT-445, PRZR PRESS, fails HIGH.

Which one of the following describes the effect on the plant with no operator action?

A. • PCV-444B, PRZR PORV, opens.

• RCS pressure will lower causing a Reactor Trip and Safety Injection.

B. • PCV-445A, PRZR PORV, opens.

• RCS pressure will lower causing a Reactor Trip and Safety Injection.

C. •PCV-444B, PRZR PORV, opens.

• RCS pressure will cycle at approximately 2000 psig.

D. ✓ • PCV-445A, PRZR PORV, opens.

• RCS pressure will cycle at approximately 2000 psig.

See AOP-100 figure in references.

EEP-0.0 - Low pressure trip will occur at 1865 psig.

Distracter Analysis:

A. Incorrect	1. Incorrect. See D.1. Plausible if the applicant thought that PT-445 controlled PCV-444B which would make this correct. Since the failure of PT-444 failing high would cause PCV-444B to open, this makes PCV-444B plausible.
	2. Incorrect. See D.1. Plausible if the applicant thought that the failure of PT 445 affected P-11 and would not close the valve. P-11 receives an input from PT-455, 456 and 457 and it is a 2/3 AND box. not from PT445.
B. Incorrect	1. Correct. See D.1.
	2. Incorrect. See A.2.
C. Incorrect.	1. Incorrect. See A.1.
	2. Correct. See D.2.
D. Correct.	1. PT-445 opens PCV-445A
	2. RCS pressure lowers until P-11, which is actuated by PT-455,456 and 457, shuts the PORV at 2000 psig then the RCS pressure would rise until PCV-445A opened again.

QUESTIONS REPORT
for ILT 37 RO BANK VER 4

K/A: 010K6.01	Pressurizer Pressure Control System (PZR PCS) - Knowledge of the effect of a loss or malfunction of the following will have on the PZR PCS: Pressure detection systems
Importance Rating:	2.7 / 3.1
Technical Reference:	FNP-1-EEP-0.0, Reactor Trip or Safety Injection, v45 FSD-A181007, Rx Protection, v18 FNP-1-AOP-100, Instr Malfunction, v13
References provided:	None
Learning Objective:	SELECT AND ASSESS the instrument/equipment response expected when performing Pressurizer Pressure and Level Control System evolutions including the fail condition, alarms, and trip setpoints, to include those items in Table 1, Instrumentation and Control (OPS-52201H08)
Question History:	VOGTLE 09
K/A match:	Applicant is required to know the effect on the Pzr PCS of a malfunctioning PT-445.
SRO justification:	N/A

B. Symptoms

1. The following are symptoms that require a reactor trip, if one has not occurred:

Reactor Trip	Instrumentation (TSLB)	Setpoint	Coincidence
1. Source Range High Flux (If not blocked)	NI-31,32 (TSLB3 1-1,1-2)	10^5 cps	1/2
2. Intermediate Range High Flux (If not blocked)	NI-35,36 (TSLB3 2-1,2-2)	Reference Surveillance Test Data Book for current S.P.	1/2
3. Power Range High Flux, Low Setpoint (If not blocked)	NI-41,42,43,44 (TSLB3 6-1,6-2,6-3,6-4)	25% Rx Pwr	2/4
4. Power Range High Flux, High Setpoint	NI-41,42,43,44 (TSLB2 11-1,11-2,11-3, 11-4)	109% Rx Pwr	2/4
5. Power Range High Positive Flux Rate	NI Cabinets (TSLB2 12-1,12-2,12-3, 12-4)	+5%/2 sec.	2/4
6. OTΔT	TI-412C,422C,432C (TSLB2 7-1,7-2,7-3)	117% +credits -penalties	2/3
7. OPΔT	TI-412B,422B,432B (TSLB2 8-1,8-2,8-3)	110%-penalties	2/3
8. Pressurizer Low Pressure	PI-455,456,457 (TSLB2 19-1,19-2,19-3)	1865 psig (rate compensated)	2/3 (Rx Pwr > 10%)
9. Pressurizer High Pressure	PI-455,456,457 (TSLB2 20-1,20-2,20-3)	2385 psig	2/3

III. The following are symptoms that require safety injection, if one has not occurred:

SI Signal	Instrumentation (TSLB)	Setpoint	Coincidence
1. Pressurizer pressure low (If not blocked)	PI-455,456,457 (TSLB2 17-1,17-2,17-3)	1850 psig	2/3
2. Steam Line Differential pressure	PI-474,484,494, PI-475,485,495, PI-476,486,496 (TSLB4 10-2,10-3,10-4, 11-2,11-3,11-4, 12-2,12-3,12-4, 13-2,13-3,13-4, 14-2,14-3,14-4, 15-2,15-3,15-4)	100 psid	1 steam line 100 psig less than other two on 2/3 protection sets
3. Low Steam Line pressure (If not blocked)	PI-474,485,496 (TSLB4 19-2,19-3,19-4)	585 psig (rate compensated)	2/3
4. Containment pressure high	PI-951,952,953 (TSLB1 1-2,1-3,1-4)	4 psig	2/3
5. Manual	N/A	N/A	1/2

IV. The following are symptoms of a safety injection:

a. Any SI annunciator lit.

b. BYP & PERMISSIVE SAFETY INJECTION ACTUATED status light lit

c. MLB-1 1-1 or MLB-1 11-1 lit

d. HHSI flow greater than 0 gpm.

15. 012A2.03 015

Unit 1 is at 8% power with the following conditions:

- NI-42, POWER RANGE, has failed HIGH.
- AOP-100, Instrumentation Malfunction, is in progress.
- At the step to remove the control power fuses for NI-42, the UO inadvertently removes the control power fuses for NI-36, INTERMEDIATE RANGE.

Which one of the following describes the next action(s) required?

A. ✔ Enter EEP-0, Reactor Trip or Safety Injection.

B. Re-install the instrument power fuses in NI-36 and continue in AOP-100.

C. Perform the actions required by annunciator FB1, IR LOSS OF DET VOLTAGE, for NI-36.

D. Restore NI-36 to operation in accordance with SOP-39.0, Nuclear Instrumentation System.

EEP-0.0
Symptoms

Intermediate Range High Flux (If not blocked)	NI-35,36 (TSLB3 2-1,2-2)	Reference Surveillance Test Data Book or current S.P.	1/2

Distracter Analysis:

A. Correct. Removing the fuses for N-36 causes it to de-energize resulting in a Reactor trip due to being below P-7 (1 of 2 causes a trip)

B. Incorrect. See A. Plausible if the applicant fails to recognize that pulling the fuses for N36 will cause a trip. A Rx trip would not occur if this was done at >10% power. The SS has the authority to have the fuses re-inserted and continue with the procedure. Other corrective actions would occur afterwards if the SS chose to do this.

C. Incorrect. See A. Plausible since this alarm would come in. This would be a correct answer if power was above 10% and AOP-100 was not in progress.

D. Incorrect. See A. Plausible since this procedure is used to align the drawer for operation but it doesn't give guidance for reinstalling the fuses.

QUESTIONS REPORT
for ILT 37 RO BANK VER 4

K/A: 012A2.03	Reactor Protection System - Ability to (a) predict the impacts of the following malfunctions or operations on the RPS; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: Incorrect channel bypassing
Importance Rating:	3.4/3.7
Technical Reference:	FNP-1-EEP-0.0, Reactor Trip or Safety Injection, v45
References provided:	None
Learning Objective:	SELECT AND ASSESS the instrument/equipment response expected when performing Excore Nuclear Instrumentation System evolutions including the fail condition, alarms, trip setpoints for the following (OPS-52201D08): • Power Range Channels • Intermediate Range Channels
Question History:	NEW
K/A match:	This KA requires an error to be made in the stem to correctly assess the KA. The Stem requires the applicant to predict the impact of improperly taking actions to bypass NI-42 by picking the appropriate procedure for the impact that was predicted.
SRO justification:	N/A

B. Symptoms

1. The following are symptoms that require a reactor trip, if one has not occurred:

Reactor Trip	Instrumentation (TSLB)	Setpoint	Coincidence
1. Source Range High Flux (If not blocked)	NI-31,32 (TSLB3 1-1,1-2)	10^5 cps	1/2
2. Intermediate Range High Flux (If not blocked)	NI-35,36 (TSLB3 2-1,2-2)	Reference Surveillance Test Data Book for current S.P.	1/2
3. Power Range High Flux, Low Setpoint (If not blocked)	NI-41,42,43,44 (TSLB3 6-1,6-2,6-3,6-4)	25% Rx Pwr	2/4
4. Power Range High Flux, High Setpoint	NI-41,42,43,44 (TSLB2 11-1,11-2,11-3, 11-4)	109% Rx Pwr	2/4
5. Power Range High Positive Flux Rate	NI Cabinets (TSLB2 12-1,12-2,12-3, 12-4)	+5%/2 sec.	2/4
6. OTΔT	TI-412C,422C,432C (TSLB2 7-1,7-2,7-3)	117% +credits -penalties	2/3
7. OPΔT	TI-412B,422B,432B (TSLB2 8-1,8-2,8-3)	110%-penalties	2/3
8. Pressurizer Low Pressure	PI-455,456,457 (TSLB2 19-1,19-2,19-3)	1865 psig (rate compensated)	2/3 (Rx Pwr > 10%)
9. Pressurizer High Pressure	PI-455,456,457 (TSLB2 20-1,20-2,20-3)	2385 psig	2/3

16. 013K2.01 016

Unit 1 was at 100% power when the following occurred:

- The 1A Auxiliary Building DC Bus de-energizes.
- An dual Unit LOSP occurs.
- An SI occurs on Unit 1 concurrently with the LOSP.

Which one of the following completes the statements below?

The 1-2A DG __(1)__ start.

The B1F Sequencer __(2)__ automatically sequence loads on.

	(1)	(2)
A.	WILL	WILL
B. ✔	WILL	will NOT
C.	will NOT	WILL
D.	will NOT	will NOT

A. Incorrect

1. Correct. See B.1.

2. Incorrect. See B.2. Plausible if the applicant incorrectly assumed that the ATS for 1-2 A DG also powered the output breaker closure ckt and the B1F sequencer. This is a common misconception.

B. Correct.

1. Correct. The automatic transfer device ensures the DG can be supplied control power from either unit if a loss of DC occurs on either unit. This allows the DG to be started and the field flashed to provide proper output.

2. Correct. The output breaker closing and the sequencer operation is powered only by the associated Unit DC system. This prevents the output breaker from closing and the Sequencer will not run.

C. Incorrect.

1. Incorrect. See B.1. Plausible if the applicant fails to recognize the DG start comes from the U2 LOSP. If it were only U1 LOSP then the DG would not start. Also if this were the B Train DGs, this equipment does not have an Auto transfer switch and therefore would not start.

2. Incorrect. See A.2

D. Incorrect.

1. Incorrect. See C.1

2. Correct. See B.2.

QUESTIONS REPORT
for ILT 37 RO BANK VER 4

K/A: 013K2.01	Engineered Safety Features Actuation System (ESFAS) - Knowledge of bus power supplies to the following: ESFAS/safeguards equipment control.
Importance Rating:	3.6/3.8
Technical Reference:	FSD A181005, v45 FSD A181004, v50
References provided:	None
Learning Objective:	DEFINE AND EVALUATE the operational implications of normal / abnormal plant or equipment conditions associated with the safe operation of the Diesel Generator Sequencers System components and equipment, to include the following (OPS-40102D07): • Normal control methods • Abnormal and Emergency Control Methods [...]
Question History:	BANK - DG SEQ-40102D06 4
K/A match:	Requires the applicant to know the power supply to the BIF sequencer which starts the ESF loads.
SRO justification:	N/A

17. 015AK1.01 017

Unit 1 was at 100% power when the following occurred:

At 1000:
- A Loss of all Offsite Power occurs.

At 1020:
- The following conditions exist:
  - RCS pressure is 2235 psig and steady.
  - RCS Loop THOT in all 3 loops is 595°F and decreasing slowly.
  - RCS Loop TCOLD in all 3 loops is 551°F and steady.
  - Core exit TCs indicate approximately 600°F and decreasing slowly.
  - Steam Generator pressures are approximately 1038 psig and steady.

Which one of the following completes the statement below?

Natural Circulation _(1)_ exist.

Per ESP-0.1, Reactor Trip Response, the _(2)_ would be used to dump steam.

	(1)	(2)
A.	does NOT	Steam Dumps
B.	DOES	Steam Dumps
C.	does NOT	SG Atmospheric Relief Valves
D. ✔	DOES	SG Atmospheric Relief Valves

ESP-0.1
16.3 IF no RCP started,
THEN verify adequate natural
circulation.

16.3.1 Check SG pressure stable or
falling.

16.3.2 Check SUB COOLED MARGIN
MONITOR indication greater
than 16F{45F} subcooled
in CETC mode.

16.3.3 Check RCS hot leg
temperatures stable or
falling.
RCS HOT LEG TEMP
[] TR 413

16.3.4 Check core exit T/Cs stable or falling.

16.3.5 Check RCS cold leg temperatures at saturation temperature for SG pressure.

RCS COLD LEG TEMP
[] TR 410

16.3.6 IF natural circulation NOT adequate,
THEN dump steam at a faster rate.

16.3.7 Begin taking natural circulation logs.

Distractor Analysis:

A. Incorrect.

1. Incorrect. See D.1. Plausible since SG pressure and Tcold are stable. Examinee unfamiliar with natural circulation may think SG's being a saturated system are not cooling down and believe NC doesn't exist.

2. Incorrect. See D.2.Plausible since this is the preferred method of cooldown in all procedures, examinee must evaluate conditions and realize the condenser is not available due to the LOSP. The LOSP causes the Circ Water pumps to become de-energized thereby not meeting the C-9 interlock which prevents the Steam Dumps from working.

B. Incorrect.

1. Correct. See D.1.

2) Incorrect. See A.2.

C. Incorrect.

1. Incorrect. See A.1.

2. Correct,

D. Correct.

1) Correct. Requirements for NC are met.

2. Correct. Since condenser has no circ water available, steam dumps are unavailable and dumping steam to atmosphere is only remaining option

K/A: APE015AK1.01	Reactor Coolant Pump (RCP) Malfunctions - Knowledge of the operational implications of the following concepts as they apply to Reactor Coolant Pump Malfunctions (Loss of RC Flow): Natural circulation in a nuclear reactor power plant
Importance Rating:	4.4 / 4.6
Technical Reference:	ESP-0.1, Reactor Trip Response, v34.0
References provided:	None
Learning Objective:	EVALUATE plant conditions and DETERMINE if any system components need to be operated while performing ESP-0.1, Reactor Trip Response. (OPS-52531B06)
Question History:	BANK - ESP-0.1-52531B06 17
K/A match:	The Loss of Offsite power will cause a loss of all RCP flow. The operational implications of Reactor Coolant Pump Malfunctions (Loss of RC Flow) is to determine if natural circulation exists and what equipment is used in this situation to continue the NC flow of cause it to increase or decrease.
SRO justification:	N/A

Step	Action/Expected Response	Response NOT Obtained
16.3	Check at least one RCP - STARTED.	16.3 IF no RCP started, THEN verify adequate natural circulation. 16.3.1 Check SG pressure stable or falling. 16.3.2 Check SUB COOLED MARGIN MONITOR indication greater than 16°F{45°F} subcooled in CETC mode. 16.3.3 Check RCS hot leg temperatures stable or falling. RCS HOT LEG TEMP [] TR 413 16.3.4 Check core exit T/Cs stable or falling. 16.3.5 Check RCS cold leg temperatures at saturation temperature for SG pressure. RCS COLD LEG TEMP [] TR 410 16.3.6 IF natural circulation NOT adequate, THEN dump steam at a faster rate. 16.3.7 Begin taking natural circulation logs.

18. 015K2.01 018

A Unit 1 Reactor startup is in progress with the following conditions:

- 1B Inverter is aligned to the alternate source.
- NI-32, SOURCE RANGE, indicates 1000 cps.

At 1000:

- DF01, 1A S/U transformer to 1F 4160V bus, trips open.

Which one of the following completes the statement below?

At 1005, the Reactor Trip breakers will be _(1)_ and NI-32 will be _(2)_.

	(1)	(2)
A.	closed	de-energized
B.	closed	energized
C. ✔	open	energized
D.	open	de-energized

1B Alternate source loses power when the loss of the 'A' Train 1F 4160V bus occurs. This causes a 1 of 2 coincidence resulting in a Reactor trip.

When the1-2A DG ties back on, N32 will be restored.

The 1B inverter is normally powered from the 125 VDC bus A. The alternate power is from 208/120vAC regulated Dist panel G which is powered from 600VAC MCC 1A which receives power from the 600 VAC Load Center 1D which receives power from 4160 VAC bus 1F which is powered by either the A Train Emergency DGs or the Startup Xformers.

Distractor analysis:

A. Incorrect.

1. Incorrect. See C.1. Plausible if the applicant thinks that 2 of 2 SR is required to trip the RX.

2. Incorrect. See C.2. Plausible since it aligned to the alternate source and is now powered from the AC MCC directly. when the LOSP occurs, the inverter will be de-energized in the first part of this event until the DG ties back on to the emergency bus, then power will be restored to the NI.

B. Incorrect.

1. Incorrect. See A.1.

2. Correct. See C.2. Logical connection to first part if the applicant thought that the 1B inverter was B train and did not lose power at all.

C. Correct.

1. 1B Alternate source loses power when the loss of the 'A' Train 1F 4160V bus occurs. This causes a 1 of 2 coincidence resulting in a Reactor trip.

2. When the1-2A DG ties on, N32 will be restored.

D. Incorrect.

1. Correct. See C.1.

2. Incorrect. See A.2.

K/A:015K2.01	Nuclear Instrumentation System (NIS) - Knowledge of bus power supplies to the following: NIS channels, components, and interconnections
Importance Rating:	3.3/3.7
Technical Reference:	D177024 SH1, 120V AC Vital and Reg Train A, v35 FNP-1-EEP-0.0, Reactor Trip or Safety Injection, v45
References provided:	None
Learning Objective:	SELECT AND ASSESS the instrument/equipment response expected when performing Excore Nuclear Instrumentation System evolutions including the fail condition, alarms, trip setpoints for the following (OPS-52201D08): [...] • Source Range Channels
Question History:	BANK - EXCORE-52201D08 11
K/A match:	Requires the applicant to know that the alternate supply to 120V Vital B will deenergize on a loss of power and be powered back up by the DG => N32 will be restored but a trip will occur.
SRO justification:	N/A

B. Symptoms

1. The following are symptoms that require a reactor trip, if one has not occurred:

Reactor Trip	Instrumentation (TSLB)	Setpoint	Coincidence
1. Source Range High Flux (If not blocked)	NI-31,32 (TSLB3 1-1,1-2)	10^5 cps	1/2
2. Intermediate Range High Flux (If not blocked)	NI-35,36 (TSLB3 2-1,2-2)	Reference Surveillance Test Data Book for current S.P.	1/2
3. Power Range High Flux, Low Setpoint (If not blocked)	NI-41,42,43,44 (TSLB3 6-1,6-2,6-3,6-4)	25% Rx Pwr	2/4
4. Power Range High Flux, High Setpoint	NI-41,42,43,44 (TSLB2 11-1,11-2,11-3, 11-4)	109% Rx Pwr	2/4
5. Power Range High Positive Flux Rate	NI Cabinets (TSLB2 12-1,12-2,12-3, 12-4)	+5%/2 sec.	2/4
6. OTΔT	TI-412C,422C,432C (TSLB2 7-1,7-2,7-3)	+credits 117% -penalties	2/3
7. OPΔT	TI-412B,422B,432B (TSLB2 8-1,8-2,8-3)	110%-penalties	2/3
8. Pressurizer Low Pressure	PI-455,456,457 (TSLB2 19-1,19-2,19-3)	1865 psig (rate compensated)	2/3 (Rx Pwr > 10%)
9. Pressurizer High Pressure	PI-455,456,457 (TSLB2 20-1,20-2,20-3)	2385 psig	2/3

19. 017K6.01 019

Given the following plant conditions on Unit 2:

- The crew is performing ESP-0.1, Reactor Trip Response.
- Natural circulation verification is in progress.
- Two non-upperhead Core Exit Thermocouples have failed due to **open** circuits.

Which one of the following completes the statement below?

The failed Core Exit Thermocouples' output will be failed _(1)_ and the Subcooled Margin Monitor calculation _(2)_ be accurate.

	(1)	(2)
A.	high	will NOT
B.	high	WILL
C.	low	WILL
D. ✔	low	will NOT

OPS-31701G
The thermocouple operates on the principle that a voltage is developed when two dissimilar metals are joined and there is a temperature difference between the sensing junction and the reference junction. The voltage created causes current to flow. If an open develops, a path for current flow is no longer available, and therefore the output fails to a low temperature indication. A short circuit causes no voltage to be developed, and the thermocouple indicator fails low.

SOP-68
The normal display mode for the SMM is the “CETC” mode. This displays the margin to saturation (°F) using the highest core exit thermocouple (excluding upperhead) and the lowest pressure.

Distracter Analysis:

A. Incorrect.
1. Incorrect. Plausible because an RTD fails high.

2. Correct. See D.2. Logical connection to first part if the applicant thinks that upper-head CETC's are used to calculate Subcooling. Also, some systems use a median signal selector such as Pzr level uses Median Tavg input so the applicant could assume the high failed CETC was "selected out".

B. Incorrect.
1. Incorrect. See A.1.

2. Incorrect. Plausible since this would be the result if a failed high output.

C. Incorrect.
1. Correct. See D.1.

2. Incorrect. See D.2. Plausible if the system used a specific CETC then the failed low CETC would cause the SCMM to read higher. Also, the applicant could think that the CETCs are averaged which would make Subcooling read higher.

D. Correct.
1. Correct. CETCs fail low.

2. Correct. SCMM Uses HIGHEST temp so it would be unaffected.

QUESTIONS REPORT
for ILT 37 RO BANK VER 4

K/A: 017K6.01	In-Core Temperature Monitor System (ITM) - Knowledge of the effect of a loss or malfunction of the following ITM system components: Sensors and detectors
Importance Rating:	2.7/3.0
Technical Reference:	FNP-1-SOP-68, ICCMS, v8.1 OPS-31701G, Sensors and Detectors, v4
References provided:	None
	Learning Objective: DEFINE AND EVALUATE the operational implications of abnormal plant or equipment conditions associated with the operation of the Inadequate Core Cooling Monitor System components [...] (OPS-52202E09): [...]
Question History:	MOD BANK
K/A match:	Requires applicant to know the effect of an open CETC on the ITM system and how its output affects the SCMM.
SRO justification:	N/A

3.2 The normal display mode for the SMM is the "CETC" mode. This displays the margin to saturation (°F) using the highest core exit thermocouple (excluding upperhead) and the lowest pressure. The "RTD" mode displays the margin to saturation (°F) using the hottest reactor coolant system (RCS) RTD (T_h or T_c) and the lowest pressure. The pressure inputs are from PT-402 and 403 and from PT-455 for A-train and PT-457 for B-train. A subcooled margin to saturation is displayed as a positive number and superheat is displayed as a negative number.

3.3 IF any digital display or a REACTOR VESSEL LEVEL mimic LED starts flashing, THEN determine the cause of the alarm per section 4.3.

3.4 Ensure that the Inadequate Core Cooling Monitoring System cabinet cooling fans are operating when the system is in operation.

4.0 Instructions

4.1 System Startup

NOTE: Indicate completion of asterisked steps by initialing procedure sign-off list FNP-1-SOP-68.0A.

*4.1.1 Verify Maintenance has completed FNP-1-STP-300.0, INADEQUATE CORE COOLING MONITORING SYSTEM CALIBRATION (TRAIN A) and FNP-1-STP-301.0, INADEQUATE CORE COOLING MONITORING SYSTEM CALIBRATION (TRAIN B).

*4.1.2 Verify all circuit breakers in back of cabinet are ON and the system has been powered up for at least one hour.

*4.1.3 Verify that the Heated Junction Thermocouple power controllers are producing an output as indicated by the amber light of each controller ON.

*4.1.4 Verify the RUN light on the cabinet front panel is ON.

NOTE: In the following step, when the SYSTEM RESET push-button is depressed, the data link is disrupted.

*4.1.5 Depress the SYSTEM RESET push-button.

QUESTIONS REPORT

for Questions

1. Unit 1 has experienced a Reactor Trip and SI due to a LOCA and the following conditions exist:

   - The operators have transitioned to EEP-1.0, Loss of Reactor or Secondary Coolant.
   - The Core Exit Thermocouples (CETCs) are reading as follows:
     – TWO CETCs are indicating a SHORT circuit.
     – THREE CETCs are 1204°F and rising.
     – All other CETCs are reading between 950°F and 1150°F and rising.

   Which one of the following completes the statements below?

   The indication for the SHORT circuited CETCs fail __(1)__.

   The __(2)__ CETC is used to evaluate entry into FRP-C.2, Response To Degraded Core Cooling.

	(1)	(2)
A.	HIGH	hottest
B.	HIGH	5th hottest
C.	LOW	hottest
D. ✔	LOW	5th hottest

20. 022A2.01 020

Unit 1 was operating at 100% power with the following conditions:

- 1A is selected on the CTMT CLR FAN SEL SWITCH.
- All containment cooler fans are running in FAST speed.

Subsequently, a Large Break LOCA occurs with the following conditions:

- Containment pressure reached 33 psig.
- A Dual Unit LOSP.
- The 1B DG tripped when it auto started.
- BA1, 1A CTMT CLR FAN FAULT, is in alarm.
- The AMBER light above 1A CTMT CLR FAN SLOW SPEED handswitch is illuminated.

Which one of the following describes the expected Containment Cooler alignment

AND

the required action per EEP-0.0, Reactor Trip or Safety Injection?

A. • NO containment cooler fans will be running.
   • Start the 1A CTMT CLR FAN in fast speed.

B. ✔ • NO containment cooler fans will be running.
   • Start the 1B CTMT CLR FAN in slow speed.

C. • The 1B CTMT CLR FAN will be running in slow speed.
   • Start the 1A CTMT CLR FAN in fast speed.

D. • The 1B CTMT CLR FAN will be running in slow speed.
   • Shift the 1B CTMT CLR FAN to fast speed.

EEP-0
7. Verify containment fan cooler alignment.
7.1 Verify at least one containment fan cooler per train - STARTED IN SLOW SPEED.
A TRAIN 1A or 1B

A. Incorrect

1. Correct. See B.1.

2. Incorrect. See B.2 Plausible if the applicant reasons that the 1B fan is 'B' train powered so the only other choice is the 1A fan in fast.

B. Correct.

1. Correct. The standby fan does not start if the slow speed fan trips.

2. Correct. Per EEP-0.0, Att 2 step 7

C. Incorrect.

1. Incorrect. See B.1 Plausible because the 1B fan would start in fast if the 1A fan was running in fast. The applicant could think this is correct for slow speed also.

2. Incorrect See B.2. Plausible if the applicant reasoned that 2 fans had to be running to meet design criteria and 1A can only be run in fast (one train of cooling). 1A fan can be started in fast but by procedure and to prevent damage, the cooler fans are run in slow in a LOCA condition. One fan and one cooler can meet design criteria.

D. Incorrect.

1. Incorrect. See C.1

2. Incorrect. See B.2 Plausible if the applicant reasoned that the 1A fan is unavailable and to improve post LOCA conditions, the 1B fan should be shifted to fast since there is no 'B' train power.

K/A: 022A2.01	Containment Cooling System (CCS) - Ability to (a) predict the impacts of the following malfunctions or operations on the CCS; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: Fan motor over-current
Importance Rating:	2.5/2.7
Technical Reference:	FNP-1-EEP-0.0, Reactor Trip or Safety Injection, v45 A181013, Containment Ventilation, v14
References provided:	None
Learning Objective:	EVALUATE plant conditions and DETERMINE if any system components need to be operated while performing (1) EEP-0, Reactor Trip or Safety Injection [...](OPS-52530A06).
Question History:	FNP 08
K/A match:	Requires the applicant to predict the final cooler alignment after a motor over-current and use EEP-0 to start the correct fan in slow.
SRO justification:	N/A

Step	Action/Expected Response	Response NOT Obtained

ATTACHMENT 2

7 **Verify containment fan cooler alignment.**

7.1 Verify at least one containment fan cooler per train - STARTED IN SLOW SPEED.

CTMT CLR FAN SLOW SPEED
- A train

[] 1A
[] 1B

- B train

[] 1C
[] 1D

7.2 Verify associated emergency service water outlet valves - OPEN.

EMERG SW FROM 1A(1B,1C,1D) CTMT CLR
[] Q1P16MOV3024A
[] Q1P16MOV3024B
[] Q1P16MOV3024C
[] Q1P16MOV3024D

21. 025AK3.01 021

Unit 1 is in Mode 5 with the following conditions:

- 1A RHR pump is tagged out.
- All SG Wide Range levels are 84%.
- Pzr level is being maintained at 21% on LI-462, PRZR LVL.
- RCS temperature is 195°F.
- RCS pressure is 325 psig.
- All RCPs are secured.
- 1B RHR pump is running in the cooldown lineup.

Subsequently, PT-402, 1C LOOP RCS PRESS, fails HIGH.

Which one of the following completes the statements below?

RHR cooling _(1)_ been lost.

Per AOP-12.0, RHR Malfunction, a loss of RHR cooling would require _(2)_ to be established for core cooling.

	(1)	(2)
A.	HAS	feed and bleed
B.	HAS	secondary heat sink
C.	has NOT	feed and bleed
D✓	has NOT	secondary heat sink

Based on NRC Comment, changed second question statement to be predictive based on the assumption of a loss of RHR cooling and not a function of the first part. Changed PT failure to PT-402.

AOP-12:
Step 3 asks if SG are available. In this case they are. In step 9 and 10 the AOP checks if they are providing cooling. If yes, the procedure is exited. If not, the AOP will send the operator to Step 25 which again utilizes SG's.

Distracter Analysis:

A. Incorrect.
1. Incorrect. Plausible because this would be a correct answer if PT-403 failed high (1A Loop RCS Press).

2. Incorrect. See B.2. Plausible since this is a method of core cooling in AOP-12.

B. Incorrect.
1. Incorrect. See A.1.

2. Correct. See D.2.

C. Incorrect.
1. Correct. See D.1

2. Incorrect. See A.2.

D. Correct.
1. Correct. 1B RHR pump is running and PT-402 does not affect its suction valves.

2. Correct. The RCS is filled and the SG's are full. Secondary heat sink is available per AOP-12.

QUESTIONS REPORT
for ILT 37 RO BANK VER 4

K/A: 025AK3.01	Loss of Residual Heat Removal System (RHRS) - Knowledge of the reasons for the following responses as they apply to the Loss of Residual Heat Removal System: Shift to alternate flowpath
Importance Rating:	3.1/3.4
Technical Reference:	FNP-1-AOP-12.0, RHR System Malfunction, Ver 25 FSD-A181002, Residual Heat Removal, Ver 44
References provided:	None
Learning Objective:	LIST AND DESCRIBE the sequence of major actions associated with AOP-12.0, RHR System Malfunction and/or STP-18.4, Containment Closure. (OPS-52520L04)
Question History:	MOD BANK
K/A match:	Requires the applicant to know that the failed transmitter has NOT caused a loss of RHR. Stem conditions must be used by the candidate to determine the reason for selecting the cooling method that is available.
SRO justification:	N/A

UNIT 1

FARLEY NUCLEAR PLANT

ABNORMAL OPERATING PROCEDURE

FNP-1-AOP-12.0

RESIDUAL HEAT REMOVAL SYSTEM MALFUNCTION

PROCEDURE USAGE REQUIREMENTS per NMP-AP-003	SECTIONS
Continuous Use	ALL
Reference Use	
Information Use	

SAFETY RELATED

Approved:

David L Reed (for)

Operations Manager

Date Issued: 01/28/13

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A. Purpose

This procedure provides actions for response to a malfunction of the RHR system.

Actions in this procedure for restoring RHR PUMPs assume electrical power is available. During loss of electrical power conditions, FNP-1-AOP-5.0, LOSS OF A OR B TRAIN ELECTRICAL POWER, provides actions for restoration of electrical power which should be performed in addition to continuing with this procedure.

The first part of this procedure deals with the protection of any running RHR pump and isolation of any leakage. If a running train is maintained the procedure is exited. Credit may be taken for RCS Loops providing core cooling in place of a running train of RHR. The next portion deals with restoring a train of RHR while monitoring core temperatures. If a train cannot be restored actions are taken for protection of personnel, establishing containment closure, and provides alternate methods of decay heat removal while trying to restore a train of RHR. Alternate cooling methods include: establishing a secondary heat sink if steam generators are available; feed and bleed cooling and feed and spill cooling.

The intent of feed and bleed cooling is to regain pressurizer level and allow steaming through a bleed path to provide core cooling. This requires that the RCS be in a configuration that will allow a level in the pressurizer.

The intent of feed and spill cooling is to allow spillage from the RCS and locally throttle injection flow to provide core cooling. This method is used when the reactor vessel head is blocked or RCS loop openings exist.

This procedure is applicable in modes 4, 5 and 6.

Containment closure is required to be completed within 2 hours of the initiating event unless an operable RHR pump is placed in service cooling the RCS AND the RCS temperature is below 180°F.

B. Symptoms or Entry Conditions

1 This procedure is entered when a malfunction of the RHR system is indicated by any of the following:

1.1 Trip of any operating RHR pump

1.2 Excessive RHR system leakage

1.3 Evidence of running RHR pump cavitation

1.4 Closure of loop suction valve

1.5 High RCS or core exit T/C temperature

1.6 Procedure could be entered from various annunciator response procedures.

CF3 1A OR 1B RHR PUMP OVERLOAD TRIP

CF4 1A RHR HX OUTLET FLOW LO

CF5 1B RHR HX OUTLET FLOW LO

CG3 1A OR 1B RHR HX CCW DISCH FLOW HI

EA5 1A OR 1B RHR PUMP CAVITATION

EB5 MID-LOOP CORE EXIT TEMP HI

EC5 RCS LVL HI-LO

Step	Action/Expected Response	Response NOT Obtained

****

CAUTION: Containment closure is required to be completed within 2 hours of the initiating event unless an operable RHR pump is placed in service cooling the RCS AND the RCS temperature is below 180°F.

****

****

CAUTION: Filling the pressurizer to 100% will cause a loss of nozzle dams due to the head of water.

****

2nd FIB assumes RHR is lost and cannot be restored.

NOTE: RCS to RHR loop suction v ergized if RCS TAVG is less than 180°F.

___ 1 **Check RHR loop suction valves - OPEN.**

1 Stop any RHR PUMP with closed loop suction valve(s).

1.1 IF required, THEN adjust charging flow to maintain RCS level.

RHR PUMP	1A	1B
1C(1A) RCS LOOP TO 1A(1B) RHR PUMP Q1E11MOV	[] 8701A [] 8701B	[] 8702A [] 8702B
1C(1A) RCS LOOP TO 1A(1B) RHR PUMP LOOP SUCTION POWER SUPPLY BREAKERS CLOSED(IF REQUIRED)	[] FU-T5 [] FV-V2	[] FU-G2 [] FV-V3

___ 2 **IF the standby RHR train is NOT affected AND plant conditions permit operation, THEN place the standby RHR train in service per FNP-1-SOP-7.0, RESIDUAL HEAT REMOVAL SYSTEM.**

2 IF core cooling provided by the SGs, THEN proceed to step 8.

Step	Action/Expected Response	Response NOT Obtained

NOTE: Rapid flow adjustments may cause more severe pump cavitation.

___	**3**	**Check RHR PUMPs - NOT CAVITATING.** The following parameters should be stable and within normal ranges. [] RHR flow rate within the Acceptable Operating Region of FIGURE 1, RCS HOT LEG LEVEL vs RHR INTAKE FLOW To Minimize Vortexing. [] Discharge pressure [] Suction pressure [] RHR motor ammeter readings [] No unusual pump noise	3 Perform the following: 3.1 Slowly reduce RHR flow rate to eliminate cavitation. 3.2 IF cavitation CANNOT be eliminated, THEN stop the affected RHR pump(s).
___	**4**	**Check any RHR PUMP - RUNNING**	4 Proceed to step 13.
___	**5**	**Verify RHR flow > 3000 gpm.** 1A(1B) RHR HDR FLOW [] FI 605A [] FI 605B	5 Refer to Technical Specifications 3.9.4 and 3.9.5 for applicability.

Step	Action/Expected Response	Response NOT Obtained

****

CAUTION: Indicated RCS level will rise approximately 1 ft for every 0.5 psi rise in RCS pressure if the indication is not pressure compensated.

****

****

CAUTION: Only borated water should be added to the RCS to maintain adequate shutdown margin.

****

___ **6** **Check RCS level ADEQUATE**

6.1 Compare any available level indications.

[] LT 2965A&B/level hose
[] LI-2384 1B LOOP RCS NR LVL
[] LI-2385 1C LOOP RCS NR LVL
[] Temporary remote level indicator off of a RCS FT on A or C loop

6.2 Check RCS level within the Acceptable Operating Region of FIGURE 1, RCS HOT LEG LEVEL vs RHR INTAKE FLOW To Minimize Vortexing.

6.2 Raise RCS level.

6.2.1 Notify personnel in containment that RCS level will be raised.

6.2.2 Align Technical Requirements Manual boration flow path.

6.2.3 Raise RCS level to within the Acceptable Operating Region of FIGURE 1, RCS HOT LEG LEVEL vs RHR INTAKE FLOW To Minimize Vortexing for the existing RHR flow.

Step	Action/Expected Response	Response NOT Obtained
___ 7	**Maintain RCS level within the following limits:** [] Maintain RCS level to within the Acceptable Operating Region of FIGURE 1, RCS HOT LEG LEVEL vs RHR INTAKE FLOW To Minimize Vortexing for the existing RHR flow. [] Maintain RCS level less than 123 ft 4 in if personnel are in the channel heads without nozzle dams installed. [] Maintain RCS level less than 123 ft 9 in if primary manways are removed without nozzle dams installed. [] Maintain RCS level less than 123 ft 9 in if seal injection is not established and RCPs are not backseated. [] Maintain RCS level less than 124 ft if safety injection check valves are disassembled.	7 Verify RHR PUMP(s) stopped AND proceed to step 13.

Step	Action/Expected Response	Response NOT Obtained

****

CAUTION: IF the leaking RHR train can NOT be identified, THEN both trains should be assumed leaking.

****

___ 8 **Check RHR system - INTACT**

[] Stable RCS level.
[] No unexpected rise in containment sump level.
[] No RHR HX room sump level rising.
[] No RHR pump room sump level rising.
[] No waste gas processing room sump level rising
[] No rising area radiation monitor
[] No unexplained rise in PRT level or temperature.

8 Isolate RHR leakage.

8.1 Isolate affected RHR train(s) from RCS.

8.1.1 Stop affected RHR pump(s).

8.1.2 Verify closed affected RHR train valves.

Affected RHR Train	A	B
1C(1A) RCS LOOP TO 1A(1B) RHR PUMP Q1E11MOV	[] 8701A [] 8701B	[] 8702A [] 8702B
1C(1A) RCS LOOP TO 1A(1B) RHR PUMP LOOP SUCTION POWER SUPPLY BREAKERS CLOSED	[] FU-T5 [] FV-V2	[] FU-G2 [] FV-V3
1A(1B) RHR HX TO RCS COLD LEGS ISO Q1E11MOV	[] 8888A	[] 8888B
1A(1B) RHR TO RCS HOT LEGS XCON Q1E11MOV	[] 8887A	[] 8887B

8.2 Isolate source of any RHR/RCS leakage.

if temp were to keep rising

___ 9 **Check core cooling provided by RHR or SGs.**

9 Proceed to step 13.

___10 **Check RCS temperature stable or lowering.**

10 Proceed to step 13.

Step	Action/Expected Response	Response NOT Obtained
___11	**Verify low pressure letdown aligned to operating RHR train:** 11.1 Determine RHR train that low pressure letdown is aligned. 11.2 IF required, THEN align low pressure letdown to the operating RHR train using FNP-1-SOP-7.0, RESIDUAL HEAT REMOVAL SYSTEM	
___12	**Go to procedure and step in effect.**	

****

CAUTION: Containment closure is required to be completed within 2 hours of the initiating event unless an operable RHR pump is placed in service cooling the RCS and the RCS temperature is below 180 F.

****

___13	**Begin establishing containment closure using FNP-1-STP-18.4, CONTAINMENT MID-LOOP AND/OR REFUELING INTEGRITY VERIFICATION AND CONTAINMENT CLOSURE.**	13	IF in mode 6, THEN refer to Technical Specifications 3.9.4 and 3.9.5 for other containment isolation requirements.

Step	Action/Expected Response	Response NOT Obtained
___14	**Monitor time to core saturation.**	
	14.1 Check time to core saturation from the current Shutdown Safety Assessment.	14.1 Determine time to core saturation: • Use ATTACHMENT 3, Time to Core Saturation OR • Monitor any available core exit thermocouples for a heat up trend.
	14.2 Monitor RCS temperature trend during the performance of this procedure.	
	14.2.1 Check vacuum degas system NOT in service.	14.2.1 IF vacuum refill in progress maintaining a vacuum on the RCS, THEN break vacuum on the RCS using FNP-0-SOP-74.0, OPERATION OF THE RCVRS SKID. (155' CTMT)

NOTE: Step 14.2.2 is a continuing action step.

	14.2.2 IF RCS level decreases to less than 121 ft 11 in AND core exit T/Cs are greater than 200°F, THEN proceed to step 21.	
	14.3 IF applicable, THEN review the current shutdown safety assessment of FNP-0-UOP-4.0 for applicability of other outage Abnormal Operating Procedures.	
___15	**Begin venting any RHR trains which have experienced evidence of cavitation using ATTACHMENT 1, RHR PUMP VENTING.**	

Step	Action/Expected Response	Response NOT Obtained
___16	**Suspend any boron dilution in progress. (IN 91-54)**	
___17	**IF the charging system is still in service, THEN align the RWST to the running Charging pump.**	

Operable CHG PUMP RWST TO CHG PUMP Q1E21LCV	1A	1B(A TRN)	1B(B TRN)	1C
	[] 115B	[] 115B	[] 115D	[] 115D

****

CAUTION: The RCS tygon level hose and LT 2965A&B utilize the same level tap. These are not independent indications.

****

18 Check for two independent RCS level indications.

___ 18.1 Compare available level indications.

- [] LT 2965A&B/level hose
- [] LI-2384 1B LOOP RCS NR LVL
- [] LI-2385 1C LOOP RCS NR LVL
- [] Temporary remote level indicator off of a RCS FT on A or C loop

18.2 Check RCS level greater than 123 ft 3 in.

18.2 Raise RCS level.

18.2.1 Notify personnel in containment that RCS level will be raised.

18.2.2 Align Technical Requirements Manual boration flow path.

18.2.3 Raise RCS level to greater than 123 ft 3 in.

Step 18 continued on next page.

Step	Action/Expected Response	Response NOT Obtained

18.3 Maintain RCS level within the following limits:

- [] Maintain RCS level less than 123 ft 4 in if personnel are in the channel heads without nozzle dams installed.
- [] Maintain RCS level less than 123 ft 9 in if primary manways are removed without nozzle dams installed.
- [] Maintain RCS level less than 123 ft 9 in if seal injection is not established and RCPs are not backseated.
- [] Maintain RCS level less than 124 ft if safety injection check valves are disassembled.

****

CAUTION: The standby RHR train may be lost due to cavitation if it is placed in service without adequate RCS level.

Assumes RHR cooling is lost

****

****

CAUTION: Starting an RHR PUMP may cause RCS level to fall due to shrink or void collapse.

****

NOTE: The term "standby RHR train" refers to the train most readily available to restore RHR cooling.

19	**WHEN RCS level greater than 123 ft 3 in, THEN place standby RHR train in service.**	19 IF unable to establish at least one train of RHR, THEN proceed to step 21 while continuing efforts to restore at least one train of RHR.

19.1 Verify CCW PUMP in standby train - STARTED.

Step 19 continued on next page.

Step	Action/Expected Response	Response NOT Obtained

19.2 Verify CCW - ALIGNED TO STANDBY RHR HEAT EXCHANGER.

Standby RHR Train	A	B
CCW TO 1A(1B) RHR HX Q1P17MOV	[] 3185A	[] 3185B

19.3 Verify the following conditions satisfied.

19.3.1 RWST TO 1A(1B) RHR PUMP Q1E11MOV8809A and B closed.

19.3.2 1A(1B) RHR HX TO CHG PUMP SUCT Q1E11MOV8706A and B closed.

19.3.3 RCS pressure less than 402.5 psig.

19.3.4 PRZR vapor space temperature less than 475°F.

Step 19 continued on next page.

Step	Action/Expected Response	Response NOT Obtained

NOTE: RCS to RHR loop suction valves will be deenergized if RCS TAVG is less than 180°F.

19.4 Verify standby RHR train loop suction valves - OPEN.

Standby RHR Train	A	B
1C(1A) RCS LOOP to 1A(1B) RHR PUMP Q1E11MOV	[] 8701A [] 8701B	[] 8702A [] 8702B
1C(1A) RCS LOOP TO 1A(1B) RHR PUMP LOOP SUCTION POWER SUPPLY BREAKERS CLOSE(IF REQUIRED)	[] FU-T5 [] FV-V2	[] FU-G2 [] FV-V3

Step 19 continued on next page.

Step	Action/Expected Response	Response NOT Obtained

19.5 Check standby RHR train discharge flow path available.

19.5.1 Verify standby RHR train - ALIGNED TO RCS COLD LEGS.

RHR Train	A	B
RHR HX TO RCS COLD LEGS ISO Q1E11MOV—OPEN	[] 8888A	[] 8888B

NOTE: The RHR HX bypass valves will fail closed and the RHR HX discharge valves will fail open upon loss of air to the AUX BLDG.

19.5.2 Verify standby RHR train HX BYP FLOW - ADJUSTED TO 15% OPEN.

Standby RHR Train	A	B
1A(1B) RHR HX BYP FLOW FK	[] 605A	[] 605B

19.5.3 Verify standby RHR train HX discharge valve - ADJUSTED CLOSED.

Standby RHR Train	A	B
1A(1B) RHR HX TO RCS DISCH VLV HIK	[] 603A	[] 603B

19.5.3 Close standby RHR train - TO RCS COLD LEGS ISO valves. (121 ft, AUX BLDG piping penetration room)

RHR Train	A	B
RHR HX TO RCS COLD LEGS ISO Q1E11MOV	[] 8888A	[] 8888B

Step 19 continued on next page.

