**QUESTIONS REPORT**

for 2014 NRC RO SRO Written Rev 4 - 45 Day Submittal

1. 2014 NRC RO 001/BANK/FUNDAMENTAL///NONE//007EK1.04/

Which ONE of the following completes the statement below?

The response of Reactor power level following a Reactor trip from 100% power is characterized by a prompt drop ___(1)___, followed by a -1/3 DPM startup rate for approximately___(2)___ .

A. (1) of approximately 3 decades as indicated on NI-35 and NI-36

(2) 20 minutes

B. ✔ (1) to approximately 5% power on PR-41, PR-42, PR-43 and PR-44

(2) 20 minutes

C. (1) of approximately 3 decades as indicated on NI-35 and NI-36

(2) 3-4 hours

D. (1) to approximately 5% power as indicated on PR-41, PR-42, PR-43 and PR-44

(2) 3-4 hours

**Feedback**

*Plausibility and Answer Analysis*

Reason answer is correct: *Power reduces to approximately 5% and -1/3 DPM S/U rate established for approximately 20 minutes. In a subcritical reactor, the neutron level (N) is related to the source strength (S) and subcritical multiplication factor (M), N=SM*

*A. Incorrect. Plausible since a decrease in power from 100 to 0.1 (close to 0) would be equal to three decades of decrease and could be confused with the negative 1/3 decade rate. The second part is correct.*

*B. Correct.*

*C. Incorrect. Plausible since a decrease in power from 100 to 0.1 (close to 0) would be equal to three decades of decrease and could be confused with the negative 1/3 decade rate. The second part is plausible because 3-4 hours is the approximate time that power will be decreasing noticeably.*

*D. Incorrect. The first part is correct. The second part is plausible because 3-4 hours is the approximate time that power will be decreasing noticeably.*

**Notes**

000007 (BW/E02&E10; CE/E02) Reactor Trip - Stabilization - Recovery / 1

007EK1.04; Knowledge of the operational implications of the Decrease in reactor power following reactor trip (prompt drop and subsequent decay) as it applies to the reactor trip.

(CFR 41.8 / 41.10 / 45.3)

| | |
|---|---|
| Importance Rating: | 3.6 3.9 |
| Technical Reference: | BD-3.10 & Reactor Theory Chapter 3 |
| References to be provided: | None |
| Learning Objective: | BD-3.10 Objective 6 |
| Question Origin: | OIT Exam Bank BD-3.10 (06) 1 |
| Comments: | HNP Station focus is on Operator Fundamentals. |
| Tier/Group: | T1/G1 |

2. 2014 NRC RO 002/NEW/FUNDAMENTAL///STEAM TABLES//008AK1.01/

Given the following plant conditions:
- The unit is operating at 100% power

Subsequently:
- A Loss of Offsite Power occurred
- ONE PRZ PORV is partially OPEN
- PRZ pressure is 1785 psig
- PRT pressure is 35 psig

Which of the following completes the statements below for the current conditions?

The temperature indicated on the PRZ PORV Tailpipe Temperature Indicator, TI-463 is (1) .

As PRT pressure continues to rise the ruture discs on the PRT will ruture at (2) psig.

A. (1) 622°F

(2) 100

B. (1) 622°F

(2) 150

C✔ (1) 280°F

(2) 100

D. (1) 280°F

(2) 150

**Feedback**

*Plausibility and Answer Analysis*

Reason answer is correct: *This is the superheat temperature PRZ pressure and throttling to 50 psia using Mollier diagram. Pressurizer level will rise due to lowering RCS presure and insurge into the pressurizer.*

*A. Incorrect. First part is plausible if candidate determines PRT saturation temperature using 1785 psig similar to the error that occurred during the Three Mile Island event. Second part is correct.*

*B. Incorrect. First part is plausible if candidate determines PRT saturation temperature using 1785 psig similar to the error that occurred during the Three Mile Island event. Second part is plausible since this is the setpoint for when the Seal Water Return Line Relief valve will lift which relieves to the PRT. (used on the 2011 NRC exam for plausibility).*

*C. Correct.*

*D. Incorrect. First part is correct. Second part is plausible since this is the setpoint for when the Seal Water Return Line Relief valve will lift which relieves to the PRT. (used on the 2011 NRC exam for plausibility).*

**Seal Water Return Line (IRC) Relief Valve, 1CS-467**
*This relief valve is on the seal water return header upstream of the inside containment seal water return isolation valve. This relief valve protects the piping and equipment in the seal water return line from overpressure. When the seal return line is isolated it will maintain a RCP seal leakoff flow path to the PRT. The relief valve lifts at 150 psig and it discharges to the PRT. It has sufficient capacity to pass the seal return flow from all three RCPs plus the excess letdown flow.*

**Notes**

000008 Pressurizer Vapor Space Accident / 3

008AK1.01; Knowledge of the operational implications of thermodynamics and flow characteristics of open or leaking Valves as it applies to a Pressurizer Vapor Space Accident.

(CFR 41.8 / 41.10 / 45.3 )

| | |
|---|---|
| Importance Rating: | 3.2 3.7 |
| Technical Reference: | Steam tables and Mollier diagram<br>FSAR Table 5.4.11-1 for PRT design pressure (100 psig)<br>DBD-100 for PRT rupture disc rupture pressure |
| References to be provided: | Steam Tables and Mollier Diagram |
| Learning Objective: | EOP-LP-3.1 Obj 3.f |
| Question Origin: | NEW |
| Comments: | Meets KA by having applicant determine thermodynamic conditions evident with a leaking PORV and the expected conditions indicated in the MCR |
| Tier/Group: | T1/G1 |

3. 2014 NRC RO 003/NEW/C/A///NONE//009EG2.1.20/

Given the following plant conditions:
- The unit was operating at 100% power

Subsequently the following occurs:
- Small Break LOCA
- Loss Of Offsite Power

Currently:
- The crew is implementing EOP-ES-1.2, Post LOCA Cooldown and Depressurization
- PRZ level is off scale low
- The OATC has been directed to depressurize the RCS to refill the PRZ

Which ONE of the following actions will be performed by the OATC to initiate the RCS depressurization?

A. ✔ OPEN one PRZ PORV

B. OPEN 1CS-487, PRZ Aux Spray valve

C. Place both PRZ Spray Valves to MANUAL and increase the demand signal to OPEN both valves

D. Place PK-444.1, Master Pressure Controller to MANUAL and increase the demand signal to OPEN both PRZ Spray Valves

**Feedback**

*Plausibility and Answer Analysis*

Reason answer is correct: *In accordance with EOP-ES-1.2 to depressurize the RCS to refill the PRZ (step 14) the operator would use normal PRZ spray but since there is also a loss of offsite power the RCP's would be off and normal spray would not be available. The RNO statement for depressurization requires the use of one PRZ PORV.*

*A. Correct.*

*B. Incorrect. Plausible since this is valve (auxiliary spray) is used to depressurize the RCS when letdown is in service during natural circulation conditions, however with the pressurizer not on scale letdown is isolated therefore auxiliary spray is not available.*

*C. Incorrect. Plausible since with the RCPs in operation this action would be a method of depressurizing the RCS. But, a loss of offsite power causes all of the RCPs to stop operating. With the RCPs off opening the spray valves will not depressurize the RCS*

*D. Incorrect. Plausible since performing this action would cause a RCS pressure reduction but with the RCPs off opening the spray valves will not depressurize the RCS.*

**Notes**

000009 Small Break LOCA / 3

009EG2.1.20; Ability to interpret and execute procedure steps

(CFR 41.10 / 43.5 / 45.12)

| | |
|---|---|
| Importance Rating: | 4.6 4.6 |
| Technical Reference: | EOP-ES-1.2, Rev. 0, Step 14, Page 18 |
| References to be provided: | None |
| Learning Objective: | EOP-3.5 Objective 2 |
| Question Origin: | New |
| Comments: | None |
| Tier/Group: | T1/G1 |

4. 2014 NRC RO 004/BANK/FUNDAMENTAL//ERG E-1/NONE//011EA1.15/

Given the following plant conditions:

- The unit was operating at 100% power

Subsequently a Large Break LOCA has occured.

Which ONE of the following describes the characteristics of a design Large Break LOCA ten (10) minutes into the event in accordance with the FSAR?

RCS temperature is ___(1)___ saturation temperature for intact SG pressure.

RCS pressure is stable below ___(2)___ require RHR pump operation.

A. (1) at

(2) normal SI accumulator pressure, but will NOT

B. (1) at

(2) RHR Pump shutoff head and will

C. (1) below

(2) normal SI accumulator pressure, but will NOT

D. ✔ (1) below

(2) RHR Pump shutoff head and will

**Feedback**

*Plausibility and Answer Analysis*

Reason answer is correct: *In accordance with the HNP FSAR Section figures 15.6.5-2 through 15.6.5-20 and the WOG EOP-E-1 background documents RCS temperature will be **below** saturation for SGs as they become a heat source, due to cold SI flow filling the reactor. For a LBLOCA classification, RCS pressure will be **below RHR pump shutoff head,** falls to essentially that of the Containment atmosphere, and therefore require the RHR pumps to be in operation.*

*A. Incorrect. Plausible if candidate has a misconception that both a large Small Break LOCA and Large Break LOCA temperatures and pressure changes are similar. During a large Small Break LOCA event temperatures will not drop below SG saturation temperature and RCS pressure will be maintained above RHR shutoff head (~140 psid) .*

*B. Incorrect. Plausible if candidate has a misconception that both a large Small Break LOCA and Large Break LOCA temperatures are similar. During a large Small Break LOCA event temperatures will not drop below SG saturation temperature could believe that the RCS pressure will drop to where it is below RHR shutoff head (~140 psid) .*

*C. Incorrect. The first part is correct. Plausible if candidate has a misconception that both a large Small Break LOCA and Large Break LOCA pressures changes are similar. During a large Small Break LOCA event pressure will drop to SI accumulator injection pressure and be maintained by the SI Accumulators and be above RHR shutoff head (~140 psid).*

*D. Correct.*

**Notes**

000011 Large Break LOCA / 3

011EA1.15; Ability to operate and monitor the RCS temperature and pressure as they apply to a Large Break LOCA.

(CFR 41.7 / 45.5 / 45.6)

| | |
|---|---|
| Importance Rating: | 4.2 4.2 |
| Technical Reference: | E-1 BD, page 28 |
| References to be provided: | None |
| Learning Objective: | BD-LP-3.3, Objective 1.g |
| Question Origin: | Bank, OIT Development 011 EA1.15 (1) |
| Comments: | Question was used in the 2008 NRC RO exam |
| Tier/Group: | T1/G1 |

5. 2014 NRC RO 005/NEW/C/A///NONE/EARLY/015AA1.16/SAT

Given the following plant conditions:

- The unit is in Mode 1
- UAT's are supplying power to the Aux Buses
- Current MCB permissive status indicating panel indication is as follows:
  - P-7 LIT
  - P-8 EXTINGUISHED
  - P-10 LIT
  - P-13 EXTINGUISHED

A fault on breaker 108, Unit Aux Xfmr A to Aux Bus A, causes the breaker to open.
Which ONE of the following completes the statement below concerning the plant response and reason for the current condition?

Which of the following conditions resulted in a Reactor Trip?