Step	Action/Expected Response	Response NOT Obtained

19.6 Verify standby RHR train pump miniflow valve - OPEN.

Standby RHR Train	A	B
1A(1B) RHR PUMP MINIFLOW Q1E11FCV	[] 602A	[] 602B

19.7 Start RHR PUMP in standby train.

19.8 Control standby RHR train RHR HX bypass valve to obtain desired flow.

Standby RHR Train	A	B
1A(1B) RHR HX BYP FLOW FK	[] 605A	[] 605B

19.8 IF unable to control standby RHR train flow with RHR HX bypass valve, THEN locally control RHR HX TO RCS COLD LEGS ISO valves. (121 ft, AUX BLDG piping penetration room)

RHR Train	A	B
RHR HX TO RCS COLD LEGS ISO Q1E11MOV	[] 8888A	[] 8888B

___**20** **IF RHR restored, THEN go to procedure and step in effect.**

20 Continue efforts to restore at least one RHR train while continuing with this procedure.

Step	Action/Expected Response	Response NOT Obtained
___21	**Initiate protective measures for personnel in containment.** 21.1 Evacuate all nonessential personnel from containment. 21.2 Ensure HP monitors essential personnel remaining in containment for the following: [] Changing containment conditions which could require evacuation of all personnel. [] Use of extra protective clothing if needed. [] Use of respirators if needed. 21.3 Monitor containment radiation monitors for changing conditions. [] R-2 CTMT 155 ft [] R-7 SEAL TABLE [] R-27A CTMT HIGH RANGE (BOP) [] R-27B CTMT HIGH RANGE (BOP)	

Step	Action/Expected Response	Response NOT Obtained
___22	**Start all available containment coolers**	
___	22.1 Determine which containment coolers have Service Water aligned. [] Q1E12H001A [] Q1E12H001B [] Q1E12H001C [] Q1E12H001D	
	22.2 Start Containment coolers with service water aligned and with power available in FAST speed. [] 1A CTMT CLR FAN FAST SPEED Q1E12H001A to START (BKR EA10) [] 1B CTMT CLR FAN FAST SPEED Q1E12H001B to START (BKR EB05) [] 1C CTMT CLR FAN FAST SPEED Q1E12H001C to START (BKR EB06) [] 1D CTMT CLR FAN FAST SPEED Q1E12H001C to START (BKR EC12)	22.2 Start Containment coolers with service water aligned and with power available in SLOW speed. [] 1A CTMT CLR FAN SLOW SPEED Q1E12H001A to START (BKR ED15) [] 1B CTMT CLR FAN SLOW SPEED Q1E12H001B to START (BKR ED16) [] 1C CTMT CLR FAN SLOW SPEED Q1E12H001C to START (BKR EE08) [] 1D CTMT CLR FAN SLOW SPEED Q1E12H001D to START (BKR EE16)
	22.3 Check discharge damper open on any started containment cooler. [] CTMT CLR 1A DISCH 3186A indicates OPEN. [] CTMT CLR 1B DISCH 3186B indicates OPEN. [] CTMT CLR 1C DISCH 3186C indicates OPEN. [] CTMT CLR 1D DISCH 3186d indicates OPEN.	22.3 STOP any containment cooler whose discharge damper fails to indicate OPEN.
___23	**IF not previously started, THEN begin venting any RHR train(s) which have experienced evidence of cavitation using ATTACHMENT 1, RHR PUMP VENTING.**	

Step	Action/Expected Response	Response NOT Obtained

NOTE: Steps 24 and 25 should be performed in conjunction with the remainder of this procedure.

___24 **Check SGs available.**

- Check SG primary nozzle dams - REMOVED.
- Check SG primary manways - INSTALLED.
- Check SG secondary handhole covers - INSTALLED.

24 Proceed to step 26.

NOTE: Establishing a secondary heat sink will reduce RCS heat up and pressurization rate to provide more time for recovery actions.

___25 **Verify secondary heat sink established.**

25.1 Maintain wide range level in all available SGs greater than 75% using FNP-1-SOP-22.0, AUXILIARY FEEDWATER SYSTEM.

25.2 IF SG steam space intact, THEN open atmospheric relief valves to prevent SG pressurization.

1A(1B,1C) MS ATMOS REL VLV
[] PC 3371A adjusted
[] PC 3371B adjusted
[] PC 3371C adjusted

25.3 IF SGBD system available, AND AFW system available, THEN establish blowdown from available SGs using FNP-1-SOP-16.3, STEAM GENERATOR FILLING AND DRAINING.

Step	Action/Expected Response	Response NOT Obtained
___26	**Evaluate event classification and notification requirements using NMP-EP-110, EMERGENCY CLASSIFICATION DETERMINATION AND INITIAL ACTION, NMP-EP-111, EMERGENCY NOTIFICATIONS, and FNP-0-EIP-8, NON-EMERGENCY NOTIFICATIONS.**	
___27	**Verify RCS isolated.** 27.1 Close RHR TO LTDN HX HIK 142. 27.2 Close LTDN LINE ISO Q1E21LCV459 and Q1E21LCV460. 27.3 Close EXC LTDN LINE ISO VLV Q1E21HV8153 and Q1E21HV8154. 27.4 Dispatch personnel to isolate all known RCS drain paths. 27.5 Dispatch personnel to isolate any RCS leakage.	
___28	**Dispatch personnel to close hot leg recirculation valve disconnects. (139 ft, AUX BLDG rad-side)** CHG PUMP TO RCS HOT LEGS Q1E21MOV8886(8884) [] Q1R18B029-A (Master Z key) [] Q1R18B033-B (Master Z key)	
___29	**Check core cooling.** 29.1 Check RCS level LESS than 121 ft 11 in AND core exit T/Cs GREATER than 200°F.	29.1 Return to step 1.0.

feed and bleed

QUESTIONS REPORT

for Questions

1. Unit 1 is in Mode 5 with the following conditions:

   - 1B RHR pump is tagged out.
   - All SG Wide Range levels are 84%.
   - Pzr level is being maintained at 21% on LI-462, PRZR LVL.
   - RCS temperature is 155°F.
   - RCS pressure is 325 psig.
   - All RCP's are secured.
   - 1A RHR pump is running in the cooldown lineup.

   Subsequently, the following occurs:

   - 1A RHR pump trips on overcurrent and cannot be restarted.
   - RCS temperature is 175°F and slowly rising.

   Which one of the following completes the statements below?

   Per AOP-12.0, Residual Heat Removal System Malfunction, the preferred method to re-establish core cooling is to establish _(1)_.

   Core cooling is monitored using _(2)_.

	(1)	(2)
A.	feed and bleed	RCS cold leg temperatures
B.	a secondary heat sink	RCS cold leg temperatures
C.	feed and bleed	CETCs
D. ✔	a secondary heat sink	CETCs

22. 026AA1.07 022

Unit 1 is at 100% power with the following conditions:

- AOP-9.0, Loss of Component Cooling Water, is in progress due to a CCW malfunction.
- The standby CCW pump has been started.
- HV-3045, CCW FROM RCP THRM BARR, went closed during the transient.
- Seal injection flow to each RCP is:
  - A RCP 6.3 gpm
  - B RCP 6.5 gpm
  - C RCP 7.1 gpm

Which one of the following completes the statements below?

HV-3045 will close when downstream flow reaches __(1)__ .

Per AOP-9.0 seal injection flow __(2)__ adequate to allow continued RCP operation.

	(1)	(2)
A.	160 gpm	is NOT
B.	75 gpm	is NOT
C. ✔	160 gpm	IS
D.	75 gpm	IS

HV-3045 closes to isolate flow from the thermal barrier when measure flow from the RCP thermal barriers is >160 gpm.

AOP 9.0 step 2 -Check cooling adequate for continued plant support.
•RCP seal injection to all RCPs greater than 6 gpm.

A. Incorrect.

1. Correct. See C.1

2. Incorrect. See C.1. Plausible since flow would cause DD1, seal inj flow low (6.7 gpm) to alarm and the applicant could reason this meant inadequate flow.

B. Incorrect.

1. Incorrect. Plausible since this valve is in series with HV-3045 and closes at 75 psig.

2. Incorrect. See A.2.

C. Correct.

1. Correct. HV-3045 closes to isolate flow from the thermal barrier when measure flow from the RCP thermal barriers is >160 gpm.

2. Correct. Per AOP-9 Step 2.

D. Incorrect.

1. Incorrect. See B.1.

2. Correct. See C.2.

K/A:APE026AA1.07	Loss of Component Cooling Water - Ability to operate and/or monitor the following as they apply to the Loss of Component Cooling Water: Flow rates to the components and systems that are serviced by the CCWS; interactions among the components
Importance Rating:	2.9/3.0
Technical Reference:	AOP-9.0, Loss of CCW, v25.0 OPS-52102G, CCW, v2 D175002, v28
References provided:	N/A
Learning Objective:	Other than Relief Valves, **LIST AND EXPLAIN** the features that prevent Overpressurization of the CCW system if a thermal barrier heat exchanger tube ruptures. (Including setpoints if applicable.) (OPS-52102G05).
Question History:	MOD BANK
K/A match:	This question evaluates candidate ability to monitor RCP seal package cooling (CCW and Seal Injection) and determine action required for loss of CCW actions for given Seal injection flowrates.
SRO justification:	N/A

RCP. The line to each RCP splits into two lines for the oil coolers and a separate line for the thermal barrier heat exchanger.

The oil coolers can maintain acceptable oil temperatures with a maximum CCW temperature of 105°F. Flow instruments FE-3048A, B, and C (located on the outlet of the oil cooler) annunciate on the MCB on low flow. After exiting the oil coolers, the flow then passes through two motor-operated isolation valves, one inside containment (MOV-3046) and one outside containment (MOV-3182). Both of these valves are operated from the MCB.

Loss of CCW flow to the RCP motor oil coolers will cause high bearing temperatures on any running RCP within approximately two minutes.

In order to prevent overpressurization of the CCW system if a thermal barrier heat exchanger ruptures, pressure and flow are sensed on the thermal barrier CCW discharge line. The pressure sensors (PI-3184A, B, and C) signal HV-3184 to shut when pressure reaches 75 psig. Flow element FE-3045 shuts HV-3045 if the flow reaches 160 gpm. A balance of plant (BOP) annunciator for each valve alarms when instrument air supply pressure to the valve decreases to 40 psig. The CCW piping on the inlet side is protected by a check valve that prevents RCS pressure from reaching the low pressure piping.

CCW piping in containment (CTMT) from the check valve in the supply line to each RCP thermal barrier heat exchanger to downstream of HV-3045 in the combined return line is designed to withstand 2500 psig. Therefore, closure of either HV-3184 or HV-3045 can contain any high pressure reactor coolant leaking to the component cooling water side of the thermal barrier heat exchanger.

SOP-23.0 “Component Cooling Water System” contains instructions for reopening HV-3045 when a high differential pressure is suspected of preventing reopening the valve after auto-closure (OR 2-99-603). When operating the valve locally, do not use any mechanical leverage on the valve handwheel because damage to the pin which connects the handwheel to the valve stem may result. (OR 2-98-320)

A "P"-signal (phase B containment isolation) will close the five CCW valves associated with the RCPs (MOV-3052, MOV-3046, MOV-3182, HV-3184, and HV-3045). Only one other valve closes on a "P"-signal. That valve is the instrument air to containment valve (HV-3611).

HV-3184 and HV-3045 are air operated valves. They fail closed on loss of air pressure. A solenoid valve, for each air operated valve, energizes to vent the air from the actuator which causes

Step	Action/Expected Response	Response Not Obtained

NOTE:
- If seal cooling is lost, it will be necessary to trip the RCP(s) within two minutes for a #1 seal leak rate of 5 gpm reducing to 42 seconds for a #1 seal leak rate of 7 gpm, to ensure that the RCP(s) stop rotating prior to actuation of the shutdown seal. (#1 seal leak rate is defined as #1 seal leakoff flow plus #2 seal leakoff flow).
- IF RCP motor bearing temperatures exceed 195°F, THEN the ON SERVICE train is affected.
- Adequate CCW flow means sufficient cooling is available to maintain acceptable temperatures. (i.e. charging pumps, RHR cooling, SFP cooling, RCP's etc.)
- Indications of pump cavitation are: Abnormal CCW flow oscillations or cavitation noise reported at the pump.
- When transitioning to FNP-1-EEP-0, REACTOR TRIP OR SAFETY INJECTION, AND at the Shift Supervisors direction, it is ACCEPTABLE for one team member to complete the Immediate Operator Actions of FNP-1-EEP-0, while the other team member verifies the reactor trip, THEN trips the RCPs before finishing the Immediate Operator Actions of FNP-1-EEP-0.

__	2	**[CA] Check cooling adequate for continued plant support.** • Check CCW flow adequate in affected train. • Check RCP motor bearing temperatures less than 195°F. • Check CCW pump not cavitating. Stop any cavitating CCW pump. • CCW Surge tank level being maintained at or above 13 inches. • RCP seal injection to all RCPs greater than 6 gpm.	2 Perform the following: 2.1 IF the ON SERVICE train is affected, THEN perform the following: 2.1.1 IF the reactor is critical, THEN trip the reactor and perform, FNP-1-EEP-0, REACTOR TRIP OR SAFETY INJECTION, while continuing with this procedure. 2.1.2 Verify all Reactor Coolant pumps stopped. 2.1.3 IF in Mode 3 or 4, THEN perform FNP-1-AOP-4.0, LOSS OF REACTOR COOLANT FLOW while continuing with procedure.

° Step 2 continued on next page

__Page Completed

QUESTIONS REPORT

for Questions

1. Which one of the following lists only signals/conditions that will isolate the component cooling water (CCW) return from the thermal barrier?

   A. • Phase A isolation
      • HI flow on CCW return at a setpoint of 160 gpm

   B. • Phase A isolation
      • HI flow on CCW return at a setpoint of 75 gpm

   C. ✓ • Phase B isolation
      • HI flow on CCW return at a setpoint of 160 gpm

   D. • Phase B isolation
      • HI flow on CCW return at a setpoint of 75 gpm

23. 026K1.01 023

Which one of the following completes the statements below?

A Train CS Pump, A Train HHSI Pump, and the A Train RHR Pump have _(1)_ suction header(s) penetrating the RWST.

The Containment Spray (CS) Pump Room Coolers are DIRECTLY started _(2)_.

A. (1) three separate

(2) by a CS actuation signal

B. (1) one common

(2) by a CS actuation signal

C. (1) three separate

(2) when the CS pump breaker closes

D. ✔ (1) one common

(2) when the CS pump breaker closes

175038 SH1
Show single penetration to the RWST.

Distracter Analysis:

A. Incorrect.	1. Incorrect. Plausible since the discharge piping is train related and separate. The applicant may reason that the most conservative alignment would be 3 headers with isolations to prevent a rupture in one from affecting the other two systems.
	2. Incorrect. Plausible because this signal starts the CS pumps. The applicant will see the pump and the room cooler start simultaneously in the simulator and may think that the CS signal started them both.
B. Incorrect.	1. Correct. See D.1.
	2. Incorrect. See A.2.
C. Incorrect.	1. Incorrect. See A.1.
	2. Correct. See D.2.
D. Correct.	1. Correct. Per D175038 SH1
	2. Correct. Per FSD A181008

QUESTIONS REPORT
for ILT 37 RO BANK VER 4

K/A:026K1.01	Containment Spray System - Knowledge of the physical connections and/or cause-effect relationships between the CSS and the following systems: ECCS
Importance Rating:	4.2 /4.2
Technical Reference:	FAD-A181008, Containment Spray, V24 D175038 SH1, SI, v42
References provided:	None
Learning Objective:	OPS-40302C05
Question History:	MOD BANK
K/A match:	Requires the applicant to have knowledge of the connection between the RWST and the CS pump as well as the cause and effect relationship between the CS pump and its room cooler.
SRO justification:	N/A

QUESTIONS REPORT

for Questions

1. A Unit 1 Safety Injection is in progress due to a Large Break LOCA.

   Which one of the following describes the connection(s) between the RWST, A Train CS and ECCS pumps suction, and the operation of MOV-8827A and MOV-8826A, CTMT SUMP TO 1A CS PUMP valves?

   A Train CS Pump, A Train HHSI Pump, and the A Train RHR Pump have __(1)__ suction header(s) penetrating the RWST,

   and

   the CS Sump suction valves __(2)__ automatically open on a LO-LO RWST condition.

	(1)	(2)
A.	separate	will **NOT**
B.	one common	will
C.	separate	will
D. ✔	one common	will **NOT**

24. 026K3.02 024

Unit 1 was operating at 100% power when a Large Break LOCA occurred:

- 1A Containment Spray (CS) pump experiences a shaft shear upon start.

Subsequently, the operating crew enters ECP-1.1, Loss of Emergency Cooling Recirculation, and the following conditions exist:

- ESP-1.3, Transfer to Cold Leg Recirculation, has not been performed.
- There are NO indications of sump blockage.
- Containment pressure is 15 psig.
- RWST level is 3.5 ft.

Which one of the following completes the statements below?

1B Containment Spray pump is discharging through __(1)__.

Per ECP-1.1, the operating crew is required to __(2)__.

	(1)	(2)
A. ✔	B Train Spray Rings ONLY	stop 1B CS pump
B.	BOTH A and B Train Spray Rings	stop 1B CS pump
C.	B Train Spray Rings ONLY	leave 1B CS pump running
D.	BOTH A and B Train Spray Rings	leave 1B CS pump running

ECP-1.1

9. [CA] Check RWST level - GREATER THAN 4.5 ft.	9 Proceed to Step 34.

34. Stop all safeguards pumps taking suction from the RWST.

Distracter Analysis:

A. Correct.	1. Correct. Spray discharge headers are not cross connected.
	2. Correct. With RWST <4.5 ft, he 1B Spray pump must be secured.
B. Incorrect.	1. Incorrect. See A.1. Plausible because the suction headers are cross connected during the injection phase and the applicant may think this is true for the discharge header.
	2. Correct. See A.2.
C. Incorrect.	1. Correct. See A.1.
	2. Incorrect. Plausible since under certain conditions in ECP-1.1, the CS pumps are left running (table of Step 10.2)
D. Incorrect.	1. Incorrect. See B.1.
	2. Incorrect. See C.2.

K/A: 026K3.02	Containment Spray System (CSS) - Knowledge of the effect that a loss or malfunction of the CSS will have on the following: Recirculation spray system
Importance Rating:	4.2/4.3
Technical Reference:	FSD A181008, v24
References provided:	None
Learning Objective:	EVALUATE plant conditions and DETERMINE if any system components need to be operated while performing (1) ECP-1.1, Loss of Emergency Coolant Recirculation; [...] (OPS-52532D06)
Question History:	VOGTLE 11
K/A match:	Requires the applicant to know that with a shaft shear (malfunction of the CSS) only one spray header is available and with a loss of recirc capability (malfunction of the CSS) and RWST level being <4.5 ft, the CS pump must be stopped (loss of recirculation spray).
SRO justification:	N/A

Step	Action/Expected Response	Response NOT Obtained
___ 6	**Verify containment spray signals - RESET.** CS RESET [] A TRN [] B TRN	
___ 7	**Reset containment sump to RHR valve switches.** CTMT SUMP TO RHR PUMP RESET [] A TRN [] B TRN	
___ 8	**Verify containment fan cooler alignment.** 8.1 Verify all available containment fan coolers - STARTED IN SLOW SPEED. CTMT CLR FAN SLOW SPEED [] 1A [] 1B [] 1C [] 1D 8.2 Verify associated emergency service water outlet valve - OPEN. EMERG SW FROM 1A(1B,1C,1D) CTMT CLR [] Q1P16MOV3024A [] Q1P16MOV3024B [] Q1P16MOV3024C [] Q1P16MOV3024D	

NOTE: The following step is a continuing action step during performance of steps 9 through 34.

___ 9	**[CA] Check RWST level - GREATER THAN 4.5 ft.**	9	Proceed to Step 34.

Step	Action/Expected Response	Response NOT Obtained

****

CAUTION: The remainder of this procedure should only be performed if RWST level is less than 4.5 ft and cold leg recirculation is not available.

****

___34 **Stop all safeguards pumps taking suction from the RWST.**

CHG PUMP
[] 1A
[] 1B
[] 1C

RHR PUMP
[] 1A
[] 1B

CS PUMP
[] 1A
[] 1B

___35 **[CA] Establish makeup to RCS from any available source.**

35.1 Consult TSC staff for alternate method of RCS makeup such as normal makeup.

OR

Step 35 continued on next page.

25. 027AK1.02 025

Unit 2 is at 100% power, and PT-444, PRZR PRESS, is stuck at **2230 psig**.

Which one of the following describes the effects on PK-444A, PRZR PRESS REFERENCE, and the pressurizer liquid density due to this malfunction?

PK-444A controller demand goes __(1)__,

and

the density of the Pressurizer liquid goes __(2)__.

	(1)	(2)
A.	down	up
B.	down	down
C.	up	up
D✓	up	down

Distracter Analysis:

A - Incorrect.

1. Incorrect. See D.1. Plausible, since if the PT had failed 6 psig higher (above 2235 psig), the proportional integral controller would integrate the error signal DOWN until the PORV 444B opened and the sprays opened. Also, the spray valve controllers are controlled by the “master” controller and when the pressure must be increased, the demand on the Spray Valves goes down. Confusion could exist as which controller function is being described.

2. Incorrect. See D.2. Plausible, since the spray valve controllers are controlled by the “master” controller and when their demand goes up pressure goes down and the liquid density goes up. Also, steam space density does go up in this condition, and the liquid specific volume goes up (and specific volume, not density, is the value given in the steam table for the property of the liquid).

B. Incorrect.

1. Incorrect. See A.1.

2. Correct. See D.2. If the applicant reasoned that less pressure = less dense.

C. Incorrect.

1. Correct. See D.1.

2. Incorrect. See D.2. The applicant could reason that more pressure = more dense.

D. Correct.

1. Correct. The Proportional/Integral PRZR PRESS controller senses a low pressure and the demand starts integrating higher and higher. This first causes the spray valves to close and the proportional heaters increase output. Then, the backup heaters energize.

2. Correct. The pressurizer liquid heats up and expands (density goes down) due to the increased heat input into the pressurizer liquid. The integral part of the controller continues to add to the error signal and PORV-445A opens due to actual pressure increasing to 2235 on PT 445. The pressure cycles around the setpoint of the PORV at 2235 psig with a higher pressurizer liquid temperature.

QUESTIONS REPORT
for ILT 37 RO BANK VER 4

K/A:APE027AK1.02	Pressurizer Pressure Control System Malfunction - Knowledge of the operational implications of the following concepts as they apply to Pressurizer Pressure Control Malfunctions: Expansion of liquids as temperature increases
Importance Rating:	2.8 / 3.1
Technical Reference:	FNP-2-AOP-100, Instrumentation Malfunction, v13
References provided:	None
Learning Objective:	DEFINE AND EVALUATE the operational implications of abnormal plant or equipment conditions associated with the operation of the Pressurizer Pressure and Level Control System components and equipment to include the following (OPS-52201H07): • Normal Control Methods • Abnormal and Emergency Control Methods
Question History:	FNP 10
K/A match:	To answer this question correctly, it must be recognized that for this particular malfunction of the PRZR Press control system, the pressurizer liquid heats up and expands due to pressurizer heaters energizing and sprays closing. The operational implications must also be understood in that this causes controller demand to go up (which would cause actual pressure go up until a PORV will lift: PORV-445A).
SRO justification:	N/A

concentration in the pressurizer at the same value as the reactor coolant system by causing a continuous recirculation through the pressurizer. Finally, the continuous flow keeps the entire pressurizer in thermal equilibrium, preventing stratified temperature layers from causing erratic pressure control.

The two air-operated PORVs (PCV-445A and PCV-444B) each have a relieving capacity of 210,000 lbm/hr at 2485 psig. These valves are set to open at 2335 psig. During power operation, they prevent excessive pressure increases in the reactor coolant system, while minimizing the actuation of the code safety valves.

Three self-actuated pressurizer code safety valves (8010A, B, and C), each with a capacity of 345,000 lbm/hr at 2485 psig, are also installed on the pressurizer. These valves are set to open at 2485 psig. They will prevent the reactor coolant system pressure from exceeding 110 percent of its design value (2735 psig) for the worst case accident of a turbine trip without a direct reactor trip at 100 percent power.

Master Pressure Controller (PRZR PRESS REFERENCE, PK-444A)

The master pressure controller (Figures 3 and 4) develops control signals for the following:

1. Variable (Proportional) heaters
2. Back-up heater control bistable
3. Spray valves (PCV-444C and PCV-444D)
4. One power-operated relief valve (PCV-444B)
5. Control pressure high annunciator

The pressure input to the master pressure controller channel is from pressurizer pressure detector PT-444. This pressure input is compared with an operator-selected pressure setpoint to give an error signal. The error signal produced is processed through a proportional-plus-integral (P+I) controller, where the error signal is conditioned to produce a compensated output.

The P portion of the P+I controller produces an output that is directly proportional to the input and is also multiplied by an amplification factor (gain). The I portion of the controller produces an output equivalent to the integral of the error signal (also known as the reset).

The longer an error exists, the larger the integral output becomes. This means that there may be an output from the integral section of the controller when there is no longer a pressure error.

PRESSURIZER PRESSURE AND LEVEL CONTROL

The conditioned ERROR signal is developed in the pressurizer pressure master controller located in the process racks. With the master controller in AUTOMATIC (as selected by manual/auto (M/A) station PK-444A on the MCB), the reference pressure may be varied by adjusting a potentiometer dial. The potentiometer is normally set so that in automatic, the pressurizer heaters, spray valves, and PORVs will control plant pressure at 2235 psig. Variation of the reference setpoint will result in automatic control of plant pressure at a value other than 2235 psig.

The I portion of the P+I controller may cause pressure to be controlled above or below the nominal 2235 psig setpoint following a transient. The off-nominal pressure is normal following a transient. The operator should not adjust the setpoint on the M/A station during these transients. Indication of control demand is shown by a meter on PK-444A. On this meter, indication going towards zero percent means the system is trying to lower pressure, and indication going towards 100% means the system is trying to raise pressure.

Selecting MANUAL on PK-444A allows the operator to directly control components such as pressurizer spray valves and pressurizer heaters. In MANUAL, the normal automatic controller output is interrupted, and the output depends on two manual push buttons on PK-444A. The INCREASE push button causes the controller to raise pressure, while the DECREASE push button causes the controller to lower pressure. This signal is neither rate nor integral compensated. As will be seen in the discussion of individual components, a control demand less than 50 percent in either AUTO or MANUAL is a demand to lower plant pressure. A control demand greater than 50 percent is a demand to raise plant pressure.

The variable heaters control reactor coolant system pressure during steady-state operation and are operated by a two-position ON/OFF switch located on the MCB. This switch is normally selected to the ON position, which closes the variable heater circuit breaker at the 600V LC M. A silicon-controlled rectifier (SCR) is between the variable heater circuit breaker and the heaters themselves. This solid-state device determines the voltage of the electrical power delivered to the variable heaters.

The SCR controller receives a control input from the master pressure controller channel. When the control input is high (the actual pressure is less than the setpoint), the heaters will receive the full voltage from the SCR controller. When the control input is low, the SCR controller does not allow current flow to the heaters. The control signal to the SCR operates in a band equivalent to a ± 15 psig error (2220 to 2250 psig if the AUTO set point is 2235 psig).

26. 027K1.01 026

Which one of the following completes the statement below?

To enhance the retention of Iodine in solution, the Containment Spray System sprays water from the _(1)_ at a pH of approximately _(2)_ .

	(1)	(2)
A.	Containment Sump	4.5
B.	RWST	4.5
C. ✓	Containment Sump	7.5
D.	RWST	7.5

Distracter Analysis:

A. Incorrect.
1. Correct. See C.1.
2. Incorrect. See C.2. Plausible since this is the pH for injection mode.

B. Incorrect.
1. Incorrect. See C.1. Plausible since this is a source of water for ECCS injection but not for iodine absorption.
2. Incorrect. See A.2.

C. Correct.
1. Correct. Containment sump water is used in iodine adsorption.
2. Correct, TSP baskets in containment adjust pH to 7.5

D. Incorrect.
1. Incorrect. See B.1.
2. Correct. See C.2.

QUESTIONS REPORT
for ILT 37 RO BANK VER 4

K/A: 027K1.01	Containment Iodine Removal System - Knowledge of the physical connections and/or cause effect relationships between the CIRS and the following systems: CSS
Importance Rating:	3.4/3.7
Technical Reference:	FSD - A181008, CS System, v24
References provided:	None
Learning Objective:	LABEL AND ILLUSTRATE the Containment Spray and Cooling System flow paths, to include the components found on Figure 2, Containment Cooling System, Figure 3, Containment Spray System and Figure 4, Service Water to Containment Coolers (OPS-40302D05). RELATE AND IDENTIFY the operational characteristics including design features, capacities and protective interlocks for the components associated with the Containment Spray and Cooling System to include the components found on Figure 2, Containment Cooling System, Figure 3, Containment Spray System and Figure 4, Service Water to Containment Coolers and the following (OPS-40302D02): [...] • Trisodium Phosphate Baskets
Question History:	FNP 10
K/A match:	Candidate is required to know that because CS is re-aligned to recirculation, it has the effect of removing iodine from the Containment atmosphere.
SRO justification:	N/A

27. 029A1.02 027

Unit 1 is in Mode 4 and and the following condition exists:

- Containment Mini-Purge is in service.
- R-24A and R-24B, CONTAINMENT PURGE, are rising but **NOT** at the alarm setpoint.
- The OATC manually actuates a Phase A Containment Isolation.

Which one of the following completes the statements below?

Radiation levels (1) stop rising in the Main Exhaust Plenum.

The Mini-Purge Supply and Exhaust fans (2) stop automatically.

	(1)	(2)
A.	WILL	WILL
B. ✔	WILL	will NOT
C.	will NOT	WILL
D.	will NOT	will NOT

Distracter Analysis:

A. Incorrect.

1. Correct. See B.1.

2. Incorrect. Plausible since the dampers shut it would be expected the fans stopped.

B. Correct.

1. Correct. Per the FSD the manual Phase A will shut the dampers.

2. Correct. The fans will NOT stop.

C. Incorrect.

1. Incorrect. See B.1. Plausible if the applicant reasons that an SI signal causes the isolation and not the phase A isolation signal. The reason the rad monitors are not in alarm is to make the will not stop rising plausible. There are two signals that isolate the Main exhaust plenum and one is Phase A isolation, the other is high rad levels.

2. Incorrect. Plausible if the applicant reasons that the SI closes the dampers or the rad monitors not being in alarm will not cause the dampers to go shut, however the Phase A stops the fan to protect the exhaust plenum from rupture.

D. Incorrect.

1. Incorrect. See C.1.

2. Correct. See B.1. Plausible if the applicant reasons that since the valves are not closed for this selection, then the fans would not stop either until the rad monitors come into alarm.

QUESTIONS REPORT
for ILT 37 RO BANK VER 4

K/A: 029A1.02	Containment Purge System - Ability to predict and/or monitor changes in parameters to prevent exceeding design limits) associated with operating the Containment Purge System controls including: Radiation levels
Importance Rating:	3.4/3.4
Technical Reference:	FSD-181013, Containment Ventilation, v14
References provided:	None
Learning Objective:	RELATE AND IDENTIFY the operational characteristics including design features, capacities and protective interlocks for the components associated with the Containment Ventilation and Purge System, to include those items in Table 6- Component Locations (OPS-40304A02)
Question History:	MOD BANK
K/A match:	Applicant is required to predict the impact on radiation levels if a manual phase A is initiated. By isolating Containment, the offsite radiations level will not exceed limits.
SRO justification:	N/A

QUESTIONS REPORT

for Questions

1. Given the following conditions on Unit 1:

   - The plant is in Mode 6 conducting refueling operations.
   - A refueling accident in containment has caused high radioactivity on local portable air samplers.
   - The radioactivity readings on the purge exhaust duct monitors have slightly increased, but NOT to the alarm setpoint.

   In anticipation of increasing radiation levels in containment, the SRO has directed a manual initiation of Phase A Containment Isolation. AOP-30.0, Refueling Accident, requires the operator to verify containment ventilation isolation.

   Which one of the following correctly lists the status of valve positions and fan status, if running prior to the event, when checked by the OATC?
   (Assume the system was lined up properly and running prior to the event)

   A. The minipurge supply and exhaust fans will stop. ALL minipurge supply and exhaust valves will be closed.

   B. The minipurge supply and exhaust fans will stop. Only the minipurge supply and exhaust valves inside containment will be closed.

   C. The containment purge supply and exhaust fans will shift to LOW Speed. Only the purge supply and exhaust valves outside containment will be closed.

   D. ✓ The containment purge supply and exhaust fans will remain running in HIGH speed. ALL purge supply and exhaust valves will be closed.

28. 035A4.06 028

Unit 1 was operating at 100% power when the following occurred:

- The 1B SG becomes faulted inside Containment.

Which one of the following describes the actions required by EEP-2.0, Faulted Steam Generator Isolation, to isolate the 1B SG?

The minimum action for Main Steam line isolation is to __(1)__ .

The actions for isolation of AFW flow to the 1B SG is to __(2)__ .

Valve nomenclature:
MOV-3764B & D, MDAFW TO 1B SG ISO
Q1N23V017B, TDAFWP TO 1B SG FCV INLET ISO
HV-3227B, MDAFWP TO 1B SG FLOW CONT
HV-3228B, TDAFWP TO 1B SG FLOW CONT

A. 1) close ONLY the MSIVs for the 1B steam line

2) close MOV-3764B & D on the BOP **and** locally close Q1N23V017B

B. 1) close ONLY the MSIVs for the 1B steam line

2) close HV-3227B and HV-3228B on the MCB **and** fail air locally

C✔ 1) close all MSIVs

2) close MOV-3764B & D on the BOP **and** locally close Q1N23V017B

D. 1) close all MSIVs

2) close HV-3227B and HV-3228B on the MCB **and** fail air locally

EEP-2

1 Verify all main steam isolation and bypass valves closed.

5. Isolate AFW flow to all faulted SG.

5.1 QIN233764B/D

5.3 Q1N23V017B

Distracter Analysis:

A. Incorrect.

1. Incorrect. See. C.1. Plausible since this would be correct if it were the action to isolate the SG during a tube rupture per EEP-3.0.

2. Correct. See C.2.

B. Incorrect.

1. Incorrect. See A.1.

2. Incorrect. Plausible because the potentiometers for these valves are taken to the closed position but air is not failed. Failing air would cause these valves to open. Failing air to the TDAFWP steam admission valves closes them and the applicant could reason the FCVs act the same way.

C. Correct.

1. Correct. Per Step 1 of EEP-2.

2. Correct. Per Step 5.1 and 5.3 of EEP-2.

D. Incorrect.

1. Correct. See C.1.

2. Incorrect. See B.2.

QUESTIONS REPORT
for ILT 37 RO BANK VER 4

K/A: 035A4.06	Steam Generator System - Ability to manually operate and/or monitor in the control room: S/G isolation on steam leak or tube rupture/leak.
Importance Rating:	4.5/4.6
Technical Reference:	FNP-1- EEP-2.0, Faulted Steam Generator Isolation, v15
References provided:	None
Learning Objective:	EVALUATE plant conditions and DETERMINE if any system components need to be operated while performing EEP-2, Faulted SG Isolation. (OPS-52530C06)
Question History:	NEW
K/A match:	Requires the applicant to know which valve must be used at the BOP (manually operated in the control room) to isolate AFW to the faulted SG. AFW is one of the isolations performed to isolate a faulted SG.
SRO justification:	N/A

Step | **Action/Expected Response** | **Response NOT Obtained**

****

CAUTION: A loss of secondary heat sink will result from failure to maintain at least one SG available for RCS cooldown.

****

****

CAUTION: An uncontrolled RCS cooldown may result from unisolating a faulted SG or secondary break. Any faulted SG or secondary break which has been isolated should remain isolated unless needed for RCS cooldown.

****

NOTE: If more than one SG appears faulted, the SG with the lowest pressure should be isolated first.

___ 1 **Verify all main steam isolation and bypass valves - CLOSED.**

1A(1B,1C) SG
MSIV - TRIP
[] Q1N11HV3369A
[] Q1N11HV3369B
[] Q1N11HV3369C
[] Q1N11HV3370A
[] Q1N11HV3370B
[] Q1N11HV3370C

1A(1B,1C) SG
MSIV - BYPASS
[] Q1N11HV3368A
[] Q1N11HV3368B
[] Q1N11HV3368C
[] Q1N11HV3976A
[] Q1N11HV3976B
[] Q1N11HV3976C

1 Place the associated test switch in the TEST position.

SG	1A	1B	1C
1A(1B,1C) SG MSIV - TEST Q1N11HV	[]3369A/ 70A	[]3369B/ 70B	[]3369C/ 70C

Step	Action/Expected Response	Response NOT Obtained

___ 5 **Isolate AFW flow to all faulted SGs.**

5.1 Close MDAFWP isolation valves to all faulted SGs. (BOP)

Faulted SG	1A	1B	1C
MDAFWP TO 1A(1B,1C) SG ISO Q1N23MOV	[]3764A []3764E	[]3764D []3764B	[]3764F []3764C

5.1 Close MDAFWP flow control valves to all faulted SGs.

MDAFWP FCV 3227
RESET
[] A TRN reset
[] B TRN reset

MDAFWP TO
1A/1B/1C SG
B TRN
[] FCV 3227 in MOD

Faulted SG	1A	1B	1C
MDAFWP TO 1A(1B,1C) SG Q1N23HV	[] 3227A in MOD	[] 3227B in MOD	[] 3227C in MOD
MDAFWP TO 1A(1B,1C) SG FLOW CONT HIC	[]3227AA adjusted	[]3227BA adjusted	[]3227CA adjusted

5.2 Close TDAFWP flow control valves to all faulted SGs.

TDAFWP FCV 3228
[] RESET reset

Faulted SG	1A	1B	1C
TDAFWP TO 1A(1B,1C) SG Q1N23HV	[] 3228A in MOD	[] 3228B in MOD	[] 3228C in MOD
TDAFWP TO 1A(1B,1C) SG FLOW CONT HIC	[]3228AA adjusted	[]3228BA adjusted	[]3228CA adjusted

Step 5 continued on next page.

Step	Action/Expected Response	Response NOT Obtained

5.3 Locally unlock and close flow control valve inlet isolation to all faulted SGs. (100 ft, AUX BLDG above AFW pump rooms)

Faulted SG	1A	1B	1C
Q1N23V	[] 017A	[] 017B	[] 017C
Key	Z-139	Z-170	Z-141

___ 6 **Monitor CST level.**

6.1 Check CST level greater than 5.3 ft.

CST LVL
[] LI 4132A
[] LI 4132B

6.1 Align AFW pumps suction to SW using FNP-1-SOP-22.0, AUXILIARY FEEDWATER SYSTEM.

6.2 Makeup to the CST from water treatment plant OR demin water system using FNP-1-SOP-5.0, DEMINERALIZED MAKEUP WATER SYSTEM, as necessary.

___ 7 **Check secondary radiation.**

7.1 Direct Counting Room to sample SGs hourly for radioactivity using FNP-0-CCP-31, LEAK RATE DETERMINATION.

7.2 Check SG radiation indication - NORMAL.

[] R-15 SJAE EXH
[] R-19 SGBD SAMPLE
[] R-23A SGBD HX OUTLET
[] R-23B SGBD TO DILUTION
[] R-15B TURB BLDG VNTL (BOP)
[] R-15C TURB BLDG VNTL (BOP)
[] R-60A MS ATMOS REL (BOP)
[] R-60B MS ATMOS REL (BOP)
[] R-60C MS ATMOS REL (BOP)
[] R-60D TDAFWP EXH (BOP)

7.2 Go to FNP-1-EEP-3, STEAM GENERATOR TUBE RUPTURE.

Step	Action/Expected Response	Response NOT Obtained

3.7 Verify at least one SG main steam isolation and bypass valve for ruptured SG(s) - CLOSED.

Ruptured SG	1A	1B	1C
1A(1B,1C) SG MSIV - TRIP Q1N11HV	[]3369A []3370A	[]3369B []3370B	[]3369C []3370C
1A(1B,1C)SG MSIV - BYPASS Q1N11HV	[]3368A []3976A	[]3368B []3976B	[]3368C []3976C

3.7 Perform the following.

3.7.1 Place associated test switch to TEST position.

Ruptured SG	1A	1B	1C
1A(1B,1C) SG MSIV - TEST Q1N11HV	[]3369A/ 70A	[]3369B/ 70B	[]3369C/ 70C

3.7.2 IF at least one main steam isolation and one bypass valve for ruptured SG closed,
THEN proceed to step 4
IF NOT go to FNP-1-ECP-3.1, SGTR WITH LOSS OF REACTOR COOLANT SUBCOOLED RECOVERY DESIRED.

****

CAUTION: [CA] To prevent excessive RCS cooldown, AFW flow to any ruptured SG that is also faulted, should remain isolated during subsequent recovery actions unless the SG is needed for RCS cooldown.

****

NOTE: [CA] Maintaining ruptured SG(s) narrow range level greater than 31%{48%} prevents SG depressurization during RCS cooldown.

___ **4 [CA] WHEN ruptured SG(s) narrow range level greater than 31%{48%}, THEN perform the following.**

Step 4 continued on next page.

29. 036AA2.02 029

Given the following conditions on Unit 1:

- Mode 6 with core off-load in progress.
- During a fuel assembly insertion into a spent fuel rack, the assembly suffers a torn grid strap.
- R-5, SFP ROOM, indication is slightly elevated.
- FH5, SFP AREA RE25 A OR B HI RAD, is in alarm.
- R-25A, SPENT FUEL BLDG EXH, is in HIGH alarm.

Which one of the following completes the statements below?

AOP-30, Refueling Accident, _(1)_ required to be entered.

'A' Train PRF _(2)_ automatically start.

	(1)	(2)
A. ✔	IS	WILL
B.	is NOT	WILL
C.	IS	will NOT
D.	is NOT	will NOT

AOP-30

B. Symptoms or Entry Conditions

1. This procedure is entered when a fuel handling accident causes damage to a fuel assembly in conjunction
with a high radiation indication on any of the following:

[ ] R-2 CTMT 155 ft
[ ] R-5 SFP ROOM
[ ] R-24A(B) CTMT PURGE
[ ] R-25A(B) SPENT FUEL BLDG EXH

ARP-FH5

AUTOMATIC ACTION for R-25A in alarm

NOTE: The unaffected train penetration room filtration system may also start, due to low DP in the spent fuel pool.

Trips the Fuel Handling Area Supply and Exhaust Fans, closes the Fuel Handling Area Supply and Exhaust Dampers AND **starts the Penetration Room 1A OR 1B Filtration Units.**

Distracter Analysis:

A. Correct.	1. Correct. Per the entry conditions of AOP-30.
	2. Correct. Per FH5 Automatic actions.
B. Incorrect.	1. Incorrect. Plausible since R-5 is not in alarm and the applicant may think this is required. Also the grid strap is torn but the applicant may think this does not constitute a damaged fuel assembly for the AOP entry conditions.
	2. Correct. See A.2.
C. Incorrect.	1. Correct. See A.1.
	2. Incorrect. Plausible if the applicant thinks that R-5 starts PRF.
D. Incorrect.	1. Incorrect. See B.1.
	2. Incorrect. See C.2.

QUESTIONS REPORT
for ILT 37 RO BANK VER 4

K/A: 036AA2.02	Fuel Handling Incidents - Ability to determine and interpret the following as they apply to the Fuel Handling Incidents: Occurrence of a fuel handling incident
Importance Rating:	3.4 / 4.1
Technical Reference:	FNP-1-AOP-30 Version 19
References provided:	None
Learning Objective:	EVALUATE plant conditions and DETERMINE if entry into AOP-30.0, Refueling Accident is required. (OPS-52521H02)
Question History:	NEW
K/A match:	KA is matched because question requires applicant to interpret conditions in the stem to determine if entry into refueling accident AOP is or is not required.
SRO justification:	N/A

A. Purpose

This procedure provides actions for response to fuel handling accident or a loss of refueling cavity water level.

This procedure is applicable at all times.

B. Symptoms or Entry Conditions

1. This procedure is entered when a fuel handling accident causes damage to a fuel assembly in conjunction with a high radiation indication on any of the following:

[ ] R-2 CTMT 155 ft
[ ] R-5 SFP ROOM
[ ] R-24A(B) CTMT PURGE
[ ] R-25A(B) SPENT FUEL BLDG EXH

2. This procedure is entered when a dry storage activity causes damage to a fuel assembly in conjunction with a high radiation indication on radiation monitor R-5(SFP ROOM).
3. This procedure is entered when rapidly falling refueling cavity level is observed.
4. This procedure may be entered at the discretion of the Shift Supervisor when any abnormal fuel handling incident occurs.

LOCATION FH5

SETPOINT: Variable, as per FNP-1-RCP-252

ORIGIN: Radiation Monitor Cabinet Channels R-25A or R-25B, Spent Fuel Pool Vent

H5
SFP AREA
RE25 A OR B
HI RAD

PROBABLE CAUSE

1. High Radiation Level in the discharged air from the Spent Fuel Pool Area Ventilation Fans.
2. The radiation monitors fail to a "High Radiation" condition on loss of instrument and/or control power that will result in actuation of associated automatic functions.

AUTOMATIC ACTION

NOTE: The unaffected train penetration room filtration system may also start, due to low ΔP in the spent fuel pool. ☐

Trips the Fuel Handling Area Supply and Exhaust Fans, closes the Fuel Handling Area Supply and Exhaust Dampers AND starts the Penetration Room 1A OR 1B Filtration Units.

OPERATOR ACTION

1. Determine which radiation monitor indicates high activity. ☐
2. IF the alarm is due to a spike as indicated by the drawer ALERT light illuminated, THEN check that the activity level has decreased below the alarm setpoint. ☐
   2.1 IF the activity level has decreased below the alarm setpoint, THEN reset the ALERT alarm on the RAD monitor drawer by depressing the FAIL/RESET pushbutton. ☐
3. IF R25A in HIGH alarm, THEN verify open SFP TO 1A PRF SUPPLY DMPR, Q1V48HV3538A. ☐
4. IF R25B in HIGH alarm, THEN verify open SFP TO 1B PRF SUPPLY DMPR, Q1V48HV3538B. ☐
5. Verify that the required automatic actions listed above have occurred. IF any automatic actions have not occurred, THEN go to FNP-1-SOP-58.0. (The section for Fuel Handling Area Heating and Ventilation Operation for guidance) ☐
6. Announce receipt of the alarm and the affected area on the public address system. ☐

30. 037AA2.07 030

Unit 1 is at 70% power with the following conditions:

- R-15A, SJAE EXH, is in alarm and the indication is stable.
- AOP-2.0, Steam Generator Tube Leakage, is in progress.

Which one of the following completes the statement below?

The SJAE Filtration system _(1)_ automatically align for operation.

Once SJAE Filtration is in service, the R-15A reading will _(2)_ .

	(1)	(2)
A.	WILL	lower
B.	WILL	remain the same
C.	will NOT	lower
D. ✔	will NOT	remain the same

SOP-28.5
The SJAE filtration system must be manually aligned.

D170064, v19
R-15A is upstream of the filter => will not decrease.

Distracter Analysis:

A. Incorrect.

1. Incorrect. See D.1. Plausible because many rad monitors have automatic actions that occur when they alarm. The realignment is basically a pushbutton but requires some manual valves per procedure. The applicant could recall the auto repositioning of valves but not what causes it.

2. Incorrect. See.D.2. Plausible because R-15B and 15C are downstream of the filter and their readings will LOWER.

B. Incorrect.

1. Incorrect. See A.1.

2. Correct. See D.2.

C. Incorrect.

1. Correct. See D.1.

2. Incorrect. See A.2.

D. Correct.

1. Correct. The SJAE filtration system must be manually aligned.

2. Correct. R-15A is upstream of the filter => will not remain the same.

QUESTIONS REPORT
for ILT 37 RO BANK VER 4

K/A: 037AA2.07	Steam Generator (S/G) Tube Leak - Ability to determine and interpret the following as they apply to the Steam Generator Tube Leak: Flowpath for dilution of ejector exhaust air
Importance Rating:	3.1/3.6
Technical Reference:	FNP-1-SOP-28.5, Condenser Air Removal, v34 D170064, v19
References provided:	None
Learning Objective:	DEFINE AND EVALUATE the operational implications of normal / abnormal plant or equipment conditions associated with the safe operation of the Miscellaneous Ventilation System components and equipment, to include the following (OPS-40103B07): • Normal control methods • Abnormal and Emergency Control Methods [...] •Actions needed to mitigate the consequence of the abnormality
Question History:	MOD BANK
K/A match:	Requires the applicant to determine the flow path for the SJAE Filtration system upon an R-15A alarm in that it must be manually aligned.
SRO justification:	N/A

4.3 STEAM JET AIR EJECTOR FILTRATION UNIT, N1U41C005-N Operation

NOTE

The "shutter" style damper located at the suction of the SJAE Filtration Unit fan (between the Filtration Unit and the fan, no TPNS), North end of Filtration unit, should always be in the OPEN position. No guidance exists to adjust this damper. ☐

4.3.1 To place SJAE FILTRATION UNIT in FILTER operation, **perform** the following:

4.3.1.1 At LCS SJAE FILTRATION, N1U41G529-N **place** local control handswitch for SJAE filtration unit valves in FILTER. ☐

4.3.1.2 **Verify** open SJAE FILTER SUCT DMPR, N1U41HV3677B. ☐

4.3.1.3 **Verify** closed SJAE FILTER BYP DMPR, N1U41HV3677A. ☐

4.3.1.4 **Close** SJAE FILTER BYP MAN ISO, N1U41V018. ☐

NOTE

The SJAE After Condenser drains to the Turbine Building Sump. IF the filtration unit is being placed in service due to a tube leak, THEN consideration should be given to re-aligning the SJAE After Condenser drains to the GSSC Drain Tank. ☐

4.3.1.5 IF the filtration unit is being **placed** in service due to a tube leak, THEN consider performing the following alignment:

4.3.1.5.1 IF 1A SJAE is in service, THEN **open** 1A SJAE AFTER COND DRN ISO, N1N51V645A. ☐

4.3.1.5.1.1 **Close** N1N51V594A, 1A SJAE AFTER COND DRN TO WASTE. ☐

4.3.1.5.2 IF 1B SJAE is in service, THEN **open** 1B SJAE AFTER COND DRN ISO, N1N51V645B. ☐

4.3.1.5.2.1 **Close** N1N51V594B, 1B SJAE AFTER COND DRN TO WASTE. ☐

4.3.1.6 When ready to restore SJAE After Condenser drain alignment to normal, **perform** the following:

4.3.1.6.1 **Verify** open N1N51V594A, 1A SJAE AFTER COND DRN TO WASTE. ☐

4.3.1.6.2 **Verify** closed 1A SJAE AFTER COND DRN ISO, N1N51V645A. ☐

4.3.1.6.3 **Verify** open N1N51V594B, 1B SJAE AFTER COND DRN TO WASTE. ☐

4.3.1.6.4 **Verify** closed 1B SJAE AFTER COND DRN ISO, N1N51V645B. ☐

QUESTIONS REPORT

for Questions

1. Unit 2 is at 30% power with the following conditions:

   - R-15A, SJAE EXH, radiation monitor is in alarm.
   - AOP-2.0, Steam Generator Tube Leakage, is in progress.
   - The leaking SG has NOT yet been identified.

   Which one of the following completes the statements below?

   R-15A indications (1) trend down when SJAE Filtration is placed on service.

   (2) will identify the leaking SG.

	(1)	(2)
A.	will NOT	R-60A (B,C) MS ATMOS REL
B. ✔	will NOT	R-70A (B, C), SG TUBE LEAK DET
C.	WILL	R-60A (B,C) MS ATMOS REL
D.	WILL	R-70A (B, C), SG TUBE LEAK DET

31. 038EG2.4.11 031

The following conditions exist on Unit 1:

- Operators are performing EEP-3.0, Steam Generator Tube Rupture.
- All RCPs have been secured.
- Operators have determined the required CETC temperature and started the RCS cooldown.

Subsequently, the following conditions exist:

- The required CETC temperature has **NOT** been reached.
- An Orange Path is indicated on the INTEGRITY CSF for the **ruptured** loop.

Per EEP-3.0, which one of the following describes the required actions?

A. Continue RCS cooldown and remain in EEP-3.0.

B. Reduce the cooldown rate and remain in EEP-3.0.

C. Stop RCS cooldown and enter FRP-P.1, Response to Imminent Pressurized Thermal Shock Conditions.

D. Stop RCS cooldown and enter FRP-P.2, Response to Anticipated Pressurized Thermal Shock Conditions.

EEP-3
Caution prior to step 6.4
CAUTION: With all RCPs secured RCS cooldown may cause a false FNP-1-CSF-0.4 Integrity Status Tree indication for the ruptured loop. Disregard ruptured loop cold leg temperature until completion of step 31.

A. Correct. Per the Caution of EEP-3.

B. Incorrect. See A. Plausible if the applicant improperly believes that reducing the cooldown rate will abate the overcooling condition.

C. Incorrect. See A. Plausible if the applicant does not recall the caution of EEP-3 which would make this the next logical choice.

D. Incorrect. See A. Plausible if the applicant does not recall the caution of EEP-3 (See C) and improperly recalls that an ORANGE path on Integrity is FRP-P.2.

QUESTIONS REPORT
for ILT 37 RO BANK VER 4

K/A: 038EG2.4.11	Steam Generator Tube Rupture - Knowledge of abnormal condition procedures.
Importance Rating:	4.0 / 4.2
Technical Reference:	FNP-1-EEP-3.0, Steam Generator Tube Rupture, v27
References provided:	None
Learning Objective:	EVALUATE plant conditions and DETERMINE if any system components need to be operated while performing EEP-3, Steam Generator Tube Rupture. (OPS-52530D06)
Question History:	FNP 06
K/A match:	Requires applicant to have knowledge of the EOP caution to ensure the RCS is cooled down during a STGR.
SRO justification:	N/A

Step	Action/Expected Response	Response NOT Obtained

****

CAUTION: With all RCPs secured RCS cooldown may cause a false FNP-1-CSF-0.4 Integrity Status Tree indication for the ruptured loop. Disregard ruptured loop cold leg temperature until completion of step 31.

****

NOTE:
- The steam dumps will be interlocked closed when RCS TAVG reaches P-12 (543°F). This interlock may be bypassed for A and E steam dumps with the STM DUMP INTERLOCK switches.
- Excessive opening of steam dumps can cause a high steam flow LO-LO TAVG main steam line isolation signal.

6.4 IF condenser available, THEN dump steam to condenser from intact SGs at maximum attainable rate.

BYP & PERMISSIVE COND AVAIL
[] C-9 light lit

STM DUMP
[] MODE SEL A-B TRN in STM PRESS

STM DUMP INTERLOCK
[] A TRN in ON
[] B TRN in ON

STM HDR PRESS
[] PK 464 adjusted

6.4 Dump steam to atmosphere.

6.4.1 Direct counting room to perform FNP-0-CCP-645, MAIN STEAM ABNORMAL ENVIRONMENTAL RELEASE.

6.4.2 Dump steam from intact SGs at maximum attainable rate.

1A(1B,1C) MS ATMOS REL VLV
[] PC 3371A adjusted
[] PC 3371B adjusted
[] PC 3371C adjusted

6.4.3 IF normal air NOT available, THEN dump steam using FNP-1-SOP-62.0, EMERGENCY AIR SYSTEM.

Step 6 continued on next page.

32. 039K4.02 032

Unit 1 was at 26% power and 230 MWe, and the following conditions occurred:

- The Reactor tripped.
- The "A" Reactor Trip Breaker failed to open.

Which one of the following completes the statements below?

The Steam Dumps are armed due to the (1).

RCS temperature will be controlled at (2).

	(1)	(2)
A.	P-4 signal	547°F
B.	P-4 signal	551°F
C.	Loss of Load signal	547°F
D.	Loss of Load signal	551°F

Since the 'A' Train Rx Trip Breaker did not open, the P-4 did not arm the Steam Dumps, the loss of load did due to the turbine trip,

'B' train P-4 enables the plant trip controller so the temperature will be maintained at Tavg no load.

A. Incorrect.

1. Incorrect. Plausible if the applicant thinks that the B train RTB arms the steam dumps.

2. Correct. See C.1.

B. Incorrect.

1. Incorrect. See A.1.

2. Incorrect. Plausible because this is where the Loss of Load controller would control due to the 4°F deadband.

C. Correct.

1. Correct. The loss of load controller C-7A, Loss of Load causes the ARMING of the steam dump (the loss of load was 20% instantaneously, and thus greater than the LOL arming setpoint of 15% with a 120 second time constant).

2. Correct. The B train P-4 shifts the controllers from the LOL to the Plant Trip controller which maintains a constant no load Tavg of 547°F.

D. Incorrect.

1. Correct. See C.1.

2. Incorrect. See B.2.

QUESTIONS REPORT
for ILT 37 RO BANK VER 4

K/A: 039K4.02	Main and Reheat Steam System - Knowledge of MRSS design feature(s) and/or interlock(s) which provide for the following: Utilization of T-ave. program control when steam dumping through atmospheric relief/dump valves, including T-ave. limits
Importance Rating:	3.1 / 3.2
Technical Reference:	FSD-A181007, Reactor Protection, v18 FNP-0-SOP-0.3, Operations Reference Information, v49.2
References provided:	None
Learning Objective:	DEFINE AND EVALUATE the operational implications of abnormal plant or equipment conditions associated with the operation of the Steam Dump System components and equipment to include the following (OPS-52201G07): • Normal Control Methods (Steam dump valves) [...] Protective isolations (Plant trip controller, Loss of load controller, C-7) [...]
Question History:	BANK - STM DUMP-52201G07 - 5
K/A match:	Requires the applicant to know which controller controls Tavg on a plant trip (Knowledge of MRSS design feature(s) and/or interlock(s) which provide for the following: Utilization of T-ave. program control) and the temperature the dumps will control at (Tavg limit).
SRO justification:	N/A

STEAM DUMPS

Operational Modes

T_{AVG}-Loss-of-Load Controllers

With the steam dump mode selector switch in T_{AVG}, either of two submodes--loss-of-load and plant trip --can control the steam dump system (Figure 7). The loss-of-load controller varies the valve positioning signal in direct proportion to the temperature deviation between T_{AVG} and T_{ref}. The T_{AVG} signal is from output of the median signal selector. In order to provide anticipatory response on T_{AVG} transients, a lead-lag circuit is used. This circuit accounts for delay times in RCS temperature detection and for loop transit times. In other words, if plant temperature is increasing, the lead-lag circuit knows that actual temperature is higher than it is sensing. The rod control system uses this same compensated T_{AVG} signal.

The steam dump system and the rod control system establish their own T_{ref} signals, using turbine load as sensed by first stage turbine impulse pressure transmitters PT-446 and/or PT-447. The reference temperature programs range from no-load temperature (547°F) to full-load temperature (573°F for unit 1 cycle 19). The rod control system positions the control rods in accordance with the deviation between the median T_{AVG} signal and T_{ref} as determined by PT-446 or PT-447. The steam dump system positions the steam dump valves according to the deviation between median T_{AVG} and T_{ref} as determined by PT-446 only. There is a 4°F dead band associated with steam dump system response in T_{AVG} mode to first give rod control an opportunity to return T_{AVG} to T_{ref}.

The steam dump PT-446 T_{ref} signal is not compensated in any manner. The T_{AVG} and T_{ref} signals are inputs to a comparator whose output is proportional to the deviation between T_{AVG} and T_{ref}. The deviation signal is converted to a valve positioning demand signal in the loss-of-load controller. The positioning signal is passed onto the I/P converters, provided train B of reactor protection has not sensed a Reactor Trip and provided the steam dump mode selector switch is selected to the T_{AVG} position. If the T_{AVG} input were to fail high to the comparator, the valve positioning demand signal would increase. If the T_{ref} signal failed high due to PT-446 failing high, the valve positioning demand signal would decrease. Conversely, if the T_{ref} signal failed low due to PT-446 failing low, the valve positioning demand signal would increase.

The characteristics of the loss-of-load controller are expressed in terms of percent steam flow versus the deviation between T_{AVG} and T_{ref} in degrees (refer to Figure 8). The loss-of-load controller is the steam dump system's main component that links the process instrumentation to the steam dump system. Because of this connecting link, the T_{AVG} loss-of-load submode functional requirements are accomplished through the loss-of-load controller. In particular, this

controller's temperature deviation control band ensures that a 50-percent load rejection does not cause a reactor trip associated with T_{AVG} or cause any steam generator code safety valve actuation.

To ensure that these functions are accomplished, a proper evaluation of the loss-of-load controller temperature deviation band is performed. This temperature deviation control band is evaluated as two separate parts. For the first part, a dead band ΔT is evaluated. This dead band ΔT is large enough that it allows some rod control system response. The dead band ΔT is also small enough that quick steam dump valve response limits the transient peak T_{AVG} value below any reactor trip values, and the steam dump system subsequently lowers the ΔT into the rod control system ΔT program band. Therefore, the loss-of-load controller dead band ΔT is adjusted to 4°F.

The second evaluated part of the loss-of-load controller temperature deviation control band is its proportional ΔT band. This proportional ΔT band actively modulates the steam dump valve banks from their fully closed to their fully open positions.

In actual application, the loss-of-load controller proportional ΔT band is 10.0°F The proportional band ΔT limits the transient peak T_{AVG} value after the selected dead band ΔT is exceeded. The dead band ΔT and the proportional band ΔT provide an overall 14°F loss-of-load controller temperature deviation band.

The loss-of-load controller output feeds four signal circuits. Each signal circuit is adjusted to respond to specific loss-of-load controller output signal values. Each signal circuit, in turn, feeds the I/P converters associated with one steam dump valve bank. Through these signal circuits, the load rejection controller linearly modulates the four steam dump valve banks in their proper sequence. The following table lists the resultant steam dump valve bank response as the loss-of-load controller ΔT changes.

BANK LOAD REJECTION ΔT RESPONSE

Bank	Fully Closed	Fully Open
1	4.0°F	6.5°F
2	6.5°F	9.0°F
3	9.0°F	11.5°F
4	11.5°F	14.0°F

T_{AVG}-Plant Trip Controller

When the steam dump mode selector switch is selected to the T_{AVG} position and train B of reactor protection has sensed a Reactor trip, the output of the plant trip (Figure 7) controller is automatically lined up to the I/P converters. Conversely, the output of the loss-of-load controller is automatically blocked. In this T_{AVG}-plant trip submode of operation, the positioning signal strength varies in direct proportion to a temperature deviation between the output of the Tavg median signal selector and $T_{no\text{-}load}$. The same compensated; median T_{AVG} signal used in the loss-of-load submode is also used here. The $T_{no\text{-}load}$ signal (547°F) is a fixed signal. T_{AVG} and $T_{no\text{-}load}$ are inputs to a comparator whose output is converted to a positioning demand signal in the turbine trip/plant trip controller. The characteristics of this controller are also expressed in percent steam flow versus the deviation degrees between T_{AVG} and $T_{no\text{-}load}$ (refer to Figure 9). Failure of a T_{AVG} channel high would not affect the steam dumps due to the median signal selector, which would auctioneer out the high signal.

The plant trip controller provides the same process instrumentation to steam dump system link as the loss-of-load controller. The plant trip controller accomplishes this link for the T_{AVG}-turbine trip submode. Because the rod control system reactivity control is not available, the plant trip controller ensures that following the reactor trip, the steam generator code safety valves do not actuate, and T_{AVG} will trend toward its no-load value.

The plant trip controller temperature deviation band evaluation is a simple process. Without the rod control system, no dead band ΔT is required. The proportional band is 28°F ΔT.

The plant trip controller output controls the steam dump valve signal circuits. Therefore, the plant trip controller output operates the steam dump valve banks according to the temperature changes listed in the following table.

BANK -PLANT TRIP ΔT RESPONSE

Bank	Fully Closed	Fully Open
1	0°F	7°F
2	7°F	14°F
3	14°F	21°F
4	21°F	28°F

33. 041K5.02 033

Unit 1 is cooling down with the following conditions:

- RCS Tcold is 480°F and stable.
- RCS pressure is 995 psig and stable.

The plan is to stabilize at this point for data collection. Steam dumps are in steam pressure mode and are ready to be placed in automatic to maintain the current RCS temperature.

Which one of the following completes the statement below?

PK-464, STM HEADER PRESS, SETPT will be set at __(1)__.

Reference Provided

A. ✔ 4.6

B. 4.75

C. 8.3

D. 8.4

Steam tables:
480F = 565.92 psia = 550.92 psig = 4.6

Distracter Analysis:

A. Correct. See Above.

B. Incorrect. See A. Plausible if 565 psia was used.

C. Incorrect. See A. Plausible if set using RCS pressure in PSIG.

d. Incorrect. See A. Plausible if set using RCS pressure in PSIA.

K/A: 041K5.02	Steam Dump System (SDS) and Turbine Bypass Control - Knowledge of the operational implications of the following concepts as the apply to the SDS: Use of steam tables for saturation temperature and pressure
Importance Rating:	2.5/2.8
Technical Reference:	Steam Tables. PK-464 M/A Station Curve 21, v2
References provided:	Steam Tables PK-464 M/A Station Curve 21, v2
Learning Objective:	DEFINE AND EVALUATE the operational implications of abnormal plant or equipment conditions associated with the operation of the Steam Dump System components and equipment to include the following (OPS-52201G07): • Normal Control Methods (Steam dump valves) [...]
Question History:	DIABLO CANYON 07
K/A match:	Requires the applicant to determine the proper setting for PK-464 to stabilize RCS temperature. The operational implication if the wrong setting is used would be missed data or a plant transient (inadvertent heatup)
SRO justification:	N/A

APPLICANT REFERENCE

PCB-1-VOLIII-CRV21

UNIT 1 VOLUME III CURVE 21
STEAM DUMP HEADER PRESSURE
(Steam Dumps: TY-A…H)
CONTROLLER: PK-464
REV. 2.0 March 6, 2003 JSJ
APPROVED:

ES MANAGER 5-12-03 DATE

PSIG	AUTO SETPOINT	PSIG	AUTO SETPOINT	PSIG	AUTO SETPOINT	PSIG	AUTO SETPOINT
0	0.0						
10	0.1	310	2.6	610	5.1	910	7.6
20	0.2	320	2.7	620	5.2	920	7.7
30	0.3	330	2.8	630	5.3	930	7.8
40	0.3	340	2.8	640	5.3	940	7.8
50	0.4	350	2.9	650	5.4	950	7.9
60	0.5	360	3.0	660	5.5	960	8.0
70	0.6	370	3.1	670	5.6	970	8.1
80	0.7	380	3.2	680	5.7	980	8.2
90	0.8	390	3.3	690	5.8	990	8.3
100	0.8	400	3.3	700	5.8	1000	8.3
110	0.9	410	3.4	710	5.9	1010	8.4
120	1.0	420	3.5	720	6.0	1020	8.5
130	1.1	430	3.6	730	6.1	1030	8.6
140	1.2	440	3.7	740	6.2	1040	8.7
150	1.3	450	3.8	750	6.3	1050	8.8
160	1.3	460	3.8	760	6.3	1060	8.8
170	1.4	470	3.9	770	6.4	1070	8.9
180	1.5	480	4.0	780	6.5	1080	9.0
190	1.6	490	4.1	790	6.6	1090	9.1
200	1.7	500	4.2	800	6.7	1100	9.2
210	1.8	510	4.3	810	6.8	1110	9.3
220	1.8	520	4.3	820	6.8	1120	9.3
230	1.9	530	4.4	830	6.9	1130	9.4
240	2.0	540	4.5	840	7.0	1140	9.5
250	2.1	550	4.6	850	7.1	1150	9.6
260	2.2	560	4.7	860	7.2	1160	9.7
270	2.3	570	4.8	870	7.3	1170	9.8
280	2.3	580	4.8	880	7.3	1180	9.8
290	2.4	590	4.9	890	7.4	1190	9.9
300	2.5	600	5.0	900	7.5	1200	10.0

DRAWINGS:

Elementary: U176066 (7378D82)
P & ID: D175033 sh. 1

Remarks: (1) The set point for PK-464 is 1005 psig when the Steam Dump Selector Switch is in the "TAVG" Position. Set M/A Station to 8.375V.
(2)PK-464 Controls only when the Steam Dump Selector is in the "STM PRESS" Position.

34. 045A2.12 034

Unit 1 was operating at 100% power when the following occurred:

- A Load Rejection resulted in the following conditions:
  - Reactor Power is 70%.
  - Turbine Power is 550 MWe.
  - FE1, CONT ROD BANK POSITION LO, is in alarm.
  - Tavg is 564°F and stable.
  - Tref is 561°F and stable.

Which one of the following completes the statements below?

The Control Rod Insertion Limit of the Core Operating Limits Report (COLR) __(1)__ been exceeded.

The next action that the operating crew is required to perform is __(2)__.

A. (1) HAS

(2) borate as necessary to withdraw rods

B. (1) HAS

(2) trip the Reactor and enter EEP-0.0, Reactor Trip or Safety Injection

C. (1) has NOT

(2) borate as necessary to withdraw rods

D. (1) has NOT

(2) raise turbine load to match Reactor power then ramp up to withdraw rods

AOP-17 rev 24

CAUTION: It is non-conservative to withdraw control rods in response to primary plant anomalies caused by unplanned secondary plant transients. Once turbine load has been stabilized and RCS TAVG has been restored to within 3F of T REF, positive reactivity can be added by withdrawing control rods a maximum of 3 steps per rod withdrawal.

FE1 - CONT ROD BANK POSITION LO

OPERATOR ACTION

[...]

5. Borate the Control Bank "OUT" as necessary using the Boron Addition Nomographs. {**CMT 0008900}**

Distracter analysis:

A. Incorrect.

1. Incorrect. See D.1. Plausible if the applicant doesn't recognize that FE1 in alarm indicates that the rods are 10 steps above FE2, CONT ROD BANK POSITION LO-LO therefore RIL is not exceeded.

2. Correct. See C.2. Plausible connection to first part since FE2 requires an Emergency Boration.

B. Incorrect.

1. Incorrect. See A.1.

2. Incorrect. See . Plausible if the applicant believes they are operating outside design basis and a trip is required. Also in AOP-17 at step 5 there is an RNO step to trip the reactor if certain criteria are not met. One such criteria is if FE2 was in alarm and the team is not confident that a parameter is being restored, then a reactor trip is required.

C. Correct.

1. Correct. FE1 is 10 steps above FE2. FE2 indicates that rod insertion limit has been exceeded.

2. Correct. Borate the Control Bank "OUT" as necessary using the Boron Addition Nomographs.

D. Incorrect.

1. Correct. See C.1

2. Incorrect. See C.2. Plausible since the applicant would not want to insert rods any more (AOP-17 directs rods inserted to match Tavg/Tref) so this would allow rods to be withdrawn. AOP-19 has a step (step 4 RNO) to restore RCS to programmed value by adjusting turbine load or boron concentration. Since this is a strategy being used in a different procedure for restoring RCS Tavg to programmed value it makes this distracter plausible.

QUESTIONS REPORT
for ILT 37 RO BANK VER 4

K/A: 045A2.12:	Main Turbine Generator (MT/G) System - Ability to (a) predict the impacts of the following malfunctions or operation on the MT/G system; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: Control rod insertion limits exceeded (stabilize secondary)
Importance Rating:	2.5/2.8
Technical Reference:	FNP-1-ARP-1.6, v72
References provided:	None
Learning Objective:	EVALUATE plant conditions and DETERMINE if any system components need to be operated while performing AOP-17, Rapid Load Reduction. (OPS-52520Z06).
Question History:	MOD BANK
K/A match:	Requires applicant to predict and understand that the rods are below the Lo Rod Insertion limit, but SDM limits have not been exceeded because the control rods are not below the Lo Lo Rod Insertion limit. Applicant must also perform the actions of the Annunciator Response Procedure for FE1 to borate the RCS to withdraw control rods.
SRO justification:	N/A

LOCATION FE1

SETPOINT: Variable; 10 Steps Greater than LO-LO Alarm Setpoint.
$Z_{LO} = Z_{LO-LO} + K_4$
Where K_4 = 10 Steps (6.25 inches)

ORIGIN: Rod Insertion Limit Computer

E1
CONT ROD BANK POSITION LO

PROBABLE CAUSE

NOTE:
- **Zinc Addition System injection will result in a continuous RCS dilution of as much as 1.7 gph, which may result in a reduction in shutdown margin if compensated for by inward rod motion instead of boration.** ☐
- **This annunciator has REFLASH capability.** ☐

Reactor Coolant System Boric Acid Concentration too low for Reactor Power Level due to:
A. Plant Transient
B. Xenon Transient
C. Dilution of RCS

AUTOMATIC ACTION

NONE

OPERATOR ACTION

1. Check indications and determine that actual control bank rod position is at low insertion limit. ☐
   - 1.1 Click on Rod Supervision button on Applications Menu. ☐
   - 1.2 Click on Rod Insertion Limits button. ☐
   - 1.3 Determine if low insertion limit exceeded. ☐
2. IF reactor coolant system dilution is in progress, THEN stop dilution. ☐
3. IF a plant transient is in progress, THEN place the turbine load on "HOLD". ☐
4. Refer to FNP-1-UOP-3.1, POWER OPERATIONS. ☐
5. Borate the Control Bank "OUT" as necessary using the Boron Addition Nomographs. {**CMT 0008900**} ☐
6. Refer to the Technical Specifications section on Reactivity Control. ☐

References: A-177100, Sh. 29l; U-2606l0; U266647 PLS Document; Technical Specifications DCP 93-1-8587; {**CMTs 0008554, 0008887**}

LOCATION FE2

SETPOINT: Variable with Reactor Power as measured by ΔT and TAVG.

ORIGIN: Rod Insertion Limit Computer

E2
CONT ROD BANK POSITION LO-LO

PROBABLE CAUSE

NOTE:
- **Zinc Addition System injection will result in a continuous RCS dilution of as much as 1.7 gph, which may result in a reduction in shutdown margin if compensated for by inward rod motion instead of boration.** ☐
- **This annunciator has REFLASH capability.** ☐

1. Reactor Coolant System Boric Acid Concentration too low to ensure Reactor Protection under Accident conditions due to;
   A. Plant Transient
   B. Xenon Transient
   C. Dilution of RCS

AUTOMATIC ACTION

NONE

OPERATOR ACTION

1. Check indications and determine that actual control bank rod position is at the low-low insertion limit. ☐
   1.1 Click on Rod Supervision button on Applications Menu. ☐
   1.2 Click on Rod Insertion Limits button. ☐
   1.3 Determine if low-low insertion limit exceeded. ☐
2. Emergency borate the reactor coolant system in accordance with FNP-1-AOP-27.0, EMERGENCY BORATION. **{CMTs 0008555, 0008900}** ☐
3. IF a plant transient is in progress, THEN place turbine load on "HOLD". ☐
4. Refer to FNP-1-UOP-3.1, POWER OPERATIONS. ☐
5. Refer to the Technical Specifications section on Reactivity Control. ☐

References: A-177100, Sh. 292; U-2606l0; U266647 PLS Document; Technical Specifications; DCP 93-1-8587; {**CMT 0008887**}

Step	Action/Expected Response	Response NOT Obtained

NOTE: TREF is NOT an accurate indication of the programmed TAVG value while operating on the steam dumps. TAVG program is approximately 547°F + 3°F for each 10% RTP.

___ 6 **Restore TAVG to programmed value.**

6.1 **Determine** an approximate TREF based on current reactor power level.

6.2 **Maintain** Delta I within limits specified in the COLR during restoration of TAVG.

- **Use** Table 1 for approximate boron concentration and rod position needed for the load reduction.

6.3 **Adjust** boron concentration and **using** inward rod motion to restore TAVG to within 3°F of TREF.

6.4 WHEN the plant is stable after the transient,
THEN **adjust** rod position and/or boron concentration to restore TAVG to programmed value.

- IF Delta I low,
  THEN borate RCS to allow control rods to be withdrawn.
- IF Delta I high,
  THEN dilute to support inward rod motion.

Step	Action/Expected Response	Response Not Obtained

NOTE:
- Misaligned rod guidance is only applicable in Mode 1 OR during a reactor startup.
- In general the rod group step counters and the DRPI rod position indications should agree within ± four steps.

__ **4 Check DRPI indicates that all rods are aligned with demanded group step position.**

4 Perform the following.

4.1 IF required, THEN restore RCS TAVG to programmed value.

- Adjust turbine load.

OR

- Adjust RCS boron concentration.

4.2 Consult Technical Specification 3.1.4 and 3.1.7.

4.3 Proceed to step 13

__ **5 Go to procedure and step in affect.**

__ **6 Notify the Shift Manager.**

__ **7 Perform FNP-1-STP-29.5, Shutdown Margin Calculation Modes 1 and 2, within 1 hour (TAVG > 547°F).**

NOTE: Technical Specification 3.2.4 limits QPTR ≤ 1.02. If QPTR is not within limit, THEN limit THERMAL POWER to ≥ 3% below RTP for each 1% of QPTR > 1.00 within 2 hours.

__ **8 Perform FNP-1-STP-7.0, QUADRANT POWER TILT RATIO CALCULATION.**

__ Page Completed

Step	Action/Expected Response	Response NOT Obtained
	4.3 **Check** pressurizer pressure maintained approximately equal to 2235 psig.	4.3 **Perform** the following. • **Start** additional pressurizer heaters to raise pressure. OR • **Initiate** pressurizer spray to lower pressure. [] PK 444C adjusted. [] PK 444D adjusted.
___ 5	**[CA] Check parameters within limits for continued at power operation.** • Pressurizer level greater than 15%. • Pressurizer pressure greater than 2100 psig. • SG narrow range levels 35-75% • TAVG 541°F-580°F. • Control rod bank position Lo-Lo Annunciator FE2 Clear. • Delta I within limits specified in the COLR.	5 IF the Team **is NOT** confident that a parameter is being restored, THEN **trip** the reactor and go to FNP-1-EEP-0, REACTOR TRIP OR SAFETY INJECTION.

35. 045 A2.12 001/NEW//HIGHER//2/2/RO/
A turbine runback has occurred on Unit 1.

Reactor power is 61% and stable.
Generator load is approximately 600 MWe and stable.
No operator actions have been taken.
The cause of the runback has been determined and the US directs the crew to restore affected systems to normal.

Which ONE of the following describes the method used to accomplish this?

A. Initiate RCS boration and manually withdraw control rods above the insertion limits.

B. Manually withdraw control rods to maintain Tavg on program. Place steam dumps in Steam Pressure mode and manually close.

C. Raise generator load to close steam dumps while borating the RCS to maintain Tavg on program.

D. Manually withdraw control rods to raise Tavg and reactor power. Ensure steam dumps close as Tavg is raised.

Ability to (a) predict the impacts of the following on the (SYSTEM) and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal operation: Control rod insertion limits exceeded (stabilize secondary).

Question Number: 60

Tier 2 Group 2

Importance Rating: RO 2.5

Technical Reference: 1-AR-A-H4
Proposed references to be provided to applicants during examination: None
Learning Objective:
Question Source: New
Question History:
Question Cognitive Level: Higher
10 CFR Part 55 Content: 41

Comments:

35. 051AK3.01 035

Unit 1 is operating at 40% power when the following occurs:

- Condenser pressure rapidly rises to 12 psia.

Which one of the following completes the statements below?

The Steam Dump (1) controller is enabled.

The Steam Dumps are (2) .

	(1)	(2)
A.	Plant Trip	CLOSED
B.	Plant Trip	OPEN
C.	Loss of Load	CLOSED
D.	Loss of Load	OPEN

Automatic Turbine trip occurs at 4.351 psia. At 40% power, a reactor trip occurs enabling the Plant Trip Controller.

8 inches of Hg vacuum is 10.8 psia.

See references Figure 2, Sheet 10 of FSD-A181007.

Distracter analysis

A. Correct. First part is correct. A turbine trip results which causes a reactor trip, thus enabling the plant trip controller.

Second part is correct. C-9 is NOT enabled at 12 psia therefore the steam dumps do not operate and are closed.

B. Incorrect. First part is correct (See A.1).

Second part is incorrect (See A.2) Plausible if the applicant cannot recall that the vacuum setpoint for the C-9 interlock is <10.8 psia and believes that adequate condenser vacuum exists for steam dump operation.

C. Incorrect. First part is incorrect (See A.1). Plausible if the applicant fails to recognize that the turbine trip causes a reactor trip at this power. If rx power were less than 35% then a rx trip would not occur and the turbine trip would cause the LOL controller to be the controlling controller.

Second part is correct (See A.2).

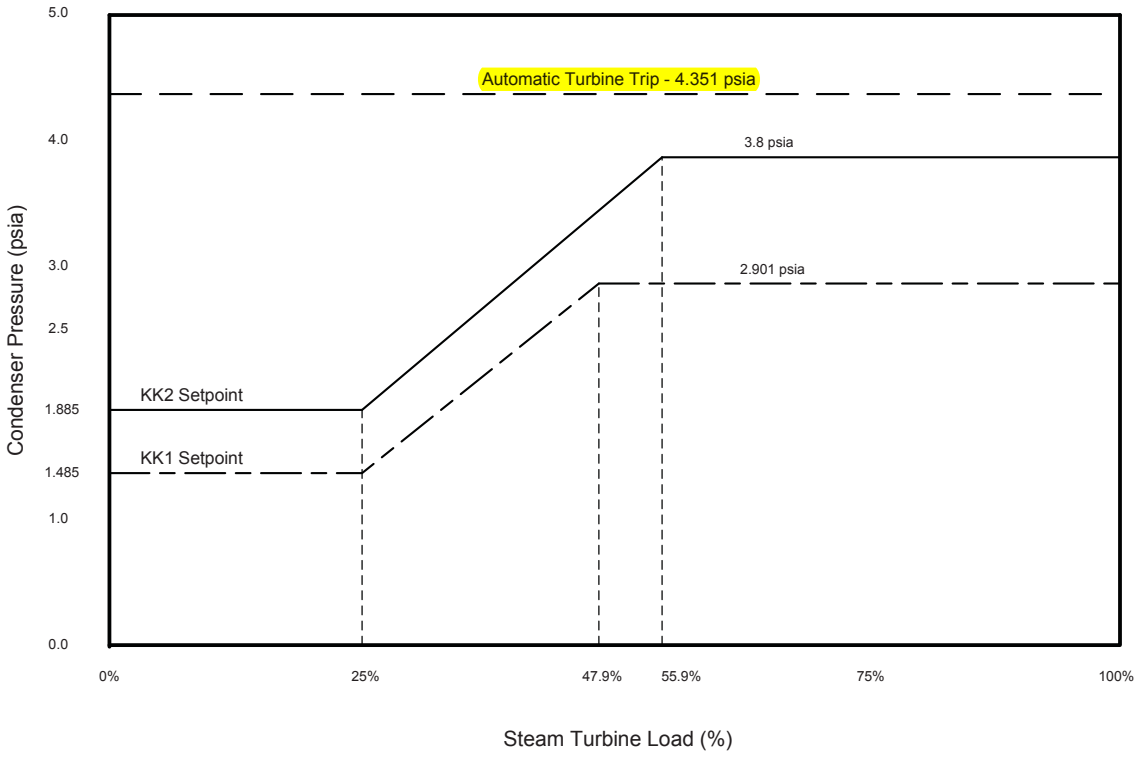
D. Incorrect. First part is incorrect (See C.1).

Second part is incorrect (See B.2)

QUESTIONS REPORT
for ILT 37 RO BANK VER 4

K/A: 051AK3.01	Loss of Condenser Vacuum - Knowledge of the reasons for the following responses as they apply to the Loss of Condenser Vacuum: Loss of steam dump capability upon loss of condenser vacuum
Importance Rating:	2.8*/3.1
Technical Reference:	FSD-A181007, Reactor Protection System, Ver 18
References provided:	None
Learning Objective:	RELATE AND IDENTIFY the operational characteristics including design features, capacities and protective interlocks for the following components associated with the Steam Dump System to include the components found on Figure 5, Steam-Dump Control (OPS-52201G02).
Question History:	FNP 13
K/A match:	Requires the applicant to know on a **loss of vacuum** which controller the steam dumps will operate on and **the reason** the steam dumps will not operate (loss of capability). On a loss of vacuum the reason is **because** the C-9 interlock (vacuum) is not met. This is not stated in the stem but is inherent to the question.
SRO justification:	N/A

LOCATION KK2



Steam Turbine Load	Setpoint	Steam Turbine Load	Setpoint	Steam Turbine Load	Setpoint
25%	1.885 PSIA	36%	2.564 PSIA	47%	3.244 PSIA
26%	1.946 PSIA	37%	2.626 PSIA	48%	3.305 PSIA
27%	2.008 PSIA	38%	2.688 PSIA	49%	3.367 PSIA
28%	2.070 PSIA	39%	2.749 PSIA	50%	3.429 PSIA
29%	2.132 PSIA	40%	2.811 PSIA	51%	3.491 PSIA
30%	2.193 PSIA	41%	2.873 PSIA	52%	3.552 PSIA
31%	2.255 PSIA	42%	2.935 PSIA	53%	3.614 PSIA
32%	2.317 PSIA	43%	2.996 PSIA	54%	3.675 PSIA
33%	2.379 PSIA	44%	3.058 PSIA	55%	3.737I PSIA
34%	2.440 PSIA	45%	3.120 PSIA	55.9%	3.8 PSIA
35%	2.502 PSIA	46%	3.182 PSIA		

References: A-177100, Sh. 491; D-172803; D-170812, Sh. 2; U-162213, Tab 5; Westinghouse Customer Advisory Letter 86-02; DCP P-95-1-8943; DCP 1090247701; Siemens letter dated 5/30/2012

36. 054AA2.03 036

Unit 2 is operating at 55% power when a transient in the Main Feedwater System results in the following:

- 2A SGFP high and low pressure stop valves indicate CLOSED.
- 2B SGFP is running at minimum speed.
- 2A SG level: 34% and lowering.
- 2B SG level: 27% and lowering.
- 2C SG level: 34% and lowering.

Which one of the following completes the statements below?

The MDAFW pumps __(1)__ received an auto start signal.

The TDAFW pump will auto start when __(2)__ .

	(1)	(2)
A.	HAVE	2B SGFP is TRIPPED
B.	have NOT	2A SG NR level reaches 28%
C.	have NOT	2B SGFP is TRIPPED
D. ✔	HAVE	2A SG NR level reaches 28%

SOP-22

3.19 MDAFW pumps will automatically start on any one of the following:

3.19.1 A steam generator Lo-Lo level of 28% (2/3 level instruments in 1/3 steam generators) and no LOSP.

3.19.2 Both main feed pumps tripped and no LOSP.

3.20 TDAFW pump will automatically start on any one of the following:

3.20.1 A steam generator Lo-Lo level of 28% (2/3 level instruments in 2/3 steam generators).

Distractor Analysis:

A. Incorrect.
1. Correct. See D.1.
2. Incorrect. See D.2. Plausible since this would generate an auto start for the MDAFW

B. Incorrect.
1. Incorrect. See D.1. Plausible since the TDAFW pump requires 2/3 SG NR level, 28%.
2. Correct. See D.2.

C. Incorrect.
1. Incorrect. See B.1.
2. Incorrect. See A.2.

D. Correct.
1. Correct. MDAFWP's require 1/3 SG NR levels below 28%,
2. Correct. TDAFWPs require 2/3 SGWL NR levels below 28%

QUESTIONS REPORT
for ILT 37 RO BANK VER 4

K/A: APE054AA2.03	Loss of Main Feedwater (MFW) - Ability to operate and / or monitor the following as they apply to the Loss of Main Feedwater (MFW): Conditions and reasons for AFW pump startup.
Importance Rating:	4.1/4.2
Technical Reference:	FNP-1-SOP-22.0, AFW, v70.1
References provided:	None
Learning Objective:	RELATE AND IDENTIFY the operational characteristics including design features, capacities and protective interlocks for the components associated with the AFW System to include the components found on Figure 2, Auxiliary Feedwater System, Figure 3, TDAFWP Steam Supply, and Figure 4, Air Supply to TDAFWP Steam Admission Valves (OPS-40201D02).
Question History:	NEW
K/A match:	Applicant is required to have the ability to monitor plant conditons and determine why (conditions and reason) the AFW pumps started.
SRO justification:	N/A

3.18 Excessive feeding of the Steam Generators with the comparatively cold CST water can cause Reactor power to increase due to the decrease in RCS cold leg temperature. (Ref. Vogtle power increase event of 08-04-97, NRC event #32721)

3.19 MDAFW pumps will automatically start on any one of the following:

3.19.1 A steam generator Lo-Lo level of 28% (2/3 level instruments in 1/3 steam generators) and no LOSP.

3.19.2 Both main feed pumps tripped and no LOSP.

3.19.3 An engineered safety feature (ESF) sequencer signal

3.19.4 An LOSP sequencer signal

3.19.5 AMSAC (2/3 steam generators < 10% level for 25 seconds; blocked when below C-20 for ≥ 260 sec)

3.20 TDAFW pump will automatically start on any one of the following:

3.20.1 A steam generator Lo-Lo level of 28% (2/3 level instruments in 2/3 steam generators).

3.20.2 Undervoltage signal of 64.4% on RCP buses (blackout) (1/2 UV relays on 2/3 buses)

3.20.3 AMSAC (2/3 steam generators < 10% level for 25 seconds; blocked when below C-20 for ≥ 260 sec)

3.21 TDAFW Steam supply valve operation on Unit 1 is as follows:

3.21.1 HV-3226, HV-3235A and HV-3235B open signals seal in as soon as they clear the closed limit switch. Therefore when securing the TDAFW pump on Unit 1, you must hold the handswitches to CLOSE until sufficient time has passed to allow valve closure.

3.22 Pipe internals can be potentially degraded. Proceed with caution. Do not subject vent/drain piping to any undue stress during removal of pipe cap/plug. (AI2009202698).

3.23 The TDAFW Pump Governor Panel switch MAN GOV ENABLE is normally maintained in the “OFF” position. The TDAFWP is **NOT** made inoperable regardless of switch position.

3.24 Guidance in this procedure has the potential to impact reactivity. Close coordination with the control room operators is required to ensure proper reactivity management per NMP-OS-001, REACTIVITY MANAGEMENT PROGRAM. (AI 2008203128)

37. 055EA2.01 037

A station blackout has occurred on Unit 1 and ECP-0.0, Loss of All AC Power, has been implemented.

Which one of the following completes the statements below?

HV-3611, INST AIR SUPPLY TO CTMT, __(1)__ CLOSE when Instrument Air pressure is lost.

The Pressurizer PORVs __(2)__ have an available backup means to be operated.

	(1)	(2)
A. ✔	WILL	DO
B.	WILL	do NOT
C.	will NOT	DO
D.	will NOT	do NOT

Per AOP- Table 1
HV-3611 fails closed.

PORVs have a backup supply of N2 to operate if air is lost (See SOP-62.1).

Distracter Analysis:

A. Correct.
1. Correct. HV-3611 fails closed.
2. Correct. The PORVs have a backup N2 supply.

B. Incorrect.
1. Correct. See A.1.
2. Incorrect. See A.2. Plausible if the applicant thinks the emergency air compressors are a source of air and are not available due to the loss of power.

C. Incorrect.
1. Incorrect. Plausible if the applicant thinks that this valve will remain open to allow the maximum amount of valve operation as the header depressurizes.
2. Correct. See A.2

D. Incorrect.
1. Incorrect. See C.1.
2. Incorrect. See B.2.

QUESTIONS REPORT
for ILT 37 RO BANK VER 4

K/A:EPE055EA2.01	Loss of Offsite and Onsite Power (Station Blackout) - Ability to determine or interpret the following as they apply to a Station Blackout: Existing valve positioning on a loss of instrument air system
Importance Rating:	3.4 / 3.7
Technical Reference:	FNP-1-SOP-17.0, Main and Reheat Steam, v 64 OPS-52104A, Main and Reheat Steam , v2 FNP-1-SOP-62.1, Backup Air Or Nitrogen Supply To The Pressurizer Power Operated Relief Valves, v23
References provided:	None
Learning Objective:	DEFINE AND EVALUATE the operational implications of normal / abnormal plant or equipment conditions associated with the safe operation of the Compressed Air System components and equipment, to include the following (OPS-40204D07): • Normal control methods • Abnormal and Emergency Control Methods [...]
Question History:	NEW
K/A match:	Requires the applicant to know the fail position of HV-3611 and if the Pzr PORVs can be operated upon a loss of instrument air during a loss of all AC event.
SRO justification:	N/A

TABLE 1

COMPONENT NUMBER	NAME	MANUAL OPERATOR	FAILED POSITON	OPERATOR DRAWING
Q1P17HV3443 (1-CCW-HV-3443)	CCW FROM EXC LTDN/RCDT HX'S	YES	CLOSED	
Q1P17RCV3028 (1-CCW-RCV-3028)	CCW SURGE TANK AIR VENT	YES		U-176886
Q1P17TCV3083 (1-CCW-TCV-3083)	LTDN HX CCW TEMP CONTROLLER	YES	OPEN	U-176888
N1P17V177 (1-CVC-FCV-307)	CCW FROM EVAP COND	NO	OPEN	
N1P17V178 (1-CCW-FCV-329)	CCW FROM EVAP COND	NO	OPEN	
N1P18HV2935A (1-BA-HV-2935A)	BREATHING AIR SUP CYLINDER ISO		OPEN	
N1P18HV2935B (1-BA-HV-2935B)	BREATHING AIR HEADER AUTO ISO		CLOSED	
N1P18HV2935C (1-BA-HV-2935C)	BREATHING AIR HEADER AUTO ISO		CLOSED	
N1P18V901	SERVICE AIR HDR AUTO ISO	YES	CLOSED	
Q1P19HV2228 (1-IA-HV-2228)	PORV BACKUP AIR SUPPLY	NO	CLOSED	
Q1P19HV3611 (1-IA-HV-3611)	INST AIR SUPPLY TO CTMT	YES	CLOSED	U-258028
N1P19V077 (1-IA-HV-3825)	INST AIR TO PENE RM AUTO ISO	YES	CLOSED	U-162164
N1P19V080 (1-IA-HV-3885)	INST AIR TO PENE RM AUTO ISO	YES	CLOSED	U-162164
N1P19V902	INST AIR DRYER AUTO BYPASS	YES	OPEN	
N1P19V903	ESSENTIAL IA HDR AUTO ISO	YES	OPEN	
N1P19V904	NON-ESS IA HDR AUTO ISO	YES	CLOSED	
N1P20LCV3434 (1-AS-LCV-3434)	AS CONDENSATE TANK LCV	YES		

1.0 PURPOSE

This procedure provides the Initial Conditions, Precautions and Limitations, and Instructions for Operation of the Backup Air or Nitrogen Supply to the Pressurizer Power Operated Relief Valves.