A. P-8 with 1 of 3 RCPs tripped

B. P-10 with 1 of 3 RCPs tripped

C. ✔ P-7 with 2 of 3 RCPs tripped

D. P-13 with 2 of 3 RCPs tripped

**Feedback**

*Plausibility and Answer Analysis*

Reason answer is correct: Automatic Reactor trip:

***RCS Low Flow*** *2/3 RCS flow channels <90.5 % of loop measured flow*
*1/3 loops above P-8*
*2/3 loops when between P-7* ***AND*** *P-8*

W*ith the unit in Mode 1 and a normal 6.9 Kv electrical alignment the Unit Aux Transformers (UAT's) would be supplying the power to the 6.9 Kv Aux Buses. Aux Bus 1A via breaker 108 and to Aux Bus 1B via breaker 128. Power is then supplied to Aux Bus 1C via breaker 109 (normally closed) but can be supplied from Aux Bus 1B (alternate alignment) via breaker 129. Power to the RCPs are from the Aux Buses (1A RCP from Aux Bus 1A, 1B RCP from Aux Bus 1B and 1C RCP from Aux Bus 1C). A loss of breaker 108 will cause the loss of power to Aux Bus 1A and to Aux Bus 1C which subsequently causes the loss of power to both RCP 1A and RCP 1C. With the current plant conditions the Reactor will trip on loss of RCS Loop Flow (setpoint 90.5%) on 2 of 3 loops since P-8 is given as EXTINGUSHED (<49% power) and above P-7 (>10% Reactor/Turbine power) light LIT.*

*A. Incorrect. Plausible since a Reactor trip would occur if the power level was > 49% power but with P-8 light extingushed and P-7 light lit Reactor power must be > 10% but < 49% and the P-8 trip on one loop low flow would not occur. The trip in this question is from loss of flow to two loops since 2 RCPs lost power.*

*B. Incorrect. Plausible since P-10 is lit which blocks and unblocks Reactor trips but does not block or unblock RCS low flow Reactor trips. The P-10 signal is sent to remove P-7 and could be confused to be the permissive that changes the state of Low RCS flow Reactor trips from single to two loop low flows associated with 10% Reactor power.*

*C. Correct.*

*D. Incorrect. Plausible since a Reactor trip would occur if P-13 were LIT. Having P-13 extingushed could be confused with having Turbine power >10% which would allow a loss of 2 RCS loop flows to trip the Reactor.*

**Notes**

000015/17 RCP Malfunctions / 4

Original K/A 015AA1.04; Ability to operate and / or monitor RCP ventilation cooling fan run indicators as they apply to the Reactor Coolant Pump Malfunctions (Loss of RC Flow).

KA replaced with:
015AA1.16 - Ability to operate and / or monitor the following as they apply to the Reactor Coolant Pump Malfunctions (Loss of RC Flow): Low-power reactor trip block status lights

(CFR 41.7 / 45.5 / 45.6)

| | |
|---|---|
| Importance Rating: | 3.2 3.5 |
| Technical Reference: | APP-ALB-011-2-5, Rev. 8 |
| References to be provided: | None |
| Learning Objective: | RPS Objective 8 |
| Question Origin: | New |
| Comments: | Original K/A 015AA1.04 was randomly replaced by David Lanyi on 5/27/2014 at the request by HNP because the utility was not able to write a question to the RO level due to the lack of procedural actions or an RO task for the K/A. |
| Tier/Group: | T1/G1 |

6. 2014 NRC RO 006/NEW/C/A///NONE//022AA2.01/

Given the following plant conditions:

- The unit is operating at 100% power
- The following annunciators have just gone into alarm:
  - ALB-008-3-3, RCP-A Seal #1 Leakoff High Low Flow
  - ALB-008-4-3, RCP-B Seal #1 Leakoff High Low Flow
  - ALB-008-5-3, RCP-C Seal #1 Leakoff High Low Flow
  - ALB-006-1-1, Charging Pumps Disch Header High-Low Flow
- 'A' CSIP pump amps have risen from 54 amps to 60 amps
- PI-121, Charging Header Pressure, lowers from 2400 psig to 2125 psig
- All RCP seal injection flows lower to approximately 4.5 gpm
- Charging flow controller FK-122.1 demand is rising

Which ONE of the following is the required response to these conditions in accordance with AOP-018, Reactor Coolant Pump Abnormal Conditions?

A. ✔ stop the running CSIP due to charging leakage and then monitor ASI pump operation

B. stop the running CSIP due to shaft shear and then start the standby CSIP

C. backflush the seal water injection and return filters due to filter blockage

D. trip the Reactor, securing all RCP's and shutting all RCP seal water return valves due to filter blockage

**Feedback**

*Plausibility and Answer Analysis*

Reason answer is correct: *Indications are consistant with a charging header leak that would affect both CSIPs. In accordance with AOP-018 the response to a loss of normal seal injection to RCPs would be to direct the operator to check 1 CSIP running (Yes), check seal injection flow lost to only 1 or 2 RCPs (No), check Charging header pressure > 2200 psig (No) - The actions would be to then: Stop the Running CSIP and dispatch an operator to monitor the operation of the ASI System.*

*A. Correct.*

*B. Incorrect. Plausible if a shaft shear condition is misdiagnosed from the given indications. The indications of a shaft shear are the lowering of amps and the lowering of discharge pressure since the motor is no longer rotating the pump impeller. The stem provides part of the shaft shear indications with lowering discharge pressure. If the crew were responding to a shaft shear they would secure the running pump in accordance with AD-OP-ALL-1000 then enter AOP-018 which would direct the crew to start the standby CSIP.*

*C. Incorrect. Plausible if a seal water filter fouling or blockage conditions is misdiagnosed from the given indications of the leakoff high / low flow alarm. The indications of low charging discharge flow could be signs of the seal water filter fouling or blockage. The actions would be to notifiying the Radwaste operator to backflush the filter are directions contained in AOP-018 if the seal water filter $\Delta P$ is high (> 20 psid)*

*D. Incorrect. Plausible if a RCP seal failure condition is misdiagnosed from the given indications of the leakoff high / low flow alarm. The indications of a seal failure are the normal charging pump pressure and amp indications in combination with the leakoff flow alarm. The alarm comes in when RCP seal flow is < 5 gpm (current flows are 4.5 to each RCP). AOP-018 directs these actions for a RCP #1 or #2 seal failure.*

**Notes**

000022 Loss of Rx Coolant Makeup / 2

022AA2.01; Ability to determine and interpret whether a charging line leak exists as it applies to the Loss of Reactor Coolant Makeup.

(CFR 43.5 / 45.13)

| | |
|---|---|
| Importance Rating: | 3.2 3.8 |
| Technical Reference: | AOP-018, Attachment 4, Pages 29-30, Rev. 48 |
| References to be provided: | None |
| Learning Objective: | LP AOP-3.18, Objective 4 |
| Question Origin: | New |
| Comments: | None |
| Tier/Group: | T1/G1 |

7. 2014 NRC RO 007/BANK/C/A///NONE//025AK1.01/

Given the following plant conditions:
- The plant is in Mode 6 (Defueled) and the core reload is in progress
- The first assembly has been taken from the upender and is on its way to the core
- 'A Train RHR is in service
- 'B' Train RHR is under clearance for breaker overhaul and will be returned to service in 2 hours
- Cavity level is 23 feet 4 inches above the Reactor Vessel Flange
- RCS temperature is 80°F

Subsequently:
- 'A' RHR Pump trips

Which ONE of the following is a correct response for the given conditions?

A. Actuate Phase A Isolation

B. Continue refueling activities for up to 1 hour

C. ✔ Immediately suspend all operations involving an increase in the Reactor decay heat load or a reduction in boron concentration of the Reactor Coolant System.

D. Immediately close or verify closed all Containment penetrations providing direct access from the Containment atmosphere to the outside atmosphere

**Feedback**

*Plausibility and Answer Analysis*

Reason answer is correct: *Both trains of RHR are inoperable. With neither RHR loop operable TS 3.9.8.1 requires the suspension of all operations involving an increase in the reactor decay heat load or a reduction in boron concentration of the Reactor Coolant System. The opererators should immediately initiate corrective action to return the required RHR loop to OPERABLE and operating status as soon as possible. It is also required to close all containment penetrations providing direct access from the containment atmosphere to the outside atmosphere (within 4 hours).*

*A. Incorrect.* *Plausible since AOP-020 would have the operator actuate Phase A Isolation IF RCS temperature could not be maintained at or below 200°F. The first fuel assembly has not been loaded in the core therefore the assembly can be returned to the SFP and NO heat load would exist in the core and RCS heatup to > 200° due to a loss of RHR would take many more hours than 2 (at which time the 'B' RHR pump would be restored and RCS cooling would resume.*

*B. Incorrect.* *Plausible since Tech Specs allows both RHR loops to be removed from operation for up to 1 hour per 2-hour period during the performance of core alterations and core loading verification in the vicinity of the reactor vessel hot legs.*

*C. Correct.*

*D. Incorrect.* *Plausible since Tech Spec 3.9.8.1 requires all Containment penetrations providing direct access from the Containment atmosphere to the outside atmosphere but the Tech Spec is NOT immediately it is within 4 hours.*

**Notes**

000025 Loss of RHR System / 4

025AK1.01; Knowledge of the operational implications of the loss of RHRS during all modes of operation as it applies to Loss of Residual Heat Removal System.

(CFR 41.8 / 41.10 / 45.3)

| | |
|---|---|
| Importance Rating: | 3.9 4.3 |
| Technical Reference: | TS 3.9.8.1 |
| References to be provided: | None |
| Learning Objective: | TS-LP-2.0/3.0/5.0/8.0 Objective 4.e |
| Question Origin: | Bank OIT Exam bank TS-2.0 (R04E) 2 |
| Comments: | None |
| Tier/Group: | T1/G1 |

8. 2014 NRC RO 008/BANK/C/A//AOP-022/NONE//026AK3.01/

Given the following plant conditions:

- The unit is in Mode 4, performing a cooldown on RHR
- Both trains of CCW are in service
- NSW pump 'A' is operating; NSW pump 'B' is in standby

Subsequently the 'A' NSW pump trips on an overcurrent condition.

Which ONE of the following completes the statement below?

The ESW pumps will start on a ___(1)___ signal to cool ___(2)___.

| | (1) | (2) |
|---|---|---|
| A. | breaker trip | Train 'A' CCW ONLY |
| B. | low pressure | Train 'A' CCW ONLY |
| C. | breaker trip | BOTH trains of CCW |
| D. ✔ | low pressure | BOTH trains of CCW |

**Feedback**

*Plausibility and Answer Analysis*

R*eason answer is correct: A low pressure condition on the NSW header causes the train-related ESW pump to start and valves to realign which changes the suction and discharge associated with the SW system. The suction supply is now from the Aux Reservior instead of from the Cooling Tower Basin.*

*Since NSW pump A is supplying both headers, both ESW pumps start on the low pressure and cooling is maintained to both CCW HXs.*

*A. Incorrect. The first part is plausible since a pump trip will result in both a low flow and a low pressure condition, but the ESW automatic functions occur on a low pressure signal. The second part is plausible since the ESW pumps are train specific and since the 'A' NSW pump has the low pressure from a pump trip of the 'A' ESW pump would start and supply flow to the 'A' train components. This is wrong though because both 'A' and 'B' ESW pump would start on the low pressure condition.*

*B. Incorrect. The first part is correct. The second part is plausible since the ESW pumps are train specific and since the 'A' NSW pump has the low pressure from a pump trip of the 'A' ESW pump would start and supply flow to the 'A' train components. This is wrong though because both 'A' and 'B' ESW pump would start on the low pressure condition.*

*C. Incorrect. The first part is plausible since a pump trip will result in both a low flow and a low pressure condition, but the ESW automatic functions occur on a low pressure signal. The second part is correct.*

*D. Correct.*

**Notes**

000026 Loss of Component Cooling Water / 8

026AK3.01; Knowledge of the reasons for the conditions that will initiate the automatic opening and closing of the SWS isolation valves to the CCWS coolers as they apply to the Loss of Component Cooling Water.