2.0 PRECAUTIONS AND LIMITATIONS

1. The sum of the pressures in each nitrogen bottle must be maintained greater than 2200 psig during standby operation. ☐

2. Opening HV2228 BYP ISO VLV, Q1P19V1099 results in a four hour RAS per TS 3.6.3 in Modes 1, 2, 3 and 4. ☐

3.0 INITIAL CONDITIONS

1. The backup air or nitrogen supply to the pressurizer power operated relief valves system valves are aligned per system check list FNP-1-SOP-62.1A. ☐

4.0 INSTRUCTIONS

4.1 Placing Backup Air or Nitrogen in Service

NOTE

Opening HV2228 BYP ISO VLV, Q1P19V1099 results in a four hour RAS per TS 3.6.3 in Modes 1, 2, 3 and 4. ☐

1. IF Q1P19HV2228 has failed closed, THEN **perform** the following:

   a. **Locally unlock** HV2228-B BYP ISO VLV, Q1P19V1099. (121 ft PPR) ☐

   b. **Open** HV2228-B BYP ISO VLV, Q1P19V1099. (121 ft PPR) ☐

   Time _____

2. Begin **logging** nitrogen bottle pressures on Figure 1 once per four hours. ☐

3. WHEN the on service nitrogen bottle pressure is less than 200 psig, THEN **shift** the on service nitrogen bottle per Section 4.3. ☐

38. 055K3.01 038

Unit 1 was operating at 80% power. The following conditions exist:

- Auxiliary Steam is supplying the SJAEs.
- V902, MS TO SJAE, valve is closed.
- V521, AS TO SJAE, fails closed.
- Main steam header pressure remains constant.

Which one of the following completes the statement below?

Main Condenser pressure will _(1)_ and MWe output will _(2)_.

	(1)	(2)
A.	rise	remain constant
B.	remain constant	remain constant
C✔	rise	decrease
D.	remain constant	increase

Distracter Analysis:

A. Incorrect.
1. Correct. See C.1.

2. Incorrect. See C.2. Plausible if the applicant believes that with constant steam header pressure, the MWe output is constant.

B. Incorrect.
1. Incorrect. See C.1. Plausible if the applicant thinks the condenser will hold vacuum by the condensing process and fails to recognize by isolating steam to the SJAEs a "hole" has been created in the condenser.

2. Incorrect. See A.2.

C. Correct.
1. Correct. By isolating steam to the SJAE, a hole is created in the main condenser resulting in lowering vacuum.

2. Correct. Degraded pressure causes megawatt output to decrease due to reduced delta Enthalpy.

D. Incorrect.
1. Incorrect. See B.1.

2. Incorrect. See C.2. Plausible if the applicant reasons that the steam not going to the SJAE is now going to the Main Turbine => more MWe.

K/A: 055K3.01	Condenser Air Removal System - Knowledge of the effect that a loss or malfunction of the CARS will have on the following: Main condenser.
Importance Rating:	2.5/2.7
Technical Reference:	FNP-1-AOP-8.0, Partial Loss of Condenser Vacuum. OPS 52104C, Condensate and Feedwater, v2
References provided:	None
Learning Objective:	Explain the relationship between condenser vacuum and backpressure (OPS31701C16).
Question History:	FNP 08
K/A match:	Requires the applicant to know the effects of a loss of the SJAEs and what will happen to condenser vacuum and MWs which correlates to the effects on the MAIN CONDENSER.
SRO justification:	N/A

Step	Action/Expected Response	Response Not Obtained
	3.4 IF the loss of condenser vacuum is due to the loss of the electrical ring bus, THEN notify ACC to restore the ring bus.	
	3.5 IF the loss of condenser vacuum is due to loss of the electrical ring bus, AND condenser vacuum has been restored, THEN return to procedure and step in effect.	
	NOTE: Normal SJAE alignment is one section per SJAE. Starting a second section on a SJAE may worsen vacuum if SJAEs are malfunctioning.	
	3.6 Verify proper operation of on service SJAEs.	3.6 Swap SJAEs or place additional SJAE sections in service as required to obtain proper SJAE operation using FNP-1-SOP-28.5, CONDENSER AIR REMOVAL SYSTEM.
	3.7 IF available, THEN start an additional CW PUMP.	
__	**4 Dispatch personnel to check main turbine gland sealing steam pressures.**	
	4.1 Check HP Gland seal header pressure maintained at ~125 psig. GS STM PRESS [ ] PI 4069B	4.1 Perform the following: 4.1.1 IF HP gland seal header pressure abnormal due to HP regulator malfunction, THEN transfer control to the HP regulator control valve bypass.

° Step 4 continued on next page

__Page Completed

A circulating water leak into the tube sheet area can be detected by opening the condenser tube sheet seal water flushing connection valve and having the chemistry group analyze the sampled water for impurities.

Condenser Air Removal System

The air removal system (Figure 3) used for the condenser consists of two separate systems piped to a common suction header. One system is the Hogger system, and the other system is the SJAE system. The Hoggers, which are high volume air removal equipment, establish the initial vacuum in the condenser and are used only during plant startup. Once steam is admitted to the condensers, the SJAEs maintain the condenser vacuum and remove air in-leakage and noncondensible gases. The SJAEs are low volume air removal equipment. In order to operate the condenser air removal system, the gland sealing steam system must be in operation to draw a vacuum on the condenser.

The common suction header (the air ejector suction line) connects to condensers A and B via four lines. Each line has a manually operated gate valve.

The Hogger system consists of two single-stage air ejectors supplied with steam from the auxiliary steam system. A pressure control valve maintains the steam supplied to each Hogger at 125 psig. The pressure control valve and air-operated condenser suction valves for each hogger are controlled by a single switch on the MCB.

The Hoggers are used during plant startup (when main steam is not available) and can attain 27.75 inches Hg vacuum. Air and gases ejected by the Hoggers are released to the atmosphere on the roof of the turbine building.

The SJAE system includes two twin elements, two-stage SJAEs. These ejectors have two inner-condensers and one after-condenser. These SJAE condensers are used to condense the steam that is ejecting the air and gases, so that only air and the non-condensible gases are ejected to the atmosphere. Each SJAE can remove 20 cfm of 70°F dry air with a 1 inch Hg absolute backpressure. The SJAEs' inner-condensers and after-condensers receive 1400 gpm cooling water from the condensate system. Steam may be supplied to the SJAEs from the main or auxiliary steam system via separate selector switches on the MCB. When directed by procedures, the SJAEs can be supplied from main steam when the main steam isolation valves (MSIVs) are open and steam pressure is sufficient for SJAE operation.

condenses on the tubes, and its specific volume decreases, helping to maintain a vacuum in the condenser shell. This vacuum determines the backpressure of the turbine. The condensate drains from the tube surfaces into the hotwell of the condenser, where it provides net positive suction head for the condensate pumps.

In a real condenser, some additional heat is removed once the steam is condensed. This is represented in Figure 4-16 as difference between point 2 and point 2′. This causes the temperature to decrease below saturation temperature. This is represented by the difference in T_1 and $T_{2'}$ in Figure 4-16 (b).

With regard to plant efficiency, it is important for the steam side of the condenser to operate in a vacuum. Low pressure at the turbine exhaust allows the steam to do more work as it passes through the turbine, increasing the energy available in the steam cycle.

Typical condenser pressures are about 2.0 inches of mercury absolute. This pressure will vary with the circulating water inlet temperature and the vapor pressure of the condensate. A higher circulating water inlet temperature causes less heat to be transferred from the steam, resulting in a lower condenser vacuum (higher absolute pressure) and reduced plant efficiency. A lower circulating water inlet temperature causes more heat to be transferred from the steam, resulting in a higher condenser vacuum (lower absolute pressure) and increased plant efficiency.

Another important function of the condenser is to remove non-condensable gas and air from the condensate ("deaerate" the condensate). As mentioned previously, SJAEs or condenser vacuum pumps perform this function.

When steam condenses, it releases non-condensable gases. Additionally, leaks in the condenser shell allow air to enter because the condenser operates below atmospheric pressure. The presence of air and non-condensable gases greatly reduces condenser efficiency because the steam must diffuse through a film of non-condensable gas before reaching the condensing surface. A temperature gradient is created as the gases blanket the condenser tubes. This results in less cooling of the steam and therefore, a higher backpressure on the turbine, reducing overall plant efficiency. The ideal condensing process is a constant pressure (isobaric) process.

After the steam condenses, the saturated liquid will continue to transfer some heat to the circulating water system as it falls to the hotwell of the condenser. Cooling the condensate below saturation temperature is called subcooling and is desirable to a small extent. A few degrees subcooling are necessary to prevent cavitation in the condensate pumps. Cavitation is the formation of vapor bubbles in the low pressure region of the pump and the subsequent collapse of the bubbles in the high pressure region of the pump. Cavitation causes erosion, excessive vibration, and increased bearing wear. Pumps can be damaged during cavitation.

The temperature difference between the saturation temperature for the existing condenser vacuum and the actual temperature of the condensate is termed "condensate depression". It is expressed as the number of degrees condensate depression or number of degrees subcooled.

$$\text{Condensate Depression} = T_{sat} - T_{actual}$$

Where:

Condensate Depression	=	number of degrees of condensate depression (°F)
T_{sat}	=	temperature of saturated liquid at the given pressure or vacuum (°F)
T_{actual}	=	temperature of subcooled liquid being considered (°F)

Equation 4-31

Excessive condensate depression decreases the operating efficiency of the plant since the subcooled condensate must be reheated in the

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39. 056AG2.2.39 039

The following conditions exist on Unit 1:

- Unit 1 is in Mode 6.
- 'A' Train is on service.
- Fuel movement inside Containment is in progress.
- 1B DG is tagged out.
- 2C DG is tagged out.

Subsequently, the 1F 4160V bus loses power and remains de-energized.

Which one of the following completes the statements below?

Fuel movement inside Containment _(1)_ allowed to continue per TS 3.8.2 AC Sources - Shutdown.

Per AOP-5.0, Loss of A or B Train Electrical Power, SFP Cooling will be restored using the _(2)_ SFP Cooling pump.

	(1)	(2)
A.	IS	1A
B.	IS	1B
C. ✔	is NOT	1A
D.	is NOT	1B

Per Tech Spec 3.8.2 Condition B, One DG is required to be operable to move fuel. With the 1B DG tagged out and 1-2A and 1C not tying on to 1F bus, there are no DG's operable. Also, 2C DG must be tagged out to keep it RO level as it requires BASES knowledge that 2C isn't a credited source of power in TS 3.8.2.

AOP-5.0 Loss Of A Or B Train Electrical Power (recovery procedure for stated conditions) step 17 RNO directs restoration of spent fuel pool (SFP) cooling per SOP-54.0 on the unaffected train. The SFP cooling pump is one of the few components that has opposite train power from its name designation. 1A SFP is 'B' train powered.

Distracter Analysis:

A. Incorrect.

1. Incorrect. See C.1. Refueling equipment remains energized in this scenario so the applicant could think that refueling is allowed to continue.

2. Correct. See C.2.

B. Incorrect.

1. Incorrect. See A.1.

2. Incorrect - The pump designator of 1A misleads novice applicants into believing it is "A" train powered. This is one of the few components with name designator different from its train location. It is a 'B' train component.

C. Correct.

1. Correct - No diesel generators are available to meet requirement of (one) required DG. This requires the movement of fuel to stop immediately.

2. Correct - 1A SFP is the 'B' train pump.

D. Incorrect.

1. Correct see C.1.

2. Incorrect see B.2.

QUESTIONS REPORT
for ILT 37 RO BANK VER 4

K/A: 056G2.2.39	Loss of Offsite Power - Knowledge of less than or equal to one hour Technical Specification action statements for systems.
Importance Rating:	3.9/4.5
Technical Reference:	Tech Specs, v193 AOP-5.0, Loss of A or B Train Electrical Power, v27 A506205, Unit 1 Electrical Load List, v77
References provided:	None
Learning Objective:	**RECALL AND APPLY** the LCO and APPLICABILITY for Technical Specifications (TS) or TRM requirements, and the REQUIRED ACTIONS for 1 HR or less TS or TRM requirements, and the relevant portions of BASES that DEFINE the OPERABILITY and APPLICABILITY of the LCO associated with the Intermediate and Low Voltage AC Distribution System components and attendant equipment alignment, to include the following (OPS-52103B01): • 3.8.2, AC Sources – Shutdown
Question History:	NEW
Basis for meeting K/A:	Requires applicant to know 1hr or less tech spec associated with Loss of Offsite Power. In this scenario, it is an IMMEDIATE tech spec.
SRO justification:	N/A

3.8 ELECTRICAL POWER SYSTEMS

3.8.2 AC Sources — Shutdown

LCO 3.8.2 The following AC electrical power sources shall be OPERABLE:

a. One qualified circuit between the offsite transmission network and the onsite Class 1E AC electrical power distribution subsystem(s) required by LCO 3.8.10, "Distribution Systems — Shutdown"; and

b. One diesel generator (DG) capable of supplying one train of the onsite Class 1E AC electrical power distribution subsystem(s) required by LCO 3.8.10.

APPLICABILITY: MODES 5 and 6,
During movement of irradiated fuel assemblies.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One required offsite circuit inoperable.	----------NOTE---------- Enter applicable Conditions and Required Actions of LCO 3.8.10, with one required train de-energized as a result of Condition A. ----------	
	A.1 Declare affected required feature(s) with no offsite power available inoperable.	Immediately
	OR	
	A.2.1 Suspend CORE ALTERATIONS.	Immediately
	AND	
		(continued)

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. (continued)	A.2.2 Suspend movement of irradiated fuel assemblies. AND	Immediately
	A.2.3 Initiate action to suspend operations involving positive reactivity additions. AND	Immediately
	A.2.4 Initiate action to restore required offsite power circuit to OPERABLE status.	Immediately
B. One required DG inoperable.	B.1 Suspend CORE ALTERATIONS. AND	Immediately
	B.2 Suspend movement of irradiated fuel assemblies. AND	Immediately
	B.3 Initiate action to suspend operations involving positive reactivity additions. AND	Immediately
	B.4 Initiate action to restore required DG to OPERABLE status.	Immediately

1E 4160V BUS TB - 155' D177017

BKR	TPNS	DESCRIPTION	SEE PAGE
	N1R15A0502-N	**1E 4160V BUS**	
DE01	**N1R12A0501-N**	**1A UNIT AUX TRANSFORMER (ALTERNATE) <<<**	
DE02	N1R15BKRDE02	PT COMPARTMENT	
DE03	**N1R11A0502-N**	**1B START-UP TRANSFORMER (NORMAL) <<<**	
DE04	**N1R11B0513-N**	**1V 4160/600V SST >>> 1V 600V LOAD CTR >>>**	E-2
	N1R11B0515-N	**1X 4160/600V SST >>> 1X 600V LOAD CTR >>>**	E-3
	N1R11B0517-N	**1Z 4160/600V SST >>> 1Z 600V LOAD CTR >>>**	E-4
DE05	N1N21M0001C-N	1C CONDENSATE PUMP	
DE06	N1N26M0001B-N	1B HEATER DRAIN PUMP	
DE07	**Q1R11B0003-N**	**1C 4160/600V SST >>> 1C 600V LOAD CENTER (NORMAL) >>>**	E-5
DE08	**N1R16B0015-N**	**DISC SW NSR18A0005-N >>> 1N 4160/600V SST (NORMAL) NSR11B0009-N >>> 1N 600V LOAD CENTER >>>**	E-32
DE09	**N1R11B0509-N**	**1Q 4160/600V SST >>> 1Q 600V LOAD CENTER (NORMAL) >>>**	E-39
DE10	----------	SPARE	
DE11	**N1R17B0515-N**	**1T 4160-480/277V SST >>> 1Q 480V MCC >>>**	E-48
	N1R17B0516-N	**1AA 4160-480/277V SST >>> 1R 480V MCC >>>**	E-62
DE12	**N1R11B0521-N**	**1J LIGHTING XFMR >>> 1A LIGHTING SWGR**	D-120
DE13	N1U41M0506B-N	1B CENTRIFUGAL WATER CHILLER COMPRESSOR	

DE07
1C 600V LOAD CENTER **AB - 121'** **C177009**

BKR	TPNS	DESCRIPTION	SEE PAGE
	Q1R16B0005-B	**1C 600V LOAD CENTER**	
EC01	Q1R16BKREC01	PT COMPARTMENT	
EC02	**Q1R11B0003-N**	**1C 4160/600V SST <<< DE07 (NORMAL)**	
EC03	N1G12L0001A-N	1A BTRS CHILLER UNIT PANEL	
EC04	**N1R17B0003-N**	**1C 600/208V MCC >>>**	**E-6**
EC05	N1P41M0001A-N	1A AUX BUILDING MAIN EXHAUST FAN	
EC06	N1V46M0001-N	RADWASTE AIR HANDLING UNIT	
EC07	**Q1R16B0008-AB**	**1F 600V LOAD CENTER <<< EF07 (ALTERNATE)**	
EC08	Q1R16BKREC08	1C 600V LOAD CENTER TIE BKR (NORMAL - EMERG)	
EC09	Q1G31M0002A-B	1A SPENT FUEL POOL PUMP	
EC10	**Q1R16B0007-B**	**1E 600V LOAD CENTER <<< EE07 (ALTERNATE - EMERG)**	
EC11	**Q1B31L0001B-B**	**1B PRESSURIZER HEATER DIST PANEL >>>**	**E-19**
EC12	Q1E12M0001D-B	1D CONTAINMENT COOLER (NORMAL/HIGH SPEED)	
EC13	**N1V51E0003B-N**	**1E 600-480/227V NORMAL LIGHTING TRANSFORMER >>> LTG PNL LP-1L, LP-1P & LP-1Q**	**E-20 E-23 E-24**
EC14	**N1V51E0003E-N**	**1F 600-480/227V NORMAL LIGHTING TRANSFORMER >>> LTG PNL LP-1C, LP-1F & LP-1I**	**E-25 E-27 E-29**

DE07
EC04
1C 600/208V MCC **AB -155'** **B177556-3**
(CONT'D)

BKR	TPNS	DESCRIPTION	SEE PAGE
FCM5	N1T48M0002-N	REFUELING WATER SURFACE EXHAUST FAN	
FCN2L	Q1F15G0001-N	DISC SWITCH N1R18B009-N >>> REACTOR CAVITY MANIPULATOR CRANE TERMINAL	
FCN2R	**N1V51E0004C-N**	**1G 600-208/120V RECEPT TRANSF >>>**	**E-11**
FCN3	N1B41M0002C-N	1C RCP BEARING OIL LIFT PUMP	
FCN4	N1B41L0001C-N	1C RCP MOTOR SPACE HEATER	
FCN5	----------	SPARE	
FCN6	N1G12M0001A-N	1A CHILLER PUMP	
FCO2R	N1Y43M0002-N	FIRE PROTECTION MOV V045	
FCO3L	N1V48K0001A-N	1A SPENT FUEL POOL MECHANICAL EQUIP ROOM HEATER	
FCO3R	N1V48K0001B-N	1B SPENT FUEL POOL MECH EQUIPMENT ROOM HEATER	
FCO7	N1V47M0001-N	NON RADWASTE AHU	
FCP2	N1G24M0002A-N	1A SG BLOWDOWN DISCHARGE PUMP	
FCP3	N1T40M0001A-N	1A CTMT RECIRCULATING FAN	
FCP4	N1T40M0001B-N	1B CTMT RECIRCULATING FAN	
FCR2	----------	SPARE	
FCR3	----------	SPARE	
FCR4L	Q1R37E0002-N	1A WPS HEAT TRACING XFMR >>> WPS HEAT TRACING CONTROL PANEL (REF D-181696)	
FCR5	N1G24M0002B-N	1B SG BLOWDOWN DISCHARGE PUMP	
FCS2L	----------	SPARE	
FCS2R	N1V47K0002-N	CABLE SPREADING ROOM CONDENSING UNIT	
FCS3L	N1F15L0002-N	REACTOR BLDG. UPENDING FRAME WINCH CONTROL PANEL	
FCS3R	N1T31K006-N	CTMT JIB CRANE #3	
FCS5	----------	SPARE	
FCS6	----------	SPARE	

2C DG tagged out stem justification
Bases knowledge required to eliminate 2C DG as a qualified power source.
See highlighted areas on this page and the next page

BASES

APPLICABLE SAFETY ANALYSES (continued)

and maintenance activities must be conducted provided an acceptable level of risk is not exceeded. During MODES 5 and 6, performance of a significant number of required testing and maintenance activities is also required. In MODES 5 and 6, the activities are generally planned and administratively controlled. Relaxations from MODE 1, 2, 3, and 4 LCO requirements are acceptable during shutdown modes based on:

a. The fact that time in an outage is limited. This is a risk prudent goal as well as a utility economic consideration.

b. Requiring appropriate compensatory measures for certain conditions. These may include administrative controls, reliance on systems that do not necessarily meet typical design requirements applied to systems credited in operating MODE analyses, or both.

c. Prudent utility consideration of the risk associated with multiple activities that could affect multiple systems.

d. Maintaining, to the extent practical, the ability to perform required functions (even if not meeting MODE 1, 2, 3, and 4 OPERABILITY requirements) with systems assumed to function during an event.

In the event of an accident during shutdown, this LCO ensures the capability to support systems necessary to avoid immediate difficulty, assuming either a loss of all offsite power or a loss of all onsite diesel generator (DG) power.

The AC sources satisfy Criterion 3 of 10 CFR 50.36(c)(2)(ii).

LCO

One offsite circuit capable of supplying the onsite Class 1E power distribution subsystem(s) of LCO 3.8.10, "Distribution Systems — Shutdown," ensures that all required loads are powered from offsite power. An OPERABLE DG (1-2A, 1C, or 1(2)B), associated with the distribution system train required to be OPERABLE by LCO 3.8.10, ensures a diverse power source is available to provide electrical power support, assuming a loss of the offsite circuit. Together, OPERABILITY of the required offsite circuit and DG ensures the availability of sufficient AC sources to operate the unit in a safe manner and to mitigate the consequences of postulated events during shutdown (e.g., fuel handling accidents).

(continued)

BASES

LCO (continued)

The qualified offsite circuit must be capable of maintaining rated frequency and voltage, and accepting required loads during an accident, while connected to the Engineered Safety Feature (ESF) bus(es). Qualified offsite circuits are those that are described in the FSAR and are part of the licensing basis for the unit.

Two physically independent circuits between the transmission network and the onsite system may consist of any combination that includes two of the six transmission lines normally supplying the 230 and 500 kV switchyards and both independent circuits from the 230 kV switchyard to the Class 1E buses via Startup Auxiliary Transformers 1A (2A) and 1B (2B). The two of six combination of transmission lines may be shared between Unit 1 and 2. If either of the transmission lines are 500 kV, one 500/230 kV Autotransformer connecting the 500 and 230 kV switchyards is available. If both of the transmission lines are 500 kV, both 500/230 kV Autotransformers connecting the 500 and 230 kV switchyards are available. Any combination of 500 and 230 kV circuit breakers required to complete the independent circuits is permissible.

The DG must be capable of starting, accelerating to rated speed and voltage, and connecting to its respective ESF bus on detection of bus undervoltage. This sequence must be accomplished within 12 seconds. The DG must be capable of accepting the required loads manually, and continue to operate until offsite power can be restored to the ESF buses. These capabilities are required to be met from a variety of initial conditions such as DG in standby with the engine hot and DG in standby at ambient conditions.

Proper sequencer operation to sense loss of power or degraded voltage, initiate tripping of ESF bus offsite breakers and initiate DG start and DG output breaker closure and sequencing of shutdown loads are required functions for a DG to be considered OPERABLE.

It is acceptable for trains to be cross tied during shutdown conditions, allowing a single offsite power circuit to supply both required trains.

APPLICABILITY

The AC sources required to be OPERABLE in MODES 5 and 6 and during movement of irradiated fuel assemblies provide assurance that:

(continued)

Step	Action/Expected Response	Response Not Obtained
__	**17 Check Spent Fuel Pool Cooling - IN SERVICE.**	17 Place Spent Fuel Pool Cooling in service on the non affected train per FNP-1-SOP-54.0, SPENT FUEL PIT COOLING AND PURIFICATION SYSTEM.
__	**18 Check 125V DC battery loads - LESS THAN THE FOLLOWING LIMITS:** A Train < 250 Amps B Train < 300 Amps	
	NOTE: IF a diesel generator is supplying the affected ESF bus, THEN step 19 is not required unless needed for a diesel load reduction.	
__	**19 Minimize DC loads in the affected train(s).** 19.1 De-energize non-essential DC loads using ATTACHMENT 2. 19.2 Direct electrical maintenance personnel to estimate remaining battery capacity.	
	NOTE: Normal DRPI power supply is from MCC 1D and alternate supply is from MCC 1B.	
__	**20 Verify DRPI - ENERGIZED.**	20 Swap to non-affected DRPI power supply: CONTROL ROD POSITION IND. DISTRIBUTION PANEL (Aux Bldg 139') [ ] N1C11L008-N • 1D MCC HDLN-6 MAIN OR • 1B MCC HBRL-7 ALT

__Page Completed

40. 057AA1.05 040

Unit 1 is in Mode 3 with the following plant conditions:

- RTBs are open
- NI-32, SOURCE RANGE, is tagged out for power supply replacement

Subsequently, the 1A 120V AC Vital Panel becomes de-energized.

Which one of the following completes the statement below?

Backup Source Range indication _(1)_ available on the MCB from Gamma-Metrics.

The Reactor Make-up system _(2)_ be affected by the malfunction of the 1A 120V Vital Panel.

	(1)	(2)
A. ✔	IS	WILL
B.	is NOT	will NOT
C.	IS	will NOT
D.	is NOT	WILL

Gamma-Metrics power comes from 120V AC Dist Panel J, which comes from Inverter F. Panel J also supplies the BOP Instrument Panel J.

N-31 is powered from 1A Vital Panel

WD1
[...]
- 1A & 1B BAT pumps start. if Rx M/U Control System is in auto.
- RMW to Blender, Q1E21FCV114B and Boric Acid to blender, Q1E21FCV113A opens if Rx M/U Control System is in auto.

Distracter Analysis:

A. Correct.

1. Correct. Gamma metrics is still available at the MCB.

2. Correct. The loss of 1A vital bus will cause both RMW pumps to start and FCV-114B and 113A to open.

B. Incorrect.

1. Incorrect. See A.1. Plausible if the applicant fails to recognize that Gammametrics is on the MCB or thinks that it has lost power. Since power to gammametrics comes from an inverter it is plausible that power could come from inverter A which powers up 1A vital panel.

2. Incorrect. Plausible since this is correct if any of the other 3 Vital panels were lost. If an auto makeup was in progress, the loss of the 1B vital would affect makeup but there is NO makeup in progress.

C. Incorrect.

1. Correct. See A.1.

2. Incorrect. See B.2.

D. Incorrect.

1. Incorrect. See B.1.

2. Correct. See A.2.

QUESTIONS REPORT
for ILT 37 RO BANK VER 4

K/A: 057AA1.05	Loss of Vital AC Electrical Instrument Bus - Ability to operate and/or monitor the following as they apply to the Loss of Vital AC Instrument Bus: Backup instrument indications
Importance Rating:	3.2/3.4
Technical Reference:	FNP-1-ARP-2.2, v32.4 D177024, 120VAC Vital & Reg AC Train A, v35
References provided:	None
Learning Objective:	NAME AND IDENTIFY the Bus power supplies, for those electrical components associated with the Excore Nuclear Instrumentation System, to include those items in Table 3-Power Supplies (OPS-52201D04).
Question History:	NEW
K/A match:	Requires the applicant to know the available backup method to monitor SR (Backup instrument indications) on the MCB upon the loss of the N-31 and N-32.
SRO justification:	N/A

TABLE 1
POWER SUPPLIES

LOAD	SUPPLY	EMERGENCY DIESEL GENERATOR	Transformer	
			Normal	Alternate
NIS Channel 1 N41 N35 N31	120V AC Vital Inst Panel A	A Train	S/U A	S/U B
NIS Reg Cab A (outlets)	120V AC Vital Inst Panel A	A Train	S/U A	S/U B
NIS Channel 2 N42 N36 N32	120V AC Vital Inst Panel B	A Train	S/U A	S/U B
NIS Reg Cab B (outlets) N43	120V AC Vital Inst Panel B	A Train	S/U A	S/U B
NIS Channel 3 N43	120V AC Vital Inst Panel C	B Train	S/U B	S/U A
NIS Reg Cab C Outlets	120V AC Vital Inst Panel C	B Train	S/U B	S/U A
NIS Channel 4 N44 Misc Drawer Audio Count Rate Comp & Rate Drawer	120V AC Vital Inst Panel D	B Train	S/U B	S/U A
NIS Reg Cab D Outlets	120V AC Vital Inst Panel D	B Train	S/U B	S/U A
Gamma-Metrics Neutron Flux Monitor	120V AC Dist Panel J	A Train	S/U A	S/U B

OPERATOR ACTION

NOTES:

The following controls may be affected if 1A 120 VAC Vital Instrumentation Panel is De-energized (Refer to A-506250, Unit 1 Load List):

- **A TRN SSPS output relay power is lost.** ☐
- **VCT Hi Lvl Divert Valve - Q1E21LCV115A diverts to the RHT if in auto.** ☐
- **LTDN Hi Temp Divert Valve - Q1E21TCV143 bypasses the demineralizers.** ☐
- **1A & 1B Reactor makeup water pumps start if Rx M/U Control System is in auto.** ☐
- **1A & 1B BAT pumps start. if Rx M/U Control System is in auto.** ☐
- **RMW to Blender - Q1E21FCV114B and Boric Acid to blender - Q1E21FCV113A opens if Rx M/U Control System is in auto.** ☐
- **If LT 112 VCT level is out of service, RWST to Chg Pump Suction Valves Q1E21LCV115B & D open.** ☐
- **Q1E21LCV460 will not close on PZR low level.** ☐
- **Annunciator KG4, TURB TV closed alert, will be in alarm and bistable TSLB2, 14-1 will be lit.** ☐
- **Annunciator KH5, TURB Auto/Stop oil press low, will be in alarm and bistable TSLB2, 13-1 will be lit.** ☐
- **If power available, RHR loop suction valves will be affected as follows:** ☐
  - **If open, MOV 8701A will close and remain closed.** ☐
  - **If open, MOV 8701B will close, can be momentarily opened from the MCB but will re-close.** ☐
  - **If closed, MOV8702A cannot be opened from the MCB.** ☐

1. IF 1A 120 VAC VITAL INSTRUMENT PANEL is de-energized, THEN immediately **perform** the following: ☐

   1.1. IF a reactor trip occurs, THEN **refer** to FNP-1-EEP-0, REACTOR TRIP OR SAFETY INJECTION. ☐

   1.2. **Attempt** to restore power from the bypass source by performing the following: ☐

      1.2.1 IF the "BYPASS SOURCE AVAILABLE" lamp is illuminated on the inverter, THEN **transfer** 1A INVERTER MANUAL BYPASS SWITCH to the "BYPASS SOURCE TO LOAD" position. ☐

41. 058AK3.02 041

The following conditions exist on Unit 1:

- 'A' Train Aux Building DC has been lost.
- AOP-29.1 Plant Stabilization in Hot Standby and Cooldown Without "A" Train AC or DC Power, is in progress.
- RCS temperature must be lowered.

Which one of the following completes the statements below?

Steam Dumps __(1)__ .

If required, Atmospheric Relief valves must be operated __(2)__ .

A. 1) **can** be used since Turbine Building DC is available for solenoid operation

2) via Local Pneumatic operation from the Lower Equipment Room because DC power is not available to the solenoids

B. 1) **can** be used since Turbine Building DC is available for solenoid operation

2) in Local from the Hot Shutdown Panel because alternate DC power is available to the solenoids

C. ✓ 1) **cannot** be used because A Train DC is required for solenoid operation

2) via Local Pneumatic operation from the Lower Equipment Room because DC power is not available to the solenoids

D. 1) **cannot** be used because A Train DC is required for solenoid operation

2) in Local from the Hot Shutdown Panel because alternate DC power is available to the solenoids

U1 load list:
Steam dumps have 'A' Train DC power.

10.1.2 IF control of the Atmospheric relief valves is not
available from the MCB,
THEN establish local control of the SG atmospheric
reliefs valves per FNP-1-SOP-62.0 EMERGENCY AIR SYSTEM.
10.1.2.1 Take Local Pneumatic control of the
Atmospheric Relief Valves in the Lower
Equipment Room.

Distracter Analysis:

A. Incorrect.

1. Incorrect. Plausible since the Steam Dumps are in the Turbine Building and not Safety Related. Applicant could reason that they use Turbine building DC.

2. Correct. See C.2.

B. Incorrect.

1. Incorrect. See A.1.

2. Incorrect. See C.2. Plausible since the HSDP uses 'B' train DC power as the 'alternate power' for remote shutdown and the applicant could reason that the ARVs are available from the HSDP.

C. Correct.

1. Correct. Per the Load List.

2. Correct. Per step 10.2.1.2 of AOP-29.1

D. Incorrect.

1. Correct. See C.1.

2. Incorrect. See B.2.

QUESTIONS REPORT
for ILT 37 RO BANK VER 4

K/A: 058AK3.02	Loss of DC Power - Knowledge of the reasons for the following responses as they apply to the Loss of DC Power: Actions contained in EOP for loss of dc power
Importance Rating:	4.0 / 4.2
Technical Reference:	A-506250, Load List, v78 FNP-1-AOP-AOP-29.1 Plant Stabilization in Hot Standby and Cooldown Without "A" Train AC or DC Power, v16
References provided:	None
Learning Objective:	EVALUATE plant conditions and DETERMINE if any system components need to be operated while performing AOP-29.1, Plant Stabilization in Hot Standby and Cooldown without “A” Train AC or DC Power and AOP-29.2, Plant Stabilization in Hot Standby and Cooldown without “B” Train AC or DC Power. (OPS-52521F06)
Question History:	NEW
K/A match:	Requires the applicant to know what actions are taken in the EOP (AOP) to operate ARVs and if Steam Dumps are available..
SRO justification:	N/A

DF03
ED04
LA08
1A 125V DC DIST PNL **AB-155'** **D177082**

BKR	TPNS	DESCRIPTION	SEE PAGE
	Q1R41L0001A-A	1A 125V DC DISTRIBUTION PANEL <<< LA08	
1A-01	Q1R45G0002A-A	NO. 1 EMERGENCY LIGHTING RELAY BOX FEEDER (CONTROL ROOM)	
1A-02	Q1R45G0002A-A	NO. 2 EMERGENCY LIGHTING RELAY BOX FEEDER (CONTROL ROOM)	
1A-03	Q1R45G0002A-A	NO. 3 EMERGENCY LIGHTING RELAY BOX FEEDER (CONTROL ROOM)	
1A-04	----------	SPARE	
1A-05	----------	SPARE	
1A-06	Q1H25L0009-A	9A TERMINATION CABINET PANEL 1 FRONT >>>	F-6
1A-07	N1H11NGAR2506F-N	#1 AUXILIARY RELAY RACK TRAIN "A" >>>	F-7
1A-08	QSH11NGEPB2508-AB	EMERGENCY POWER BOARD (VIA EPB ANNUN UNIT 1/UNIT 2 PWR TRANS SW QSH11S0001A-A) >>>	F-8
	Q1H25L036-A	36A TERMINATION CABINET PANEL 3 REAR (VIA EPB ANNUN UNIT 1/UNIT 2 PWR TRANS SW QSH11S0001A-A) >>>	F-9
1A-09	Q1H25L0004-A	4A TERMINATION CABINET PANEL 1 FRONT >>>	F-10
1A-10	Q1H25L0004-A	4A TERMINATION CABINET PANEL 2 FRONT >>>	F-11
1A-11	Q1H25L0005-A	5A TERMINATION CABINET PANEL 3 REAR >>>	F-12
	Q1H25L0005-A	5A TERMINATION CABINET PANEL 4 REAR >>>	F-13
1A-12	Q1H25L0008-A	8A TERMINATION CABINET PANEL 1 FRONT >>>	F-14
1A-13	Q1H25L0008-A	8A TERMINATION CABINET PANEL 3 REAR >>>	F-15
1A-14	Q1H25L0008-A	8A TERMINATION CABINET PANEL 4 REAR >>>	F-16

DF03
ED04
LA08
1A-07
#1 AUX REL RACK TRAIN "A" **AB-155'** **D181709 / U260388**

FUSE	TPNS OR RELAY	DESCRIPTION
	N1H11NGAR2506F-N	#1 AUXILIARY RELAY RACK TRAIN "A" <<< 1A-07
M1, M2	N1N36V0505A-N	STEAM DUMP VALVE SOLENOID "A"
M3, M4	N1N36V0505B-N	STEAM DUMP VALVE SOLENOID "A"
M5, M6	N1N36V0505E-N	STEAM DUMP VALVE SOLENOID "B"
M7, M8	N1N36V0505F-N	STEAM DUMP VALVE SOLENOID "B"
M9, M10	N1N36V0505C-N	STEAM DUMP VALVE SOLENOID "A"
M11,M12	N1N36V0505D-N	STEAM DUMP VALVE SOLENOID "A"
M13,M14	N1N36V0505G-N	STEAM DUMP VALVE SOLENOID "B"
M15,M16	N1N36V0505H-N	STEAM DUMP VALVE SOLENOID "B"
M17,M18	RELAY RA	ISOLATION RELAY (D177655/2)
M19,M20	RELAY RX1 & RBX1	ISOLATION RELAY (D177109/2)
M21,M22	----------	SPARE
M23,M24	----------	SPARE
M25,M26	RELAY LOIX	ISOLATION RELAY (D177376/2)
M27,M28	RELAY RA	ISOLATION RELAY (D177224/3)
M29,M30	RELAY RA	ISOLATION RELAY (D177381/4)
M31,M32	RELAY 8149AX	AUX RELAY (D177376/2)
M33,M34	RELAY 8149BX	AUX RELAY (D177376/2)
M35,M36	RELAY 8149CX	AUX RELAY (D177376/2)

Table 3 – POWER SUPPLIES

LOAD	POWER SUPPLY
Reheat Control System	1N(2N) 208V/120V AC Panel
Main Steam Line Drain System	120V Distribution Cabinet J
MSIV HV-3369A, B, C (V001A, B, C)	125VDC Bus 1A / Dist. Panel 1A
MSIV HV 3370A, B, C (V002A ,B, C)	125VDC Bus 1B / Dist. Panel 1D
MSIV Bypass HV-3368A, B, C (V003A, B, C)	125VDC Bus 1A / Dist. Panel 1A
MSIV Bypass HV-3976A, B, C (V003D, E, F)	125VDC Bus 1B / Dist. Panel 1D
Atmos Relief Valve PV-3371A, B, C F-64 and F-56 electrical load list D177401 sh 2	125VDC Bus 1A / Dist. Panel 1B and 120VAC 1J BOP inst panel (control power)
Steam Dump Valves (501A-H)	125VDC Bus 1A / Dist. Panel 1A and 125VDC Bus 1B / Dist. Panel 1D and 120VAC Inst. Panel 1B (control power)

9.4 Isolate gland seal steam.

GLAND SEAL SUPPLY REG INLET ISO
(TURB BLDG, 155 ft)
[] N1N32V527

GLAND SEAL SUPPLY REG BYPASS
(TURB BLDG, 155 ft)
[] N1N32V529

9.5 Close MS TO AS MAN ISO N1N11V612 (Turb Bldg, 155 ft).

9.6 Isolate air to main steam isolation and bypass valves using ATTACHMENT 4.

10.0 Control RCS temperature 545-549°F on core exit thermocouples.

10.1 Evaluate the status of Steam Dumps and SG Atmospheric Relief Valves for RCS temperature control.

10.1.1 IF steam dumps are not available for RCS Temperature control,
THEN utilize SG atmospheric relief valves.

10.1.2 IF control of the Atmospheric relief valves is not available from the MCB,
THEN establish local control of the SG atmospheric reliefs valves per FNP-1-SOP-62.0 EMERGENCY AIR SYSTEM.

10.1.2.1 Take Local Pneumatic control of the Atmospheric Relief Valves in the Lower Equipment Room.

Step 10 continued on next page.

10.1.2.2 IF required,
THEN take local control of the Atmospheric Relief Valves in the MSVR as follows:

a) Open breaker 12 of 125VDC Dist Panel 1B(1F 4160V Swgr)

NOTE: Normal communication refers to Pax phone, gaitronics, or sound powered phones.

---

b) IF normal communications cannot be established between the Main Steam Valve Room and the Control Room,
THEN establish one of the following alternate communication methods.

[] Radio headsets located in Control Room emergency storage locker.
[] Obtain the 600 ft long sound powered phone cable and headsets located in Control Room emergency storage locker and perform ATTACHMENT #3.

c) Isolate air to the following valves: (MSVR)

[] 1A MS ATMOS REL VLV Q1N11PCV3371A
[] 1B MS ATMOS REL VLV Q1N11PCV3371B
[] 1C MS ATMOS REL VLV Q1N11PCV3371C

d) Adjust atmospheric relief valves remotely or with local handwheel to control RCS temperature.

[] 1A MS ATMOS REL VLV Q1N11PCV3371A
[] 1B MS ATMOS REL VLV Q1N11PCV3371B
[] 1C MS ATMOS REL VLV Q1N11PCV3371C

Table 3 – POWER SUPPLIES

LOAD	POWER SUPPLY
Reheat Control System	1N(2N) 208V/120V AC Panel
Main Steam Line Drain System	120V Distribution Cabinet J
MSIV HV-3369A, B, C (V001A, B, C)	125VDC Bus 1A / Dist. Panel 1A
MSIV HV 3370A, B, C (V002A ,B, C)	125VDC Bus 1B / Dist. Panel 1D
MSIV Bypass HV-3368A, B, C (V003A, B, C)	125VDC Bus 1A / Dist. Panel 1A
MSIV Bypass HV-3976A, B, C (V003D, E, F)	125VDC Bus 1B / Dist. Panel 1D
Atmos Relief Valve PV-3371A, B, C F-64 and F-56 electrical load list D177401 sh 2	125VDC Bus 1A / Dist. Panel 1B and 120VAC 1J BOP inst panel (control power)
Steam Dump Valves (501A-H)	125VDC Bus 1A / Dist. Panel 1A and 125VDC Bus 1B / Dist. Panel 1D and 120VAC Inst. Panel 1B (control power)

42. 059A4.08 042

Unit 1 is at 45% power with the following conditions:

- 1A SGFP is the only SGFP running.
- FT-477 is selected on FS/478Y, A SG FW FLOW SEL SW.

Subsequently, FT-477, 1A SG FW FLOW, fails **low**.

Which one of the following completes the statement below?

FCV-478, 1A SG FW FLOW, will **initially** (1) and SGFP speed will **initially** (2) .

	(1)	(2)
A.	open	decrease
B. ✔	open	increase
C.	close	decrease
D.	close	increase

Distracter Analysis:

A. Incorrect.

1. Correct. See B.1.

2. Incorrect. See B.2. Plausible if the applicant believes the SGFP will slow to maintain a constant level due to the opening FRV. If the stm flow transmitter failed low, this response would be correct.

B. Correct.

1. Correct. The FRV will open due to the Feed Flow mismatch; because of the failure the control circuit will attempt to increase feed to match the steam flow, by OPENING the FRV.

2. Correct. The SGFP speed, NOT directly impacted by the Feed flow transmitter malfunction, but because the A SG FRV will continue to open, Feed pressure will fall, and since the SGFP controller is trying to maintain a constant DP (no change in steam flow) the result will be an increase in SGFP speed.

C. Incorrect.

1. Incorrect. See B.1. Plausible if the applicant reasons that with less feed flow indicated, less is needed and the FRV will close down. If the stm flow transmitter failed low, this response would be correct.

2. Incorrect. See B.2.Plausible if the applicant reasons that with less flow needed the SGFP will slow down. If the stm flow transmitter failed low, this response would be correct.

D. Incorrect.

1. Incorrect. See C.1.

2. Correct. See B.2. Plausible connection to D.1 because the applicant could reason with a more closed FRV, the SGFP would have to speed up to keep level constant.

K/A: 059A4.08	Main Feedwater (MFW) System - Ability to manually operate and monitor in the control room: Feed regulating valve controller
Importance Rating:	3.0 / 2.9
Technical Reference:	FNP-1-AOP-100, Instrumentation Malfunction, v13
References provided:	None.
Learning Objective:	RELATE AND IDENTIFY the operational characteristics including design features, capacities and protective interlocks for the following components associated with the Steam Generator Water Level Control System (OPS-52201B02): • Feedwater Regulating Valves
Question History:	BANK - SGWLC-52201B08 19
K/A match:	Requires applicant to have the ability to determine (monitor) the FRV response to a failed Feed flow transmitter.
SRO justification:	N/A

UNIT 1

SECTION 1.5

STEAM GENERATOR STEAM FLOW/FEED FLOW/STEAM PRESSURE INSTRUMENTATION

SYMPTOMS

- One or more of the following annunciators may be in alarm:

  JA4 MS LINE PRESS LO ALERT(FNP-1-ARP-1.9)

  JB1, JB2, JB3-1A, 1B & 1C SG STM FLOW > FEED FLOW (FNP-1-ARP-1.9)

  JD5 HI STM FLOW & LO LO TAVG OR LO STM PRESS STM LINE ISO

  JE1, JE2, JE3 1A, 1B & 1C SG STM LINE HI ΔP ALERT

  JF1, JF2, JF3 1A, 1B, & 1C SG LVL DEV

  JG1, JG2, JG3-1A,1B & 1C SG FEED FLOW > STM FLOW

- Controller failure

FK-478	1A SG FW FLOW
FK-488	1B SG FW FLOW
FK-498	1C SG FW FLOW
FK-479	1A SG FW BYP FLOW
FK-489	1B SG FW BYP FLOW
FK-499	1C SG FW BYP FLOW

- Failed or erroneous indications from the following instrumentation:

S/G	STEAM PRESS		
	CH II	CH III	CH IV
A	PI-474	PI-475	PI-476
B	PI-484	PI-485	PI-486
C	PI-494	PI-495	PI-496

S/G	STEAM FLOW		FEED FLOW	
	CH III	CH IV	CH III	CH IV
A	FI-474	FI-475	FI-477	FI-476
B	FI-484	FI-485	FI-487	FI-486
C	FI-494	FI-495	FI-497	FI-496

43. 059K3.03 043

Unit 1 is at 100% power when the following occurs:

- 1B SGFP trips.
- AOP-13.0, Condensate and Feedwater Malfunction, IMMEDIATE OPERATOR ACTIONS are complete.