(CFR 41.5,41.10 / 45.6 / 45.13)

| | |
|---|---|
| Importance Rating: | 3.2 (our sample plan listed the K/A value at 4.2) 3.5 |
| Technical Reference: | AOP-022, ALB-002 |
| References to be provided: | None |
| Learning Objective: | ESWS Objective 7.d |
| Question Origin: | Bank OIT Exam Bank ESWS (07D) 2 |
| Comments: | None |
| Tier/Group: | T1/G1 |

9. 2014 NRC RO 009/NEW/FUNDAMENTAL///NONE/EARLY/029EK3.06/SAT

Which ONE of the following completes the statements below?

In accordance with the EOP Basis Document, the reason(s) for tripping the Main Turbine during an ATWS is to prevent ___(1)___ .

In accordance with EOP-FR-S.1, Response to Nuclear Power Generation/ATWS, the first verification that the Main Turbine has tripped will be to check Turbine ___(2)___ .

A. ✔ (1) adding positive reactivity and conserve SG inventory

(2) Stop Valve position (on TSLB 2)

B. (1) adding positive reactivity and conserve SG inventory

(2) Governor Valve position (on DEH Panel B)

C. (1) pressurized thermal shock

(2) Stop Valve position (on TSLB 2)

D. (1) pressurized thermal shock

(2) Governor Valve position (on DEH Panel B)

**Feedback**

*Plausibility and Answer Analysis*

Reason answer is correct: *In accordance with the WOG basis document for FR-S.1, ATWS Turbine trip removes a large source of positive reactivity addition and conserves SG inventory. This addition will come from an uncontrolled cooldown of the RCS caused by the continued steam being supplied to the Main Turbine. Step 2 of FR-S.1 requires that the operator verfies that the Turbine has tripped by looking at TSLB-2 (Trip Status Light Box-2) light indications for Turbine Stop Valves 1 through 4 indications. With ALL four lights lit (valve indication of being SHUT) the Turbine is verified Tripped.*

*A. Correct.*

*B. Incorrect. The first part is correct. The second part is plausible because FR-S.1 has the Main Turbine Governor valves checked shut but this would be checked IF the operator checked all Turbine Stop valves on TSLB-2 and found that one or more where NOT shut. They would then manually trip the Main Turbine and then could check all turbine governor valves shut on DEH panel B.*

*C. Incorrect. The first part is plausible since a large RCS cooldown can occur if the Main Turbine is not tripped during an ATWS event. This cooldown can place the plant in a pressurized thermal shock condition but this is NOT the reason given in the WOG for tripping the Turbine. The second part is correct.*

*D. Incorrect. The first part is plausible since a large RCS cooldown can occur if the Main Turbine is not tripped during an ATWS event. This cooldown can place the plant in a pressurized thermal shock condition but this is NOT the reason given in the WOG for tripping the Turbine. The second part is plausible because FR-S.1 has the Main Turbine Governor valves checked shut but this would be checked IF the operator checked all Turbine Stop valves on TSLB-2 and found that one or more where NOT shut. They would then manually trip the Main Turbine and then could check all turbine governor valves shut on DEH panel B.*

**Notes**

000029 ATWS / 1

029EK3.06; Knowledge of the reasons for verifying a main turbine trip; methods as they apply to the ATWS.

(CFR 41.5 / 41.10 / 45.6 / 45.13)

| | |
|---|---|
| Importance Rating: | 4.2 4.3 |
| Technical Reference: | WOG FR-S.1 Background document, FR-S.1 step 2, Rev. 1 |
| References to be provided: | None |
| Learning Objective: | Lesson Plan EOP-LP-3.15 Objectives 2 and 3 |
| Question Origin: | New |
| Comments: | None |
| Tier/Group: | T1/G1 |

10. 2014 NRC RO 010/NEW/C/A///NONE//040AK2.01/

Given the following plant conditions:

- The unit was operating at 100% power, a Reactor Trip and Safety Injection have occurred due to a steam line rupture in Containment on the 'B' SG

Current plant conditions are as follows:

- Containment pressure is 28 psig
- The crew has transitioned from EOP-E-0, Reactor Trip or Safety Injection and are at step 1 of EOP-E-2, Faulted Steam Generator Isolation

Which ONE of the following identifies the set of valves listed below that are expected to be in the SHUT position for the current plant conditions?

1. All MSIV's
2. 1MS-70, Main Steam B to Aux FW Turbine
3. 'B' SG MDAFW AND TDAFW motor isolation valves
4. ONLY 'B' MSIV
5. All Blowdown isolation valves
6. 1SI-3, BIT Outlet

A. 1, 2 and 3

B. 4, 5 and 6

C. ✔ 1, 3 and 5

D. 2, 4 and 6

**Feedback**

*Plausibility and Answer Analysis*

Reason answer is correct: *During a Main Steam Line rupture inside Containment a Safety Injection signal caused by Containment pressure exceeding 3 psig occurs. For the given conditions a Main Steam Line Isolation signal and AFW Isolation signal would also have been generated*
*A MSLI signal, which would have been caused by either: Steamline low pressure (2/3 steamline pressures on any SG < 601 psig) or Containment Pressure > 3.0 psig. The MSLI signal will ensure that only one SG depressurizes following a steamline break upstream of the Main Steam Isolation Valves (MSIVs). The main steamline isolation signal automatically shuts the MSIVs (1MS-80, 1MS-82, 1MS-84), MSIV bypass valves (1MS-81, 1MS-83, 1MS-85), and MSIV before seat drain valves (1MS-231, 1MS-266, 1MS-301).*
*An AFW isolation is initiated if two of three differential pressures indicate any SG is 100 psi below the other two SGs and a main steam line isolation signal is present. The AFW isolation signal shuts the AFW flow control valves and the AFW isolation MOVs to the affected SG (from the MDAFW pumps and the TDAFW pump). The AFW isolation signal isolates AFW flow to a faulted SG on loss of secondary coolant to limit further RCS cooldown. For the given conditions a large steam line rupture is present in the 'B' SG indicated by the Containment pressure of 28 psig. This large steam break would have caused the 'B' SG pressure to have decreased to > 100 psig below the 'A' and 'C' SG's by the time the crew had begun implementation of E-2.*

*A. Incorrect. Plausible since the MSIV's and AFW isolation valves shut but 1MS-70 would be OPEN, 1MS-70 would be procedurally isolated during the implementation of E-2.*

*B. Incorrect. Plausible since 'B' MSIV and Blowdown would be isolated but 1SI-3 would be OPEN. Plausibility of 1SI-3 is made because the valve is shut during the implementation of E-2. Since the given information is that the crew is at the begining of implementation of E-2 the step to shut 1SI-3 would not have be implemented yet.*

*C. Correct.*

*D. Incorrect. Plausible since the 'B' MSIV would be isolated and the other 2 valves would be procedurally isolated during the implementation of E-2. Since the given information is that the crew is at the begining of implementation of E-2 the step to shut 1MS-70 or 1SI-3 would not have been implemented yet.*

**Notes**

000040 (BW/E05; CE/E05; W/E12) Steam Line Rupture - Excessive Heat Transfer / 4

040AK2.01; Knowledge of the interrelations between the Steam Line Rupture and valves.

(CFR 41.7 / 45.7)

| | |
|---|---|
| Importance Rating: | 2.6 2.5 |
| Technical Reference: | E-2, Faulted SG Isolation, Rev. 0<br>ESFAS student text |
| References to be provided: | None |
| Learning Objective: | Lesson Plan ESFAS Objective 8 |
| Question Origin: | NEW |
| Comments: | None |
| Tier/Group: | T1/G1 |

11. 2014 NRC RO 011/NEW/C/A///NONE//054AG2.4.9/

Given the following plant conditions:
- The unit has just entered Mode 2
- 1B MFW pump is in operation and trips due to low lubricating oil pressure
- SG pressures are 1106 psig

One (1) minute later the following plant conditions exist:
- Containment pressure is 13.2 psig and rising
- RCS pressure is 650 psig and lowering
- Tavg is 342°F and lowering
- Multiple Containment radiation monitors are in alarm
- SG levels are:
  'A' 23% slowly rising  'B' 22% slowly rising  'C' 24% slowly rising

Given the current plant conditions, which ONE of the following completes the statement below?

The Main Feedwater system _____ required to maintain a heat sink.

A. continues to operate and is

B. continues to operate but is not

C. has been automatically isolated and AFW is

D. ✔ has been automatically isolated and AFW is not

**Feedback**

*Plausibility and Answer Analysis*

Reason answer is correct: *The standby 'A' MFW pump will autostart if the running MFW pump trips on either low lube oil pressure or electrical fault. Both Main Feedwater pumps will receive trip signals from a Main Steam Line Isolation signal generated by a Safety Injection signal that would develop from Containment pressure exceeding 3 psig. In this case the signal occurs 1 minutes after the 'B' MFW pump tripped. The conditions occurring to the RCS are indicative a Large Break LOCA. The WOG background documents state that the SG's are only needed for a heat sink during small break LOCA conditions. In this case with a Large Break LOCA occurring and since the RCS pressure is lower than the SG pressure the SG's are not required to be a Reactor heat sink. Core decay heat removal will be provided by break flow and Safety Injection flow. Additionally, EOP-FR-H.1, Response to Loss of Secondary Heat Sink would not be implemented based on RCS pressure < non faulted SG pressures and RCS temperature < 350°F.*

*A. Incorrect. Plausible since the MFW system continues to operate after a Reactor trip suppling the SG's with feedwater. The student must determine that a Main Feedwater Isolation signal caused the MFW pumps to trip since there isn't any information provided stating that a MFIS has occurred. The MFIS is caused by either a Safety Injection signal or SG high-high level in 2 of 4 SG level channels. Since a LOCA has occurred and RCS pressure is > SG pressure the SG's are not needed as a heat sink.*

*B. Incorrect. Plausible for the same reason as answer 'A' and additionally the part about not required to restore SG levels to maintain a heat sink being correct.*

*C. Incorrect. The first part is correct the Main Feedwater system has been automatically isolated due to the Main Steam Isolation Signal generated by the Safety Injection signal. The second part about AFW is required to restore SG levels and maintain a heat sink is plausible since all SG levels are below the auto start signal setpoint (<25%) and would be running but are not required to maintain a secondary heat sink during a Large Break LOCA.*

*D. Correct.*

**Notes**

000054 (CE/E06) Loss of Main Feedwater / 4

054AG2.4.9; Knowledge of low power/shutdown implications in accident (e.g., loss of coolant accident or loss of residual heat removal) mitigation strategies.

(CFR 41.10 / 43.5 / 45.13)

| | |
|---|---|
| Importance Rating: | 3.8 4.2 |
| Technical Reference: | AOP-010-BD Rev. 19 for MFW pump auto start, WOG background document for EOP-E-1 for requirements of SG heat sink |
| References to be provided: | None |
| Learning Objective: | Lesson Plan EOP-LP-3.11 objective 4.e |
| Question Origin: | NEW |
| Comments: | None |
| Tier/Group: | T1/G1 |

12. 2014 NRC RO 012/NEW/FUNDAMENTAL///NONE//056AA1.08/

Given the following plant conditions:
- The unit is operating at 100% power
- Both ESCW chillers are in operation

Subsequently:
- A loss of Off-site power has occurred

The Safeguards Actuation verification is in progress in accordance with EOP-E-0, Reactor Trip or Safety Injection, Attachment 3.