Which one of the following describes the **overall** Steam Generator pressure response during the transient and the reason for the pressure change?

SG pressures ____ .

A. ✔ rise due to the turbine ramp down

B. rise due to shrink in the Steam Generators

C. lower due to the turbine ramp down

D. lower due to swell in the Steam Generators

Distracter Analysis:

A. Correct. SG pressure goes up due to the turbine ramp down and the resulting RCS cold leg temperature rise.

B. Incorrect. SG pressure goes up and candidate without detailed knowledge may associate that with shrink in the SG, but shrink is a result of the pressure rise, not the cause of the pressure rise.

C. Incorrect. Plausible because candidate without detailed knowledge may think SG pressure goes down as you ramp down and cool down the RCS. Tavg actually goes down, but cold leg temperature goes up resulting in pressure rise in the SG.

D. Incorrect. Plausible because candidate may assume temperature and pressure in the SG will go down due to the ramp down. As pressure goes down, swell may occur and candidate may associate this with the ramp down.

QUESTIONS REPORT
for ILT 37 RO BANK VER 4

K/A: 059K3.03	Main Feedwater System - Knowledge of the effect that a loss or malfunction of the MFW will have on the following: S/GS
Importance Rating:	3.5 / 3.7
Technical Reference:	OPS-52101C, SG, v3
References provided:	None
Learning Objective:	DEFINE AND EVALUATE the operational implications of abnormal plant or equipment conditions associated with the operation of the Steam Generator Protection System components and equipment to include the following (OPS-52201K07): Normal control methods Abnormal and Emergency Control Methods:
Question History:	NEW
K/A match:	Requires the applicant to understand the operator actions during a loss of MFW and the resultant effect on SG pressure.
SRO justification:	N/A

Main Steam Atmospheric Relief Valves

An atmospheric relief valve provided for each steam generator has been placed in the same location as the code safety relief valves. The atmospheric relief valves (PV-3371A, B and C) normally operate to prevent operation of the safety valves during relatively mild transients. Following safety valve actuation, the atmospheric relief's act to assist the safety valves to positively reseat by reducing steam pressure to a value below the safety valve reseating pressure. The reliefs also provide the capability for the removal of reactor decay heat when the main condensers are not available. An AUTO/MANUAL SETPOINT STATION may control the atmospheric relief valves from the MCB or hot shutdown panel (HSP). The main steam line penetrations and associated valves will be discussed in detail in the Main and Reheat Steam lesson plan.

STEAM GENERATOR OPERATING CHARACTERISTICS

SHRINK AND SWELL

Shrink and swell are steam generator phenomena that are characterized by a change in water level following a change in steam flow. Shrink is a reduction in water level following a reduction in steam flow, while swell is just the opposite.

The rate of heat transfer across the tubes can be calculated using the following equation:

$$\dot{Q} = UA\,(T_{avg} - T_{stm}).$$

Where:

$\dot{Q} = Rate\ of\ \ heat\ transfer, BTU / hr$

$U = Overall\ heat\ transfer\ coefficient, BTU / hr - ft^2 - {}^\circ F$

$A = Area\ of\ \ heat\ transfer\ surface, ft^2$

$$T_{avg} = Avg.\ temperature\ of\ \ primary\ coolant = \frac{T_h + T_c}{2}$$

$T_{stm} = Saturation\ temperature\ for\ the\ steam, {}^\circ F.$

$\dot{Q}$ is proportional to the power level, or the energy being removed from the primary system to the steam generator. The heat transfer coefficient (U) remains relatively constant, and is determined by the composition and characteristics of the tubes. The area of heat transfer surface (A) is constant. If you have ever seen a pot of water boiling on a stove, you noticed that tiny bubbles of steam were formed at the hottest portions of the pot and then rose to the surface where they escaped as steam. The same thing takes place around each steam generator tube. The rate of heat transfer or the boiling rate bubbles being formed determined the quantity of the steam. A given boiling rate (power) water mixture will have a corresponding density and specific volume. Looking closely now at an increase in power level, the following events take place:

As steam flow to the main turbine is increased, more energy will be drawn from the steam generator, which tends to decrease the steam pressure. This decrease in steam pressure causes the number and size of the steam bubbles in the boiling region to increase, which increases the steam to water ratio and specific volume, with a subsequent decrease in density. Initially, the mass of water in the steam generator remains constant, so the decrease in density will be seen as an increased steam generator water level. This phenomenon is known as "swell." The steam generator water level control system will decrease the water level to the operating band causing the mass in the generator to decrease as power level increases.

The opposite effect will be observed in the steam generator when the power level is decreased. The lower heat transfer rate along with the higher steam pressure causes less boiling to occur and a contraction of the steam bubbles present. This decreases the steam-to-water ratio with a subsequent increase in density. Since the mass in the steam generator is initially constant, the increase in density will be seen as a decrease in steam generator water level. This phenomenon has been termed "shrink."

CIRCULATION AND RECIRCULATION RATIO

The moisture that is removed from the steam prior to the steam leaving the steam generator enters the downcomer region where it mixes with the incoming feedwater. Since this separated moisture, upon reaching the riser region, is making its second pass across the heat exchanging U-tubes; this moisture content is called recirculation flow. This recirculation flow

44. 061A1.02 044

Unit 1 is implementing ESP-0.1, Reactor Trip Response. Plant conditions are as follows:

At 1000:
- FI-3229, EQ AFW TOTAL FLOW, indicates 1200 gpm.
- RCS temperature is 547°F and slowly lowering.
- All SG NR levels are approximately 32% and rising.
- MDAFW pump discharge pressure is 1250 psig.

At 1015:
- AFW has been throttled and FI-3229, indicates 475 gpm.
- RCS temperature is 542°F and slowly lowering.
- All SG NR levels are approximately 42% and rising.
- MDAFW pump discharge pressure is 1350 psig.

Which one of the following completes the statements below?

At 1015, SG pressure is _(1)_ than **at 1000**.

At 1015, MDAFW Pump amps are _(2)_ than **at 1000**.

	(1)	(2)
A. ✔	lower	lower
B.	higher	lower
C.	lower	higher
D.	higher	higher

Distracter Analysis:

A. Correct 1) SG pressure will be lower at 1015. Following a reactor trip steam dumps will modulate maintain no load Tavg temperature of 547°F with an approximate SG pressure of 1005 psig. Also the secondary side is a saturated system such that RCS temperature reduction will result in a corresponding SG pressure reduction.

2) Flow is reduced therefore the work of the pump is reduced and backpressure on the pump increases. As the back pressure increases downstream of a centrifugal pump, energy that the pump used to put into increasing flow rate must now be used to overcome the higher pressure. As the backpressure increases, the discharge pressure must increase. This results in less flow rate. With less flow rate the pump does not have to work as hard and the power required will decrease.

B. Incorrect 1) 1st part is incorrect but plausible if the applicant disregards the effects of steam dump operations and believes the level increase in the SG will compress the steam bubble and raise SG pressure.

2) 2nd part is correct see A.2

C. Incorrect 1) first part is correct see A.1

2) 2nd part is incorrect amps will decrease plausible if the applicant believes the work the pump must do to overcome the higher discharge pressure will result in amps increasing.

D. Incorrect 1) 1st part is incorrect see B.1

2) 2nd part is incorrect see C.2

QUESTIONS REPORT
for ILT 37 RO BANK VER 4

K/A: 061A1.02	Auxiliary / Emergency Feedwater System Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating the AFW controls including: S/G pressure
Importance Rating:	3.3 / 3.6
Technical Reference:	FNP-1-ESP-0.1, Reactor Trip Response, v34
References provided:	None
Learning Objective:	SELECT AND ASSESS the AFW System instrument/equipment response expected when performing auxiliary feedwater evolutions including (OPS-52102H05): • The Normal Condition
Question History:	New
K/A match:	Requires applicant to be able to predict resultant SG pressure after AFW flow is adjusted.
SRO justification:	N/A

Step	Action/Expected Response	Response NOT Obtained
		1.1.3 Verify SG blowdown - ISOLATED. Verify SG blowdown - ISOLATED. 1A(1B,1C) SGBD ISO [] Q1G24HV7614A closed [] Q1G24HV7614B closed [] Q1G24HV7614C closed

****

CAUTION: To provide adequate heat sink total AFW flow must remain greater than 395 gpm until at least one SG narrow range level is greater than 31%.

****

		1.1.4 IF cooldown continues, THEN control total AFW flow to stop RCS cooldown.
		1.1.5 IF MSIVs are closed, THEN proceed to step 1.1.10
		1.1.6 Verify MSRs reset. REHEATER CONTROL SYSTEM [] CP 4054
		1.1.7 Verify Main Steam Drain Pots isolated. [] MS DRN VLVS N1N11V904A/B/C/D handswitch to close.
		1.1.8 Direct personnel to perform the TB SO Actions Following A Reactor Trip and/or Safety Injection per FNP-0-SOP-0.0.
		1.1.9 IF cooldown continues, THEN close main steam isolation and bypass valves.

SG are a saturated system if Cooling down then SG press is lowering

Step 1 continued on next page.

Although lack of significant slip seems a distinct disadvantage to positive displacement pumps, it is also an advantage. In normal operation, the piston empties the cylinder almost completely on each discharge stroke. This ensures positive delivery of a specific amount of fluid to where it is needed. Lack of slip also makes positive displacement pumps excellent metering pumps, because it is easy to determine how much fluid they pump on each stroke. To determine how much fluid a piston-type reciprocating pump moves in an hour, one merely has to multiply the capacity of the cylinder by the number of discharge strokes the pump makes in an hour.

A positive displacement pump is started with both the suction and discharge valves open. Since this type of pump has almost no slip, the discharge valve must be open as the pump is started. Starting or operating a positive displacement pump with the discharge valve closed can result in severe damage, including potential rupture of the pump casing and discharge piping. A blocked discharge line has the same potential for damage, and should be verified as clear before starting the pump.

CENTRIFUGAL PUMP LAWS

Centrifugal pumps generally obey what are known as the pump laws. These laws apply only to centrifugal pumps in closed systems, the laws do not apply to open systems discussed earlier in the calculation of the suction lift, suction head, and discharge head equations. These laws state that the volume flow rate or capacity is directly proportional to the pump speed, the discharge head is directly proportional to the square of the pump speed, and the power required by the pump motor is directly proportional to the cube of the pump speed. These laws are summarized in the following equations:

$$\dot{V} \propto N$$

$$H_p \propto N^2$$

$$P \propto N^3$$

Where:

$\dot{V}$ = pump volumetric flow rate (gpm)

$\propto$ = proportional

N = pump speed (rpm)

H_p = pump discharge head (psi)

P = pump power (kW)

Equation 2-16

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45. 061G2.1.23 045

Unit 1 was operating at 30% power with **only** the 1A SGFP running when the following occurred.

- The 1A SGFP tripped.

Subsequently, BKR DG15, 1B S/U XFMR TO 1G 4160 V BUS, trips followed by a spurious Safety Injection.

- All SG NR levels are 50% and slowly rising.

Which one of the following completes the statement below, per SOP-22.0, Auxiliary Feedwater?

To stop the 1B MDAFW pump, in addition to placing the MCB switch to STOP, _____ is(are) required.

A. ✔ no other actions

B. resetting the SI

C. placing the 1B MDAFWP AUTO/DEFEAT switch in DEFEAT

D. locally cycling the control power breaker for the 1B MDAFW pump breaker

Ran on desktop simulator.

Distractor Analysis:

A. Correct. Since there are no auto start signals, the MDAFWP can be stopped with only the hand switch.

B. Incorrect. See A. Plausible because the SI "locks in" valves but not pumps. SI must be reset to regain control of valves.

C. Incorrect. See A. Plausible because this would be correct if the LOSP hadn't occurred.

D: Incorrect See A. Plausible because this is how the SGBD and sampling are restored after an auto start. The applicant could reason that this is also required to stop the pump.

QUESTIONS REPORT
for ILT 37 RO BANK VER 4

K/A: 061G2.1.23	Auxiliary / Emergency Feedwater (AFW) System - Ability to perform specific system and integrated plant procedures during all modes of plant operation.
Importance Rating:	4.3/4.4
Technical Reference:	FNP-1-SOP-22.0, Auxiliary Feedwater, v70.1 FSD-A181007, Reactor Protection, v14
References provided:	None
Learning Objective:	DEFINE AND EVALUATE the operational implications of normal / abnormal plant or equipment conditions associated with the safe operation of AFW System components and equipment to include the following (OPS-40201D07): [...] • Abnormal and Emergency Control Methods [...] • Actions needed to mitigate the consequence of the abnormality
Question History:	FNP 05
K/A match:	Requires the applicant to have knowledge of what action is required to secure the 1B MDAFW pump (ability to perform procedure).
SRO justification:	N/A

46. 062A1.03 046

Given the following conditions on Unit 1:

- The 1A inverter is being **manually** transferred to the alternate source for maintenance in accordance with SOP-36.4, 120V AC Distribution Systems.

Which one of the following completes the statement below?

The MANUAL BYPASS switch _(1)_ placed in the BYPASS SOURCE TO LOAD position and the inverter amperage output indication on the EPB _(2)_ be available .

	(1)	(2)
A.	IS	WILL
B.	is NOT	will NOT
C. ✔	IS	will NOT
D.	is NOT	WILL

SOP-36.4

4.3.2 Manual Load Transfer from Inverter to Alternate Source
4.3.2.1 Verify the BYPASS SOURCE AVAILABLE lamp lit.
4.3.2.2 Verify bypass source is in sync with the inverter as follows:
4.3.2.2.1 Verify IN SYNC lamp lit.
4.3.2.2.2 Verify OUT OF SYNC LAMP NOT lit.
[...]
4.3.2.3 Press the BYPASS SOURCE TO LOAD pushbutton.
[...]
4.3.2.4 Transfer the manual bypass switch to the BYPASS SOURCE TO LOAD position.

Distracter Analysis:

A. Incorrect.
1. Correct. See C.1.

2. Incorrect. See C.2. Plausible if the ammeter was downstream of the manual bypass switch.

B. Incorrect.
1. Incorrect. See C.1. Plausible if the applicant was not familiar with the procedure as pressing the "bypass source to load" button would switch the inverter to the bypass source. The switch is procedurally driven.

2. Correct. See C.1.

C. Correct.
1. Correct. Per step 4.3.2.4

2. Correct. The ammeter is upstream of the manual bypass switch.

D. Incorrect.
1. Incorrect. See B.1.

2. Incorrect. See A.2.

K/A: 062A1.03	A.C. Electrical Distribution - Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating the ac distribution system controls including: Effect on instrumentation and controls of switching power supplies
Importance Rating:	2.5 / 2.8
Technical Reference:	FNP-1-SOP-36.4, 120 VAC Distr, v84 OPS-52103D 120 AV Distribution, v2
References provided:	None
Learning Objective:	STATE AND EXPLAIN any special considerations such as safety hazards and **plant condition changes** that apply to the 120 Volt AC Distribution System (OPS-52103D04).
Question History:	MOD BANK
K/A match:	Requires the applicant to be able to predict the change in EPB amps for the 1A inverter when switching to the alternate source (operating the ac distribution system controls).
SRO justification:	N/A

4.3 Manually Transferring Inverter 1A (B, C, D, F, G) Power Supply

4.3.1 Manual Load Transfer from Alternate Source to Inverter:

4.3.1.1 **Verify** inverter is in sync with the bypass source as follows:

4.3.1.1.1 **Verify** IN SYNC lamp lit. ☐

4.3.1.1.2 **Verify** OUT OF SYNC lamp NOT lit. ☐

CAUTION

Do not transfer unless unit is in sync. ☐

4.3.1.2 **Verify** the MANUAL BYPASS switch in the NORMAL OPERATION position. ☐

4.3.1.3 **Press** the INVERTER TO LOAD pushbutton. ☐

4.3.2 Manual Load Transfer from Inverter to Alternate Source

4.3.2.1 **Verify** the BYPASS SOURCE AVAILABLE lamp lit. ☐

4.3.2.2 **Verify** bypass source is in sync with the inverter as follows:

4.3.2.2.1 **Verify** IN SYNC lamp lit. ☐

4.3.2.2.2 **Verify** OUT OF SYNC LAMP NOT lit. ☐

CAUTION

Do not transfer unless unit is in sync. ☐

4.3.2.3 **Press** the BYPASS SOURCE TO LOAD pushbutton. ☐

NOTE

In the following step, the FAN FAILURE light will illuminate and the BYPASS SOURCE AVAILABLE light will go out. ☐

4.3.2.4 **Transfer** the manual bypass switch to the BYPASS SOURCE TO LOAD position. ☐

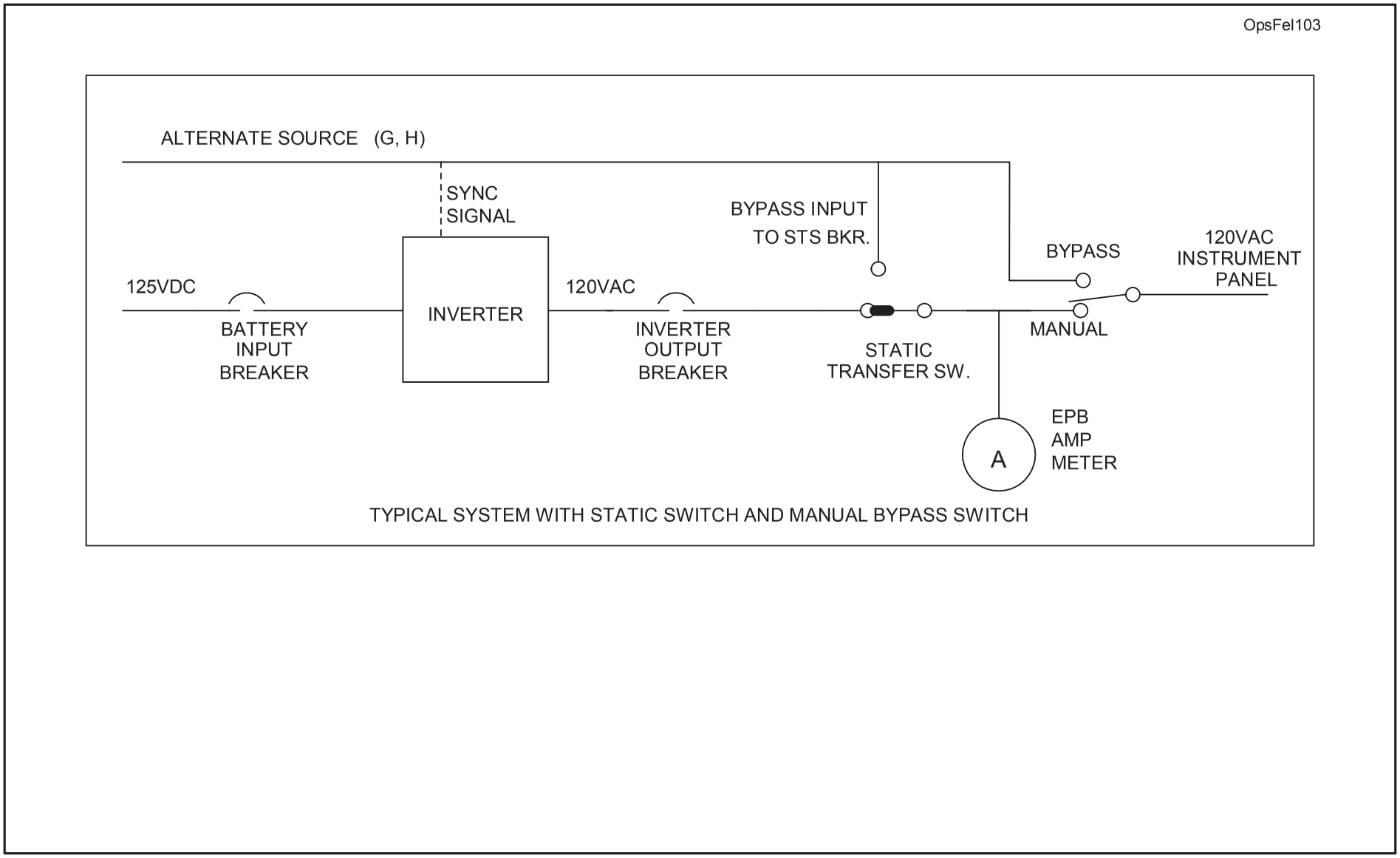

FIGURE 7 - 120 VAC Instrument Inverter

QUESTIONS REPORT
for 2014 combined

1. 120 VAC-40204F09 006

The 1A Inverter automatically transferred to the bypass source due to an inverter fault. The inverter was removed from service IAW SOP-36.4, 120V A.C. Distribution Systems.

The inverter is being placed back in service after maintenance. The following conditions now exist:

COMPONENT	STATUS
• Battery input breaker	CLOSED
• Inverter output breaker	CLOSED
• Manual Bypass Switch	BYPASS SOURCE TO LOAD.
• Inverter Powering Load light	**NOT** LIT
• In Synch light	LIT
• Bypass Source Available light	LIT
• Bypass Source Powering Load light	LIT

Which one of the following will be the effect and indication on the EPB when the **MANUAL BYPASS** switch is transferred to the NORMAL OPERATION position?

A. • The inverter will pick up the load from the normal supply.

• 1A Inverter AMPS will indicate normally on the EPB.

B. ✔ • The alternate supply will continue to supply the load through the static transfer switch.

• 1A Inverter AMPS will indicate normally on the EPB.

C. • The inverter will pick up the load from the normal supply.

• 1A Inverter AMPS will indicate 0 amps on the EPB.

D. • The alternate supply will continue to supply the load through the static transfer switch.

• 1A Inverter AMPS will indicate 0 amps on the EPB.

47. 062AA2.03 047

Unit 1 is operating at 100% reactor power when the following occurs:

- One of the Service Water to Turbine Building isolations has gone closed due to the malfunction of its associated D/P switch.
- 'A' Train SW header pressure is 91 psig.
- 'B' Train SW header pressure is 109 psig.

Which one of the following completes the statements below?

__(1)__ , has gone closed.

If the hand switch for the closed isolation is placed in the OPEN position by the operator, the valve will __(2)__.

	(1)	(2)
A.	MOV-517, SW TO TURB BLDG ISO B TRN	remain closed
B. ✔	MOV-517, SW TO TURB BLDG ISO B TRN	open and reclose
C.	MOV-515, SW TO TURB BLDG ISO A TRN	remain closed
D.	MOV-515, SW TO TURB BLDG ISO A TRN	open and reclose

Added valve Nomenclature **based on NRC Comment**.

Based on the higher header pressure a 'B' train valve has gone closed. 'B' train valves are MOV 514 and 517.

AOP-7.0
Note prior to step 1.2.2 RNO
In the following step it will take close coordination between the control room operator and the system operator in the field. The MOVs in step 1.2.2 will auto close when they reach the open limit regardless of the handswitch being held in the OPEN position. The MOVs will indicate full open for only a brief moment then go back to a dual indication as they start closing.

1.2.2 Place handswitch(es) for each closed
SW TO TURB BLDG ISO to OPEN
and hold.

[ ] Q1P16V515
[ ] Q1P16V516
[ ] Q1P16V517
[ ] Q1P16V514

1.2.3 WHEN SW TO TURB BLDG ISO

indicates open,
THEN direct personnel to open
associated breakers(s).

[ ] Q1P16V515 power supply--FN-B3
[ ] Q1P16V516 power supply--FT-M4
[ ] Q1P16V517 power supply--FN-B4
[ ] Q1P16V514 power supply--FT-M3

Distracter Analysis

A. Incorrect.

1. Correct. See B.1.

2. Incorrect. See B.2. Plausible if the applicant doesn't understand how the valve logic works. They may assume the valve cannot be re-opened due to the constant high flow signal caused by the malfunction DP switch

B. Correct.

1. Correct. V-517 is a 'B' train valve

2. Correct. The valve will open then reclose.

C. Incorrect.

1. Incorrect. See B.1. Plausible if the applicant reasoned that with less flow in the system there is less pressure.

2. Incorrect. See A.2.

D. Incorrect.

1. Incorrect. See C.1.

2. Correct. See B.2.

QUESTIONS REPORT
for ILT 37 RO BANK VER 4

K/A: 062AA2.03	Loss of Nuclear Service Water Ability to determine and interpret the following as they apply to the Loss of Nuclear Service Water: The valve lineups necessary to restart the SWS while bypassing the portion of the system causing the abnormal condition.
Importance Rating:	4.0/4.7
Technical Reference:	AOP-7.0, Loss of Turbine Building Service Water, v13
References provided:	None
Learning Objective:	LABEL, DRAW AND ILLUSTRATE the Service Water System flow paths, to include those items found on the following figures (OPS-440101B05): [..] Figure 9, Service Water to Turbine Building [..] STATE AND EXPLAIN the operational implications for all Cautions, Notes, and Actions associated with AOP-7.0, Loss of Turbine Building Service Water. (OPS-52520G03)
Question History:	MOD BANK
K/A match:	Per Discussion with Chief Examiner, there are no specific instructions to bypass portions of Service Water at FNP. The restoration of the Service Water System to the Turbine Building per AOP-7.0 following the inadvertent isolation due to an instrument malfunction is the closest tie to this K/A.
SRO justification:	N/A

Step	Action/Expected Response	Response Not Obtained

****

CAUTION: IF required to adequately cool running diesel generators, THEN any action previously taken to isolate service water to the turbine building to ensure an adequate cooling supply, should remain in effect during this procedure.

****

NOTE:
- Steps 3, 4, and 5 should be performed in conjunction with FNP-1-EEP-0, REACTOR TRIP OR SAFETY INJECTION if sufficient personnel are available.
- SW TO TURB BLDG ISO A(B) TRN valves will automatically close if SW flow in either train is greater than 17,600 gpm.

__ **1 Check at least one SW train aligned to turbine building.**

- Check A train SW - ALIGNED TO TURBINE BUILDING.

  SW TO TURB BLDG ISO
  A TRN
  [ ] Q1P16V515 open
  [ ] Q1P16V516 open

  OR

- Check B train SW - ALIGNED TO TURBINE BUILDING.

  SW TO TURB BLDG ISO
  B TRN
  [ ] Q1P16V517 open
  [ ] Q1P16V514 open

1 Perform the following.

1.1 Restore at least one SW train to turbine building.

- Align A train SW to turbine building.

  SW TO TURB BLDG ISO
  A TRN
  [ ] Q1P16V515 open
  [ ] Q1P16V516 open

  OR

- Align B train SW to turbine building.

  SW TO TURB BLDG ISO
  B TRN
  [ ] Q1P16V517 open
  [ ] Q1P16V514 open

° Step 1 continued on next page

__ Page Completed

Step	Action/Expected Response	Response Not Obtained

NOTE: Indications for use in determining if isolation is due to flooding or instrumentation include a drop in SW dilution flow and CCW HX SW flow prior to the isolation, number of MOVs closed, maintenance in progress, reports from field and electrical grounds.

1.2 IF the loss of Turbine Bldg SW is known to be an instrumentation issue only, THEN perform the following:

1.2.1 Dispatch personnel to Diesel Building. (1N MCC located in 1C DG Rm, 1T MCC located in 1B DG Rm)

NOTE: In the following step it will take close coordination between the control room operator and the system operator in the field. The MOVs in step 1.2.2 will auto close when they reach the open limit regardless of the handswitch being held in the OPEN position. The MOVs will indicate full open for only a brief moment then go back to a dual indication as they start closing.

1.2.2 Place handswitch(es) for each closed SW TO TURB BLDG ISO to OPEN and hold.

[ ] Q1P16V515
[ ] Q1P16V516
[ ] Q1P16V517
[ ] Q1P16V514

1.2.3 WHEN SW TO TURB BLDG ISO indicates open, THEN direct personnel to open associated breakers(s).

[ ] Q1P16V515 power supply--FN-B3
[ ] Q1P16V516 power supply--FT-M4
[ ] Q1P16V517 power supply--FN-B4
[ ] Q1P16V514 power supply--FT-M3

° Step 1 continued on next page

Page Completed

QUESTIONS REPORT
for 2014 combined

1. SW-62102F02 001

Unit 1 is operating at 100% reactor power when **ONE** of the "A" Train Service Water Header to Turbine Building D/P switches (either PDS-569 or 566, it has not yet been determined which one) develops a leak on the low pressure side.

The following annunciator comes into alarm:

- AF5, SW TO TURB BLDG A OR B TRN FLOW HI

Which ONE of the following describes the condition of the Service Water System and the appropriate procedure to execute?

A. ✔ MOV-514 or MOV-516 is shut, MOV-515 and MOV-517 are open; go to AOP-7.0, Loss of Turbine Building Service Water.

B. MOV-515 or MOV-517 is shut, MOV-514 and MOV-516 are open; go to AOP-7.0, Loss of Turbine Building Service Water.

C. MOV-514 and MOV-516 are shut, MOV-515 and MOV-517 are open; trip the reactor and go toEEP-0, Reactor Trip or Safety Injection.

D. MOV-515 and MOV-517 are shut, MOV-514 and MOV-516 are open; trip the reactor and go to EEP-0, Reactor Trip or Safety Injection.

48. 063A3.01 048

The following indications and alarms are received:

- The UNIT 1 AUX BLDG DC BUS - A TRN GROUND DET white light comes ON momentarily and then goes OFF.
- WC3, 1A 125V DC BUS BATT BKR 72-LA05 TRIPPED, is **in alarm**.
- WC2, 1A 125V DC BUS UV OR GND, **alarms and clears**.

Which ONE of the following describes the status of the indications on the EPB for the 1A DC BUS and the 1A and 1B Inverters?

1A DC BUS VOLTAGE reads approximately (1).

1A and 1B INVERTER AMPERES are reading approximately (2).

A. (1) 0 DC VOLTS

(2) 25 amps

B. (1) 0 DC VOLTS

(2) 0 amps

C. (1) 125 DC VOLTS

(2) 0 amps

D. ✔ (1) 125 DC VOLTS

(2) 25 amps

When the Battery output breaker is opened, LA-05, WC3 will come into alarm due to the b contact from breaker LA05. WC2 shows either a low voltage condition or a ground. In this case it would be a ground.

The battery output breaker has opened due to a ground on the battery and when it opens WC2 clears. The annunciators provide indication that the breaker opened and the white light provides indication of the ground. For this set of circumstances, the battery is no longer aligned to the bus and the battery charger is carrying the load. The indications will remain normal and the inverters will have normal indications. The inverters will not swap to the bypass source and will still be powered from the battery charger.

DWG: D177082 sheet 1, U265966

A - Incorrect. First part is incorrect. See D.1. Plausible if the applicant thinks the DC bus was deenergized due to the indications given.

Second part is Correct. See D.2. Plausible connection to first part if the applicant thinks that the bypass source is supplying the inverter output.

B - Incorrect. First part is incorrect. See A.1.

Second part is correct. See D.2. Plausible connection to the first part if the applicant confused the normal and alternate power supplies to the inverter.

C - Incorrect. First part is correct. See D.1

Second part is incorrect. See D.2. Plausible if the applicant thought that when the inverter automatically shifts to the alternate source, Current indication is lost. This is correct if the inverter is manually bypassed.

D - Correct. First part is correct. When the battery breaker opens, the battery charger will supply the DC bus.

Second part is correct. The inverter is still supplying the load from the normal source. The inverter gets its power from the 125V DC bus. As long as the 125V DC buc remains energized, the inverter will stay on its normal source.

QUESTIONS REPORT
for ILT 37 RO BANK VER 4

K/A: 063A3.01	DC Electrical Distribution System - Ability to monitor automatic operation of the DC electrical system including: Meters, annunciators, dials, recorders, and indicating lights
Importance Rating:	2.7 / 3.1
Technical Reference:	D177082, v42
References provided:	None
Learning Objective:	DEFINE AND EVALUATE the operational implications of normal / abnormal plant or equipment conditions associated with the safe operation of the DC Distribution System components and equipment, to include the following (OPS-40204E07): Normal control methods Abnormal and Emergency Control Methods
Question History:	FNP 10
K/A match:	It meets the KA in that it tests the ability to determine the proper readings on the EPB for an abnormal condition based on the indications and alarms received (white light and annunciators). The automatic portion of the KA is the breaker opening on an overcurrent condition.
SRO justification:	N/A

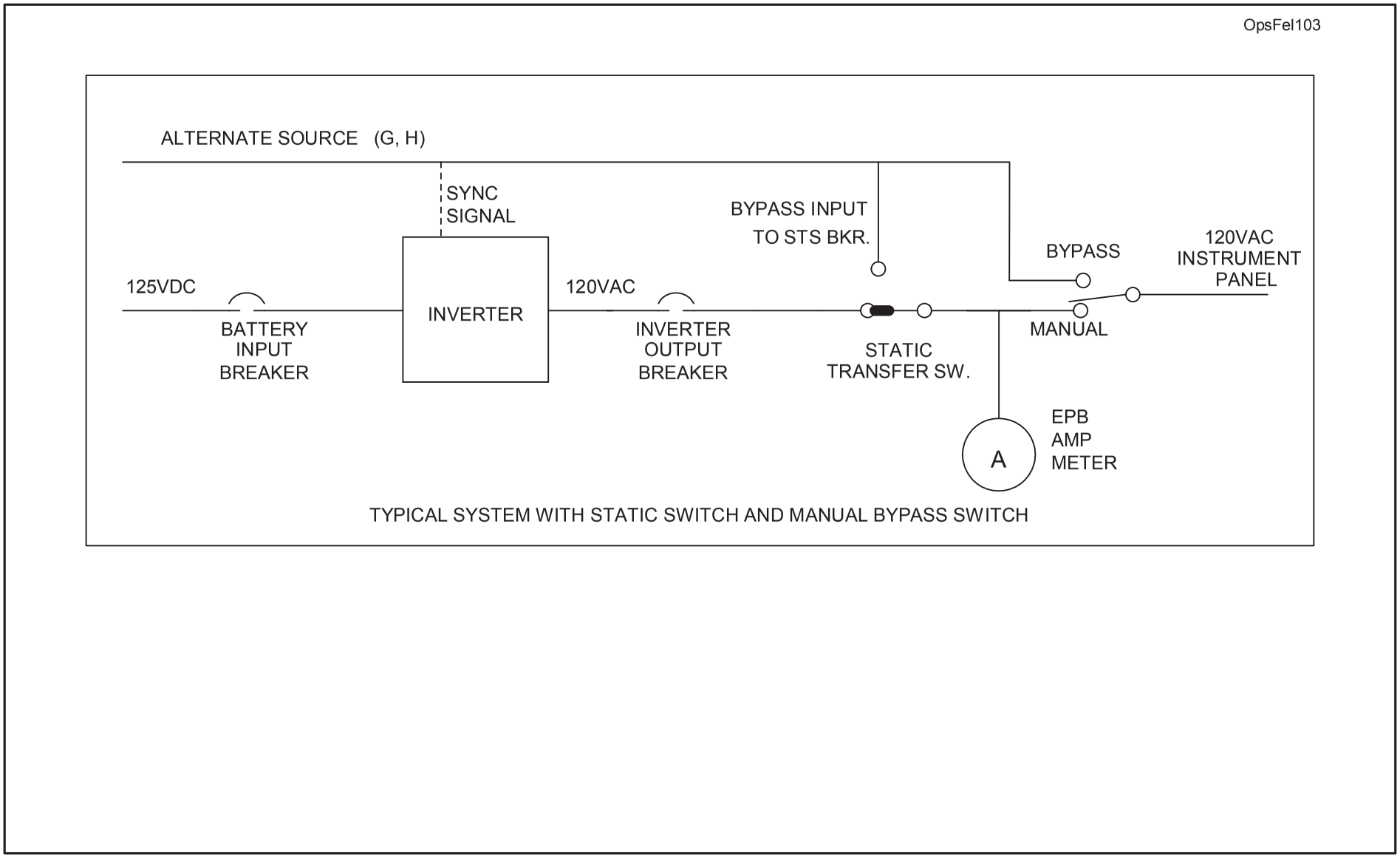

FIGURE 7 - 120 VAC Instrument Inverter

49. 063G2.4.35 049

Which ONE of the following describes operational implications of minimizing DC loads during the performance of ECP-0.0, Loss of All AC Power?

DC loads are minimized to extend the availability of _____ .

A. MCB indications

B. SPDS indications

C. TDAFWP operation

D. Plant Emergency Lighting

ECB-0.0
Following loss of all ac power, the station batteries are the only source of electrical power. The station batteries supply the dc busses and the ac vital instrument busses. Since ac emergency power is not available to charge the station batteries, battery power supply must be conserved to permit monitoring and control of the plant until ac power can be restored .

A. Correct. Per Bkgrnd document.

B. Incorrect. See A. Plausible since ECP-0.0 has the operator monitor CSFs, so they may reason that this is a reason to minimize DC loads.

C. Incorrect. See A. Plausible since the TDAFWP is necessary for heat sink.

D. Incorrect. See A. Plausible since there will be no lighting available on a loss of all AC other than Emergency Lighting. In addition, during a loss of all AC the Control Room lighting is from the Aux Building DC system. An applicant could reason that lighting is vital for performing the numerous local actions required during ECP-0.0.

QUESTIONS REPORT
for ILT 37 RO BANK VER 4

K/A: 063G2.4.35	DC Electrical Distribution - Knowledge of local auxiliary operator tasks during an emergency and the resultant operational effects.
Importance Rating:	3.8 / 4.0
Technical Reference:	FNP-0-ECP-0.0, Specific Bkgrnd Doc for FNP-1/2-ECP-0.0, Loss of all AC Power, v 3.01
References provided:	None
Learning Objective:	EVALUATE plant conditions and DETERMINE if any system components need to be operated while performing (1) ECP-0.0, Loss of All AC Power; [...] (OPS-52532A06
Question History:	NEW
K/A match:	Requires the applicant to know the impact of local operator action during ECP-0.0. This is to minimize DC loads. Even though this information comes from the background document, it is considered overall mitigative strategy.
SRO justification:	N/A

LOSS OF ALL AC POWER
Plant Specific Background Information

Section: Procedure

Unit 1 ERP Step: 14 **Unit 2 ERP Step:** 14 **ERG Step No:** 14

ERP StepText: Minimize DC loads.

ERG StepText: Check DC Bus Loads

Purpose: To conserve dc power supply by shedding non-essential dc loads from the dc busses as soon as practical

Basis: Following loss of all ac power, the station batteries are the only source of electrical power. The station batteries supply the dc busses and the ac vital instrument busses. Since ac emergency power is not available to charge the station batteries, battery power supply must be conserved to permit monitoring and control of the plant until ac power can be restored. A plant specific procedure should be prepared to prioritize the shedding of dc loads in order to conserve and prolong the station battery power supply. The plant specific evaluation should consider shedding of equipment loads from the dc busses and of instrumentation from the ac vital busses. The intent of load shedding is to remove all large non-essential loads as soon as practical, consistent with preventing damage to plant equipment. Consideration should be given to the priority of shedding additional loads in case ac power cannot be restored within the projected life of the station batteries. Consideration should also be given to securing a portable diesel powered battery charger to ensure dc power availability. Since the remaining battery life cannot be monitored from the control room, Step 14 requires personnel to be dispatched to locally monitor the dc power supply. This is intended to provide the operator information on remaining battery life and the need to shed additional dc loads. The plant specific procedure should be structured to ensure communications with the control room operator to ensure his knowledge of dc power status.

Knowledge: N/A

References:

Justification of Differences:

1 Changed to make plant specific.

2 Placed actions in an Attachment to allow an extra operator to perform required actions outside of the control room without interfering with the flow of the procedure.

50. 064G2.4.45 050

The 1-2A DG was running and tied to its respective Emergency Bus due to a Unit 1 LOSP when the following occurred:

- WA1, 1-2A DG ENGINE S/D, was received.
- The System Operator was dispatched to the local alarm panel.

Which one of the following alarm windows at the LOCAL alarm panel indicates the condition that was the cause of the shutdown?

A. HIGH CRANKCASE PRESSURE

B. GENERATOR BEARINGS TEMP HIGH

C. ✓ LUBE OIL PRESSURE LOW

D. JACKET COOLANT TEMP HIGH

Essential Engine trips:
Engine overspeed
Lubricating oil pressure low
Generator differential
Engine start failure

Distracter Analysis:

A. Incorrect. See C. Plausible because this is a NON Essential trip.

B. Incorrect. See C. Plausible because this is a NON Essential trip.

C. Correct. See C. This is an Essential trip.

D. Incorrect. See C. Plausible because this is a NON Essential trip.

K/A: 064G2.4.45	Emergency Diesel Generators - Ability to prioritize and interpret the significance of each annunciator or alarm.
Importance Rating:	4.1/4.3
Technical Reference:	FSD A181005, v45
References provided:	None
Learning Objective:	SELECT AND ASSESS the following instrument/equipment response expected when performing Diesel Generator and Auxiliaries System evolutions including the fail condition, alarms, and trip setpoints (OPS-52102I05): [...] b. Diesels 1-2A, 1B, 2B: • Lube Oil High Temperature Engine Shutdown (TS-549, TS-550) • Low Oil pressure Shutdown Switch (PS-553, PS-554) • Low Oil pressure Switch (PS-555, PS-556) • Crankcase Pressure Alarm (PS-559, PS-560) • Fuel Oil Supply Tank Level Switch (LS-505A, LS-506B) • Start Air Comp Press Switch (PS-520A/B, PS-522A/B, PS-517A/B, PS-518A/B) • Jacket Water Coolant Low Pressure Switch (PS-625, PS-626) • Jacket Water Coolant Low Pressure Shutdown (PS-665, PS-666) • Jacket Water Coolant High Temperature Switch (TS-623, TS-624)
Question History:	BANK - DG-40102C07 13
K/A match:	Requires the applicant to determine which parameter caused the DG to shutdown (interpret the significance) while running after an emergency start. The 'prioritize' is implied due to the significance of the condition resulting in the Essential shutdown of the DG and would be the first annunciator addressed. We recognize that this is reverse logic
SRO justification:	N/A

51. 065AK3.04 051

A complete loss of instrument air has occurred on Unit 1, and the following conditions exist:

- FNP-1-AOP-6.0, Loss of Instrument Air is in progress.
- The Reactor was tripped.
- The TDAFW pump auto started.
- BOTH MDAFW pumps failed to start and **cannot** be started.
- SG NR Levels are:
  – 1A SG is 27% and slowly rising.
  – 1B SG is 29% and slowly rising.
  – 1C SG is 30% and slowly rising.

Subsequently, Instrument Air is expected to be lost for the next 4 hours.

Which one of the following completes the statements below?

Alignment of the Emergency Air Compressors to the TDAFW components is required within a MAXIMUM of (1) in order to (2).

	(1)	(2)
A.	1 hour	ensure adequate heat sink
B. ✔	2 hours	ensure adequate heat sink
C.	1 hour	prevent excessive cooldown
D.	2 hours	prevent excessive cooldown

AOP-6

Caution prior to step 8.2.2

CAUTION: The TDAFWP steam admission valves will fail closed within two hours if emergency air is not aligned.

EEP-0

8 Check AFW Status
8.1 Check secondary heat sink available.
Total feed flow to SGs -GREATER THAN 395 gpm.
[...]
OR
Narrow range level in at
least one SG - GREATER THAN
31%{48%}

Distracter Analysis:

A. Incorrect.

1. Incorrect. See B.1. Plausible since there are a number of one hour requirements in the AOP's and the applicant could incorrectly apply the 1 hour.
(examples: **AOP-2** - Level 3 action is to reduce power to <50% in 1 hour. **AOP-4**, note before step 7 - In Mode 3 with reactor trip breakers closed AND rod control enabled, loss of two RCP busses requires actions to restart RCP(s) or de-energize all CRDMs within 1 hour per Tech Spec 3.4.5, Condition C. **AOP-19**, Step 7 - Perform FNP-1-STP-29.5, Shutdown Margin Calculation Modes 1 and 2, within 1 hour (TAVG > 547°F).)

2. Correct. See B.2.

B. Correct

1. Correct per AOP-6 caution.

2. Correct. Without the TDAFWP, heat sink is NOT adequate per EEP-0.

C. Incorrect.

1. Incorrect. See A.1.

2. Incorrect. See B.2. Plausible if the applicant thought that all valves (feed flow and steam admission) failed open upon a loss of air giving full AFW flow. The steam admission valves fail closed.

D. Incorrect.

1. Correct. See B.1.

2. Incorrect. See C.2.

QUESTIONS REPORT
for ILT 37 RO BANK VER 4

K/A: 065AK3.04	Loss of Instrument Air - Knowledge of the reasons for the following responses as they apply to the Loss of Instrument Air: Cross-over to backup air supplies
Importance Rating:	3.0/3.2
Technical Reference:	FNP-1-AOP-6.0, Loss of Instrument Air, v42 FNP-1-EEP-0.0, Reactor Trip or Safety Injection, v45
References provided:	None
Learning Objective:	**EVALUATE** plant conditions and **DETERMINE** if any system components need to be operated while performing AOP-6.0, Loss of Instrument Air. (OPS-52520F06)
Question History:	FNP 10
K/A match:	Requires the applicant to know that the backup supply of air is required to ensure heat sink.
SRO justification:	N/A

Step	Action/Expected Response	Response Not Obtained
	8.2 IF TDAFWP required, THEN perform the following:	8.2 STOP TDAFWP.
	8.2.1 Locally manually control TDAFWP flow control valves with handwheels. (MSVR). TDAFWP TO 1A(1B,1C) SG [ ] Q1N23HV3228A [ ] Q1N23HV3228B [ ] Q1N23HV3228C	8.2.1 Control TDAFWP speed. TDAFWP SPEED CONT [ ] SIC 3405 adjusted
	**********	
	CAUTION: The TDAFWP steam admission valves will fail closed within two hours if emergency air is not aligned.	
	**********	
	8.2.2 Align emergency air using FNP-1-SOP-62.0, EMERGENCY AIR SYSTEM.	8.2.2 Manually operate TDAFWP per FNP-1-SOP-22.0, Appendix I, TDAFWP MANUAL OPERATION.
__	**9 Verify SW to standby CCW heat exchanger isolated.** [ ] SW TO 1C CCW HX Q1P16MOV3130C [ ] SW TO 1B CCW HX Q1P16MOV3130B [ ] SW TO 1A CCW HX Q1P16MOV3130A	
	NOTE: PORV BKUP air supply Q1P19HV2228 fails closed on a loss of 'B' train DC.	
__	**10 Align nitrogen supply to PRZR PORVs using FNP-1-SOP-62.1, BACKUP-UP AIR OR NITROGEN SUPPLY TO THE PRESSURIZER POWER OPERATED RELIEF VALVES.**	

__Page Completed

Step	Action/Expected Response	Response NOT Obtained
___ 8	Check AFW status.	
	8.1 Check secondary heat sink available. • Total feed flow to SGs - GREATER THAN 395 gpm. AFW FLOW TO 1A(1B,1C) SG [] FI 3229A [] FI 3229B [] FI 3229C AFW TOTAL FLOW [] FI 3229 OR • Narrow range level in at least one SG - GREATER THAN 31%{48%}	8.1 Perform the following. 8.1.1 Verify all available AFW pumps started. MDAFWP [] 1A amps > 0 [] 1B amps > 0 TDAFWP STM SUPP FROM 1B(1C) SG [] MLB-4 1-3 lit [] MLB-4 2-3 lit [] MLB-4 3-3 lit TDAFWP SPEED [] SI 3411A > 3900 rpm TDAFWP SPEED CONT [] SIC 3405 adjusted to 100% 8.1.2 Verify total AFW flow greater than 395 gpm. AFW FLOW TO 1A(1B,1C) SG [] FI 3229A [] FI 3229B [] FI 3229C AFW TOTAL FLOW [] FI 3229 8.1.3 IF total AFW flow less than 395 gpm, AND all SG narrow range levels less than or equal to 31%(48%), THEN go to FNP-1-FRP-H.1, RESPONSE TO LOSS OF SECONDARY HEAT SINK.
	8.2 WHEN all SG narrow range levels less than 31%{48%}, THEN maintain total AFW flow greater than 395 gpm.	