Which ONE of the following identifies the current status of ESCW chillers WC-2A and WC-2B?

A. ✔ Both will restart after sequencer operation on their respective buses.

B. Both will restart immediately upon restoration of power of their respective bus.

C. Neither will be running but can be manually restarted after the 30 minute anti-recycle interlock has timed out.

D. Neither will be running but could be manually restarted after verifying Load Block 9 was reached on their respective sequencer.

**Feedback**

*Plausibility and Answer Analysis*

Reason answer is correct: *Upon the loss of off-site power both Emergency busses will loose power and the Emergency Diesel Generators and sequencers will automatically run. The Chillers and their Chilled water pump are sequentially loaded to reduce starting power requirements on the diesels generators . If a Chiller was active, but stopped because of momentary loss of electrical power, it will resume operation upon receipt of the automatic actuating signals 90 to 146 seconds later.*

*Chiller operation via the sequencer:*
*• At load block 1, the anti-recycle timer is bypassed and the oil pump starts.*
*• At load block 2, the chilled water pump starts (even if it is selected for local operation).*
*• At load block 8 the compressor starts if all trips are reset, lube oil pressure increased to above 25 psid and remains above 20 psid and the lube oil pump has run for at least 30 seconds.*

*A. Correct.*

*B. Incorrect. Plausible since many of the loads powered from the Emergency buses immediately restart when power is restored to the Emergency bus after a loss of off-site power occurs.*

*C. Incorrect. Plausible since the Chiller anti-recycle feature prevents more than one normal start within a 30 minute period and could be thought to prevent a restart until 30 minutes has elasped at any time. Since the Chiller was running and has restarted this could be feasible but this feature is bypassed upon any automatic start signal from the ESF sequencer.*

*D. Incorrect. Plausible since there are other components that stop and are restarted after Load Block 9. As an example a component that cools equipment similar to the cooling of equipment provided by the Chillers would be the Fuel Pool Cooling Pumps. The SFP Cooling pumps stop when power is lost to the Emergency Bus and are restarted after sequencer Load Block 9. The controls for both the Chillers and the SFP Cooling pumps are also both on the same back control panel in the Main Control Room (Auxillary Equipment Panel- 1 referred to as AEP-1).*

**Notes**

000056 Loss of Off-site Power / 6

056AA1.08; Ability to operate and / or monitor HVAC chill water pump and unit as they apply to the Loss of Offsite Power.

(CFR 41.7 / 45.5 / 45.6)

| | |
|---|---|
| Importance Rating: | 2.5 2.5 |
| Technical Reference: | E-0, Attachment 3, Rev. 3 |
| References to be provided: | None |
| Learning Objective: | ESCWS Objective 10 |
| Question Origin: | NEW |
| Comments: | None |
| Tier/Group: | T1/G1 |

13. 2014 NRC RO 013/BANK/C/A//AOP-022/NONE//062AG2.4.1/

Given the following plant conditions:
- The plant is at 100% power
- 'B' Train equipment is in service
- 'A' EDG is running for testing

Subsequently the following occurs:
- A Normal Service Water System rupture occurs
- 1A-SA ESW Pump tripped one minute ago and cannot be restarted

Which ONE of the following describes a required action and the reason for the action?

A. Isolate Letdown due to loss of 'B' CSIP.

B. Isolate Letdown due to loss of cooling to Letdown Heat Exchanger.

C. Emergency Stop 'A' EDG due to loss of ESW to 'A' EDG Air Compressors.

D. ✔ Emergency Stop 'A' EDG due to loss of ESW to 'A' EDG Jacket Water Cooler.

**Feedback**

*Plausibility and Answer Analysis*

Reason answer is correct: *The NSW system rupture must have been significant enough to start the ESW pumps on the low system pressure start in order for the 1A-SA pump to be running and trip. Immediate action step 2 of AOP-022 checks if ESW flow is lost to a running EDG for >1 minute. In this case the 'A' EDG is running for testing and would then be required to be Emergency Stopped since ESW flow has been lost for > 1 Minute.*

A. Incorrect. *Plausible for two reasons. First, if a CSIP is not running AOP-018 entry conditions are met and the action would be to isolate letdwon. Second, AOP-022 applies and entry conditions are met with the NSW system rupture and subsequent ESW pump trip. Under normal operating conditions the NSW pump would be providing flow to the ESW Headers. A rupture of the NSW system would auto start the ESW pumps on low pressure. The loss of the 'A' ESW pump would require the 'A' CSIP to be secured. If the 'A' CSIP was the only CSIP running then the RNO action for no CSIP running is to isolate letdown. However this is not correct since the 'A' ESW pump tripped which would affect the 'A' Train components. Since the 'B' Train CSIP would be in service there would still be a CSIP running that would not be affected by the loss of the 'A' ESW pump.*

B. Incorrect. *Plausible since this would be a correct action if cooling had been lost to the Letdown HX, however the cooling source for the Letdown HX has not been lost. But the cooling to the CCW heat exchanger has been lost which must be cooled for the CCW system to function properly. Since CCW cools the Letdown Heat Exchanger which has been affected by the loss of SW this answer is plausible.*

C. Incorrect. *Plausible since the plant IA system has ESW flow to cool the system a misconception could be that the EDG air compressors also are cooled by ESW and a loss of ESW would overheat the air compressors requiring the Emergency shutdown. Since the control air system is supplied by the air compressors the misconception could be that the shutdown cylinder would not function since control air is required to operate the cylinder. By Emergency stopping the EDG prior to the loss of control air the EDG could still be controlled. A total loss of control air could be thought that the EDG would not be able to be stopped if required to prevent damage to the EDG.*

D. Correct.

**Notes**

000062 Loss of Nuclear Svc Water / 4

062AG2.4.1; Knowledge of EOP entry conditions and immediate action steps.

(CFR 41.10 / 43.5 / 45.13)

| | |
|---|---|
| Importance Rating: | 4.6 4.8 |
| Technical Reference: | AOP-022, Step 2 and RNO, Page 4, Rev. 36 |
| References to be provided: | None |
| Learning Objective: | AOP-3.22 Objective 4 |
| Question Origin: | Bank OIT Development AOP-022 (04) 4 |
| Comments: | Dave Lanyi (NRC Chief Examiner) has given us permission to use "AOP" entry and immediate actions steps instead of "EOP" because HNP does not have any actions in the EOP's for NSW |
| Tier/Group: | T1/G1 |

14. 2014 NRC RO 014/NEW/C/A///NONE//065AA2.05/

Given the following plant conditions:

- A Reactor and Turbine startup is in progress
- Reactor power is 6%

Subsequently a leak has developed in the Instrument Air system and air pressure indications are as follows:

| Time | IA pressure |
|---|---|
| 1107 | 76.6 psig |
| 1110 | 64.2 psig |
| 1113 | 58.9 psig |
| 1116 | 34.7 psig |

Based on the plant conditions, which ONE of the following identifies the EARLIEST time the Reactor is required to be tripped?

A. 1107

B. 1110

C. 1113

D. ✔ 1116

**Feedback**

*Plausibility and Answer Analysis*

Reason answer is correct: *In accordance with AOP-017, Loss of Instrument Air, continuous action step #2 requires that IA pressure be maintained above 35 psig and if not then IF the Reactor is critical then Trip the Reactor and perform EOP-E-0, Reactor Trip or Safety Injection, while continuing with AOP-017. At time 1116 IA pressure is < 35 psig and would therefore require the Reactor to be tripped.*

*In accordance with AOP-017 Basis Document: It has been determined that spurious valve actuations will begin to occur on a system-wide basis at pressures below 35 psig. If air header pressure drops below 35 psig at any time, the operator is expected to abandon attempts to recover the system, and implement the RNO actions that follow. This is a continuous action step*.

*A. Incorrect. Plausible since most air valves in the letdown system require 85 psig for full stroke. AOP-017, Attachment 7 states that the letdown flowpath valves may begin to fail to mid-position as pressure falls below that value. Without letdown in service the PRZ would begin to fill and eventually a Reactor Trip on High PRZ level at 92% would occur. This level rise to 92% would occur much later than 1107.*

*B. Incorrect. Plausible since the low Instrument Air pressure alarm is received when IA pressure decreases to < 75 psig. Air pressure this low is indication of a large leak where all available air compressors would be running and NOT meeting the system demands. This pressure is below the normal operation of the IA system but not low enough to warrent a Reactor trip.*

*C. Incorrect. Plausible since at IA pressure < 60 psig the FW flow control valves automatically shut but with the current plant conditions the Main Feed Water Regulating Valves are not currently in service. The valves automatically closing will not have any effect on FW flow to the SGs and therefore will not require a Reactor Trip based on the loss of FW flow to ALL SGs.*

*D. Correct.*

**Notes**

000065 Loss of Instrument Air / 8

065AA2.05; Ability to determine and interpret the following as they apply to the Loss of Instrument Air: When to commence plant shutdown if instrument air pressure is decreasing.

(CFR 43.5 / 45.13)

| | |
|---|---|
| Importance Rating: | 3.4 4.1 |
| Technical Reference: | AOP-017, Step 2 RNO, page 4, Rev. 36 |
| References to be provided: | None |
| Learning Objective: | Lesson Plan ISA Objective 9.c |
| Question Origin: | OIT Development Bank |
| Comments: | At HNP there is no hard number to warrent a plant shutdown. AOP-017 section 3.1 step 12 checks IA pressure sufficient to continue power operation. Basis document reads controlling the plant while remaining at power may prove too difficult or challenging for plant systems and operator resources. Since there is no procedural guidance our question was written to when the Reactor would be tripped due to lowered IA pressure. Noting that IA pressure < 60 psig will cause the MFW Reg valves to fail close which will require a Rx trip since SG levels will not be able to be maintained but if the plant was operating prior to establishing MFW then the plant could be operated until IA pressure decreased to < 35 psig. |
| Tier/Group: | T1/G1 |

15. 2014 NRC RO 015/PREVIOUS/FUNDAMENTAL///NONE//WE04EK2.1/

Given the following plant conditions:

- A Reactor Trip and Safety Injection have occurred from 100% power
- The crew has transitioned to EOP-ECA-1.2, LOCA Outside Containment
- 1RH-1 and 1RH-2, RCS Loop A to RHR Pump A-SA, BOTH indicate partially OPEN

Which ONE of the following identifies:

(1) The action required to ALLOW shutting 1RH-1 and 1RH-2 from the MCB

AND

(2) The MCB parameter and trend that is used in EOP-ECA-1.2 to determine if this action has isolated the break?

A. (1) turn ON the control power switch on the MCB

(2) PRZ level increasing

B. (1) turn ON the control power switch on the MCB

(2) RCS pressure increasing

C. (1) CLOSE the breakers for 1RH-1 and 1RH-2 locally

(2) PRZ level increasing

D. ✔ (1) CLOSE the breakers for 1RH-1 and 1RH-2 locally

(2) RCS pressure increasing

**Feedback**

*Plausibility and Answer Analysis*

Reason answer is correct: *The breakers are NOT normally powered. Closing breakers is correct. In accordance with EOP-ECA-1.2, step 6.b, RCS pressure increasing is one of the parameters that would be used to identify if the break is isolated.*

*A. Incorrect. The control power switch is plausible because other valves used for this alignment have a control power switch to prevent operation. PRZ level increasing is plausible because with the leak isolated, inventory would be recovered but some leak locations will result in increasing level so the EOP network does not use level.*

*B. Incorrect. The control power switch is plausible because other valves used for this alignment have a control power switch to prevent operation. RCS pressure increasing is correct.*

*C. Incorrect. The breakers are NOT normally powered. Closing breakers is correct. PRZ level increasing is plausible because with the leak isolated, inventory would be recovered but some leak locations will result in increasing level so the EOP network does not use level*

*D. Correct.*

**Notes**

W/E04 LOCA Outside Containment / 3

WE04EK2.1; Knowledge of the interrelations between the (LOCA Outside Containment) and components, and functions of control and safety systems, including instrumentation, signals, interlocks, failure modes, and automatic and manual features.

(CFR 41.7 / 45.7)

| | |
|---|---|
| Importance Rating: | 3.5 3.9 |
| Technical Reference: | EOP-ECA-1.2, step 6, page 5, Rev 0 |
| References to be provided: | None |
| Learning Objective: | EOP-3.3 Objective 2 |
| Question Origin: | Previous 2012 NRC RO 16 radomly selected |
| Comments: | None |
| Tier/Group: | T1/G1 |

16. 2014 NRC RO 016/MODIFIED/C/A///NONE//WE05EK2.2/

Given the following plant conditions:
- The unit was operating at 100% power
- MDAFW pump 'B' is under clearance

Subsequently the following occurs:
- A manual Reactor Trip was initiated due to a loss of both MFPs
- The TDAFW pump tripped after starting
- MDAFW flow control valves are full open
- SG NR levels are 43% and lowering
- Containment pressure is 0.5 psig

Which ONE of the following would be the FIRST set of conditions that would require entry into EOP-FR-H.1, Response to Loss of Secondary Heat Sink?

All SG NR levels are ___(1)___ AND total AFW flow is ___(2)___.

A. ✔ (1) 24%

(2) 200 KPPH

B. (1) 24%

(2) 220 KPPH

C. (1) 39%

(2) 200 KPPH

D. (1) 39%

(2) 220 KPPH

**Feedback**

*Plausibility and Answer Analysis*

Reason answer is correct: Heat Sink CSFST indicates a loss of heat sink if AFW flow is less than 210 KPPH AND ALL SG NR levels are less than 25% with normal Containment conditions (40% adverse conditions).

*A. Correct*

*B. Incorrect. Plausible since the level is below the requirement but AFW flow is above the requirement.*

*C. Incorrect. Plausible since this level is less than the adverse Containment requirement and AFW flow is below the requirement.*

*D. Incorrect. Plausible since this level is below the requirement for adverse Containment conditions.*

*Original question:*

Given the following plant conditions:
- The plant was operating at 100% power
- MDAFW pump 'A' is under clearance
- A manual Reactor Trip was initiated due to a loss of both MFPs
- The TDAFW pump tripped after starting
- MDAFW flow control valves are full open
- SG NR levels are 50% and lowering
- Containment pressure is 3.5 psig

Which ONE of the following would be the FIRST set of conditions that would require entry into FRP-H.1, Response to Loss of Secondary Heat Sink?

All SG NR levels are ___(1)___ AND total AFW flow is ___(2)___.

A. (1) 39%

(2) 220 KPPH

B✔ (1) 39%

(2) 200 KPPH

C. (1) 24%

(2) 220 KPPH

D. (1) 24%

(2) 200 KPPH

**Notes**

W/E05 Inadequate Heat Transfer – Loss of Secondary Heat Sink / 4

WE05EK2.2; Knowledge of the interrelations between the (Loss of Secondary Heat Sink) and the 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.

(CFR 41.7 / 45.7)

| | |
|---|---|
| Importance Rating: | 3.9 4.2 |
| Technical Reference: | EOP-CSFST |
| References to be provided: | None |
| Learning Objective: | Heat Sink Status Tree, EOP3-11 Obj. 4 |
| Question Origin: | Previous - 2012 NRC RO 17 |
| Comments: | Question has been modified by changing the Containment pressure to a non-adverse value a previous non-correct distractor is now correct. Also changed the order of the answers to put them in sequenced order. |
| Tier/Group: | T1/G1 |

17. 2014 NRC RO 017/BANK/C/A//ECA-1.1/NONE//WE11EA2.2/

Given the following plant conditions:

- The unit was operating at 100% power and has experienced a large break LOCA
- The RHR system is NOT capable of cold leg recirculation and the crew has transitioned from EOP-E-1, Loss of Reactor or Secondary Coolant to EOP-ECA-1.1, Loss of Emergency Coolant Recirculation
- RWST level is 45%

The following conditions currently exist:

- One Containment Spray pump and two CSIPs and are running
- Containment pressure is 12 psig and lowering
- RWST level is 2.7% and lowering

Which ONE of the following identifies the required crew actions for operation of the CSIPs and Containment Spray pumps?

A. Allow CSIPs AND Containment Spray pumps to operate

B. ✔ Stop CSIPs, allow Containment Spray pumps to operate

C. Allow CSIPs to operate, stop Containment Spray pumps

D. Stop CSIPs AND Containment Spray pumps

**Feedback**

*Plausibility and Answer Analysis*

Reason answer is correct: *The foldout of EOP ECA-1.1 for loss of section states: IF RWST level drops to 3%, THEN secure all pumps taking suction only from the RWST. During ECCS actuation the RHR, CSIP's and Containment Spray pumps align to the RWST for suction. When RWST level reaches 23.4% the Containment Spray pumps auto swap feature opens the suction valves from the Containment Recirc Sumps and shuts the suction valves from the RWST. Both Containment Spray pumps would be taking a suction from the Containment Recirc sumps from that point on. With the current RWST level of 2.7% only the RHR and CSIPs are aligned to the RWST. Therefore since the Containment Spray pumps are not taking a suction from the RWST they are not required to be secured. Operator action is required to change the RHR suction lineup from the RWST to the Containment Recirc sump. During this manual swap over the CSIP's are secured and their suction source is switched from the RWST to the RHR pump discharge. This manual swap over was not completed since neither RHR pump was capable of cold leg recirc therefore the CSIPs are continuing to take a suction from the RWST and will need to be stopped.*

*A. Incorrect. Plausible if the CSIPs were aligned to another suction source. The CSIPs could be aligned to have their suction source from the VCT or their suction source could come from the RHR pumps discharge if they were aligned for cold leg recirculation. Therefore the RWST level would not have an impact on their operation. Allowing the Containment Spray pumps to remain in operation is correct. The Containment Spray pump suction source is currently from the Containment Recirculation sump.*

*B. Correct.*

*C. Incorrect. Plausible to allow the CSIPs to remain in operation if the CSIPs were aligned to have their suction source from the VCT or their suction source from the Containment Recirc sumps to the RHR pumps discharge if they were aligned for cold leg recirculation. Therefore the RWST level would not have an impact on their operation. Stopping the Containment Spray pumps would be correct if the Containment Spray trains auto swap over did NOT function as designed.*

*D. Incorrect. Plausible if the CSIPs and Containment Spray pumps were both taking a suction from ONLY the RWST which both pumps would be with RWST level >23.4%. But the Containment Spray pumps suction source auto swapped to the Containment Recirc sump as designed when RWST level is 23.4%.*

**Notes**

W/E11 Loss of Emergency Coolant Recirc. / 4

WE11EA2.2; Ability to determine and interpret adherence to appropriate procedures and operation within the limitations in the facility's license and amendments as they apply to the (Loss of Emergency Coolant Recirculation).

(CFR 43.5 / 45.13)

| | |
|---|---|
| Importance Rating: | 3.4 4.2 |
| Technical Reference: | ECA-1.1 Foldout |
| References to be provided: | None |
| Learning Objective: | LP-EOP-2.3 Objective 4 |
| Question Origin: | Bank, OIT Exam Bank EOP-3.3 (05C) 6 |
| Comments: | None |
| Tier/Group: | T1/G1 |

18. 2014 NRC RO 018/BANK/C/A///NONE//077AK3.02/

Given the following plant conditions:
- The unit is operating at 100% power
- The Load Dispatcher reports a large disturbance occurring on the grid

The following conditions are observed:

| Time | Grid Frequency (Hz) |
|---|---|
| 0107 | 59.6 |
| 0110 | 59.2 |
| 0114 | 58.9 |
| 0116 | 58.7 |
| 0119 | 58.5 |
| 0121 | 58.3 |

Which ONE of the following describes (1) the EARLIEST time that the Reactor must be tripped in accordance with AOP-028, Grid Instability and (2) what is the basis for that Reactor Trip?

A. (1) 0119

(2) Continued operation in this condition could lead to high temperatures in the generator and subsequent insulation degradation

B. (1) 0121

(2) Continued operation in this condition could lead to high temperatures in the generator and subsequent insulation degradation

C. (1) 0119

(2) Provides core protection against DNB as a result of underfrequency on more than one RCP

D. (1) 0121

(2) Provides core protection against DNB as a result of underfrequency on more than one RCP

**Feedback**

*Plausibility and Answer Analysis*

Reason answer is correct: *In AOP-028 the procedure provides specific guidance on generator conditions that require a Reactor trip.*

- *Generator frequency less than 59 Hz for greater than or equal to 5 minutes*
- *Generator frequency less than 58.4 Hz*
- *Turbine speed less than or equal to 1752 RPM*
- *Trip the Reactor and Go to EOP-E-0*

*A reactor trip is required at 0119 when frequency is less than 59 Hz for 5 minutes. A reactor trip setpoint is also exceeded at 0121 but this is not the earliest.*

*Prior to checking the Main Generator for indications requiring a Reactor trip a caution provides directions on low frequency conditions requiring when the generator must be taken off line. AOP-028 Basis document provides a reason for this caution stating:*

*This caution alerts the operator to the consequences of operating equipment in an underfrequency condition. Operation outside of established limits could cause high temperatures in the generator and possibly lead to insulation degradation and generator damage. This condition could also lead to damage of major electrical equipment when operating at lower speeds and higher currents.*

*A. Correct.*

*B. Incorrect. The first part dealing with trip time is plausible since the generator frequency is < 58.4 Hz which would require a Reactor trip but the first time that frequency exceeded a limit was at 0119. The second involving the basis for the actions is correct.*

*C. Incorrect. Correct time. Basis is plausible as this is the basis for RCP Underfrequency Trip.*

*D. Incorrect. The first part dealing with trip time is plausible since the generator frequency is < 58.4 Hz which would require a Reactor trip but the first time that frequency exceeded a limit was at 0119. Basis is plausible as this is the basis for RCP Underfrequency Trip.*

**Notes**

000077 Generator Voltage and Electric Grid Disturbances / 6

077AK3.02; Knowledge of the reasons for the actions contained in abnormal operating procedure for voltage and grid disturbances as they apply to Generator Voltage and Electric Grid Disturbances.

(CFR 41.4, 41.5, 41.7, 41.10 / 45.8)

Importance Rating: 3.6 3.9

Technical Reference: AOP-028-BD, page 8, Step C2 and 2, Rev. 13

References to be provided: None

Learning Objective: AOP-LP-3.28, Objective 2A

Question Origin: Bank OIT Exam Bank AOP-028 (02A) 2

Comments: None

Tier/Group: T1/G1

19. 2014 NRC RO 019/NEW/C/A///NONE//001AK3.02/

During a plant startup Control Bank D rods B8 and H14 continued to step out after outward demand had stopped.