Step 8 continued on next page.

52. 068AK3.18 052

Unit 1 is at 100% power with the following conditions:

- A Control Room evacuation has been initiated per AOP-28.0, Control Room Inaccessibility.

Which one of the following completes the statements below?

In accordance with AOP-28.0, a Reactor trip is initiated __(1)__ .

Expeditiously taking local control of Charging flow at the Hot Shutdown Panels is required because __(2)__ .

A. 1) from the Control Room prior to evacuation

2) letdown will not automatically isolate and Pressurizer pressure control will be degraded due to a loss of Pressurizer level

B. ✔ 1) from the Control Room prior to evacuation

2) an automatic isolation of Letdown will complicate Pressurizer level control

C. 1) locally at the Reactor Trip Switchgear after the Control Room evacuation

2) letdown will not automatically isolate and Pressurizer pressure control will be degraded due to a loss of Pressurizer level

D. 1) locally at the Reactor Trip Switchgear after the Control Room evacuation

2) an automatic isolation of Letdown will complicate Pressurizer level control

AOP-28

1. Verify Reactor Tripped

[...]

6. Establish communications at the hot shutdown panels for Unit 1 and Unit 2.

Note
Isolation of letdown due to low pressurizer level (15%) will unnecessarily complicate plant recovery (LCV 459 & 460 cannot be re-opened from the HSDP). Therefore, emphasis should be placed on controlling charging and AFW flow to establish a stable or slowly rising pressurizer level that compensates for any effect on level due to cooldown.

11 Control CHG FLOW N1E21HIK122 to maintain pressurizer level 20-30%.

Distracter Analysis:

A. Incorrect.	1. Correct. See B.1.
	2. Incorrect. Plausible if the applicant thought that automatic letdown isolation would not occur while in remote from the HSDP since some auto actions do not occur when in LOCAL. (MDAFW / TDAFW pumps auto start etc)
B. Correct.	1. Per Step 1 of AOP-28.
	2. Per the note prior to Step 11 of AOP-28.
C. Incorrect.	1. Incorrect. Plausible since the Control Room is to be evacuated, the applicant may reason that a local trip is required. AOP-28.1 and 28.2 have the Rx Trip breakers locally verified open after tripping from the Control Room the applicant could confuse these steps.
	2. Incorrect. See A.2.
D. Incorrect.	1. Incorrect. See C.1.
	2. Correct. See B.2.

QUESTIONS REPORT
for ILT 37 RO BANK VER 4

K/A:068AK3.18	Control Room Evacuation - Knowledge of the reasons for the following responses as they apply to the Control Room Evacuation: Actions contained in EOP for control room evacuation emergency task
Importance Rating:	4.2 / 4.5
Technical Reference:	FNP-1- AOP-28.0, Control Room Inaccessibility, v16
References provided:	None
	Learning Objective: EVALUATE plant conditions and DETERMINE if any system components need to be operated while performing AOP-28.0, Control Room Inaccessibility. (OPS-52521B06)
Question History:	NEW
K/A match:	Requires the applicant to have knowledge of why(reason) Pressurizer level control is important in AOP-28 as defined by the note prior to step 11.
SRO justification:	N/A

NOTE:
- The operator should remain in this AOP instead of going to FNP-1-EEP-0, REACTOR TRIP OR SAFETY INJECTION.
  FNP-1-EEP-0, REACTOR TRIP OR SAFETY INJECTION assumes the control room is accessible.
- To minimize switchyard transients, it is recommended that the unit trip be coordinated with Unit 2 to prevent simultaneously tripping both units. A time delay of at least 30 seconds between Unit 1 and Unit 2 trips is desirable.

__ **1 Verify reactor tripped.**

__ **2 Verify the turbine tripped.**

__ **3 Verify at least one train of 4160 V ESF buses energized.**

__ **4 Perform the following.**

4.1 Direct Operation's personnel to man the Hot Shutdown Panels.

4.2 Actuate the plant emergency alarm.

4.3 Announce "Main control room evacuation. Report to your designated assembly areas."

4.4 Verify control room and C.A.S. evacuated.

4.5 Notify appropriate support groups to report to the Hot Shutdown Panels.

4.6 Direct Security to station personnel at each control room door to prevent entry.

__ **5 Evaluate event classification and notification requirements using NMP-EP-110, EMERGENCY CLASSIFICATION DETERMINATION AND INITIAL ACTIONS; NMP-EP-111, EMERGENCY NOTIFICATIONS; AND FNP-0-EIP-8, NON-EMERGENCY NOTIFICATION.**

__ **6 Establish communications between the hot shutdown panels for Unit 1 and Unit 2.**

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NOTE:
- Isolation of letdown due to low pressurizer level (15%) will unnecessarily complicate plant recovery (LCV 459 & 460 cannot be re-opened from the HSDP). Therefore, emphasis should be placed on controlling charging and AFW flow to establish a stable or slowly rising pressurizer level that compensates for any effect on level due to cooldown.
- If letdown isolates, guidance for a long term recovery effort of letdown can be found in FNP-1-AOP-28.1, Attachment titled "Local Control of Letdown"..

__ **11 Control CHG FLOW N1E21HIK122 to maintain pressurizer level 20-30%.**

__ **12 Control pressurizer heaters to maintain pressurizer pressure 2220-2250 psig.**

__ **13 Maintain steam generator wide range levels at 64-66%.**

13.1 Verify both MDAFW pumps running.

1A MDAFWP
[ ] Q1N23P001A (A-HSDP)

1B MDAFWP
[ ] Q1N23P001B (B-HSDP)

13.2 Monitor 1A (1B, 1C) SG WR LVL. (A HSDP)

13.3 Control MDAFWP TO 1A (1B, 1C) SG (A-HSDP)

[ ] Q1N23HV3227A adjusted
[ ] Q1N23HV3227B adjusted
[ ] Q1N23HV3227C adjusted

13.4 IF TDAFWP required,
THEN perform the following.

13.4.1 Place TDAFWP STM SUPP FROM 1B SG Q1N12HV3235A/26 to START (D-HSDP).

13.4.2 Place TDAFWP STM SUPP FROM 1C SG Q1N12HV3235B to START (D-HSDP).

13.4.3 Control TDAFWP TO 1A (1B, 1C) SG (D-HSD).

[ ] Q1N23HV3228A adjusted
[ ] Q1N23HV3228B adjusted
[ ] Q1N23HV3228C adjusted

__Page Completed

53. 068K4.01 053

Unit 2 is at 100% power with the following conditions:

- A #1 Waste Monitor Tank (WMT) release is in progress with the #1 WMT pump running.
- RCV-18, WMT DISCH TO ENVIRONMENT, is open.

Subsequently R-18, LIQ WASTE DISCH, alarms HIGH.

Which one of the following completes the statements below?

RCV-18 will __(1)__ .

The #1 WMT pump will __(2)__ .

	(1)	(2)
A.	remain open	trip
B.	remain open	continue to run
C.	close	trip
D. ✔	close	continue to run

FH-1:
R-18 Closes RCV-18.

Distracter Analysis:

A. Incorrect.

1. Incorrect. See D.1. Plausible since the 2nd half has the WMT pump trip which would terminate the release if it actually tripped.

2. Incorrect. See D.2. Plausible because it would terminate the release but it does not trip. The WMT pump has a low level trip.

B. Incorrect.

1. Incorrect. See D.1. Plausible since SGBD has 2 Radiation Monitors that effectively stops a SGBD release (R-23A and B). The applicant could reason that there is another Radiation Monitor that will stop the release. Additionally, if the applicant thought that the discharge from the WMT and SGBD combined before going to the river, then they may reason that R-23B will also close RCV-18.

2. Correct. See D.2. Plausible selection if the applicant used reasoning of first part.

C. Incorrect.

1. Correct. See D.1.

2. Incorrect. See A.2.

D. Correct.

1. Per FH1, RCV-18 closes.

2. WMT pump does NOT trip on High Rad for R-18.

K/A: 068K4.01	Liquid Radwaste - Knowledge of design feature(s) and/or interlock(s) which provide for the following: Safety and environmental precautions for handling hot, acidic, and radioactive liquids
Importance Rating:	3.4 / 4.1
Technical Reference:	FNP-2-ARP-1.6, v61
References provided:	None
Learning Objective:	DEFINE AND EVALUATE the operational implications of normal / abnormal plant or equipment conditions associated with the safe operation of the Radiation Monitoring System components and equipment, to include the following (OPS-40305A07): [...] • Automatic actuation
Question History:	GINNA 06
K/A match:	Requires the applicant to know the interlock to prevent a radioactive discharge above limits.
SRO justification:	N/A

LOCATION FH1

RADIATION MONITOR REFERENCE TABLE (cont)

RE	LOCATION	TYPE	DETECTOR	FUNCTION	ACTIONS
R-12*	Containment Atmosphere (AB 121')	Gas	G-M (W)		Perform Step 4.11
R-13	Waste Gas Compressor Suction (AB 100' WGC Valve Room)	Gas	G-M (W)		Perform Step 4.12
R-14 ODCM	Plant Vent Stack (AB Roof)	Gas	G-M (W)	Closes HCV-14	Perform Step 4.13
R-15A ODCM	Condenser Air Ejector Discharge Header (TB 155')	Gas	G-M		Perform Step 4.14
R-15B*	Condenser Air Ejector (Intermediate Range) (TB 189')	Gas	G-M (Eberline)		Perform Step 4.15
R-15C*	Condenser Air Ejector (High Range) (TB 189')	Gas	Ion Chamber (Eberline)		Perform Step 4.15
R-17A	Component Cooling Water (CCW Hx Room)	Liquid	Scint. (W)	Closes CCW surge tank vent (RCV-3028)	Perform Step 4.16
R-17B	Component Cooling Water (CCW Hx Room)	Liquid	Scint.	Closes CCW surge tank vent (RCV-3028)	Perform Step 4.16
R-18 ODCM	Waste Monitor Tank Pump Discharge (AB 121' at the Batching Funnel)	Liquid	Scint. (W)	Closes RCV-18	Perform Step 4.17
R-19	Steam Generator Blowdown/Sample (AB 139')	Liquid	Scint. (W)	Isolates sample lines 3328, 3329, 3330	Perform Step 4.18
R-20A	Service Water from Containment Coolers A and B (AB 121' BTRS Chiller Room)	Liquid	Scint. (W)		Perform Step 4.19

*Technical Specification related

54. 073K4.01 054

R-14, PLANT VENT, is in HIGH alarm on Unit 1.

Which one of the following actions will occur as a result of the high alarm on R-14?

A. ✔ The Waste Gas release will isolate.

B. RADWASTE Exhaust fans will trip.

C. Auxiliary Building Main Exhaust fans will trip.

D. The Control Room Emergency Filtration/Pressurization system will auto start.

FH1:
AUTOMATIC ACTIONS
1. [...]
A. R14: (Plant Vent Gas) closes Waste Gas Release Valve 1-GWD-HV-014.

Distracter Analysis:

A. Correct. R-14 is the Plant Vent Stack rad monitor in alarm closes the valve for WGDT release.

B. Incorrect. Plausible since these fans discharge to the vent stack.

C. Incorrect. Plausible since these fans discharge to the vent stack.

D. Incorrect. Plausible since these start on a T signal which comes from and SI or when a Manual Phase A is actuated. The applicant could reason that a release to the atmosphere could enter the control room and therefore start this system.

QUESTIONS REPORT
for ILT 37 RO BANK VER 4

K/A: 073K4.01	Process Radiation Monitoring (PRM) System - Knowledge of PRM system design feature(s) and/or interlock(s) which provide for the following: Release termination when radiation exceeds setpoint
Importance Rating:	4.0 / 4.3
Technical Reference:	FNP-1-SOP-51, Waste Gas System, v51
References provided:	None
Learning Objective:	DEFINE AND EVALUATE the operational implications of normal / abnormal plant or equipment conditions associated with the safe operation of the Radiation Monitoring System components and equipment, to include the following (OPS-40305A07): [...] • Automatic actuation
Question History:	FNP 13
K/A match:	Applicant is required to know the interlock which provides for release termination when radiation exceeds setpoint
SRO justification:	N/A

4.2 Radiation monitor R-14 check.

4.2.1 **Verify** the following RCV-14 isolation valves are closed before performing this test:

1-GWD-V-7895 (Q1G22V089) closed. _____

1-GWD-V-7898 (Q1G22V207) closed. _____

4.2.2 **Turn** gas decay tank discharge valve to plant vent 1-GWD-RCV-14 (Q1G22V206) handswitch (1HS-014) to OPEN. _____

4.2.3 **Adjust** HIK-014 flow controller to 100%. _____

NOTE:

Either step 4.2.4 or step 4.2.5 may be utilized to satisfy the isolation capabilities of RCV-14. Steps not required to be performed should be marked N/A (NOT APPLICABLE). ☐

Step 4.2.4 will insert a signal approximately equal to 10^5 cpm. IF the current trip setpoint of RCV-14 is greater than 10^5 cpm, THEN guidance is provided to perform step 4.2.5. ☐

4.2.4 Initiate high alarm on channel R-14 as follows:

4.2.4.1 **Place** the OPERATION SELECTOR switch to PULSE CAL. ☐

4.2.4.2 **Check** HIGH ALARM is received. ☐

4.2.4.3 IF HIGH ALARM is received, THEN **proceed** to step 4.2.4.4. Otherwise, proceed to step 4.2.5. ☐

4.2.4.4 **Check** 1-GWD-RCV-14 (Q1G22V206) closes. ☐

4.2.4.5 **Operate** handswitch (1HS-014) for 1-GWD-RCV-14 (Q1G22V206) from WGP to verify that valve cannot be opened. ☐

4.2.4.6 **Reset** HIGH ALARM using the OPERATION SELECTOR switch. ☐

4.2.4.7 **Place** the OPERATION SELECTOR switch to OPERATE. ☐

4.2.4.8 **Turn** gas decay tank discharge valve to plant vent 1-GWD-RCV-14 (Q1G22V206) handswitch (1HS-014) to CLOSED. ☐

4.2.4.9 **Adjust** HIK-014 flow controller to 0%. ☐

4.2.4.10 **Proceed** to step 4.1.7. ☐

55. 076K2.08 055

Which one of the following completes the statement below?

Q1P16V516, SW TO TURB BLDG ISO A TRN, on Unit 1 is powered from 600V _(1)_ , which is supplied from a(n) _(2)_ Diesel Generator during an LOSP

	(1)	(2)
A.	MCC 1N	A Train
B. ✔	MCC 1T	B Train
C.	MCC 1N	B Train
D.	MCC 1T	A Train

MOV-516 is powered from Safety Related 600V MCC 1T, which is powered by an B Train Diesel Generator during LOSP conditions.

Distracter Analysis:

A. Incorrect.
1. Incorrect. See B.1. Plausible if the applicant fails to recall the correct power supply as this is the opposite train.
2. Incorrect. See B.2. Plausible if the applicant fails to recall the correct power supply as this is the opposite train.

B. Correct.
1. Correct. Per the Load List.
2. Correct. Per the Load List.

C. Incorrect.
1. Incorrect. See A.1.
2. Correct. See B.2.

D. Incorrect.
1. Correct See B.1.
2. Incorrect. See A.2.

QUESTIONS REPORT
for ILT 37 RO BANK VER 4

K/A: 076K2.08	Service Water System (SWS) - Knowledge of bus power supplies to the following: ESF-actuated MOVs
Importance Rating:	3.1 / 3.3
Technical Reference:	A506250, U1 Load List, v 78
References provided:	None
Learning Objective:	NAME AND IDENTIFY the Bus power supplies, for those electrical components associated with the Service Water System, to include those items in Table 7- Power Supplies (OPS-40101B04).
Question origin:	MOD BANK
Basis for meeting K/A:	K/A is met by testing candidate's knowledge of the power supply to MOV-516, a Service Water supply isolation to the Turbine Building. This MOV gets an ESF actuation signal to go closed on a Safety Injection, and to a throttled position on an LOSP.
SRO justification:	N/A

DG03
EE14
FTF5L
1T 600V MCC SECTION **DB - 155'** **B177556-18B**
(CONT'D)

BKR	TPNS	DESCRIPTION	SEE PAGE
FTF4	----------	MCC SPACE HTRS BKR COMPT	
FTF5L	----------	1T 600/208V MCC XFMR>>>1TMCC 208V SECTION >>>	G-106
FT-M1		INCOMMING LINE COMPARTMENT	
FT-M2		TERMINAL BLOCK COMPARTMENT	
FT-M3	Q1P16V514-B	SERVICE WATER MOV - V514	
FT-M4	Q1P16V516-B	SERVICE WATER MOV - V516	
FT-M5	----------	SPARE	
FT-N1		TERMINAL BLOCK COMPARTMENT	
FT-N2	Q1P16V518-B	SERVICE WATER MOV - V518	
FT-N3	Q1P16V536-B	SERVICE WATER MOV - V536	
FT-N4	Q1P16V538-B	SERVICE WATER MOV - V538	

QUESTIONS REPORT

for Questions

1. Which one of the following identifies the power supply for Unit 1 MOV-515, SW TO TURB BLDG ISO A TRN?

   600V AC MCC _(1)_, which is normally supplied by the _(2)_ Startup Transformer.

	(1)	(2)
A. ✔	1N	1A
B.	1T	1B
C.	1N	1B
D.	1T	1A

56. 077AG2.4.31 056

Unit 1 is operating at 100% power with the following conditions:

- WE2, 1F, 4KV BUS OV-OR-UV OR LOSS OF DC, is in alarm
- AOP-5.2, Degraded Grid, has just been entered.
- Voltage on all emergency busses for both units are reading 3850 volts.
- MVARs are reading (+) 550 on the MCB.
- The Generator Capability Curve has been exceeded.
- The Shift Supervisor has directed to maintain (+) 400 MVARs.

Which one of the following completes the statements below?

The operator will __(1)__ Voltage, to reach (+) 400 MVARs.

After adjusting voltage, current to large motors, such as the RCP or CW pump motors, will __(2)__ .

	(1)	(2)
A.	LOWER	LOWER
B. ✔	LOWER	RISE
C.	RAISE	LOWER
D.	RAISE	RISE

UOP-3.1

6.3 Maintain the generator load as displayed on the DEH CRT “GENERATOR REACTIVE CAPABILITY” screen, within the limits shown. Strategies to accomplish this end are, but not limited to, the following: (AI2009200620)

6.3.1 Adjusting hydrogen pressure in the generator.

6.3.2 Adjusting applied excitation to the generator to change VARS per the guidance of Attachment 1.

Although not necessary to know that the MVARs is outside the curve, it adds operational validity. If grid voltage fell, the MVAR out would increase and if outside the curve, would require action per UOP-3.1. AOP-5.2 can be entered for a number of reasons without specific "data" such as: Notification from the Alabama Control Center (ACC) that the offsite grid has become degraded.

Lowering Generator voltage lowers (+) VARs

P=IE => P/E = I => E goes down, I goes up.

Distracter Analysis:

A. Incorrect.
1. Correct. See B.2.
2. Incorrect. See B.2. Plausible connection to the first part if the applicant thought less voltage = less current.

B. Correct.
1. Correct. To reduce MVARs out (+), voltage must be lowered.
2. Correct. Lowering voltage will result in the loads drawing more current.

C. Incorrect.
1. Incorrect. See B.1. Plausible since VARs can be either positive or negative. If they were negative, then raising voltage would be appropriate.
2. Incorrect. See B.2. Plausible since this is correct for raising voltage.

D. Incorrect.
1. Incorrect. See C.1.
2. Correct. See B.2. Plausible connection to the first part if the applicant thought more voltage = more current.

QUESTIONS REPORT
for ILT 37 RO BANK VER 4

K/A: 077AG2.4.31	Generator Voltage and Electric Grid Disturbances - Knowledge of annunciator alarms, indications, or response procedures.
Importance Rating:	4.2 / 4.1
Technical Reference:	FNP-1-UOP-3.1, Power Operation, v117
References provided:	None
Learning Objective:	IDENTIFY conditions during performance of UOP-3.1, Power Operations that might result in equipment damage or degradation and DISCUSS the appropriate precautions and limitations. (OPS-52510F01).
Question History:	FNP 08
K/A match:	Requires the applicant to know the response required by the procedure to restore the MVARs to within the Generator capability curve due to degraded grid voltage.
SRO justification:	N/A

NOTE

Maintaining axial flux difference with ± 5% from the target value helps ensure axial flux does not exceed limits specified in the COLR during transients. ☐

6.2.2 **Maintain** the axial flux difference within the limits specified in the COLR. Operation within ± 5% from the target value is desirable. ☐

NOTE

Refer To FNP-0-SOP-36.8, High Voltage Switchyard Activities, Section 4.8, Voltage Management Strategy Guidance, for additional information concerning voltage control. ☐

6.3 **Maintain** the generator load as displayed on the DEH CRT "GENERATOR REACTIVE CAPABILITY" screen, within the limits shown. Strategies to accomplish this end are, but not limited to, the following: (AI2009200620) ☐

6.3.1 Adjusting hydrogen pressure in the generator. ☐

6.3.2 Adjusting applied excitation to the generator to change VARS per the guidance of Attachment 1. ☐

6.3.3 Requesting the opposite unit to adjust applied excitation to change VARS. ☐

6.3.4 **Contact** ACC, with an explanation of the problem and **request** a voltage schedule relief, OR: ☐

NOTE

The capacitor bank and the shunt reactor cannot be in service simultaneously. ☐

- Raising grid voltage by removing the shunt reactor from service, IF in service. ☐
- Raising grid voltage by placing the capacitor bank in service, IF not in service. ☐
- Lowering grid voltage by placing the shunt reactor in service, IF not in service. ☐
- Lowering the grid voltage by removing the capacitor bank from service, IF in service. ☐

6.3.5 **Reduce** load on the main generator. ☐

ATTACHMENT 1

NOTE

Ensure this operator aid is updated with any revision that affects this page. ☐

OPERATOR AID FOR GRID VOLTAGE ADJUSTMENT

1. WHEN required by the Voltage Schedule to raise grid voltage, THEN briefly place the AUTO VOLTAGE ADJ SWITCH in the RAISE position and allow to spring return to the NEUTRAL position.

   - Monitor voltage on VM5122 or VM4099, GENERATOR VOLT METER to ensure voltage remains less than 23.10.
   - Repeat as required to raise grid voltage to desired value as indicated on the Unit 1 230KV switch house camera.

2. WHEN required by the Voltage Schedule to lower grid voltage, THEN briefly place the AUTO VOLTAGE ADJ SWITCH in the LOWER position and allow to spring return to the NEUTRAL position.

   - Monitor voltage on VM5122 or VM4099, GENERATOR VOLT METER to ensure voltage remains greater than 20.90.
   - Repeat as required to lower grid voltage to desired value as indicated on the Unit 1 230KV switch house camera.

Ref. FNP-1-UOP-3.1

REACTIVE POWER

Reactive power is the power consumed in an AC circuit because of the expansion and contraction of magnetic (inductive) and electrostatic (capacitive) fields. Reactive power is expressed in volt-amperes-reactive (VAR). Equation 5-25 is a mathematical representation for reactive power (Q).

$$Q = VI\sin\theta = I^2X$$

Where:

Q	=	reactive power (VAR)
V	=	rms voltage (V)
I	=	rms current (A)
θ	=	angle between V and I (°)
X	=	net reactance (Ω)

Equation 5-25

Unlike true power, reactive power is not useful because it is stored in the circuit itself. This power is stored by inductors and capacitors. Inductors expand and collapse their magnetic fields in an attempt to keep current constant and capacitors charge and discharge in an attempt to keep voltage constant. Circuit inductance and capacitance consumes and gives back apparent power. The power delivered to the inductance is stored in the magnetic field when the field is expanding and returned to the source when the magnetic field collapses. The power delivered to the capacitance is stored in the electrostatic field when the capacitor is charging, and returned to the source when the capacitor discharges.

We know that alternating current constantly changes; thus, the cycle of expansion and collapse of the magnetic and electrostatic fields constantly occurs. The combined capacitive reactance (X_C) and inductive reactance (X_L) is net reactance (X).

Why are we concerned with reactive power? In a perfect inductor or a perfect capacitor, no energy is consumed. The reactance just exchanges energy without using any energy. A perfect conductor likewise consumes no energy. All of the energy the generator puts into one end of a perfect transmission line comes out on the other end. A perfect generator would have no resistance in its windings.

In the real world none of these components are perfect. There is some amount of resistance in each of the components. When current (true, apparent, or reactive) flows through a resistor, real heat is produced and real losses occur. Generators have maximum current ratings based on the amount of heat they can reject. Reactive power produces current in the generator and, therefore, real heat.

We cannot use or sell reactive power, only true power. Therefore, we are very interested in minimizing the reactive power we produce. If reactive power were zero, then true power and apparent power would be equal. In practice we always generate some heat-producing, energy-wasting reactive power. The power factor relates apparent and true power.

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B **Symptoms or Entry Conditions**

I. This procedure is entered when a potential or actual degraded condition is indicated by any of the following:

a. Notification from the Power Control Center (PCC) of the following:

"*The PCC is not able to assess the electric system for adverse voltage effects from postulated grid conditions for Plant Farley. We advise you to review the entry conditions of your plant Abnormal Operating Procedure for grid disturbance/loss of grid to determine the appropriate plant actions.*"

b. Notification from the Alabama Control Center (ACC) that the offsite grid is one contingency away from being degraded.

c. Notification from the Alabama Control Center (ACC) that the offsite grid has become degraded.

d. EPB annunciator(s), 4KV Bus OV-OR-UV or Loss of DC, in alarm:

- Location WE2: 1F, 4KV BUS OV-OR-UV OR LOSS OF DC

OR

- Location VE2: 1G, 4KV BUS OV-OR-UV OR LOSS OF DC

NOTE

Because of substantial open phase voltage, the indications listed for the following item are not guaranteed to occur during an open phase event.

e. Potential Loss of a Single Phase, symptoms may include the following:

- Random motors tripping
- Failure to start certain motors
- Negative Sequence Alarm
- Fluctuating Voltage/Metering Indications
- Phase Imbalance

57. 078K1.04 057

MOV-514, 515, 516 AND 517, SW to TURB BLDG ISOs have inadvertently closed.

Which one of the following completes the statements below?

The Instrument Air Compressors _(1)_ have cooling supplied.

A back up source of cooling to the Condensate pumps _(2)_ be aligned.

	(1)	(2)
A. ✔	WILL	CAN
B.	WILL	CANNOT
C.	will NOT	CAN
D.	will NOT	CANNOT

Condensate pumps have backup cooling available from Demin water.

Distracter Analysis:

A. Correct.

1. Correct. There is an alternate piping arrangement to allow cooling flow to the IA Compressors if SW is isolated to the Turbine Building.

2. Correct. Demin water is available to be aligned to the Condensate Pumps if SW is isolated to the Turbine Building.

B. Incorrect.

1. Correct. See A.1.

2. Incorrect. See A.2. Plausible if the applicant fails to recall that there is a back up cooling supply available.

C. Incorrect.

1. Incorrect. See A.1. Plausible if the applicant doesn't recall that an emergency line exists to cool the IA Compressors.

2. Correct. See A.2.

D. Incorrect.

1. Incorrect. See C1.

2. Incorrect. See B.2.

QUESTIONS REPORT
for ILT 37 RO BANK VER 4

K/A: 078K1.04	Instrument Air System - Knowledge of the physical connections and/or cause-effect relationships between the IAS and the following systems: Cooling water to compressor
Importance Rating:	2.6/3.9
Technical Reference:	FSD-A181001, Service Water System, v62 FNP-0-SOP-0.0, General Instructions to Operations Personnel, v157
References provided:	None
Learning Objective:	DEFINE AND EVALUATE the operational implications of normal / abnormal plant or equipment conditions associated with the safe operation of the Compressed Air System components and equipment, to include the following (OPS-40204D07): [...] Abnormal and Emergency Control Methods [...] Atlas Copco air compressor shutdown functions including setpoints [...]
Question History:	NEW
K/A match:	Requires applicant to know of the SW bypass line (physical connection) to cool the IA Compressors upon SW to the Turbine Building Isolation.
SRO justification:	N/A

APPENDIX B
TB SO ACTIONS FOLLOWING
A REACTOR TRIP AND/OR SAFETY INJECTION
Page 3 of 9

2.0 Instructions For Safety Injection - Unit 1

2.1 IF Safety Injection has occurred, on Unit 1 AND a condensate pump is running THEN **align** backup cooling to the condensate pumps. (137 Ft. Turb Bldg above telephone booth) ☐

2.1.1 **Open** N1N21V955, Cnds Pumps DW Supp VLV N1N21PCV916 Inlet ISO. ☐

2.1.2 **Open** N1N21V954, Cnds Pumps DW Supp VLV Outlet ISO. ☐

2.1.3 **Verify** running condensate pump lower motor bearing cooling water leakoff line has flow. ☐

2.1.4 **Inform** OPS supervision to establish a tracking item for configuration control.

2.1.5 **Proceed** to step 4.

A safety injection will cause MOV-514 through 517 to close

3.0 Instructions For Safety Injection – Unit 2

3.1 IF Safety Injection has occurred, on Unit 2 AND a condensate pump is running THEN **align** backup cooling to the condensate pumps. (137 Ft. Turb Bldg above the Cnds Pmp cooling SW strainers) ☐

3.1.1 **Open** N2P11V045, Cnds Pumps Dw Supp VLV N2P11V048 Inlet ISO. ☐

3.1.2 **Open** N2P11V044, Cnds Pumps Dw Supp VLV Outlet ISO. ☐

3.1.3 **Verify** running condensate pump lower motor bearing cooling water leakoff line has flow. ☐

3.1.4 **Inform** OPS supervision to establish a tracking item for configuration control. ☐

58. 103A3.01 058

A Large Break LOCA has occurred on Unit 2, and the following conditions exist:

- Containment pressure has risen to 18 psig and is stable.

Which one of the following completes the statements below?

R-11, CTMT PARTICULATE and R-12, CTMT GAS, (1) **isolated**.

HV-3184, CCW FROM RCP THRM BARR, (2) **closed**.

	(1)	(2)
A. ✔	ARE	is NOT
B.	ARE	IS
C.	are NOT	is NOT
D.	are NOT	IS

EEP-0.0,
Attachment 3 shows R-11 and 12 isolate on a Phase A - 4 psig (HI-1)
Attachment 5 shows HV-3814 closed on a Phase B - 16 psig. (HI-3)

Distracter Analysis:

A. Correct.
1. Correct. R-11/12 isolate on a Phase A
2. Correct. HV-3184 closes at 27 psig - Phase B so it is open.

B. Incorrect.
1. Correct. See A.1.
2. Incorrect. See A.2. Plausible since 18 psig is above the HI-2 setpoint of 16.2 psig which closes the MSIVs. The applicant could reason that HV-3184 is closed on the HI-1 or HI-2 signal.

C. Incorrect.
1. Incorrect. See A.1. Plausible since the applicant could reason that R-11/12 is closed on the HI-3 signal.
2. Correct. See A.2.

D. Incorrect.
1. Incorrect. See C.1.
2. Incorrect. See B.2.

QUESTIONS REPORT
for ILT 37 RO BANK VER 4

K/A: 103A3.01	Containment System - Ability to monitor automatic operation of the containment system, including: Containment isolation
Importance Rating:	3.9 / 4.2
Technical Reference:	FNP-1-EEP-0.0, Reactor Trip or Safety Injection, v45 FSD-A181007, Rx Protection System, v18
References provided:	None
Learning Objective:	DEFINE AND EVALUATE the operational implications of normal / abnormal plant or equipment conditions associated with the safe operation of the Radiation Monitoring System components and equipment, to include the following (OPS-40305A07): [...] • Automatic actuation [...]
Question History:	NEW
K/A match:	Applicant must be able to know what the expected condition (monitor automatic operation) of R-11/12 isolations and HV-3184 are when Ctmt pressure reaches 18 psig .
SRO justification:	N/A

Step	Action/Expected Response	Response NOT Obtained

ATTACHMENT 3

PHASE A CONTAINMENT ISOLATION

NOTE:
- ATTACHMENT 3, FIGURE 1 provides a listing of component names corresponding to each MLB-2 location.
- ATTACHMENT 9 provides a listing of sequenced loads.

1	Check all the following MLB-2 indicating lights lit.	1 Verify associated component status.

	1	2	3	4	5	6	7	8	9	10
1	CTMT ISO PHASE A	3657 CLOSED	3198A CLOSED	3772A CLOSED	8112 CLOSED	LCV1003 CLOSED	7126 CLOSED	CONT RM FILT FAN 1A ON	CONT RM PRZN FAN 1A ON	3622 CLOSED
2	3234A CLOSED	3660 CLOSED	3198D CLOSED	3772B CLOSED	8149A CLOSED	3377 CLOSED	3103 CLOSED	3104 CLOSED	3649A CLOSED	3624 CLOSED
3	P16V515 CLOSED	3318B CLOSED	2866C CLOSED	3772C CLOSED	8149B CLOSED	3380 CLOSED	8033 CLOSED	3765 CLOSED	3649B CLOSED	3626 CLOSED
4	P16V517 CLOSED	3999A CLOSED	2867C CLOSED	3443 CLOSED	8149C CLOSED	8871 CLOSED	8028 CLOSED	3766 CLOSED	3649C CLOSED	3628 CLOSED

	11	12	13	14	15	16	17	18	19	20
1	CTMT ISO PHASE A	3658 CLOSED	3198B CLOSED	3196 CLOSED	8100 CLOSED	7136 CLOSED	3331 CLOSED		CONT RM FILT FAN 1B ON	CONT RM PRZN FAN 1B ON
2	3234B CLOSED		3198C CLOSED	3197 CLOSED	8152 CLOSED	3376 CLOSED	3332 CLOSED		3623 CLOSED	3627 CLOSED
3	P16V514 CLOSED	3318A CLOSED	2866D CLOSED	3067 CLOSED	8880 CLOSED	7150 CLOSED	3333 CLOSED		3625 CLOSED	3629 CLOSED
4	P16V516 CLOSED	3999B CLOSED	2867D CLOSED	3095 CLOSED	8860 CLOSED	8961 CLOSED	3334 CLOSED		8047 CLOSED	3659 CLOSED

2	Notify control room of phase A containment isolation status.	

-END-

ATTACHMENT 3

FIGURE 1

LOCATION	COMPONENT NUMBER	NAME
1-1	N/A	CTMT ISO PHASE A - ACTUATED
1-2	Q1N12HV3234A	TDAFWP STM SUPP WARMUP ISO (BOP) - CLOSED
1-3	Q1P16V515	SW TO TURB BLDG ISO A TRN - CLOSED
1-4	Q1P16V517	SW TO TURB BLDG ISO B TRN - CLOSED
2-1	Q1E14HV3657	CTMT ATMOS TO R-11/12 ISO (BOP) - CLOSED
2-2	Q1E14MOV3660	CTMT ATMOS TO R-11/12 ISO (BOP) - CLOSED
2-3	Q1E14MOV3318B	CTMT ΔP ISO (BOP) - CLOSED
2-4	Q1E12HV3999A	RX CAV CLG DMPR (BOP) - CLOSED
3-1	Q1P13HV3198A (Q1P13V284)	CTMT PURGE DMPRS (HS-3198) - CLOSED
3-2	Q1P13HV3198D (Q1P13V281)	CTMT PURGE DMPRS (HS-3198) - CLOSED
3-3	Q1P13HV2866C (Q1P13V301)	MINI-PURGE SUPPLY DAMPER - CLOSED
3-4	Q1P13HV2867C (Q1P13V303)	MINI-PURGE EXHAUST DAMPER - CLOSED
4-1	Q1N25HV3772A	CHEM ADD TO 1A SG ISO (BOP) - CLOSED
4-2	Q1N25HV3772B	CHEM ADD TO 1B SG ISO (BOP) - CLOSED
4-3	Q1N25HV3772C	CHEM ADD TO 1C SG ISO (BOP) - CLOSED
4-4	Q1P17HV3443	CCW FROM EXC LTDN/RCDT HXS - CLOSED
5-1	Q1E21MOV8112	RCP SEAL WTR RTN ISO - CLOSED
5-2	Q1E21HV8149A	LTDN ORIF ISO 45 GPM - CLOSED
5-3	Q1E21HV8149B	LTDN ORIF ISO 60 GPM - CLOSED
5-4	Q1E21HV8149C	LTDN ORIF ISO 60 GPM - CLOSED
6-1	Q1G21LCV1003	RCDT LCV - CLOSED
6-2	Q1G21HV3377	CTMT SUMP DISCH (BOP) - CLOSED

ATTACHMENT 3

FIGURE 1

LOCATION	COMPONENT NUMBER	NAME
6-3	Q1G21HV3380	CTMT SUMP RECIRC (BOP) - CLOSED
6-4	Q1E21HV8871	ACCUM TEST LINE TO RWST ISO - CLOSED
7-1	Q1G21HV7126	RCDT VENT LINE ISO - CLOSED
7-2	Q1P15SV3103	PRZR LIQ SAMPLE ISO (BOP) - CLOSED
7-3	Q1B31HV8033	PRT N2 SUPPLY - CLOSED
7-4	Q1B31HV8028	RMW TO PRT ISO - CLOSED
8-1	QSV49F001A/3A	1A CONT RM FILTRATION RECIRC UNIT (BOP) - ON
8-2	Q1P15SV3104	PRZR STM SAMPLE ISO (BOP) - CLOSED
8-3	Q1P15SV3765	RCS LOOPS 2 & 3 SAMPLE ISO (BOP) - CLOSED
8-4	Q1P15HV3766	ACCUM SAMPLE ISO (BOP) - CLOSED
9-1	QSV49F002A	1A CONT RM PRZN FILTER UNIT (BOP) - ON
9-2	QSV49HV3649A	CONT RM EXH FAN INLET DMPRS (BOP) - CLOSED
9-3	QSV49HV3649B	CONT RM EXH FAN INLET DMPRS (BOP) - CLOSED
9-4	QSV49HV3649C	CONT RM EXH FAN INLET DMPRS (BOP) - CLOSED
10-1	QSV47HV3622	COMPUTER RM HVAC RTN (BOP) - CLOSED
10-2	QSV47HV3624	CONT RM HVAC SUPP (BOP) - CLOSED
10-3	QSV47HV3626	COMPUTER RM HVAC SUPP (BOP) - CLOSED
10-4	QSV49HV3628	CONT RM UTILITY EXH (BOP) - CLOSED
11-1	N/A	CTMT ISO PHASE A - ACTUATED
11-2	Q1N12HV3234B	TDAFWP STM SUPP WARMUP ISO (BOP) - CLOSED
11-3	Q1P16V514	SW TO TURB BLDG ISO B TRN - CLOSED
11-4	Q1P16V516	SW TO TURB BLDG ISO A TRN - CLOSED
12-1	Q1E14HV3658	R-11/12 DISCH TO CTMT (BOP) - CLOSED
12-2	N/A	SPARE

Step	Action/Expected Response	Response NOT Obtained

ATTACHMENT 5

PHASE B CONTAINMENT ISOLATION

NOTE:
- ATTACHMENT 5, FIGURE 1 provides a listing of component names corresponding to each MLB-3 location.
- ATTACHMENT 9 provides a listing of sequenced loads.
- Position of dampers 3361A (B) is dependent on penetration room pressure/inleakage, and may not be open in all cases.
- IF PRF has been aligned in the post-LOCA mode per FNP-1-SOP-60.0, PENETRATION ROOM FILTRATION SYSTEM, THEN only one train of equipment may be in operation.

1 **Check all the following MLB-3 indicating lights lit.**

1 Verify associated component status.

	1	2	3	4	5	6	7	8	9	10
1	CTMT ISO PHASE B	CS PMP 1A ON	3052 CLOSED	PENE RM EXH FAN 1A ON		CTMT ISO PHASE B	CS PMP 1B ON	3046 CLOSED	PENE RM EXH FAN 1B ON	
2	3611 CLOSED	CS RM CLR 1A ON	3045 CLOSED	PENE RM RECIRC FAN 1A ON		2228 CLOSED	CS RM CLR 1B ON	3184 CLOSED	PENE RM RECIRC FAN 1B ON	
3		8820A OPEN	3182 CLOSED	3361A OPEN			8820B OPEN		3361B OPEN	
4				3362A OPEN					3362B OPEN	

2 **Verify proper PRF system operation using FNP-1-SOP-60.0, PENETRATION ROOM FILTRATION SYSTEM.**

3 **Notify control room of phase B containment isolation status.**

-END-

59. G2.1.18 059

The OATC discovers that additional information is required to be inserted into the narrative of an archived log.

Per FNP-0-SOP-0.11, Watch Station Tours and Operator Logs, which one of the following completes the statements below?

The entry __(1)__ required to be designated as a LATE ENTRY.

The entry __(2)__ have to be recorded by the person that was responsible for the original log entry.

	(1)	(2)
A.	IS	DOES
B. ✔	IS	does NOT
C.	is NOT	DOES
D.	is NOT	does NOT

SOP-0.11
5.1 General
[...]
Any on shift operator may make a log entry in the log of their unit log **after** logging in to the software. If a log entry is edited, the entry **will be** noted as having been edited and the person making the change **will be** identified.
[...]

5.2 **Requirements Common To All Narrative Logs:**
[...]
The narrative log will be shown in chronological order. WHEN necessary to insert additional information into a log that has been archived, THEN the entry will be designated as a late entry AND be noted with the actual date/time of the event in the active log. [...]

Distracter Analysis:

A. Incorrect.

1. Correct. See B.1

2. Incorrect. See B.2. Plausible if the applicant reasons that since the entry was made by an individual "log in" on the computer logs, they must make any changes to "their" log.

B. Correct.

1. Once archived any additions to the log must designated as a Late Entry.

2. There is NO requirement to have the person that made the log entry make a late entry for that time. The electronic log records all actions and names of persons making entries so this in not necessary.

C. Incorrect.

1. Incorrect. See B.1. Plausible since section 5.1 allows editing of log entries after they are made if the log is an active log and does not require a late entry.

2. Incorrect. See A.2.

D. Incorrect.

1. Incorrect. See C.2.

2. Correct. See B.2

K/A: G2.1.18	Ability to make accurate, clear, and concise logs, records, status boards, and reports.
Importance Rating:	3.6 / 3.8
Technical Reference:	FNP-0-SOP-0.11, Watch Station Tours and Operator Logs V27.0
References provided:	None
Learning Objective:	List the requirements for operator rounds as delineated in SOP-0.11 (OPS40502O03).
Question History:	NEW
K/A match:	Requires applicant to know the requirement for amending narrative logs after they are archived to ensure all logs are accurate, clear, and concise.
SRO justification:	N/A

5.0 NARRATIVE LOG GUIDELINES

5.1 General:

Logs should provide an accurate history of plant operations as a narrative sequence of events or functions performed. These log entries become the tracking mechanism by which we measure Technical Specification compliance, Risk Assessment (for all modes of operations), Event analysis, and Performance Indicator assessment.

Care should be taken to ensure that pertinent data, alarms, or indications are recorded in the appropriate operator log(s) to allow reconstruction of the event.

During fast-paced transients, notes can be used until transfer to the appropriate log can be accomplished after the condition stabilizes.

The normal method of log keeping will be the use of the computerized log, with one master log program, consisting of sublogs for the applicable shift members.

Any on shift operator may make a log entry in the log of their unit log **after** logging in to the software. If a log entry is edited, the entry **will be** noted as having been edited and the person making the change **will be** identified.

Changes to plant equipment status that affect NRC Performance Indicators (PI) will be entered into the Control Room Log on the affected Unit. See Figure 2, Performance Indicators Primarily Controlled And Monitored By Operations for items that are under Operations responsibility for documenting. The intent of this requirement is that the Control Room Log will be the location for review for Operations PI Data Preparation.

5.2 Requirements Common To All Narrative Logs:

Significant events (e.g., trips, ESF actuations) will be included in sufficient detail so that the event is basically described.

IF an instrument is removed from service to perform a TS, TRM, or ODCM test, the out of service time will be tracked in accordance with FNP-0-SOP-0.13, Recording Limiting Conditions For Operations.

The narrative log will be shown in chronological order. WHEN necessary to insert additional information into a log that has been archived, THEN the entry will be designated as a late entry AND be noted with the actual date/time of the event in the active log.

Narrative log entries must be kept current with clear, concise, and complete entries, using the appropriate log entry type when applicable.

The "NOTES" feature of the computerized log may be used to enter miscellaneous information for shift turnover or other purposes. This is not a part of the official log.

The Shift Clerk should maintain at least the previous seven days logs in the Shift Clerk's office for review by the operating crew should the electronic logs become unavailable. Then the logs shall be forwarded to Document Control for filing in accordance with FNP-0-AP-4, Control Of Plant Documents And Records.

60. G2.1.5 060

Both Units are operating at 100% power with the following conditions:

- A non-licensed Fire Protection Administrator who is qualified as a Shift Communicator is on shift.

Which one of the following completes the statements below?

Per EIP-0.0, Emergency Organization, a **minimum** of _(1)_ licensed Plant Operators is required to staff the shift.

The **maximum** number of hours that a Plant Operator may work in any 24 hour period is _(2)_ per NMP-AD-016-003, Scheduling and Calculating Work Hours.

	(1)	(2)
A.	3	12
B. ✔	3	16
C.	4	12
D.	4	16

EIP-0.0 Table 1 requires:
1 OATC per Unit - Total of 2
1 UO Shared - Total of 1
Shift Communicator (Least affected UO)

NMP-AD016-003
6.1.2 The following work hour **ceiling** limits apply to covered individuals regardless of unit status unless the unit status is related to declared plant emergencies or an unannounced emergency preparedness exercise:
• No more than 16 work hours in any 24-hour period
• No more than 26 work hours in any 48-hour period
• No more than 72 work hours in any 7-day/168-hour period

Distracter analysis

A. Incorrect. First part is correct (See B.2).

Second part is incorrect (See B.2). Plausible since this is the normal number of hours work and the applicant could not be able to recall the correct limit.