Rods were placed to manual and all rod motion stopped.

Current Rod Control status is as follows:
- Control Bank D group step counter demand is 174 and 173 steps
- DRPI indication for Control Rods B08 and H14 indicate 192 steps

Which ONE of the following completes the statement below identifying the Techical Specification LCO that is NOT met for this condition and the reason why?

Technical Specification ___(1)___ since ___(2)___ .

**(Assume Control Bank D rods remain at the current positions)**

A. (1) 3.1.3.1, Movable Control Assemblies - Group Height

(2) two rods are not within the proper alignment limits

B. (1) 3.1.3.1, Movable Control Assemblies - Group Height

(2) more than one DRPI indication is inoperable

C. (1) 3.1.3.2, Position Indication Systems - Operating

(2) two rods are not within the proper alignment limits

D. (1) 3.1.3.2, Position Indication Systems - Operating

(2) more than one DRPI indication is inoperable

**Feedback**

*Plausibility and Answer Analysis*

Reason answer is correct: Tech Spec 3.1.3.1 is not met. The control rods H2 and B8 are not positioned within ± 12 steps of their groups step counter demand position as indicated on DRPI.

*A. Correct.*

*B. Incorrect. The first part is correct. The second part is plausible since the indication for Control Rods H2 and B8 are not at the same step counter demand and it could be thought of a problem with DRPI. Since the given information is that rods H2 and B8 continued to step out after outward demand had stopped the indications found on DRPI would be the actual rod position indication where the group step counters would only indicate where the demand for the rod group would be.*

*C. Incorrect. The first part is plausible since the Tech Spec deals with the DRPI system being capable of determing the shutdown and control rod positions within ± 12 steps. Since the position of rods H2 and B8 are > 12 steps from the group step counter demand the student could believe that the Tech Spec applies. The second part is correct.*

*D. Incorrect. The first part is plausible since the Tech Spec deals with the DRPI system being capable of determing the shutdown and control rod positions within ± 12 steps. Since the position of rods H2 and B8 are > 12 steps from the group step counter demand the student could believe that the Tech Spec applies. The second part is plausible since the indication for Control Rods H2 and B8 are not at the same step counter demand and it could be thought of a problem with DRPI. Since the given information is that rods H2 and B8 continued to step out after outward demand had stopped the indications found on DRPI would be the actual rod position indication where the group step counters would only indicate where the demand for the rod group would be.*

**Notes**

000001 Continuous Rod Withdrawal / 1

001AK3.02; Knowledge of the reasons for Tech-Spec limits on rod operability as they apply to the Continuous Rod Withdrawal.

(CFR 41.5,41.10 / 45.6 / 45.13)

Importance Rating: 3.2 4.3

Technical Reference: Tech Spec 3.1.3.1

References to be provided: None

Learning Objective:

Question Origin: New

Comments: None

Tier/Group: T2/G1

20. 2014 NRC RO 020/BANK/C/A///NONE//036AA2.01/

Given the following plant conditions:

- The unit is in Mode 6 with refueling in progress
- A spent fuel assembly is being moved in the Fuel Handling Building (FHB) when it's damaged by contacting a wall of the pool
- Spent Fuel Pool area radiation monitor RM-1FR-3566A-SA is in HIGH alarm
- Spent Fuel Pool area radiation monitor RM-1FR-3567B-SB is in ALERT

Which ONE of the following describes the effect on the Fuel Handling HVAC system?

A. ✔ ONLY "A" train of Fuel Handling Building Ventilation Emergency Exhaust has received an automatic start signal.

B. BOTH "A" and "B" trains of Fuel Handling Building Ventilation Emergency Exhaust have received automatic start signals.

C. NEITHER train of Fuel Handling Building Ventilation Emergency Exhaust has received an automatic start signal, but manual start is required.

D. NEITHER train of Fuel Handling Building Ventilation Emergency Exhaust has received an automatic start signal, and manual start is NOT required.

**Feedback**

*Plausibility and Answer Analysis*

Reason answer is correct: *AOP-013, Fuel Handling Accident for a fpent fuel assembly that has collided with another object directs the use of Section 3.1. Step 6 checks FHB radiation monitors for any in HIGH Alarm. If any listed monitors are in HIGH Alarm then the operator is directed to verify that the FHB HVAC system auto alignment has occurred by referring to OP-170, Fuel Handling Building HVAC. The FHB HVAC system response to the HIGH Alarm is as follows:*

*Any one of a train's ARMs in HIGH alarm in the FHB will start 1 train of FHB emergency exhaust. The FHB area monitors are part of the safety-related portion of the RMS and measure the radiation exposure rate around the new and spent fuel pools (north and south), and the fuel transfer canal. Each radiation monitor has three GM tube detectors. If any one of three detectors associated with a microprocessor is in a high radiation alarm state, automatic actions are initiated. The receipt of a high alarm from any single monitor (1 of 12) starts the associated exhaust Fan (E-12 or E-13) and opens the associated emergency exhaust inlet valve. It stops the normal supply and exhaust fans in the FHB and shuts the FHB operating floor dampers. The detectors are arranged such that there is always one group of three detectors (one monitor) that cannot be shielded by a crane or other object.*

*In the FHB, Krypton-85 (Kr-85) is the primary radiological concern for fuel offloaded more than six months. Kr-85 is a beta hazard and will not be detected by the area radiation monitors.*

*A. Correct.*

*B. Incorrect. Plausible if the candidate misunderstands only the High alarm will result in a start of the FHB emergency exhaust system and considers an ARM in ALERT will cause the start of FHB emergency exhaust.*

*C. Incorrect. Plausible if candidate misunderstands the coincidence of the FHB emergency exhaust system and believes both Trains of FHB emergency exhaust ARMs have to be in High alarm in order to generate this automatic signal and the actions of AOP-013 requires the candidate to manually start the FHB emergency exhaust system.*

*D. Incorrect. Plausible if candidate misunderstands the coincidence of the FHB emergency exhaust system and believes both Trains of FHB emergency exhaust ARMs have to be in High alarm in order to generate this automatic signal.*

**Notes**

000036 (BW/A08) Fuel Handling Accident / 8

036AA2.01; Ability to determine and interpret ARM system indications as they apply to the Fuel Handling Incidents.

(CFR 43.5 / 45.13)

| | |
|---|---|
| Importance Rating: | 3.2 3.9 |
| Technical Reference: | AOP-013, Section 3.1 steps 5 and 6, Rev. 15, and AOP-005-BD, Disccusion item, Page 3, Rev. 11 |
| References to be provided: | None |
| Learning Objective: | AOP-LP-3.13, Objective 4 |
| Question Origin: | Bank, OIT Exam Bank AOP-013 (04) 2 |
| Comments: | None |
| Tier/Group: | T2/G1 |

21. 2014 NRC RO 021/NEW/C/A//STEAM TABLES/NONE//037AK1.01/

With the unit operating at 100% power a tube leak develops on the 'C' SG

Current plant conditions are as follows:
- 'C' SG pressure is 980 psig
- ERFIS is NOT available
- An RCS cooldown and depressurization is about to be commenced
- The CRS directs steam to be dumped until the RCS is subcooled by 40°F

In accordance with AOP-016, Excessive Primary Plant Leakage, which ONE of the following completes the statement below?

PREFERRED RCS temperature indication will be obtained using ___(1)___ and the RCS cooldown will be stopped when the RCS is at ___(2)___.

A. (1) highest core exit T/C

   (2) 500°F

B. ✔ (1) highest core exit T/C

   (2) 504°F

C. (1) active loop WR Thot

   (2) 500°F

D. (1) active loop WR Thot

   (2) 504°F

**Feedback**

*Plausibility and Answer Analysis*

Reason answer is correct: *AOP-016 requires core exit temperature to be obtained using the Highest Core Exit TC's when ERFIS is not available. The other means to obtain the core exit temperature would be an active loop WR Thot.*

*Saturation temperature for a SG pressure 980 psig (994.7 psia) is 544°F. (544°F - 40°F required = 504°F)*

*Using the Steam Tables, the RCS temperature that would have 40°F of subcooling for a SG pressure of 980 psig would be 504°F.*

*A. Incorrect. The first part is correct. The second part is plausible if the candidate subtracts 14.7 from 980 to obtain a psia value. They would then use 965 psia and come up with a saturation temperature of 540°F. With subcooling of 40°F the temperature would be 500°F (540 - 40 = 500).*

*B. Correct.*

*C. Incorrect. The first part is plausible since this is the other choice for obtaining core exit temperature but not the preferred choice. The second part is plausible if the candidate subtracts 14.7 from 980. They would then use 965 psia and come up with a saturation temperature of 540°F. With subcooling of 40°F the temperature would be 500°F (540 - 40 = 500).*

*D. Incorrect. The first part is plausible since this is the other choice for obtaining core exit temperature but not the preferred choice. The second part is correct.*

**Notes**

000037 Steam Generator Tube Leak / 3

037AK1.01; Knowledge of the operational implications of the use of steam tables as it applies to Steam Generator Tube Leak.

(CFR 41.8 / 41.10 / 45.3)

| | |
|---|---|
| Importance Rating: | 2.9 3.3 |
| Technical Reference: | AOP-016, Attachment 11, Page 52, Rev. 54, Steam Table |
| References to be provided: | None |
| Learning Objective: | AOP-LP-3.16, Objective 3 |
| Question Origin: | NEW |
| Comments: | None |
| Tier/Group: | T2/G1 |

22. 2014 NRC RO 022/NEW/C/A///NONE//051AG2.4.46/

Given the following plant conditions:
- The plant is operating at 58% power during a Reactor startup in accordance with GP-005, Power Operation

Subsequently:
- The crew is experiencing Condenser vacuum problems and are implementing AOP-012, Partial Loss of Condenser Vacuum
- Load is being reduced in accordance with AOP-038, Rapid Downpower

Current Condenser conditions are:
- Condenser Zone 1 pressure is 4.9 inches Hg absolute
- Condenser Zone 2 pressure is 5.1 inches Hg absolute

Which ONE of the following completes the statements below?