B. Correct. First part is correct. Per EIP-0.0, 3 Licensed operators are required to man the shift since a shift communicator is also on shift.

Second part is correct. The following work hour **ceiling** limits apply to covered individuals regardless of unit status:
• No more than 16 work hours in any 24-hour period

C. Incorrect. First part is incorrect (See B.2). Plausible since without a non-licensed shift communicator, this would be a correct answer.

Second part is incorrect (See A.2).

D. Incorrect. First part is incorrect (See C.2).

Second part is correct (See B.2).

QUESTIONS REPORT
for ILT 37 RO BANK VER 4

K/A: G2.1.5	Ability to use procedures related to shift staffing, such as minimum crew complement, overtime limitations, etc.
Importance Rating:	2.9/3.9
Technical Reference:	FNP-0-EIP-0.0, Emergency Organization, v30 NMP-AD-016-003, Scheduling and Calculating Work Hours, V7
References provided:	None
Learning Objective:	Given the plant mode for each unit, STATE AND EXPLAIN the minimum manning requirements for manning one or both units (OPS40502H04).
Question History:	FNP 13
K/A match:	Requires the applicant to have the ability to determine what minimum crew manning in that they must determine at what time the crew falls below minimum and how long they have to correct the situation.
SRO justification:	N/A

TABLE 1

MINIMUM SHIFT STAFFING REQUIREMENTS Based on the Emergency Plan table 3 and FNP-0-EIP-0.0			
Position		Person Filling Position	Function
Operations			
Shift Manager	1		Emergency Direction and Control (Emergency Director)
			Plant Operations and Assessment of Operational Aspects. Shift SRO
Unit 1 Shift Supervisor	1		Plant Operations and Assessment of Operational Aspects. SS (SRO)
Unit 2 Shift Supervisor	1		Notification / Communication. The SS of the least affected unit will assume the role of the ENN/ENS communicator
SSS, STA Qualified	1		Shift Technical Advisor Core/Thermal Hydraulics, Electrical, Mechanical
SSS, Fire Brigade Qualified	1		Fire Brigade per the FSAR (Fire Brigade Chief)
OATC Unit 1	1		Plant Operations and Assessment of Operational Aspects
OATC Unit 2	1		Plant Operations and Assessment of Operational Aspects
Unit Operator Unit 1/2	1		Plant Operations and Assessment of Operational Aspects
Shift Communicator	1		Least affected unit UO will assume the role of the Shift Communicator
System Operator Operations	3	SO #1_____ SO #2_____ SO #3_____	Plant Operations and Assessment of Operational Aspects
Systems Operators Fire brigade	4	SO #4_____ SO #5_____ SO #6_____ SO #7_____	Brigade per the FSAR (Fire Brigade members)

Have separtate communicator available

5.7 Nuclear Oversight will audit work hour control. An audit of gate times or payroll times are not an appropriate measure of 10 CFR 26 compliance since these measures may not be representative of risk-significant work activities.

6.0 Procedure

6.1 On-Line Method – Maximum Average Work Hour (MAWH)

6.1.1 MAWH is the on-line method selected for the SNC fleet for managing cumulative fatigue that establishes a limit of 54 work hours per week that an individual may average over the licensee-defined averaging period of 1 to 6 weeks. A weekly maximum average of 54 hours worked, is calculated based on a rolling averaging period of up to 6 weeks.

This is an alternative approach to on-line minimum days off (MDO) and is applicable to all Covered Worker classifications.

Note
The requirements for ceilings, breaks and MAWH (54-hour averaging) must be met simultaneously. Unless the calculation period falls within a partial week, then only the ceilings and breaks would apply.

6.1.2 The following work hour **ceiling** limits apply to covered individuals regardless of unit status unless the unit status is related to declared plant emergencies or an unannounced emergency preparedness exercise:

- No more than 16 work hours in any 24-hour period
- No more than 26 work hours in any 48-hour period
- No more than 72 work hours in any 7-day/168-hour period

The periods of "24-hours," "48-hours," "7-days/168-hours" and “9-days/216-hours” are rolling time periods. Rolling means the period is not re-zeroed or reset following a day off. The period continues to roll.

6.1.3 The following **break** requirements apply to covered individuals regardless of unit status unless the unit status is related to declared plant emergencies or an unannounced emergency preparedness exercise:

- At least a 10-hour break between successive work periods (an 8-hour break is acceptable only when a break of less than 10 hours is necessary to accommodate a crew's scheduled transition between work schedules or shifts).
- A 34-hour break in any 9-calendar day/216-hour period.

6.1.4 The **averaging period** is the duration over which the 54-hour average (MAWH) is calculated and will be consistent with standard shift schedules, but may not be less than 1 week or greater than 6 weeks.

- All departments will use an averaging period that will coincide with the department’s standard shift schedule. Standard shift schedules could change due to Management decisions.

61. G2.2.42 061

Unit 1 is at 100% power with the following conditions:

RCS leakage is:
- Total Leakage is 7.06 gpm
- Leakage to the RCDT 4.01 gpm
- Leakage to PRT 0.00 gpm

Primary-to-Secondary leakage is:
- A Steam Generator 75.0 gpd
- B Steam Generator 80.0 gpd
- C Steam Generator 0.0 gpd

Which one of the following statements is correct concerning the leak rate data and LCO 3.4.13 RCS Operational Leakage?

A. No Tech Spec LCO entry is required.

B. The identified leakage LCO limit has been exceeded.

C. ✔ The unidentified leakage LCO limit has been exceeded.

D. The primary-to-secondary leakage LCO limit has been exceeded.

LCO 3.4.13 RCS operational LEAKAGE shall be limited to:
a. No pressure boundary LEAKAGE;
b. 1 gpm unidentified LEAKAGE;
c. 10 gpm identified LEAKAGE; and
d. 150 gallons per day primary to secondary LEAKAGE through any one steam generator (SG).

Unidentified = 7.06 gpm - 4.01 gpm = 3.05 gpm

Distracter Analysis:

A. Incorrect. See C. Plausible since NMP-EP-11-GL01, threshold value for a NOUE for unidentified leakage is 10 gpm

B. Incorrect. See C. Plausible if the applicant adds the the RCDT to total leakage.

C. Correct. See explanation above.

D. Incorrect. See C. Plausible since novice operators often total the leakage because AOP-2 says if unable to determine leak rate from an individual SG then the total is assumed to be from one SG.

QUESTIONS REPORT
for ILT 37 RO BANK VER 4

K/A: G2.2.42	Ability to recognize system parameters that are entry-level conditions for Technical Specifications.
Importance Rating:	3.9 / 4.6
Technical Reference:	Tech Specs, v193
References provided:	None
Learning Objective:	RECALL AND APPLY the LCO and APPLICABILITY for Technical Specifications (TS) or TRM requirements, and the REQUIRED ACTIONS for 1 HR or less TS or TRM requirements, and the relevant portions of BASES that DEFINE the OPERABILITY and APPLICABILITY of the LCO associated with the Reactor Coolant System (RCS) and attendant equipment alignment, to include the following (OPS-52101A01): [...] • 3.4.13, RCS Operational LEAKAGE [...]
Question History:	MOD BANK
K/A match:	The question presents a plausible scenario where RCS Leak Rate data has been collected. The student must determine that LCO entry is required due to identified leakage is above Tech Spec LCO limits.
SRO justification:	N/A

3.4 REACTOR COOLANT SYSTEM (RCS)

3.4.13 RCS Operational LEAKAGE

LCO 3.4.13 RCS operational LEAKAGE shall be limited to:

a. No pressure boundary LEAKAGE;

b. 1 gpm unidentified LEAKAGE;

c. 10 gpm identified LEAKAGE; and

d. 150 gallons per day primary to secondary LEAKAGE through any one steam generator (SG).

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

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. RCS operational LEAKAGE not within limits for reasons other than pressure boundary LEAKAGE or primary to secondary LEAKAGE.	A.1 Reduce LEAKAGE to within limits.	4 hours
B. Required Action and associated Completion Time of Condition A not met. OR Pressure boundary LEAKAGE exists. OR Primary to secondary LEAKAGE not within limit.	B.1 Be in MODE 3. AND B.2 Be in MODE 5.	6 hours 36 hours

QUESTIONS REPORT
for Questions

1.

Given the following:

- Unit 1 is at 340ºF maintaining stable plant conditions

- 14905-1, "RCS Leak Rate Calculation" has just been completed.

The following data was recorded.

- Total RCS Leakage = 11.06 gpm

- Leakage to PRT = 5.79 gpm

- Leakage to RCDT = 4.08 gpm

Primary-to-Secondary leakage is:

- SG # 1 = 0.06 gpm

- SG # 2 = 0.05 gpm

- SG # 3 = 0.10 gpm

- SG # 4 = 0.06 gpm

Which **ONE** of the following statements is **CORRECT** concerning the leak rate data?

A. No Tech Spec LCO entry is required.

B. ✔ The identified leakage LCO limit has been exceeded.

C. The unidentified leakage LCO limit has been exceeded.

D. The primary-to-secondary leakage LCO limit through SG # 3 has been exceeded.

62. G2.2.44 062

Unit 1 is at approximately 30% power with the following conditions:

- The TSLB3 Bistable status is as follows:
  - 4-1, PR P8 NC-41N, Bistable light is LIT.
  - 4-2, PR P8 NC-42N, Bistable light is LIT.
  - 4-3, PR P8 NC-43N, Bistable light is DARK.
  - 4-4, PR P8 NC-44N, Bistable light is DARK.
- The Low Power Low Flow Trip Block P-8 light on the Bypass and Permissive Panel is DARK.

Which one of the following completes the statement below?

If 1A Reactor Coolant Pump trips, EEP-0.0, Reactor Trip or Safety Injection, entry __(1)__ required.

If Reactor power is reduced to 25%, the Low Power Low Flow Trip Block P-8 light on the Bypass and Permissive Panel will be __(2)__ .

	(1)	(2)
A.	is NOT	DARK
B.	IS	DARK
C.	is NOT	LIT
D. ✔	IS	LIT

SOP-0.3

P-8 Single Loop Loss of Flow Permissive from NIS 41, 42, 43, and 44: 2/4 > setpoint (30%) reinstates the Rx trip from loss of flow. the TSLB will be LIT when > P-8. The Bypass and Permissive panel will be DARK.

EEP-0.0:
Loss of flow on 2/3 detectors in 1/3 loops >30% power causes a Rx trip.

Distracter Analysis:

A. Incorrect.	1. Incorrect. See D.1. Plausible if the applicant thought that the coincidence was 3 of 4.
.	2. Incorrect. See D.1. Plausible since the TSLB lights go DARK below P-8.
B. Incorrect.	1. Correct. See D.2.
	2. Incorrect. See A.2.
C. Incorrect.	1. Incorrect. See A.1.
	2. Correct. See D.2.
D. Correct.	1. Correct. 2 of 4 bistables are LIT the Rx will trip.
	2. Correct. The Bypass and Permissive panel LIGHTS when below P-8.

QUESTIONS REPORT
for ILT 37 RO BANK VER 4

K/A: G2.2.44	Ability to interpret control room indications to verify the status and operation of a system, and understand how operator actions and directives affect plant and system conditions.
Importance Rating:	4.2 / 4.4
Technical Reference:	FNP-1-SOP-0.3, Operations Reference Information, v49.2 FNP-1-EEP-0.0, Reactor Trip or Safety Injection, v45
References provided:	None
Learning Objective:	RECALL AND DESCRIBE the operation and function of the following reactor trip signals, permissives, control interlocks, and engineered safeguards actuation signals associated with the Reactor Protection System (RPS) and Engineered Safeguards Features (ESF) to include setpoint, coincidence, rate functions (if any), reset features, and the potential consequences for improper conditions to include those items in the following tables (OPS-52201I07): [...] Table 5, Permissives [...]
Question History:	NEW
K/A match:	Requires the applicant to interpret the Bistables to verify the status of the P-8 permissive and how ramping up will affect the bistables (the P-8 signal). An operator must be able to look at the bistables and determine if a Rx trip is or is not required as he/she must back up a fail to trip condition.
SRO justification:	N/A

Reactor Trip	Instrumentation (TSLB)	Setpoint	Coincidence
10. Pressurizer High Water Level	LI-459A,460,461 (TSLB2 18-1,18-2,18-3	92%	2/3 (RX Pwr >10%)
11. Low Reactor Coolant Flow	FI-414,415,416 FI-424,425,426 FI-434,435,436 (TSLB2 4-1,4-2,4-3, 5-1,5-2,5-3, 6-1,6-2,6-3)	90%	2/3 per loop on 1/3 loops (Rx Pwr > 30%) 2/3 per loop on 2/3 loops (30% > Rx Pwr > 10%)
12. RCP Undervoltage	RCP Undervoltage Relays (TSLB2 1-1,1-2,1-3)	2680 V (0.6 sec time delay)	1/2 detectors on 2/3 RCPs (Rx Pwr > 10%)
13. RCP Bus Underfrequency	BUS Underfrequency Relays (TSLB2 2-1,2-2,2-3)	57 Hz (0.3 sec . time delay)	1/2 detectors on 2/3 Busses (Rx Pwr > 10%)
14. Low Low SG Water Level	LI-474,475,476 LI-484,485,486 LI-494,495,496 (TSLB4 4-1,4-2,4-3, 5-1,5-2,5-3, 6-1,6-2,6-3)	28%	2/3 Detectors on 1/3 SGs
15. Turbine Trip	DEHC (TSLB2 13-1,13-2,13-3, 14-1,14-2,14-3, 14-4)	Low Auto Stop Oil at 45 psig or Throttle Valves Closed	2/3 for Auto Stop Oil or 4/4 Throttle Valves Closed (Rx Pwr > 35%)
16. SI	N/A	Any SI Signal	1/2 Trains
17. General Warning	N/A	N/A	2/2 Trains
18. Manual	N/A	N/A	1/2

ll. The following are symptoms of a reactor trip:

a. Any reactor trip annunciator lit.

b. Rapid decrease in neutron level indicated by nuclear instrumentation.

c. All shutdown and control rods are fully inserted. Rod bottom lights are lit.

63. G2.3.11 063

The following conditions exist on Unit 2:

- The plant was operating at 100% power.
- A Steam Generator Tube Rupture has occurred in the 2B SG.
- The crew is performing the actions in EEP-3.0, Steam Generator Tube Rupture, to isolate the 2B SG.

Which one of the following describes the actions required to minimize radiation releases in accordance with EEP-3.0?

A. Place the 2B SG Atmospheric Relief Valve in MANUAL and maintain closed.

B. ✔ Verify the 2B SG Atmospheric Relief Valve in AUTO with controller setpoint at 8.25 (1035 psig).

C. Verify the 2B SG Atmospheric Relief Valve in AUTO with controller setpoint at 8.04 (1005 psig).

D. Place the 2B SG Atmospheric Relief Valve in MANUAL and control pressure at 1035 psig.

EEP-3

3 [CA] WHEN ruptured SG(s) identified,
THEN isolate flow from ruptured SG(s).

3.1 Verify ruptured SG(s) atmospheric relief valve - ALIGNED.

Ruptured 2B MS ATMOS REL VLV PC 3371B - 8.25 in AUTO

Distracter Analysis:

A. Incorrect. See B. Plausible, since this is correct per EEP-2 for a faulted SG isolation.

B. Correct. See B. EEP-3 directs adjusting the SG Atmospheric Relief Valve in AUTO with controller setpoint at 8.25 to minimize radioactive releases.

C. Incorrect. See B. Plausible, since this is a value used in SOP-18, Steam Dump System, for steam dump operation during plant heatup. Step 4.1.5 and in the note prior to step 4.3.

D. Incorrect. See B. Plausible, since EEP-2 directs the ARV be placed in manual to isolate a faulted SG and additionally, skill of the craft would allow this if the automatic controller was not working correctly. Controlling at 1035, the normal automatic setpoint, would make sense if the valve was in manual since it would prevent challenging a safety relief valve which may fail to reseat and create an unisolable release.

QUESTIONS REPORT
for ILT 37 RO BANK VER 4

K/A: G2.3.11	Ability to control radiation releases. (CFR: 41.11 / 43.4 / 45.10)
Importance Rating:	3.8 / 4.3
Technical Reference:	FNP-2-EEP-3.0, SGTR, v27
References provided:	None
Learning Objective:	EVALUATE plant conditions and DETERMINE if any system components need to be operated while performing EEP-3, Steam Generator Tube Rupture. (OPS-52530D06)
Question History:	HNP 09
K/A match:	Candidate must recall EEP-3.0 procedure strategy for protecting SG and minimizing radioactive release.
SRO justification:	N/A

Step	Action/Expected Response	Response NOT Obtained

****

CAUTION: At least one SG must be maintained available for cooldown.

****

___ 3 **[CA] WHEN ruptured SG(s) identified, THEN isolate flow from ruptured SG(s).**

3.1 Verify ruptured SG(s) atmospheric relief valve - ALIGNED.

Ruptured SG	1A	1B	1C
1A(1B,1C) MS ATMOS REL VLV PC	[]3371A 8.25 in AUTO	[]3371B 8.25 in AUTO	[]3371C 8.25 in AUTO

Step 3 continued on next page.

Step | **Action/Expected Response** | **Response NOT Obtained**

___ **4** **Isolate all faulted SGs.**

4.1 Verify all faulted SG atmospheric reliefs - MANUALLY CLOSED.

Faulted SG	1A	1B	1C
1A(1B,1C) MS ATMOS REL VLV PC	[]3371A	[]3371B	[]3371C

4.1 Locally unlock and close one isolation valve for any failed atmospheric relief. (127 ft, AUX BLDG main steam valve room)

Faulted SG	1A	1B	1C
Q1N11V	[]004A []004B	[]004C []004D	[]004E []004F
Key	Z-131 Z-126	Z-125 Z-124	Z-123 Z-122

4.2 Verify all faulted SG main feed stop valves - CLOSED.

Faulted SG	1A	1B	1C
MAIN FW TO 1A(1B,1C) SG STOP VLV Q1N21MOV	[]3232A	[]3232B	[]3232C

4.2 Locally close all faulted SG main feed stop valves. (127 ft, AUX BLDG main steam valve room)

Faulted SG	1A	1B	1C
MAIN FW TO 1A(1B,1C) SG STOP VLV Q1N21MOV	[]3232A	[]3232B	[]3232C

4.3 Verify blowdown from all faulted SGs - ISOLATED.

Faulted SG	1A	1B	1C
1A(1B,1C) SGBD ISO Q1G24HV	[]7614A closed	[]7614B closed	[]7614C closed

4.3 Locally isolate blowdown. (121 ft, AUX BLDG rad side at PRIP)

Faulted SG	1A	1B	1C
1A(1B,1C) SGBD PENE RM ISO Q1G24HV	[]7697A stopped []7697B stopped	[]7698A stopped []7698B stopped	[]7699A stopped []7699B stopped

Step 4 continued on next page.

4.0 INSTRUCTIONS

4.1 Steam Dump Operation During Plant Heatup

NOTE

- The following step must be completed during RCS heatup prior to reaching No Load Tavg. ☐
- If steam leakage is known to exist *through* the steam dump valves, all valves except A and E may be ISOLATED to minimize RCS heat loss. ☐

1. **Verify** the following valves OPEN:
   - N1N11V516A, 1A STM DUMP VLV ISO ☐
   - N1N11V517A, 1E STM DUMP VLV ISO ☐
   - N1N36V502A, 1A & 1B STM DUMP VLVS TO 1A COND ISO ☐
   - N1N36V503A, 1E & 1F STM DUMP VLVS TO 1B COND ISO ☐
2. **Verify** 0 demand on STM HDR PRESS controller PK-464 and STM DUMP DEMAND TI408. ☐
3. **Place** STM DUMP INTLK TRAIN A and B in ON. ☐
4. **Place** the STM DUMP MODE SEL TRAINS A-B in the STM PRESS position. ☐
5. Using the Curve Book, **set** STM HDR PRESS PK-464 potentiometer for the desired steam pressure (usually 1005 psig). ☐
6. **Place** the STM HDR PRESS controller PK-464 in AUTO. ☐

NOTE

When the reactor is critical and above the point of nuclear heat addition, the remaining six steamdump valves can be unisolated. ☐

7. **Verify** that Steam Dump operation begins when Tavg reaches Tsat for the desired steam pressure (≈ 548ºF for 1005 psig). ☐

64. G2.3.12 064

Two Reactor Operators are in the RCA.

Subsequently, they are required to enter a **High Radiation Area** to align filters for a Tagging Order.

Which one of the following completes the statements below?

The radiation level at which this posting is required is _(1)_.

A briefing by Health Physics _(2)_ required prior to entering the High Radiation Area.

	(1)	(2)
A. ✔	> 100 mrem/hr	IS
B.	> 100 mrem/hr	is NOT
C.	> 1000 mrem/hr	IS
D.	> 1000 mrem/hr	is NOT

Tech Specs - Pursuant to 10 CFR 20, paragraph 20.1601(c), in lieu of the requirements of 10 CFR 20.1601, each high radiation area, as defined in 10 CFR 20, in which the intensity of radiation is > 100 mrem/hr but < 1000 mrem/hr, shall be barricaded and conspicuously posted as a high radiation area and entrance thereto shall be controlled by requiring issuance of a Radiation Work Permit (RWP).

NMP-HP-204
Documented High Radiation Area briefings are required for each entry into a High Radiation Area and shall include the attributes identified in the High Radiation Area electronic log stamp (similar to Figure 1,1A).

Distracter analysis:

A. Correct	1. Correct. Per Tech Specs. (above)
	2. Correct. Per NMP-HP-204 (above)
B. Incorrect.	1. Correct. See A.1.
	2. Incorrect. See A.2. Plausible since workers who enter the RCA entry under a Yellow or Red RWP must be briefed by HP. They may assume that this brief is adequate for the HRA entries inside the RCA. This has been a past problem for FNP.
C. Incorrect.	1. Incorrect. See A.1. Plausible since this is the limit for a Locked High Rad Area.
	2. Correct. See A.2.
D. Incorrect.	1. Incorrect. See C.1.
	2. Incorrect. See B.2.

K/A: G2.3.12	Knowledge of radiological safety principles pertaining to licensed operator duties, such as containment entry requirements, fuel handling responsibilities, access to locked high-radiation areas, aligning filters, etc.
Importance Rating:	3.2 / 3.0
Technical Reference:	Tech Spec, v193 NMP-HP204, ALARA Planning and Job Review, v 3.1
References provided:	None
Learning Objective:	IDENTIFY AND EXPLAIN the precautions that should be taken by an individual prior to leaving the RCA when the PEA sounds if the individual either is wearing PCs or is potentially contaminated (OPS40501B03).
Question History:	MOD BANK
K/A match:	Requires the applicant to know the posting for a High Radiation Area and radiological briefing requirements required for entry to perform work such as aligning filters.
SRO justification:	N/A

5.0 ADMINISTRATIVE CONTROLS

5.7 High Radiation Area

5.7.1 Pursuant to 10 CFR 20, paragraph 20.1601(c), in lieu of the requirements of 10 CFR 20.1601, each high radiation area, as defined in 10 CFR 20, in which the intensity of radiation is > 100 mrem/hr but < 1000 mrem/hr, shall be barricaded and conspicuously posted as a high radiation area and entrance thereto shall be controlled by requiring issuance of a Radiation Work Permit (RWP). Individuals qualified in radiation protection procedures (e.g., Health Physics personnel) or personnel continuously escorted by such individuals may be exempt from the RWP issuance requirement during the performance of their assigned duties in high radiation areas with exposure rates $\leq$ 1000 mrem/hr, provided they are otherwise following plant radiation protection procedures for entry into such high radiation areas.

Any individual or group of individuals permitted to enter such areas shall be provided with or accompanied by one or more of the following:

a. A radiation monitoring device that continuously indicates the radiation dose rate in the area.

b. A radiation monitoring device that continuously integrates the radiation dose rate in the area and alarms when a preset integrated dose is received. Entry into such areas with this monitoring device may be made after the dose rate levels in the area have been established and personnel are aware of them.

c. An individual qualified in radiation protection procedures with a radiation dose rate monitoring device, who is responsible for providing positive control over the activities within the area and shall perform periodic radiation surveillance at the frequency specified by the health physics supervision in the RWP.

5.7.2 In addition to the requirements of Specification 5.7.1, areas accessible to personnel with radiation levels, as measured at 30 cm from the radiation source or from any surface that the radiation penetrates, such that a major portion of the body could receive in one hour a dose greater than 1000 mrem, shall be provided with locked or continuously guarded doors to prevent unauthorized entry and the keys shall be maintained under the administrative control of the Shift Foreman on duty or health physics supervision. Doors shall remain locked

(continued)

4.4 DOSIMETRY SETPOINTS

1. Dosimetry setpoints should be set low enough to provide workers with a warning of higher than expected work area dose rates.

2. Approval by the HP Manager or their designee is required PRIOR to allowing the use of anticipated dose rate alarms. Document approval on Attachment 4.

3. The following items are to be considered when establishing Dosimetry setpoints:

   - Specific location to be entered and task to be performed
   - Previous work in the area and any dose rate alarms in the area
   - Worker position during task performance
   - Shielding or flushing of Hot Spots

4.5 ALARA BRIEFINGS

1. Prior to performing work on a Yellow or Red RWP, workers shall receive the appropriate ALARA Briefing.

2. Pre-job briefings should be attended by all workers and HP technicians involved as well as a member of the work group supervision and HP supervision.

3. Additional, individual or small group briefings may be performed as required to address particular needs (e.g., replace workers, special skilled workers required) provided job scope or conditions of the original briefing have not changed.

4. Documented High Radiation Area briefings are required for each entry into a High Radiation Area and shall include the attributes identified in the High Radiation Area electronic log stamp (similar to Figure 1,1A).

5. Locked High Radiation Area briefings are required for every entry into a LHRA and shall, as a minimum, be documented by completion of the ESOMS LHRA stamp (Similar to Figure 1, 1B), or via completion of Attachment 4 or similar form.

6. For those jobs requiring an ALARA briefing, ensure all workers are in attendance.

QUESTIONS REPORT

for Bank

1. Unit 1 is in Mode 6 for a refueling outage.

   - Two Plant Operators are required to enter a room that is posted as a **Locked High Radiation Area (LHRA)** to perform work.

   Which one of the following completes the statements below?

   The radiation level at which this posting is required is _(1)_.

   The LHRA key is obtained from _(2)_.

   A. 1) > 100 mrem/hr

      2) Health Physics Supervision

   B. 1) > 100 mrem/hr

      2) the Shift Support Supervisor (SSS)

   C✔ 1) > 1000 mrem/hr

      2) Health Physics Supervision

   D. 1) > 1000 mrem/hr

      2) the Shift Support Supervisor (SSS)

65. G2.3.5 065

The Unit 1 Plant Operators have just informed the Shift Supervisor that the Victoreen airborne detector R-31, RADWASTE AREA VENTS EL 121', is in HIGH alarm.

The source of their information was from which one of the following?

A. Westinghouse PERMS radiation monitoring system panels on MCB.

B. Gaseous Waste processing panel annunciator reported by the RADSIDE SO.

C. Victoreen process and effluent monitoring system panel on BOP.

D. ✔ A report from the systems operator in the area of the rad monitor.

OPS- 52106D
Pg 18
Airborne Radiation Monitoring System (Figures 15 through 17)
The Victoreen airborne detectors (R-30 through 34) are completely self-contained, off-line units with **no control room instrumentation or indication.** The units have positive displacement pumps similar to the Westinghouse APD (Figure 16).

Distracter Analysis:

A. Incorrect. See D. Plausible because most rad monitors are part of the PERMS system and do provide indication in the Control Room or alarm on the MCB.

B. Incorrect. See D. Plausible since the R-31 is located on the 121' rad side, and the applicant may think that the alarm is part of the annunciator panel for the Waste Gas panel which is on the 100'.

C. Incorrect. See D. Plausible since R-30 and R-31 are Victoreen units, but they do not provide indication or alarm on the BOP.

D. Correct. The only way to know if R-31 is in alarm is to either check the Plant Computer or check locally.

QUESTIONS REPORT
for ILT 37 RO BANK VER 4

K/A: G2.3.5	Ability to use radiation monitoring systems, such as fixed radiation monitors and alarms, portable survey instruments, personnel monitoring equipment, etc.
Importance Rating:	2.9 / 2.9
Technical Reference:	FSD A181015, RMS, v14
References provided:	None
Learning Objective:	DEFINE AND EVALUATE the operational implications of normal / abnormal plant or equipment conditions associated with the safe operation of the Radiation Monitoring System components and equipment, to include the following (OPS-40305A07): • Normal control methods
Question History:	BANK - RMS-40305A02 017
K/A match:	Applicant is required to know how to obtain information from R-31 (use of R-31).
SRO justification:	N/A

66. G2.4.37 066

An ALERT has been declared on Unit 1.

Per NMP-AD-021, Control Room Access and Decorum, which one of the following personnel can grant permission to enter the AT THE CONTROLS AREA (red carpet area)?

A. Shift Manager ONLY.

B. Shift Supervisor ONLY.

C. ✓ Unit Operator or Operator At The Controls ONLY.

D. Shift Supervisor, Unit Operator or Operator at the Controls.

NMP-AD-021

6.4 Access to the At the Controls Area

6.4.1 Access to the At the Controls Area is restricted to on shift Operations licensed personnel. **No other individuals, including the remainder of the shift complement, will enter the At the Controls Area without first obtaining permission from the UO or OATC.** Any individual in the At the Controls Area shall minimize the time spent between the operator and the main control board.

Distracter analysis:

A. Incorrect. See C. Plausible since an emergency is in effect and the Shift Manager can give permission to enter the Control Room Operating Area (CROA) in this condition.

B. Incorrect. See C. Plausible since an emergency is in effect and the Shift Supervisor can give permission to enter the Control Room Operating Area (CROA) in this condition

C. Correct. Per NMP-AD-021

D. Incorrect. See C. Plausible since the SS gives permission to enter the CROA and the applicant may reason that they can also give access to the ATCA since it is part of the CROA.

QUESTIONS REPORT
for ILT 37 RO BANK VER 4

K/A: G2.4.37	Knowledge of the lines of authority during implementation of the emergency plan.
Importance Rating:	3.0 / 4.1
Technical Reference:	NMP-AD-021, Control Room Access and Decorum, v4.2
References provided:	None
Learning Objective:	Identify who authorizes control room access during various plant conditions (OPS52303C02*).*
Question History:	BANK - PLT COMM-52303C02 003
K/A match:	Requires the applicant to know who has the authority to admit a person to the At the Controls Area.
SRO justification:	N/A

6.4 Access to the At the Controls Area

6.4.1 Access to the At the Controls Area is restricted to on shift Operations licensed personnel. No other individuals, including the remainder of the shift complement, will enter the At the Controls Area without first obtaining permission from the UO or OATC. Any individual in the At the Controls Area shall minimize the time spent between the operator and the main control board.

6.4.2 Sitting on, leaning against/upon or placing books on the At the Controls Area railing is prohibited unless the books are placed on a procedure shelf specifically designed to hang over the railing. This practice could cause the inadvertent manipulation of a main control board switch. Individual sheets of paper may be placed on the MCB provided they are placed in an area free of switches and potential of inadvertent contact.

6.4.3 Food or drink in the At the Controls Area is prohibited. Eating or drinking is prohibited while any part of an individual is in the At the Controls Area. It is permitted in other areas within the Control Room Operating Area. The intent of this policy is to minimize the possibility of inadvertently shorting out MCB components.

6.4.4 Reaching or leaning over the control boards should be minimized.

6.5 Access to Main Control Room Restricted Areas

6.5.1 Main Control Room Restricted Areas shall not be used for personnel traffic. These panels contain sensitive switches, relays or controls that could cause plant transients or unintended equipment operation if inadvertently bumped.

6.5.2 Permission to work in a Restricted Area must be granted by the respective unit's Shift Supervisor, UO or OATC.

7.0 Records

This procedure creates no records.

8.0 Commitments

Vogtle Commitment # 1984303031 (SNC6996)

67. G2.4.49 067

A Unit Operator discovers a ruptured pipe in a radioactive system.

Per EIP-1.0, Duties of an Individual who Discovers an Emergency Condition, which one of the following is required to be performed FIRST?

A. Search all elevations of the Auxiliary Building for injured personnel.

B. Report directly to the Emergency Director and provide a status report.

C. Isolate the ruptured pipe using an upstream valve from a safe location.

D. Inform the Control Room of the emergency then proceed directly to their assembly area.

EIP-1.0
4.1 An individual who discovers an emergency condition shall perform the following actions in a timely manner:
4.1.1 Withdraw to a safe place (such as evacuating from an area if a radiation monitor alarms or if radioactive contamination is involved).
4.1.2 Take actions he is qualified to perform which will aid in controlling and minimizing the effects of the emergency. Examples of such actions include:
4.1.2.1 Extinguishing a small fire with fire fighting equipment located in the immediate area.
4.1.2.2 Closing an upstream valve when a system pipe rupture has occurred.

Distracter analysis:

A. Incorrect. See C. Plausible because EIP-1 has the UO remove injured personnel and a search seems important since it would be pertaining to life saving.

B. Incorrect. See C. Plausible because it is a subsequent action of EIP-1.

C. Correct. Per 4.1.2.2 - Closing an upstream valve when a system pipe rupture has occurred.

D. Incorrect. See C. Plausible since informing the control room would be an appropriate action and proceeding to the assembly area is an action required if the plant emergency alarm is sounded. The applicant could assume that proceeding to the assembly area will allow them to be made available to the Emergency Director for dispatch.

QUESTIONS REPORT
for ILT 37 RO BANK VER 4

K/A: G2.4.49	Ability to perform without reference to procedures those actions that require immediate operation of system components and controls. (CFR: 41.10 / 43.2 / 45.6)
Importance Rating:	4.6 / 4.4
Technical Reference:	FNP-0-EIP-1.0, Duties of an Individual who Discovers an Emergency Condition, v5.0
References provided:	None
Learning Objective:	Using EIP-1.0, Duties of an Individual Who Discovers an Emergency Condition, STATE AND DESCRIBE BRIEFLY the actions performed by an individual who discovers an emergency condition. (OPS-40501A03).
Question History:	BANK - EPIP OVER-40501A03 011
K/A match:	Candidate must recall for a Trained operator discovering an emergency condition, immediate operation of the system is allowed and expected to isolate a rupture.
SRO justification:	N/A

SHARED

FARLEY NUCLEAR PLANT

EMERGENCY PLAN IMPLEMENTING PROCEDURE

FNP-0-EIP-1.0

SAFETY RELATED

DUTIES OF AN INDIVIDUAL WHO DISCOVERS AN EMERGENCY CONDITION

PROCEDURE USAGE REQUIREMENTS PER FNP-0-AP-6	SECTIONS
Continuous Use	
Reference Use	
Information Use	ALL

Approved:

C.D. Collins
Plant Manager

Date Issued 10/21/2009

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DUTIES OF AN INDIVIDUAL WHO DISCOVERS AN EMERGENCY CONDITION

1.0 Purpose

This procedure describes the action which is to be taken by an individual who discovers an emergency condition.

2.0 References

J. M. Farley Nuclear Plant Emergency Plan.

3.0 General

3.1 All personnel should be safety conscious and be on continuous alert to detect any unsafe situation which, if not corrected, could precipitate an emergency condition.

3.2 All personnel permanently assigned to FNP shall be thoroughly familiar with the entrances to and exits from areas in which they work.

4.0 Procedure

4.1 An individual who discovers an emergency condition shall perform the following actions in a timely manner:

4.1.1 Withdraw to a safe place (such as evacuating from an area if a radiation monitor alarms or if radioactive contamination is involved).

4.1.2 Take actions he is qualified to perform which will aid in controlling and minimizing the effects of the emergency. Examples of such actions include:

4.1.2.1 Extinguishing a small fire with fire fighting equipment located in the immediate area.

4.1.2.2 Closing an upstream valve when a system pipe rupture has occurred.

4.1.2.3 Rendering first-aid to affected personnel.

4.1.2.4 Removing injured personnel from the affected area, if necessary, to minimize their exposure to further injury, high radiation, or radioactive contamination.

4.1.2.5 Locally stopping machinery that is contributing to the severity of the emergency (stopping a pump when a downstream pipe has ruptured; de-energized a burning motor; etc.).

4.1.2.6 Warning other personnel in the affected area to withdraw to a safe place.

4.1.3 Notify the Control Room using the plant telephone system by dialing 911 or public address system channel number 5, giving the information listed below. Notification of the control room may occur before 4.1.2 above, based on the judgement of the individual.

4.1.3.1 Your name.

4.1.3.2 Type of emergency (pipe rupture, fire, personnel injury, etc.).

4.1.3.3 Location of emergency.

4.1.3.4 Injured personnel.

4.1.3.5 Visible damage to plant components.

4.2 An individual who discovers an emergency condition shall subsequently:

4.2.1 Follow instructions issued by the Emergency Director.

4.2.2 If the possibility of personal contamination exists, remain in the Radiation Controlled Area until monitored, unless the Plant Emergency Alarm is sounded.

4.2.3 Take precautions, if possible, to prevent or minimize the spread of contamination.

4.2.4 As soon as possible following the emergency situation, report personally to the Emergency Director. In addition document the event by writing a Condition Report.

68. G2.4.9 068

Unit 1 is in Mode 5, with the following conditions:

AT 10:00

- RCS Tcold is 100°F.
- Both trains of RHR are in service.
- RCS level is 129'7".

AT 10:10 the following events occur:

- NE2, 1B RHR PUMP RM SUMP LVL HI-HI OR TRBL, alarms.
- Both 1B RHR PUMP RM SUMP PUMPS are running.
- RCS level is 129'2" and slowly lowering.
- There are no indications of cavitation on either RHR pump.
- Both RHR pump discharge flowrates are 3000 gpm and stable.
- AOP-12.0, Residual Heat Removal Malfunction, is in progress.

Which one of the following completes the statements below?

Per AOP-12.0, (1) RHR pump(s) is(are) secured and flowpath(s) isolated.

V013B (2) in an accessible room to be operated.

Valve nomenclature: Q1E11V013B (1-RHR-V-8720B), 1B RHR Hx to CVCS Letdown Iso

	(1)	(2)
A. ✔	ONLY 1B	IS
B.	ONLY 1B	is NOT
C.	BOTH 1A and 1B	IS
D.	BOTH 1A and 1B	is NOT

The indication given shows a leak in the 1B RHR pump room.

AOP-12.
Step 8.1 RNO has operators isolate the affected RHR train from the RCS.

Q1E11V013B, 1B RHR HX to CVCS is located in the RHR HX room. It is NOT in the same room (pump room) as the leak, and would be accessible following AOP-12.0 to align LP letdown to A train RHR.

Distracter Analysis:

A. Correct.
1. Correct. The leak is in the 1B RHR pump room.

2. Correct. Q1E11V013B, 1B RHR HX to CVCS is located in the RHR HX room. It is NOT in the same room (pump room) as the leak, and would be accessible following AOP-12.0 to align LP letdown to A train RHR.

B. Incorrect.
1. Correct. See A.1.

2. Incorrect. A.2. Plausible if the applicant does not know the location of V013B and assumes it is in the RHR pump room.

C. Incorrect.
1. Incorrect. A.1. Plausible since both RHR HX are in the same room so the applicant may believe the pumps share a room.

2. Correct. See A.2.

D. Incorrect.
1. Incorrect. See C.1.

2. Incorrect. See B.2.

K/A: G2.4.9	Knowledge of low power/shutdown implications in accident (e.g., loss of coolant accident or loss of residual heat removal) mitigation strategies.
Importance Rating:	3.8/4.2
Technical Reference:	FNP-1-AOP-12.0, Residual Heat Removal System Malfunction, v25 FNP-1-ARP-3.2, v30.2
References provided:	None
Learning Objective:	LIST AND DESCRIBE the sequence of major actions associated with AOP-12.0, RHR System Malfunction and/or STP-18.4, Containment Closure. (OPS-52520L04)
Question History:	BANK - AOP-12.0-52520L04 004
K/A match:	Requires the applicant to know the mitigation strategy to isolate either one or both trains of RHR based on indications. The implication is implied in that the wrong answer will cause a loss of RHR (core) cooling.
SRO justification:	N/A

Step	Action/Expected Response	Response NOT Obtained

****

CAUTION: IF the leaking RHR train can NOT be identified, THEN both trains should be assumed leaking.

****

___ 8 **Check RHR system - INTACT**

[] Stable RCS level.
[] No unexpected rise in containment sump level.
[] No RHR HX room sump level rising.
[] No RHR pump room sump level rising.
[] No waste gas processing room sump level rising
[] No rising area radiation monitor
[] No unexplained rise in PRT level or temperature.

8 Isolate RHR leakage.

8.1 Isolate affected RHR train(s) from RCS.

8.1.1 Stop affected RHR pump(s).

8.1.2 Verify closed affected RHR train valves.

Affected RHR Train	A	B
1C(1A) RCS LOOP TO 1A(1B) RHR PUMP Q1E11MOV	[] 8701A [] 8701B	[] 8702A [] 8702B
1C(1A) RCS LOOP TO 1A(1B) RHR PUMP LOOP SUCTION POWER SUPPLY BREAKERS CLOSED	[] FU-T5 [] FV-V2	[] FU-G2 [] FV-V3
1A(1B) RHR HX TO RCS COLD LEGS ISO Q1E11MOV	[] 8888A	[] 8888B
1A(1B) RHR TO RCS HOT LEGS XCON Q1E11MOV	[] 8887A	[] 8887B

8.2 Isolate source of any RHR/RCS leakage.

___ 9 **Check core cooling provided by RHR or SGs.**

9 Proceed to step 13.

___10 **Check RCS temperature stable or lowering.**

10 Proceed to step 13.

LOCATION NE2

SETPOINT: 52.75 inches

ORIGIN: Float switch N1G21LSHH3290-B

E2
1B RHR PUMP RM SUMP LVL HI-HI OR TRBL

PROBABLE CAUSE

1. Flooding due to a major leak in the 1B Residual Heat Removal Pump piping.
2. Major leak in the room cooler for the 1B Residual Heat Removal Pump.
3. Breakers Q1R17BKRFBC5 and Q1R17BKRFBD5 for sump pumps Q1G21P010A and Q1G21P010B respectively, are open.

AUTOMATIC ACTION

IF sump pump handswitches are in auto, THEN the sump pumps Q1G21P010A and Q1G21P010B start.

OPERATOR ACTION

1. Determine the cause for the excess level.
2. Verify that both sump pumps Q1G21P010A and Q1G21P010B are running.
3. IF the pump breakers are open, THEN close Q1R17BKRFBC5 and Q1R17BKRFBD5
   - 3.1 Verify that the sump pumps are running.
4. IF the level increase is due to a room cooler leak, THEN perform the following:
   - 4.1 Isolate service water to the leaking cooler.
   - 4.2 IF necessary, THEN place the 1a RHR PMP in service in accordance with FNP-1-SOP-7.0, RESIDUAL HEAT REMOVAL SYSTEM.

OPERATOR ACTION (continued)

5. IF the level increase is due to a leak in the Residual Heat Removal System, THEN perform the following:
   - 5.1 Secure the 1B Residual Heat Removal pump,
   - 5.2 Isolate the RHR system leak.
   - 5.3 Restore the Residual Heat Removal flow with the idle pump in accordance with FNP-1-SOP-7.0, RESIDUAL HEAT REMOVAL SYSTEM.
6. Once the leak has been repaired, return the Residual Heat Removal system to normal operation in accordance with FNP-1-SOP-7.0, RESIDUAL HEAT REMOVAL SYSTEM.
7. Refer to Tech Specs 3.5.2, 3.5.3, 3.9.4, and 3.9.5.

References: D-177392, Sh. 1; Tech Specs

69. W/E03EK2.2 069

Given the following conditions on Unit 1:

- A LOCA has occurred
- RCS pressure is 500 psig and stable
- Containment pressure rose to 20 psig and is currently 14.1 psig and stable
- The crew is performing actions of ESP-1.2, Post LOCA Cooldown and Depressurization

Which one of the following describes the method that will be used to perform the cooldown of the RCS?

A. ✔ SG atmospherics at less than 100°F in any 60 minute period.

B. SG atmospherics at the maximum attainable rate.

C. Steam dumps at less than 100°F in any 60 minute period.

D. Steam dumps at the maximum attainable rate.

ESP-1.2
9.2 [CA] Maintain RCS cold legs cooldown rate - LESS THAN 100°F IN ANY 60 MINUTE PERIOD.

Since Containment pressure rose to > 16.2 psig, the MSIV's went shut - ARVs must be used.

Distracter Analysis:

A. Correct. Steam Dumps are not available and the cooldown rate of ESP-1.2 is LESS THAN 100°F IN ANY 60 MINUTE PERIOD.

B. Incorrect. See A. Plausible since other procedures (EEP-3) allow maximum attainable rate cooldowns.

C. Incorrect. See A. Plausible if the applicant failed to recall that the MSIVs shut on HI-2 but the cooldown rate is correct.

D. Incorrect. See A. Plausible if the applicant failed to recall that the MSIVs shut on HI-2 and since other procedures (EEP-3) allow maximum attainable rate cooldowns they could choose this cooldown rate.

QUESTIONS REPORT
for ILT 37 RO BANK VER 4

K/A: W/E03EK2.2	LOCA Cooldown and Depressurization - Knowledge of the interrelations between the (LOCA Cooldown and Depressurization) and the following: Facility's heat removal systems, including primary coolant, emergency coolant, the decay heat removal systems, and relations between the proper operation of these systems to the operation of the facility.
Importance Rating:	3.7 / 4.0
Technical Reference:	ESP-1.2, Post LOCA Cooldown and Depressurization, v24
References provided:	NONE
Learning Objective:	EVALUATE plant conditions and DETERMINE if any system components need to be operated while performing ESP-1.2, Post LOCA Cooldown and Depressurization. (OPS-52531F06)
Question History:	MOD BANK
K/A match:	Requires applicant to have the knowledge of the interrelation between the small break LOCA and the facility's heat removal system (ARVs) and that the proper operations prevents exceeding cooldown limits.
SRO justification:	N/A

Step	Action/Expected Response	Response NOT Obtained

9.1.2 Verify blocked indication.

BYP & PERMISSIVE
STM LINE ISOL.
SAFETY INJ.
[] TRAIN A BLOCKED light lit
[] TRAIN B BLOCKED light lit

9.1.3 Bypass the steam dump interlock.

STM DUMP
INTERLOCK
[] A TRN to BYP INTLK
[] B TRN to BYP INTLK

9.1.4 Adjust steam header pressure controller to control cooldown rate.

STM HDR
PRESS
[] PK 464 adjusted

9.2 [CA] Maintain RCS cold legs cooldown rate - LESS THAN 100°F IN ANY 60 MINUTE PERIOD.

RCS COLD LEG TEMP
[] TR 410

Step 9 continued on next page.

24. Given the following plant conditions:
    - A LOCA has occurred
    - RCS pressure is 1100 psig and stable
    - Containment pressure rose to 2.6 psig and is currently 2.1 psig and stable
    - The crew is performing actions contained in EPP-009, Post LOCA Cooldown and Depressurization

    Which ONE of the following describes the method that will be used to perform the cooldown of the RCS?

    Perform the cooldown using. . .

    A. S/G PORVs at less than 100°F per hour.

    B. S/G PORVs at the maximum achievable rate.

    C. Condenser steam dumps at less than 100°F per hour.

    D. Condenser steam dumps at maximum achievable rate.

70. W/E04EK2.2 070

ECP-1.2, LOCA Outside Containment, is in progress on Unit 1.

Which one of the following describes the actions and the operational implications of those actions required by ECP-1.2?

The required action is to isolate the discharge of __(1)__ train(s) of RHR at a(one) time.

This __(2)__ result in a loss of ECCS recirculation capability for the isolated train(s).

	(1)	(2)
A. ✔	ONE	WILL
B.	ONE	will NOT
C.	BOTH	WILL
D.	BOTH	will NOT

Per ECP-1.2, the RHR Cold leg injection path is isolated one at a time.

Distracter Analysis:

A. Correct.
1. Per ECP-1.2, one RHR train will be isolated at a time.

2. Per the FSD, isolating the RHR discharge affects both recirculation AND injection.

B. Incorrect.
1. Correct. See A.1.

2. Incorrect. Plausible if the applicant is unfamiliar with the system alignment and reasons that the injection lines are not in the same path as the recirculation lines. This is fundamentally true for the suction path in that the sump suctions are a different path than the RWST suction.

C. Incorrect.
1. Incorrect. See A.1. Plausible if the applicant is not familiar with the procedure mitigation strategy.

2. Correct. See A.2.

D. Incorrect.
1. Incorrect. See C.1.

2. Incorrect. See B.2.

QUESTIONS REPORT
for ILT 37 RO BANK VER 4

K/A: W/E04EK2.2	LOCA Outside Containment - Knowledge of the interrelations between the (LOCA Outside Containment) and the following: Facility's heat removal systems, including primary coolant, emergency coolant, the decay heat removal systems, and relations between the proper operation of these systems to the operation of the facility.
Importance Rating:	3.8/4.0
Technical Reference:	FNP-1-ECP-1.2, LOCA Outside Containment, v8 A181002, RHR/LHSI, v44
References provided:	None
Learning Objective:	EVALUATE plant conditions and DETERMINE if any system components need to be operated while performing ECP-1.2, LOCA Outside Containment. (OPS-52532E06)
Question History:	FNP 07
K/A match:	Requires the applicant to know the interrelation between the LOCA outside Containment and the RHR (Decay Heat Removal/ECCS) in that isolating a train of RHR results in the loss of recirculation (cooling) capability of the RHR/ECCS system.
SRO justification:	N/A

Step	Action/Expected Response	Response NOT Obtained

1.5 Verify charging pump to regenerative heat exchanger valves - CLOSED.

CHG PUMPS TO REGENERATIVE HX
[] Q1E21MOV8107
[] Q1E21MOV8108

1.6 Verify containment sump pump isolation valves - CLOSED. (BOP)

CTMT SUMP DISCH
[] Q1G21HV3376
[] Q1G21HV3377

CTMT SUMP RECIRC
[] Q1G21HV3380

Isolate

___ 2 **Try to identify and isolate break.**

2.1 Isolate A train RHR cold leg injection path.

1A RHR HX TO RCS COLD LEGS ISO
[] Q1E11MOV8888A closed

RHR TO RCS HOT LEGS XCON
[] Q1E11MOV8887A closed

2.2 Check RCS pressure - RISING.

2.2 Proceed to step 2.4.

1C(1A) LOOP RCS WR PRESS
[] PI 402A
[] PI 403A

2.3 Go to FNP-1-EEP-1, LOSS OF REACTOR OR SECONDARY COOLANT.

Step 2 continued on next page.

Step	Action/Expected Response	Response NOT Obtained
2.4	Restore A train RHR cold leg injection path. 1A RHR HX TO RCS COLD LEGS ISO [] Q1E11MOV8888A open RHR TO RCS HOT LEGS XCON [] Q1E11MOV8887A open	
2.5	Isolate B train RHR cold leg injection path. 1B RHR HX TO RCS COLD LEGS ISO [] Q1E11MOV8888B closed RHR TO RCS HOT LEGS XCON [] Q1E11MOV8887B closed	
2.6	Check RCS pressure - RISING. 1C(1A) LOOP RCS WR PRESS [] PI 402A [] PI 403A	2.6 Proceed to step 2.8.
2.7	Go to FNP-1-EEP-1, LOSS OF REACTOR OR SECONDARY COOLANT.	
2.8	Restore B train RHR cold leg injection path. 1B RHR HX TO RCS COLD LEG ISO [] Q1E11MOV8888B open RHR TO RCS HOT LEGS XCON [] Q1E11MOV8887B open	

Restore

Isolate

Restore

Step 2 continued on next page.

71. W/E05EK1.1 071

A loss of ALL feedwater has occurred on Unit 1. The team is implementing FRP-H.1, Response to Loss of Secondary Heat Sink, and the following conditions exist:

- SI has **NOT** actuated.
- RCS temp is 547°F.
- 1A SGFP has just been started and has been aligned to feed all SGs.
- Attachment 1, MAIN FEEDWATER BYPASS VALVES AUTOMATIC CLOSURE DEFEAT, has been completed.
- The red light is LIT on the following handswitches:
  - MOV-3232A, MAIN FW TO 1A SG STOP VLV
  - MOV-3232B, MAIN FW TO 1B SG STOP VLV
  - MOV-3232C, MAIN FW TO 1C SG STOP VLV

Immediately upon feeding the SGs, GB5, STM LINE LO PRESS RX TRIP SI, annunciator comes into alarm.

Which one of the following completes the statements below?

The 1A SGFP (1) trip.

MOV-3232A, B, C (2) automatically close.

	(1)	(2)
A.	will NOT	will NOT
B.	will NOT	WILL
C.	WILL	will NOT
D. ✔	WILL	WILL

FRP-H.1 step 3 NOTE states: **"If SI has not actuated since Reactor Trip**, defeating the feedwater isolation signal to main feedwater regulating bypass valves will ensure the main feedwater flow path remains open. A **subsequent SI will still cause the trip of an operating SGFP**."

Additionally, SI would be blocked (step 7.22) however, only if < P-12.
Step 9.10 CAUTION reminds the operator that: "**SI actuation circuits will automatically unblock** if RCS average temperature rises **to greater than 543°F** or PRZR pressure rises to greater than 2000 psig."

MOV-3232A/B/C will auto close upon a trip of BOTH SGFPs AND the handswitch is in the (spring returned) Automatic Position, this closure signal is NOT bypassed by the jumpers installed by Attachment 1 of FRP-H.1.

FRP-H.1, Step 9.7.3, if feeding the SGs using the Condensate system, would de-energize the Main Feed Stop Valves in the open position. This step is only encountered however, if the SGFPs are not available to feed the SGs.

A. Incorrect.

1) Incorrect. See D.1. Plausible if the applicant thinks the jumpers will prevent a SGFP trip which is reasonable if it prevents the feed water isolation.

2) Incorrect. See D.2. Plausible if the applicant thinks the jumpers prevent the MOVs from closing. Also, when using condensate pumps, the MOVs are opened and powered down and the applicant may think this is true for SGFP feeding of the SGs.

B. Incorrect.

1. Incorrect, see A.1.

2. Correct. See D.2.

C. Incorrect.

1. Correct. See D.1.

2. Incorrect. See A.2.

D. Correct.

1. Correct. The SGFP will trip per the note prior to step 3.

2) Correct. The MOVs close on the trip of both SGFPs.

QUESTIONS REPORT
for ILT 37 RO BANK VER 4

K/A: W/E05EK1.1	Loss of Secondary Heat Sink - Knowledge of the operational implications of the following concepts as they apply to the (Loss of Secondary Heat Sink: Components, capacity, and function of emergency systems.
Importance Rating:	3.8/4.1
Technical Reference:	FNP-2-FRP-H.1, Response to Loss of Secondary Heat Sink, v27 D-175073, SH 1, Main Feedwater System, Ver 18
References provided:	None
Learning Objective:	ANALYZE plant conditions and DETERMINE if actuation or reset of any Engineered Safety Features Actuation Signal (ESFAS) is necessary. (OPS-52533F05)
Question History:	MOD BANK
K/A match:	Applicant is require to know that the operational implication of an SI (function of emergency systems) in FRP-H.1 is a loss of Feed flow to the SGs.
SRO justification:	N/A

Step	Action/Expected Response	Response NOT Obtained

NOTE: If SI has not actuated since Reactor Trip, defeating the feedwater isolation signal to main feedwater regulating bypass valves will ensure the main feedwater flow path remains open. A subsequent SI will still cause the trip of an operating SGFP.

___ **3** **Direct I&C personnel to defeat the feedwater isolation by installing jumpers stored in the control room emergency locker using ATTACHMENT 1.**

___ **4** **Monitor CST level.**

4.1 [CA] Check CST level greater than 5.3 ft.

CST LVL
[] LI 4132A
[] LI 4132B

4.2 Align makeup to the CST from water treatment plant OR demin water system using FNP-1-SOP-5.0, DEMINERALIZED MAKEUP WATER SYSTEM, as necessary.

4.1 Align AFW pumps suction to SW using FNP-1-SOP-22.0, AUXILIARY FEEDWATER SYSTEM.

Step	Action/Expected Response	Response NOT Obtained

NOTE:
- IF some form of secondary feed flow becomes imminent and normal charging is in service, THEN raising charging flow will reduce the potential subsequent loss of pressurizer level due to cooldown shrinkage.
- IF it is necessary to feed a hot, dry SG(s) [RCS hot leg temperature > 550°F AND SG wide range level < 12%{31%}], THEN it (they) should be fed one at a time at a flow rate of 20 gpm to 100 gpm until RCS hot leg temperature falls to less than 550°F. IF bleed and feed is imminent OR bleed and feed is in progress and RCS temperatures are rising, THEN there is no limit on the feed flow rate.

___ **5 [CA] Try to establish AFW flow to at least one SG.**

5.1 Verify blowdown from all SGs - ISOLATED.

1A(1B,1C) SGBD
ISO
[] Q1G24HV7614A closed
[] Q1G24HV7614B closed
[] Q1G24HV7614C closed

5.2 Verify SG blowdown sample ISOLATED MLB lights lit.

1A(1B,1C) SGBD SAMPLE
ISO

[] MLB4 6-4 lit Q1P15HV3328 closed
[] MLB4 7-4 lit Q1P15HV3329 closed
[] MLB4 8-4 lit Q1P15HV3330 closed

5.2 Locally verify SGBD sample - isolated (BOP).

STEAM GEN 1A(1B,1C) SAMPLE
ISO

[] Q1P15HV3328 closed
[] Q1P15HV3329 closed
[] Q1P15HV3330 closed

OR

Locally verify SGBD sample-isolated (PRIP).
STEAM GEN 1A(1B,1C)SAMPLE ISO

[] Q1P15HV3179C closed
[] Q1P15HV3180C closed
[] Q1P15HV3181C closed

Step 5 continued on next page.

Step	Action/Expected Response	Response NOT Obtained
5.3	Verify all available AFW pumps - STARTED. MDAFWP [] 1A amps > 0 [] 1B amps > 0 TDAFWP STM SUPP FROM 1B(1C) SG [] MLB4 1-3 lit [] MLB4 2-3 lit [] MLB4 3-3 lit TDAFWP SPEED [] SI 3411A > 3900 rpm TDAFWP SPEED CONT [] SIC 3405 at 100%	5.3 Perform local start from Hot Shutdown Panels. 5.3.1 Place the following to LOCAL. 1A MDAFWP [] Q1N23P001A (A-HSDP) 1B MDAFWP [] Q1N23P001B (C-HSDP) TDAFWP STM SUPP FROM 1B(1C) SG [] Q1N12HV3235A/26 (F-HSDP) [] Q1N12HV3235B (F-HSDP) 5.3.2 Start all AFW pumps. 1A MDAFWP [] Q1N23P001A started (A-HSDP) 1B MDAFWP [] Q1N23P001B started (B-HSDP) TDAFWP STM SUPP FROM 1B(1C) SG [] Q1N12HV3235A/26 held until sealed in. (D-HSDP) [] Q1N12HV3235B held until sealed in. (D-HSDP)

Step 5 continued on next page.

Step	Action/Expected Response	Response NOT Obtained
		5.3.3 IF any AFW pump started, THEN proceed to step 5.4, IF NOT perform the following. 5.3.3.1 Restore the following components to REMOTE. 1A MDAFWP [] Q1N23P001A (A-HSDP) 1B MDAFWP [] Q1N23P001B (C-HSDP) TDAFWP STM SUPP FROM 1B(1C) SG [] Q1N12HV3235A/26 (F-HSDP) [] Q1N12HV3235B (F-HSDP) 5.3.3.2 IF necessary, THEN dispatch an operator locally to TDAFWP to assist with restoration of TDAWFP.

NOTE: [CA] Step 5.3.3.3 is a continuing action until step 12 is reached.

		5.3.3.3 [CA] WHEN any available AFW pump started, THEN return to step 5.4. 5.3.3.4 Proceed to step 6.

Step 5 continued on next page.

Step	Action/Expected Response	Response NOT Obtained

5.4 [CA] Verify at least one flow path to at least one SG - ALIGNED.

SG	1A	1B	1C
MDAFWP TO 1A(1B,1C) SG Q1N23HV	[]3227A in MOD	[]3227B in MOD	[]3227C in MOD
MDAFWP TO 1A(1B,1C) SG FLOW CONT HIC	[]3227AA adjusted	[]3227BA adjusted	[]3227CA adjusted
TDAFWP TO 1A(1B,1C) SG Q1N23HV	[]3228A in MOD	[]3228B in MOD	[]3228C in MOD
TDAFWP TO 1A(1B,1C) SG FLOW CONT HIC	[]3228AA adjusted	[]3228BA adjusted	[]3228CA adjusted
AFW TO 1A(1B,1C) SG STOP VLV Q1N23MOV	[]3350A open	[]3350B open	[]3350C open
MDAFWP TO 1A(1B,1C) SG ISO Q1N23MOV (BOP)	[]3764A open []3764E open	[]3764D open []3764B open	[]3764C open []3764F open

5.4 Direct personnel to perform the following.

- Direct personnel to establish flow path to affected SGs from hot shutdown panel. (121 ft, AUX BLDG HSDP rooms)

OR

- Direct personnel to establish flow to affected SGs. (127 ft, AUX BLDG main steam valve room)

Step 5 continued on next page.

Step	Action/Expected Response	Response NOT Obtained

NOTE: [CA] Step 5.5 is a continuing action until step 12 is reached.

	5.5 [CA] Check total AFW flow to SGs greater than 395 gpm.	5.5 Perform the following. 5.5.1 WHEN any feed flow established AND at least one SG narrow range level greater than 31%{48%} THEN go to procedure and step in effect 5.5.2 Continue efforts to establish AFW flow. 5.5.3 Proceed to Step 6.
	5.6 Go to procedure and step in effect.	

NOTE: Securing RCPs will provide additional time to restore feedwater before reaching bleed and feed criteria. It is not desired to secure all pressurizer heaters prior to step 17.

___	**6 Stop all RCPs.** RCP [] 1A [] 1B [] 1C	6 IF any RCP cannot be tripped, THEN deenergize associated bus. [] 1A 4160 V bus [] 1B 4160 V bus [] 1C 4160 V bus

Step	Action/Expected Response	Response NOT Obtained
___ 7	**[CA] Try to establish main feedwater flow to intact SGs with one SGFP.**	7 Perform the following. a) Verify at least one CNDS PUMP - STARTED b) If unable to establish main feedwater flow and at least one condensate pump is started, <u>THEN</u> proceed to step 9 OBSERVE CAUTION PRIOR TO STEP 9. c) If unable to establish main feedwater flow and no condensate pump is started, <u>THEN</u> continue efforts to start a condensate pump and proceed to step 11.
	7.1 Verify at least one CNDS PUMP - STARTED.	7.1 Perform the following. a) Continue efforts to start a CNDS PUMP. b) Proceed to step 11.
	7.1.1 Verify backup cooling aligned to condensate pumps per FNP-1-SOP-21.0.	7.1.1 Ensure all condensate pump handswitches positioned to STOP. CNDS PUMP [] 1A [] 1B [] 1C
	7.2 Check intact SGs main steam line isolation valves - OPEN.	7.2 <u>IF</u> no intact SGs main steam line isolation valves open, <u>THEN</u> proceed to Step 9. OBSERVE CAUTION PRIOR TO STEP 9.
	7.3 Check all intact SG pressures - GREATER THAN 540 psig.	7.3 Proceed to Step 9. OBSERVE CAUTION PRIOR TO STEP 9.

Intact SG	1A	1B	1C
1A(1B,1C) SG MSIV - OPEN Q1N11HV	[]3369A []3370A	[]3369B []3370B	[]3369C []3370C

Step 7 continued on next page.

Step	Action/Expected Response	Response NOT Obtained
7.4	Check condenser - AVAILABLE. BYP & PERMISSIVE COND AVAIL [] C-9 status light lit	7.4 Proceed to Step 9. OBSERVE CAUTION PRIOR TO STEP 9.
7.5	Verify an EH pump running.	7.5 Proceed to step 9. OBSERVE CAUTION PRIOR TO STEP 9.
7.6	Verify main lube oil for SGFP available.	7.6 Proceed to Step 9. OBSERVE CAUTION PRIOR TO STEP 9.
7.6.1	Verify one main lube oil pump for SGFP to be started - STARTED. 1A SGFP MN OIL PUMP [] # 1 [] # 2 1B SGFP MN OIL PUMP [] # 1 [] # 2	
7.6.2	Check SGFP lube oil pressure - GREATER THAN 15 psig. 1A(1B) SGFP TURB BRG OIL PRESS [] PI 4001A [] PI 4001B	

Step 7 continued on next page.

Step	Action/Expected Response	Response NOT Obtained
7.7	Verify all main feedwater flow control and bypass valves - CLOSED IN MANUAL. 1A(1B,1C) SG FW FLOW [] FK 478 [] FK 488 [] FK 498 1A(1B,1C) SG FW BYP FLOW [] FK 479 [] FK 489 [] FK 499	7.7 Verify all main feedwater stop valves - CLOSED. MAIN FW TO 1A(1B,1C) SG STOP VLV [] Q1N21MOV3232A [] Q1N21MOV3232B [] Q1N21MOV3232C
7.8	IF SI has NOT actuated since reactor trip, THEN reset FW ISO.	7.8 Verify SI reset. [] MLB-1 1-1 not lit [] MLB-1 11-1 not lit

NOTE: If SI has not actuated since Reactor Trip, defeating the feedwater isolation signal to main feedwater regulating bypass valves will ensure the main feedwater flow path remains open. A subsequent SI will still cause the trip of an operating SGFP.

7.9 Check feedwater isolation signal to intact SGs main feedwater regulating bypass valves defeated per ATTACHMENT 1.

7.10 Verify PHASE A CTMT ISO RESET.

[] MLB-2 1-1 not lit
[] MLB-2 11-1 not lit

Step 7 continued on next page.

Step	Action/Expected Response	Response NOT Obtained
7.11	Verify the following service water valves - OPEN <u>OR</u> THROTTLED. SW TO TURB BLDG ISO A TRN [] Q1P16V515 [] Q1P16V516 SW TO TURB BLDG ISO B TRN [] Q1P16V517 [] Q1P16V514 SW FROM TURB BLDG A HDR ISO [] Q1P16V540 [] Q1P16V542 SW FROM TURB BLDG B HDR ISO [] Q1P16V543 [] Q1P16V541	7.11 <u>IF</u> SW flow cannot be established to the turbine building, <u>THEN</u> proceed to Step 9. OBSERVE CAUTION PRIOR TO STEP 9.
7.12	Verify SGFP speed control - MANUALLY ADJUSTED TO 0%. SGFP MASTER CONT [] SK 509A 1A(1B) SGFP SPEED CONT [] SK 509B [] SK 509C	
7.13	Latch 1A(1B) SGFP turbine.	
7.14	Open 1A(1B) SGFP LOW PRESS. STOP VALVE.	
7.15	Open 1A(1B) SGFP HIGH PRESS. STOP VALVE.	

Step 7 continued on next page.

Step	Action/Expected Response	Response NOT Obtained

7.16 Raise 1A(1B) SGFP to minimum speed.

1A(1B) SGFP
[] INCREASE SPEED depressed
[] BOILER CONTROL light illuminated

7.17 Open 1A(1B) SGFP discharge valve.

SGFP 1A(1B)
DISCH VLV
[] N1N21V503A
[] N1N21V503B

7.18 Verify all intact SGs main feedwater stop valves - OPEN.

Intact SG	1A	1B	1C
MAIN FW TO 1A(1B,1C) SG STOP VLV Q1N21MOV	[] 3232A	[] 3232B	[] 3232C

7.19 Place 1A(1B) SGFP speed controller in AUTO.

1A(1B) SGFP
SPEED
CONT
[] SK 509B
[] SK 509C

Step 7 continued on next page.

Step	Action/Expected Response	Response NOT Obtained

7.20 Adjust master speed controller to raise feedwater discharge header pressure to 50 psi greater than steam header pressure.

FW
HDR
PRESS
[] PI 508

STM
HDR
PRESS
[] PI 464A

7.21 Control feedwater regulating bypass valves to supply main feedwater to intact SGs.

Intact SG	1A	1B	1C
1A(1B,1C) SG FW BYP FLOW FK	[] 479 adjusted	[] 489 adjusted	[] 499 adjusted

7.21 Locally remove seal and control main feedwater regulating valves with handwheels. (127 ft, AUX BLDG main steam valve room)

Intact SG	1A	1B	1C
1A(1B,1C) SG FW FLOW Q1C22FCV	[] 478	[] 488	[] 498

7.22 WHEN P-12 light lit, THEN perform the following.

7.22.1 Block low steam line pressure SI.

STM LINE PRESS SI
BLOCK - RESET
[] A TRN to BLOCK
[] B TRN to BLOCK

7.22.2 Verify blocked indication.

BYP & PERMISSIVE
STM LINE ISOL.
SAFETY INJ.
[] TRAIN A BLOCKED light lit
[] TRAIN B BLOCKED light lit

Step	Action/Expected Response	Response NOT Obtained
___ 8	**Check SG levels.**	
	8.1 [CA] Verify feed flow to at least one SG. • Check SG wide range level - RISING. OR • Check core exit T/C temperature - FALLING.	8.1 Proceed to Step 9. OBSERVE CAUTION PRIOR TO STEP 9.
	8.2 Check at least one SG narrow range level - GREATER THAN 31%{48%}.	8.2 Continue feeding SGs to restore at least one SG narrow range level greater than 31%{48%}.

NOTE: [CA] Continuing verification of sufficient feed flow is adequate to ensure that the heat sink critical safety function is satisfied.

8.3 Go to procedure and step in effect.

Step	Action/Expected Response	Response NOT Obtained

****

CAUTION: [CA] Following block of automatic SI actuation, manual SI actuation may be required if conditions degrade.

****

___ **9 [CA] Try to establish condensate flow to intact SGs.**

9.1 IF SI has NOT actuated since reactor trip, THEN reset FW ISO.

9.1 Verify SI RESET.

[] MLB-1 1-1 not lit
[] MLB-1 11-1 not lit

NOTE:
- Step 9.8, pressurizer pressure reduction, should be performed in conjunction with steps 9.2 through 9.7.
- If SI has not actuated since Reactor Trip, defeating the feedwater isolation signal to main feedwater regulating bypass valves will ensure the main feedwater flow path remains open.

9.2 Check feedwater isolation signal to intact SGs main feedwater regulating bypass valves defeated per ATTACHMENT 1.

9.3 Verify all main feedwater flow control and bypass valves - CLOSED IN MANUAL.

1A(1B,1C) SG
FW FLOW
[] FK 478
[] FK 488
[] FK 498

1A(1B,1C) SG
FW BYP FLOW
[] FK 479
[] FK 489
[] FK 499

9.3 Verify all main feedwater stop valves - CLOSED.

MAIN FW TO 1A(1B,1C) SG
STOP VLV
[] Q1N21MOV3232A
[] Q1N21MOV3232B
[] Q1N21MOV3232C

Step 9 continued on next page.

Step	Action/Expected Response	Response NOT Obtained
9.4	Verify backup cooling aligned to condensate pumps per FNP-1-SOP-21.0.	9.4 Ensure all condensate pump handswitches positioned to STOP. CNDS PUMP [] 1A [] 1B [] 1C
9.5	Locally open SGFP BYP N1N21V509. (155 ft, TURB BLDG)	9.5 Open and deenergize 1A(1B) SGFP discharge valve. SGFP 1A(1B) DISCH VLV [] N1N21V503A [] N1N21V503B SGFP DISCH VLV BKR (TB155): 1A []EP-08, 1B []EQ-10
9.6	Locally isolate SGFP miniflow valves. (155 ft, TURB BLDG) SGFP 1A(1B) RECIRC FCV INLET ISO [] N1N21V502A closed [] N1N21V502B closed	

Step 9 continued on next page.

Step | **Action/Expected Response** | **Response NOT Obtained**

9.7 Perform the following.

9.7.1 Dispatch personnel to 1V 600 V MCC. (139 ft, AUX BLDG electrical penetration room)

9.7.2 Place handswitch for main feedwater stop valves to intact SGs to OPEN and hold in that position.

Intact SG	1A	1B	1C
MAIN FW TO 1A(1B,1C) SG STOP VLV Q1N21MOV	[]3232A	[]3232B	[]3232C

9.7.3 WHEN main feedwater stop valves to intact SGs open, THEN direct personnel to open associated breakers. (139 ft, AUX BLDG electrical penetration room)

Intact SG	1A	1B	1C
BKR	[]FV-K2	[]FV-K3	[]FV-L2

9.7.4 WHEN associated breaker open, THEN allow main feedwater stop valve handswitch to spring return.

9.7 Perform the following.

a) Direct personnel to open associated breakers. (139 ft, AUX BLDG electrical penetration room)

Intact SG	1A	1B	1C
BKR	[]FV-K2	[]FV-K3	[]FV-L2

b) Locally open main feedwater stop valves to intact SGs with handwheels. (127 ft. AUX BLDG main steam valve room)

Intact SG	1A	1B	1C
MAIN FW TO 1A(1B,1C) SG STOP VLV Q1N21MOV	[]3232A	[]3232B	[]3232C

Step 9 continued on next page.

Step	Action/Expected Response	Response NOT Obtained
9.8	Reduce PRZR pressure to less than 1950 psig.	
9.8.1	Check either condition for using auxiliary spray satisfied. • Normal letdown in service. OR • No PRZR PORV available.	9.8.1 Perform the following. • If normal letdown secured and a PRZR PORV available, THEN open only one PRZR PORV to reduce PRZR pressure to less than 1950 psig. AND • Proceed to step 9.9.
9.8.2	Manually open both normal pressurizer spray valves. 1A(1B) LOOP SPRAY VLV [] PK 444C [] PK 444D	
9.8.3	Open auxiliary spray valve. RCS PRZR AUX SPRAY [] Q1E21HV8145 open	
9.8.4	Verify flow path aligned CHG FLOW [] FK 122 manually open CHG PUMPS TO REGENERATIVE HX [] Q1E21MOV8107 open [] Q1E21MOV8108 open RCS NORMAL CHG LINE [] Q1E21HV8146 closed RCS ALT CHG LINE [] Q1E21HV8147 closed	

Step 9 continued on next page.

Step	Action/Expected Response	Response NOT Obtained

9.8.5 Operate the following valves as required to reduce PRZR pressure to less than 1950 psig.

CHG FLOW
[] FK 122 manually open

1A(1B) LOOP
SPRAY VLV
[] PK 444C manually open/closed
[] PK 444D manually open/closed

RCS PRZR
AUX SPRAY
[] Q1E21HV8145 open/closed

RCS NORMAL
CHG LINE
[] Q1E21HV8146 open/closed

RCS ALT
CHG LINE
[] Q1E21HV8147 open/closed

Step 9 continued on next page.

Step	Action/Expected Response	Response NOT Obtained
9.9	Maintain PRZR pressure at 1900-1950 psig.	
9.9.1	IF using auxiliary spray, THEN operate the following valves as required to control PRZR pressure. CHG FLOW [] FK 122 manually open 1A(1B) LOOP SPRAY VLV [] PK 444C manually open/closed [] PK 444D manually open/closed RCS PRZR AUX SPRAY [] Q1E21HV8145 open/closed RCS NORMAL CHG LINE [] Q1E21HV8146 open/closed RCS ALT CHG LINE [] Q1E21HV8147 open/closed	9.9.1 IF using a PRZR PORV, THEN open only one PRZR PORV to control PRZR pressure.

Step 9 continued on next page.

Step	Action/Expected Response	Response NOT Obtained

****

CAUTION: SI actuation circuits will automatically unblock if RCS average temperature rises to greater than 543°F or PRZR pressure rises to greater than 2000 psig.

****

9.10 WHEN pressurizer pressure less than 2000 psig, THEN perform the following.

9.10.1 Block low pressurizer pressure SI.

PRZR PRESS SI
BLOCK - RESET
[] A TRN to BLOCK
[] B TRN to BLOCK

9.10.2 Verify blocked indication.

BYP & PERMISSIVE
PRZR. SAFETY
INJECTION
[] TRAIN A BLOCKED light lit
[] TRAIN B BLOCKED light lit

Step 9 continued on next page.

QUESTIONS REPORT

for Questions

1. A Reactor Trip has occurred on Unit 1. The following conditions exist:

   - 'B' Train SSPS is in TEST.
   - FRP-H.1, Response to Loss of Secondary Heat Sink, is in progress.
   - FRP-H.1 Attachment 1, Main Feedwater Bypass Valves Automatic Closure Defeat, has been completed.
   - 1A SGFP has been aligned and is feeding the SGs.

   Subsequently, an automatic SI occurs.

   Which one of the following completes the statement below which describes the effects on the 1A SGFP and support conditions per FRP-H.1?

   1A SGFP _(1)_ automatically trip.

   Service Water cooling to the Turbine Building _(2)_ isolate.

	(1)	(2)
A.	WILL	will NOT
B. ✔	WILL	WILL
C.	will NOT	will NOT
D.	will NOT	WILL

72. W/E06EG2.1.20 072

FRP- C.2, Response to Degraded Core Cooling, has been entered on Unit 2. The operating crew is at the step to "Check RCP Status" and the following conditions exist:

- All RCPs are running.
- 2B RCP seal injection is 4 gpm and cannot be raised any higher.
- HH1 and HH3, RCP 2A and 2C BRG UPPER/LOWER OIL RES LO LVL, are in alarm.

Which one of the following completes the statement below?

Per FRP-C.2, the operating crew is required to _____.

A. ✔ stop 2B RCP

B. stop ALL RCPs

C. stop 2A and 2C RCP

D. leave ALL RCPs running

FRP-C.2
NOTE: Since RCP damage may occur when operating RCPs without normal support conditions established or under highly voided RCS conditions, the intent of the following step is to save one RCP (which provides the best pressurizer spray capability) for future use, if all three RCPs are running.

7 Check if one RCP should be stopped.

7.1 Check ALL RCPs - STARTED

7.2 Stop RCP 2B.

7.3 Proceed to Step 9.

Distracter Analysis:

A. Correct: Per Step 7 of FRP-C.2.

B. Incorrect. See. A. Plausible since RCP support conditions are not met for any RCP.

C. Incorrect See A. Plausible since the applicant may not recall that 2B RCP seal injection is too low or that any is better than none but the oil reservoir issue requires securing the pump.

D. Incorrect. See A. Plausible if the applicant recalls that RCP support conditions are not required but fails to recall that the 2B RCP is saved for future use.

QUESTIONS REPORT
for ILT 37 RO BANK VER 4

K/A: W/E06EG2.1.20	Degraded Core Cooling - Ability to interpret and execute procedure steps.
Importance Rating:	4.0/4.6
Technical Reference:	FNP-2-FRP- C.2, Response to Degraded Core Cooling, v16
References provided:	None
Learning Objective:	EVALUATE plant conditions and DETERMINE if any system components need to be operated while performing [...] (2) FRP-C.2, Response to Degraded Core Cooling; ([...] (OPS-52533C06)
Question History:	BANK - FRP-C-52533C04 2
K/A match:	Applicant is required to interpret the plant conditions and execute the correct step in that the 2B RCP must be secured.
SRO justification:	N/A

Step	Action/Expected Response	Response NOT Obtained
___ 6	**Check RCP status.**	
	6.1 Check at least one RCP - STARTED.	6.1 Proceed to Step 8.

NOTE: Normal support conditions for running RCPs are desired, however, RCP operation must continue even if support conditions cannot be maintained.

6.2 Verify No. 1 seal support conditions established.

6.2.1 [CA] Maintain seal injection flow - GREATER THAN 6 gpm.

6.2.2 Verify No. 1 seal leakoff flow - WITHIN FIGURE 1 LIMITS.

6.2.3 Verify No. 1 seal differential pressure - GREATER THAN 200 psid.

6.3 Verify CCW - ALIGNED.

CCW FROM
RCP THRM BARR
[] Q2P17HV3045 open
[] Q2P17HV3184 open

6.4 Check RCP thermal barrier - INTACT.

RCP
THRM BARR
CCW FLOW
HI
[] Annunciator DD2 clear

6.4 Verify CCW flow isolated.

CCW FROM
RCP THRM BARR
[] Q2P17HV3045 closed
[] Q2P17HV3184 closed

Step 6 continued on next page.

Step	Action/Expected Response	Response NOT Obtained
	6.5 Check CCW to RCP oil coolers - SUFFICIENT. CCW FLOW FROM RCP OIL CLRS LO [] Annunciator DD3 clear	6.5 Verify CCW - ALIGNED. CCW TO RCP CLRS [] Q2P17MOV3052 open CCW FROM RCP OIL CLRS [] Q2P17MOV3046 open [] Q2P17MOV3182 open
	6.6 Check RCP oil level - SUFFICIENT. RCP 2A(2B,2C) BRG UPPER/LOWER OIL RES LO LVL [] Annunciator HH1 clear [] Annunciator HH2 clear [] Annunciator HH3 clear	

NOTE: Since RCP damage may occur when operating RCPs without normal support conditions established or under highly voided RCS conditions, the intent of the following step is to save one RCP (which provides the best pressurizer spray capability) for future use, if all three RCPs are running.

Step	Action/Expected Response	Response NOT Obtained
___ 7	**Check if one RCP should be stopped.**	
	7.1 Check ALL RCPs - STARTED	7.1 Proceed to Step 9.
	7.2 Stop RCP 2B.	
	7.3 Proceed to Step 9.	

73. W/E08EA1.1 073

An RCS soak is in progress per FRP-P.1, Response to Imminent Pressurized Thermal Shock Condition, with the following conditions:

- RCS Pressure is 1000 psig and stable.
- RCS Cold Leg Temperature is 450°F and stable.

Which one of the following actions is permitted?

A. Start a RCP.

B. Energize PZR heaters.

C. Increase AFW flow to SGs.

D. ✔ Isolate the SI Accumulators.

FRP-P.1
28.2 IF RCS soak will not be affected, THEN perform actions of other procedures in effect.

Distracter Analysis:

A. Incorrect. See D. Plausible because A RCP is started in FRP-P.1 if possible but before the soak.

B. Incorrect. See D. Plausible since heaters are used but the pressure is stable then this would raise pressure and the applicant may think that FRP-P.1 established a pressure/temperature band for the soak.

C. Incorrect. See D. Plausible if the applicant thinks that FRP-P.1 established a pressure/temperature band for the soak.

D. Correct. This has no impact on Pressure/Temperature.

QUESTIONS REPORT
for ILT 37 RO BANK VER 4

K/A: W/E08EA1.1	Pressurized Thermal Shock - Ability to operate and / or monitor the following as they apply to the (Pressurized Thermal Shock): Components, and functions of control and safety systems, including instrumentation, signals, interlocks, failure modes, and automatic and manual features.
Importance Rating:	3.8 / 3.8
Technical Reference:	FNP-1-FRP-P.1, Response to Immanent Pressurized Thermal Shock, v20
References provided:	None
Learning Objective:	EVALUATE plant conditions and DETERMINE if any system components need to be operated while performing (1) FRP-P.1, Response to Imminent Pressurized Thermal Shock Condition; [...]. (OPS-52533K06)
Question History:	WOLF CREEK 07
K/A match:	Requires the applicant to know which components can be operated (Ability to operate Components) during Pressurized Thermal Shock conditions.
SRO justification:	N/A

Step	Action/Expected Response	Response NOT Obtained
___26	**Verify adequate RCS pressure reduction.** • SUB COOLED MARGIN MONITOR indication - LESS THAN OR EQUAL TO 26°F{55°F} SUBCOOLED IN CETC MODE. OR • RCS pressure - LESS THAN 125 psig{200 psig}	26 Return to Step 17.
___27	**Determine if RCS soak required.**	
	27.1 Check RCS cold leg cooldown - GREATER THAN 100°F IN ANY 60 MINUTE PERIOD. RCS COLD LEG TEMP [] TR 410	27.1 Go to procedure and step in effect.
___28	**Establish RCS soak.**	
	28.1 [CA] Maintain RCS temperature and pressure stable for 1 hour. RCS COLD LEG TEMP [] TR 410 1C(1A) LOOP RCS WR PRESS [] PI 402A [] PI 403A	
	28.2 IF RCS soak will not be affected, THEN perform actions of other procedures in effect.	

Step 28 continued on next page.

74. W/E11EA1.1 074

The following conditions exist on Unit 1:

- LOCA inside containment
- EEP-1.0, Loss of Reactor or Secondary Coolant, is in progress.
- 1B Charging Pump is on A Train.
- MOV-3185A, CCW TO 1A RHR HX, will not open.

Per EEP-1.0, a loss of power to which one of the following components will result in a complete loss of ECCS recirculation availability?

A. MOV-8827B, CTMT SUMP TO 1B CS PUMP

B. ✔ MOV-8706B, 1B RHR HX TO CHG PUMP SUCT

C. 1A RHR pump

D. 1C Charging Pump

Equipment failures will in an entry in Loss of Emergency Coolant Recirculation. The following equipment is required for recirculation capability

1A RHR Pump
CTMT SUMP TO 1A RHR PUMP Q1E11MOV8811A
CTMT SUMP TO 1A RHR PUMP Q1E11MOV8812A
1A RHR HX TO CHG PUMP SUCT Q1E11MOV8706A
CCW TO 1A RHR HX Q1P17MOV3185A

OR

1B RHR Pump
CTMT SUMP TO 1B RHR PUMP Q1E11MOV8811B
CTMT SUMP TO 1B RHR PUMP Q1E11MOV8812B
1B RHR HX TO CHG PUMP SUCT Q1E11MOV8706B
CCW TO 1B RHR HX Q1P17MOV3185B

A. Incorrect. See B. MOV8827B is not required by EEP-1.0, but plausible because this MOV is required for recirc of Containment sump contents by the Containment Spray system. This answer would result in a loss of Containment spray recirculation on B train.

B. Correct. Power loss to MOV-8706B removes B train recirc capability, MOV-3185 in the stem has disabled A train recirc resulting in a complete loss of recirculation capability

C. Incorrect. See B. Plausible because the 1A RHR Pump is required by EEP-1.0, but since MOV3185A is already closed in the stem A train is already lost. If MOV-3185A were capable of being opened this answer would disable A train recirculation.

D. Incorrect. See B. EEP-1.0 does not specifically require a Charging Pump to be available, although it does require an MOV8706 for RHR HX TO CHG PUMP SUCT to be available. Plausible because it would be logical to require the B Train Charging Pump to be available.

QUESTIONS REPORT
for ILT 37 RO BANK VER 4

K/A: WE11EA1.1	Loss of Emergency Coolant Recirculation - Ability to operate and / or monitor the following as they apply to the (Loss of Emergency Coolant Recirculation)**:** Components, and functions of control and safety systems, including instrumentation, signals, interlocks, failure modes, and automatic and manual features.
Importance Rating:	3.9 / 4.0
Technical Reference:	FNP-1-EEP-1.0, v31
References provided:	None
Learning Objective:	ANALYZE plant conditions and DETERMINE the successful completion of any step in EEP-1, Loss of Reactor or Secondary Coolant. (OPS-52530B07)
Question origin:	FNP 11
Basis for meeting K/A:	K/A is met by placing candidate in a situation with a Loss of Recirculation one failure away. Candidate must monitor and evaluate the component failures and determine which one of the component failures, would result in loss of Recirc Capability.
SRO justification:	N/A

Step	Action/Expected Response	Response NOT Obtained

NOTE: Unless a known problem exists with components required for cold leg recirculation or their power supplies, it is assumed cold leg recirculation capability is available. Transition to FNP-1-ECP-1.1, LOSS OF EMERGENCY COOLANT RECIRCULATION, however, should be made upon discovery of inability to establish at least one train of recirculation.

13.1 Verify cold leg recirculation capability - AVAILABLE.

13.1.1 Train A equipment available:

- 1A RHR Pump
- CTMT SUMP TO 1A RHR PUMP Q1E11MOV8811A
- CTMT SUMP TO 1A RHR PUMP Q1E11MOV8812A
- 1A RHR HX TO CHG PUMP SUCT Q1E11MOV8706A
- CCW TO 1A RHR HX Q1P17MOV3185A

OR

13.1.2 Train B equipment available:

- 1B RHR Pump
- CTMT SUMP TO 1B RHR PUMP Q1E11MOV8811B
- CTMT SUMP TO 1B RHR PUMP Q1E11MOV8812B
- 1B RHR HX TO CHG PUMP SUCT Q1E11MOV8706B
- CCW TO 1B RHR HX Q1P17MOV3185B

13.2 Begin taking ECCS logs.

13.1 IF cold leg recirculation capability can NOT be verified, THEN go to FNP-1-ECP-1.1, LOSS OF EMERGENCY COOLANT RECIRCULATION.

Step 13 continued on next page.

75. W/E15EK1.2 075

The following plant conditions exist on Unit 1 following a Large Break LOCA:

- ECCS is aligned for Cold Leg Recirculation.
- LI-3594A, CTMT SUMP LVL, indicates 8.2 feet and rising.
- The Motor Driven Fire Pump is running.
- FRP-Z.2, Containment Flooding, has just been entered.

Which one of the following completes the statements below?

The potential source of Containment flooding is __(1)__.

The concern with increasing Containment sump level is __(2)__ .

A. (1) Service Water piping

(2) damage to vital systems or components due to submersion

B. (1) Service Water piping

(2) damage to Containment structure due to lateral forces on walls

C. (1) Fire Protection sprinkler header

(2) damage to vital systems or components due to submersion

D. (1) Fire Protection sprinkler header

(2) damage to Containment structure due to lateral forces on walls

RO knowledge due to the bases information applies to the overall mitigative strategy.

FRP-Z.2
1 Try to identify source of water into sump.

Check indications for components supplied with service water.

FRB-Z.2
Step 1.
[...] Containment flooding is a concern since critical plant components necessary for plant recovery may be damaged and rendered inoperable. [...]

Distracter Analysis:

A. Correct.
1. Correct. Per Step 1 of Z.2

2. Correct. Per the Bkgrnd document.

B. Incorrect.
1. Correct. See A.1.

2. Incorrect. See A.2. Plausible since the weight of the water would push against the inner Containment wall and the applicant may think this would challenge the structure if the water level were to get too high.

C. Incorrect.
1. Incorrect See A.1. Plausible if the applicant thought that Containment had sprinklers. There is a fire protection connection off of SW in ctmt and it would be plausible that this connection may also go to a fire header and sprinkler system. The piping for this connection is painted red like other fire protection piping so a student may not know this is a service water connection.

2. Correct. See A.2.

D. Incorrect.
1. Incorrect. See C.1.

2. Incorrect. See B.2.

QUESTIONS REPORT
for ILT 37 RO BANK VER 4

K/A: WE15EK1.2	Knowledge of the operational implications of the following concepts as they apply to the (Containment Flooding): Normal, abnormal and emergency operating procedures associated with (Containment Flooding).
Importance Rating:	2.7 / 2.9
Technical Reference:	FNP-1-FRP-Z.2, Response To Containment Flooding, Ver 6 FNP-0-FRB-Z.2, Specific Background Document for FNP-1/2-FRP-Z.2, v1
References provided:	None
Learning Objective:	STATE AND EXPLAIN the basis for all Cautions, Notes, and Actions associated with [...] ; (2) FRP-Z.2, Response to Containment Flooding; [...]. (OPS-52533M03)
Question History:	MOD BANK
K/A match:	Requires applicant to determine the source of containment flooding and the operational implications of the flooding.
SRO justification:	N/A

Section: Procedure

Unit 1 ERP Step: 1 **Unit 2 ERP Step:** 1 ***ERG Step No:*** *1*

ERP StepText: Try to identify source of water into sump.

ERG StepText: *Try To Identify Unexpected Source Of Water To Sump:*

Purpose: To identify unexpected source of water in sump.

Basis: This step instructs the operator to try to identify the unexpected source of the water in the containment sump. Containment flooding is a concern since critical plant components necessary for plant recovery may be damaged and rendered inoperable. A water level greater than the design basis flood level provides an indication that water volumes other than those represented by the emergency stored water sources (e.g., RWST, accumulators, etc.) have been introduced into the containment sump. Typical sources which penetrate containment are service water, component cooling water, primary makeup water and demineralized water. All possible plant specific sources which penetrate containment should be included in this step. These systems provide large water flow rates to components inside the containment and a major leak or break in one of these lines could introduce large quantities of water into the sump. Identification and isolation of any broken or leaking water line inside containment is essential to maintaining the water level below the design basis flood level.

Knowledge: N/A

References:

Justification of Differences:

1 Changed to make plant specific.

UNIT 1

Step	Action/Expected Response	Response NOT Obtained
___ 1	**Try to identify source of water into sump.** • Check indications for components supplied with service water. • Check indications for components supplied with CCW. • Check indication of Reactor Makeup Water Storage Tank level. • Check indication of Demineralized Water Storage Tank level.	
___ 2	**Direct Chemistry to sample containment sump for radioactivity, chromates and boron concentration using FNP-0-CCP-1300, CHEMISTRY AND ENVIRONMENTAL ACTIVITIES DURING A RADIOLOGICAL ACCIDENT.**	
___ 3	**Notify TSC staff of sump level and activity level to obtain recommended action.**	
___ 4	**Go to procedure and step in effect.**	

-END-

QUESTIONS REPORT

for Questions

1. Which one of the following is the **first** Major Action Category in FRP-Z.2, Response To Containment Flooding, and reason for this in accordance with the background document?

   A. ✔ Identify unexpected sources of water in the sump since flooding could damage critical plant equipment.

   B. Evaluate the ECCS system status to determine a strategy to transition to simultaneous cold and hot leg recirculation.

   C. Have chemistry evaluate sump level, chemistry, and activity level to determine a strategy to transfer excess water out of containment.

   D. Notify the TSC of sump chemistry, and activity level to determine potential changes in the planned transition to simultaneous cold and hot leg recirculation.