For the current Condenser conditions the C-7A status light is ___(1)___ and alarm ALB-018-1-1, Turbine Trip Condenser Low Vacuum, is ___(2)___ .

| | (1) | (2) |
|---|---|---|
| A. | ON | ON |
| B. | OFF | ON |
| C. | ON | OFF |
| D. ✔ | OFF | OFF |

**Feedback**

*Plausibility and Answer Analysis*

Reason answer is correct: *Turbine Trip Condenser Low Vacuum setpoint is 5 in Hg when <60% power. The pressure switches that feed the turbine low vacuum trip are located in Zone 1 (ONLY). Zone 1 has not exceeded the trip setpoint but Zone 2 has. The Turbine Trip on Low Vacuum should be OFF until Zone 1 reaches the setpoint.*

*The Main Condenser is divided into Zones 1 and 2. During summer operation, Zone 2 may increase more than 1 inch of Hg higher pressure than Zone 1. The pressure switches which feed the turbine low vacuum trip are located in Zone 1.*

*During load rejections, the steam dump arming signal is controlled by interlocks C-7A and C-7B. C-7A interlock actuates if the rate of decrease of turbine load exceeds 10 percent over a 120-second time span (i.e., C-7A will actuate for both a ramp rate > 5 percent per minute and step drops >10 percent). Ramping the unit down at the maximum rate allowed by AOP-038 will NOT activate the Loss of Load permissive (it is not addressed in AOP-038).*

*A. Incorrect. The first part is plausible since Condenser Zone 2 has exceeding the Turbine Trip setpoint. The second part is plausible since the unit is being rapidly ramped down IAW AOP-038 which allows a ramp rate of up to 45 MW/Min. Ramping at this fast of a rate could be thought to exceed the C-7A actuation but it will not. IAW AOP-038, the maximum rate is 45 MW/min and any rate exceeding this requires a Reactor Trip. The HNP FSAR design basis for the Main Generator list the output to be 1034 MWe when supplied with 982 psia steam at 542ºF at the throttle valves and exhausting to a 2.99/4.13 in Hg abs condenser pressure. To activate C-7A the Turbine would have to be reduced at a rate of 51.7 MW/min. This rate exceeds the maximum rate the operator can achieve while operating the unit IAW AOP-038.*

*B. Incorrect. The first part is plausible since Condenser Zone 2 has exceeding the Turbine Trip setpoint. The second part is correct.*

*C. Incorrect. The first part is correct. The second part is plausible since the unit is being rapidly ramped down IAW AOP-038 which allows a ramp rate of up to 45 MW/Min. Ramping at this fast of a rate could be thought to exceed the C-7A actuation but it will not. IAW AOP-038, the maximum rate is 45 MW/min and any rate exceeding this requires a Reactor Trip. The HNP FSAR design basis for the Main Generator list the output to be 1034 MWe when supplied with 982 psia steam at 542ºF at the throttle valves and exhausting to a 2.99/4.13 in Hg abs condenser pressure. To activate C-7A the Turbine would have to be reduced at a rate of 51.7 MW/min. This rate exceeds the maximum rate the operator can achieve while operating the unit IAW AOP-038.*

*D. Correct.*

**Notes**

000051 Loss of Condenser Vacuum / 4

051AG2.4.46; Ability to verify that the alarms are consistent with the plant conditions.

(CFR 41.10 / 43.5 / 45.3 / 45.12)

| | |
|---|---|
| Importance Rating: | 4.2 4.2 |
| Technical Reference: | AOP-012-BD, Page 2, Rev. 15 |
| References to be provided: | None |
| Learning Objective: | LP AOP-3.12 Objective 3 |
| Question Origin: | New |
| Comments: | None |
| Tier/Group: | T2/G1 |

23. 2014 NRC RO 023/BANK/C/A///NONE//068AK2.07/

Given the following plant conditions:

- The unit was operating at 100% power
- The MCR was evacuated due to a fire
- Off-site power was lost as the crew evacuated the MCR

Subsequently:

- AOP-004, Remote Shutdown is in progress and transfer to the ACP has just been completed

In accordance with AOP-004, which ONE of the following describes the required actions to take for EDG operation?

A. Locally restart and load both EDGs.

B. Locally restart and load ONLY the 'B' EDG.

C. Check that the 'B' EDG has energized its emergency bus or start the 'B' EDG from the ACP then start all Train 'B' components.

D. ✔ Check that both emergency busses are energized. If any emergency bus is not energized locally start and load the respective EDG.

**Feedback**

*Plausibility and Answer Analysis*

Reason answer is correct: *A loss of offsite power will cause both emergency busses to de-energize. The associated EDG will start and load the bus via the sequencer. The EDGs will continue to run and supply emergency bus loads during and after the transfer of control to the ACP is completed. IAW AOP-004 Section 3.1, step 8.a the crew should check that both emergency busses are energized by evidence of running equipment powered by the respective emergency bus. ('B' EDG has priority since train B is the only train credited for safe shutdown). Since there are no controls for EDG operation at the ACP if one or both emergency bus is de-energized the action would be to locally start and load the affected EDG. The AOP-004 basis document states that IF offsite power was lost to either or both busses, the respective EDG(s) should have automatically started and loaded.*

*A. Incorrect. Plausible since multiple running componets will stop and need to be restarted during the transfer of control to the ACP. A student could have a misconception that when the EDG controls are transferred to the ACP the EDG would stop and need to be restarted. But since both EDGs would continue to run during and after transfer of control to the ACP is completed this is incorrect.*

*B. Incorrect. Plausible for the same reason as above. Additionally, since the 'B' train is the only train credited for safe shutdown the misconception could be that only the 'B' EDG would need to be started and loaded. But since the assoicated safety bus remained energized this action is not required to be performed.*

*C. Incorrect. Plausible since the step in AOP-004 to check is to check that the emergency busses are energized. A misconception could be that since 'B' is the only train credited for safe shutdown it would have priority over checking the 'A' emergency bus. Starting the EDG from the ACP is plausible since many of the ECCS controls are located on the ACP. But, the EDG controls are not located on the ACP. The EDGs will have to be controlled locally.*

*D. Correct.*

**Notes**

000068 (BW/A06) Control Room Evac. / 8

068AK2.07; Knowledge of the interrelations between the Control Room Evacuation and the ED/G.

(CFR 41.7 / 45.7)

| | |
|---|---|
| Importance Rating: | 3.3 3.4 |
| Technical Reference: | AOP-004, Step 8, Page 19, Rev. 65<br>AOP-004-BD, Step 8a, Page 30, Rev. 28 |
| References to be provided: | None |
| Learning Objective: | LP-AOP-004 Objective 4 |
| Question Origin: | Bank, OIT Development 068 AK2.07 |
| Comments: | NOTE: The 2014 written exam sample plan for this question has the wrong RO importance rating. The rating should be 3.3. The rating on the sample plan was 4.2. |
| Tier/Group: | T2/G1 |

24. 2014 NRC RO 024/BANK/C/A///NONE//WE03EK2.2/

Given the following plant conditions:

- A LOCA has occurred
- RCS pressure is 1100 psig and stable
- Containment pressure is 5 psig and stable
- The crew is implementing EOP-ES-1.2, Post LOCA Cooldown and Depressurization.

Which ONE of the following completes the statement below?

The crew will perform a RCS cooldown using the ___(1)___ at ___(2)___ .

A. (1) S/G PORVs

(2) less than 100°F per hour

B. (1) S/G PORVs

(2) the maximum achievable rate.

C. (1) Condenser steam dumps

(2) less than 100°F per hour

D. (1) Condenser steam dumps

(2) maximum achievable rate

**Feedback**

*Plausibility and Answer Analysis*

Reason answer is correct: *SG PORVs will be used for the cooldown because the condenser is not available and EOP-ES-1.2 limits cooldown to 100°F/hour.*

*A. Correct.*

*B. Incorrect. SG PORVs will be used for the cooldown because the condenser is not available. The Cooldown Rate is incorrect. Other EOPs perform a max rate cooldown but EOP-ES-1.2 limits cooldown to 100°F/hour.*

*C. Incorrect. Condenser steam dumps are not available because at 3 psig in Containment a MSLI actuated to shut all MSIVs. Rate is correct.*

*D. Incorrect. Condenser steam dumps are not available because at 3 psig in Containment a MSLI actuated to shut all MSIVs. Credible because it is the normal method of cooldown. The Cooldown Rate is incorrect. Other EOPs perform a max rate cooldown but EOP-ES-1.2 limits cooldown to 100°F/hour.*

**Notes**

W/E03 LOCA Cooldown – Depress / 4

WE03EK2.2; Knowledge of the interrelations between the (LOCA Cooldown and Depressurization) and the 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.

(CFR 41.7 / 45.7)

| | |
|---|---|
| Importance Rating: | 3.7 4.0 |
| Technical Reference: | EOP Users Guide, EOP-ES-1.2 |
| References to be provided: | None |
| Learning Objective: | LP-EOP-3.5, Obj. 5c |
| Question Origin: | Bank OIT Exam Bank EOP-3.5 (05C) 1 |
| Comments: | None |
| Tier/Group: | T2/G1 |

25. 2014 NRC RO 025/BANK/FUNDAMENTAL///NONE//WE06EK3.2/

Given the following plant conditions:

- EOP-FR-C.2, Response to Degraded Core Cooling is in progress due to an ORANGE condition on the Core Cooling CSFST
- RCPs 'A' and 'C' are running; RCP 'B' is secured
- Both CSIPs are tripped
- The crew is about to depressurize all SGs to atmospheric pressure

Which ONE of the following completes the statement below describing the RCP operational requirement and the EOP basis for RCP operation from this point forward in EOP-FR-C.2?

RCPs are _____ .

A. stopped to reduce heat input into the RCS

B. ✔ stopped because number 1 seal differential pressure will be lost

C. left running to provide core cooling until ECCS flow is established

D. left running to provide core cooling until the ORANGE condition clears

**Feedback**

*Plausibility and Answer Analysis*

Reason answer is correct: *ALL RCPs are stopped during the RCS depressurization to prevent the RCPs from operating when #1 Seal Differential pressure is < 200 psid. As the RCS is depressurized the RCP seal DP is reduced.*

*A. Incorrect. Plausible since any time the RCP's are in operation they provide heat input to the RCS.*

*B. Correct.*

*C. Incorrect. Plausible since any time the RCPs are in operation they provide core cooling.*

*D. Incorrect. Plausible since any time the RCPs are in operation they provide core cooling.*

**Notes**

W/E06 Degraded Core Cooling / 4
WE06EK3.2; Knowledge of the reasons for normal, abnormal and emergency operating procedures associated with (Degraded Core Cooling) as they apply to the (Degraded Core Cooling).

(CFR 41.5 / 41.10, 45.6, 45.13)

| | |
|---|---|
| Importance Rating: | 3.5 4.0 |
| Technical Reference: | WOG Background Document EOP-FR-C.2, Rev. 2 |
| References to be provided: | None |
| Learning Objective: | EOP-3.10 Objective 4 |
| Question Origin: | Bank, OIT Exam Bank EOP-3.10 (04) 3 |
| Comments: | None |
| Tier/Group: | T2/G1 |

26. 2014 NRC RO 026/NEW/FUNDAMENTAL//FR-P.1/NONE//WE08EA2.2/

Given the following plant conditions:
- The plant was operating at 100% power
- A Large Break LOCA has occurred
- FR-P.1, Response to Imminent Pressurized Thermal Shock is in progress

Subsequently:
- The RCS Tavg cooldown rate was determined to be 240°F in the last hour

Which ONE of the following completes the statement below concerning the MINIMUM RCS soak time requirements and the reason for the soak in accordance with FRP-P.1?

A RCS soak period of ___(1)___ is required for the current plant conditions to ___(2)___ .

A. ✔ (1) 1 hour

(2) relieve Reactor vessel stress to enhance and maintain vessel integrity

B. (1) 29 hours

(2) allow time for the vessel head to cool to prevent voiding during the subsequent depressurization

C. (1) 1 hour

(2) allow time for the vessel head to cool to prevent voiding during the subsequent depressurization

D. (1) 29 hours

(2) relieve Reactor vessel stress to enhance and maintain vessel integrity

**Feedback**

*Plausibility and Answer Analysis*

Reason answer is correct: *Following an excessive cooldown, reactor vessel stress must be relieved to enhance and maintain vessel integrity. If the RCS cooldwon rate was greater than 100°F in any sixty minute period then a ONE hour RCS soak is required. The caution prior to determining RCS soak requirements in FR-P.1 states that following an excessive cooldown, Reactor vessel stress must be relieved to enhance an maintain vessel integrity.*

*A. Correct.*

*B. Incorrect. The first part is plausible since a candidate could have a misconception that this longer time requirement and reason is correct based on the requirement of a 29 hour RCS soak during a Natural Circ coodown with steam void in the vessel with RVLIS and without CRDM fans in operation. The second part is plausible since in accordance with EOP-ES-0.3, the required 29 hours of soak time will allow the vessel head time to cool to a temperture at which RCS depressurization will not cause voiding but this time period is not required to relieve Reactor vessel stress.*

*C. Incorrect. The first part is correct. The second part is plausible since in accordance with EOP-ES-0.3, the required 29 hours of soak time will allow the vessel head time to cool to a temperture at which RCS depressurization will not cause voiding but this time period is not required to relieve Reactor vessel stress.*

*D. Incorrect. The first part is plausible since a candidate could have a misconception that this longer time requirement and reason is correct based on the requirement of a 29 hour RCS soak during a Natural Circ coodown with steam void in the vessel with RVLIS and without CRDM fans in operation. The second part is correct.*

**Notes**

W/E08 RCS Overcooling – PTS / 4

WE08EA2.2; Ability to determine and interpret adherence to appropriate procedures and operation within the limitations in the facility's license and amendments as they apply to (Pressurized Thermal Shock).

(CFR 43.5 / 45.13)

Importance Rating: 3.5 4.1

Technical Reference: EOP-FR-P.1, page 44, Rev 0

References to be provided: None

Learning Objective: EOP-LP-3.14 Obj 2.e

Question Origin: NEW

Comments: None

Tier/Group: T2/G1

27. 2014 NRC RO 027/NEW/C/A//FR-Z.2/NONE//WE15EA1.3/

Given the following plant conditions:

- A LOCA has occurred
- 480V Emergency Bus 1A2-SA de-energized due to a ground fault
- The crew is performing EOP-E-1, Loss Of Reactor Or Secondary Coolant

The following conditions exist in Containment:

- Containment Pressure is 10.3 psig and rising slowly
- Containment Sump Level is 210 inches and rising slowly
- High Range Containment Post LOCA Radiation Monitors are in alarm

Which ONE of the following completes the statement below?

Enter ___(1)___ AND sample the ___(2)___ .

A. (1) EOP-FR-Z.1, Response to High Containment Pressure

(2) Containment Sumps

B. (1) EOP-FR-Z.1, Response to High Containment Pressure

(2) A ESW Supply Header

C. ✔ (1) EOP-FR-Z.2, Response to Containment Flooding

(2) Containment Sumps

D. (1) EOP-FR-Z.2, Response to Containment Flooding

(2) A ESW Supply Header

**Feedback**

*Plausibility and Answer Analysis*

Reason answer is correct: *With the Containment sump level greater than 196" the EOP-CSFST terminus is ORANGE for Containment flooding and requires the crew to implement EOP-FR-Z.2. Once in EOP-FR-Z.2 the crew first attempts to identify the source of additional water inside Containment and second sample the Containment sump water to determine if the water maybe transfered to a tank outside of Containment to reduce the sump water level.*

*A. Incorrect. The first part is plausible since the 1A2-SA 480V Emergency Bus is de-energized. The A train of Containment Spray pump has no power, however the B train of equipment is available and the CSFST will remain YELLOW for Containment pressure. The second part is correct.*

*B. Incorrect. The first part is plausible since the 1A2-SA 480V Emergency Bus is de-energized. The A train of Containment Spray pump has no power, however the B train of equipment is available and the CSFST will remain yellow for Containment pressure. The second part is plausible since the actions of EOP-FR-Z.1 require the operator to sample the ESW return header if a Containment spray and ESW booster pump are not running, however entry into EOP-FR-Z.1 is not required since the B train of equipment is available and the CSFST will remain yellow for Containment pressure.*

*C. Correct.*

*D. Incorrect. The first part is correct. The second part is plausible since the actions of EOP-FR-Z.2 require the operator to monitor the ESW system for unexpected sources of water to the sump and the Containment sump is sampled by the procedure, however the ESW system is not a direct source of the Containment sump activity and is not one of the recommended sampling locations.*

**Notes**

W/E15 Containment Flooding / 5

WE15EA1.3; Ability to operate and / or monitor desired operating results during abnormal and emergency situations as they apply to the (Containment Flooding).

(CFR 41.7 / 45.5 / 45.6)

| | |
|---|---|
| Importance Rating: | 2.8 3.0 |
| Technical Reference: | EOP-CSFST-5, Rev. 11, pg 5<br>EOP-FR-Z.2 Rev. 0, pg 4 |
| References to be provided: | None |
| Learning Objective: | EOP-LP-3.13 Obj 4.e |
| Question Origin: | New |
| Comments: | None |
| Tier/Group: | T2/G1 |

28. 2014 NRC RO 028/NEW/C/A///NONE//003A3.01/

Given the following plant conditions:
- The unit is operating at 100% power with "A" Train equipment in service

Subsequently a fault causes 6.9KV Emerg Bus A-SA to Aux Bus D Tie Breaker 105 to open.

Plant conditions are as follows:
- 'A' EDG has failed to start
- The crew enters AOP-025, Loss of One Emergency AC Bus or One Emergency DC Bus and starts 'B' CSIP but the pump immediately trips on overcurrent

Which ONE of the following identifies how RCP seal injection will be restored?

RCP seal injection FLOW _____ .

A. must be manually restored at the ASI System Control Panel by placing the ASI Pump switch to "START"

B. must be manually restored at the ASI System Control Panel by selecting 'BYPASS' for both squib valves then manually starting the ASI pump

C. will be restored automatically by the ASI system after RCP seal flows remain below 4 gpm for 2 minutes and 30 seconds

D. ✔ will be restored automatically by the ASI system after RCP seal flows remain below 4 gpm for 2 minutes and 45 seconds

**Feedback**

*Plausibility and Answer Analysis*

Reason answer is correct: *The ASI system starts off of RCP seal injection low flow based on a time delay. Each RCP inputs seal injection flows to the ASI system. When 2 out 3 RCP seal injection flows are < 4.0 gpm the ASI Pump Auto Start Timer is initiated. When the 1st timer gets to 2:30 ( 2 ½ minutes) the squib valves 1ASI-21 and 1ASI-22 are actuated and both valves OPEN. 15 seconds later (a total time of 2 minutes and 45 seconds) the ASI Pump starts and restores RCP seal injection flow.*

*A. Incorrect. Plausible since power was lost to one of the Emergency busses and auto actuation could be thought to be lost. But power to the ASI system is from Dedicated Shutdown Diesel which has not lost power. The ASI pump can be locally started anytime in accordance with OP-185, Alternate Seal Injection, Section 5.2, without any time delays but for RCP seal flow to occur both squib valves have to be operated to allow flow through the system.*

*B. Incorrect. Plausible since power was lost to one of the Emergency busses and auto actuation could be thought to be lost. But power to the ASI system is from Dedicated Shutdown Diesel which has not lost power. Plausible to manually restore RCP seal injection since the ASI pump and squib valves can be manually controlled. in accordance with OP-185, Alternate Seal Injection, Section 5.2 the ASI system would be started by manual actuation of the squib valves then placing the ASI pump start switch to "START". Selecting "BYPASS" on the individual squib valve controls prevents the squib valves from operating under any condition including if RCP seal flows are < 4.0 gpm for 2 minutes and 30 seconds. (Additionally, the panel Firing Circuit Available lights will be Off when squib valves control switches CS-210.2 & 210.3 are in Bypass.)*

*C. Incorrect. Plausible since the squib valves operate after a 2 min 30 second delay after RCP seal flow is sensed to be < 4.0 gpm but RCP seal injection flow is not restored until after the ASI pump starts at 2 min 45 seconds.*

*D. Correct.*

**Notes**

003 Reactor Coolant Pump

003A3.01; Ability to monitor automatic operation of the RCPS, including Seal injection flow.

(CFR 41.7 / 45.5)

| | |
|---|---|
| Importance Rating: | 3.3 3.2 |
| Technical Reference: | APP-ALB-008-2-2, page 9, Rev. 23 |
| References to be provided: | None |
| Learning Objective: | ASI Objective 4 |
| Question Origin: | New |
| Comments: | None |
| Tier/Group: | T2/G1 |

29. 2014 NRC RO 029/NEW/C/A///NONE//004A3.10/

A plant transient resulted in the crew reducing power from 100%.

Current plant conditions are as follows:
- Power is stable at 50%
- Median Tavg is 572.9°F
- PRZ level is 44.2%
- PRZ pressure is 2252 psig

Based on currently plant conditions, which ONE of the following completes the statements below?

Charging flow will ___(1)___ to return PRZ level to program.

The Pressurizer ___(2)___ .

A. (1) rise

(2) Group C heaters will be at minimum

B. (1) rise

(2) spray valves will be open

C✔ (1) lower

(2) Group C heaters will be at minimum

D. (1) lower

(2) spray valves will be open

**Feedback**

*Plausibility and Answer Analysis*

Reason answer is correct*: Pressurizer programmed level input signal varies as a function of the median loop Tavg signal. The program changes reference PZR level from 25% to 60% as Tavg varies from 557°F to 588.8°F. Median Tavg of 572.9°F corrolates to a PZR level of 42.5%. With PZR level control in Automatic and actual PZR level higher than program level, FCV-122 should be closing to reduce flow to the PZR and thus reduce level to program. At power PZR pressure is maintained at 2235 psig in Auto control with PK-444A1, PZR Master Pressure Controller by controlling cycling of PZR heaters and normal spray valves. PZR Group C heaters will be on until pressure reaches 2220 psig and from 2220 to 2250 psig they will be partially on. Above 2250 psig they will be at minimum. PZR spray valves begin to throttle open at 2260 psig and are full open at 2310 psig. With PZR pressure at 2252 psig the Group C heaters would be at minimum and the spray valves would be closed.*

*A. Incorrect. The first part is plausible if the student incorrectly determines that the PZR level is below program level which would cause the flow controller to open delivering more flow to return level to program. The second part is correct.*

*B. Incorrect. The first part is plausible if the student incorrectly determines that the PZR level is below program level which would cause the flow controller to open delivering more flow to return level to program. The second part is plausible if the student incorrectly determines the pressure required for PZR spray operation. The current pressure is just below the opening setpoint of 2260 psig.*

*C. Correct.*

*D. Incorrect. The first part is correct. The second part is plausible if the student incorrectly determines the pressure required for PZR spray operation. The current pressure is just below the opening setpoint of 2260 psig.*

**Notes**

004 Chemical and Volume Control

004A3.10; Ability to monitor automatic operation of the CVCS, including PZR level and pressure.

(CFR 41.7 / 45.5)

| | |
|---|---|
| Importance Rating: | 3.9 3.9 |
| Technical Reference: | AOP-019, Attachment 1, Page 18, Rev. 24 |
| References to be provided: | None |
| Learning Objective: | Lesson Plan PZRLC Objective 8 |
| Question Origin: | NEW |
| Comments: | None |
| Tier/Group: | T2/G1 |

30. 2014 NRC RO 030/NEW/FUNDAMENTAL///NONE//004K4.05/

Which ONE of the following completes the statements below?

During full power operation the CSIP normal miniflow valve ___(1)___ to provide low flow protection.

Flow from the miniflow valve returns to the ___(2)___ .

A. (1) is open

(2) CSIP suction

B. ✔ (1) is open

(2) top of the VCT

C. (1) throttles

(2) CSIP suction

D. (1) throttles

(2) top of the VCT

**Feedback**

*Plausibility and Answer Analysis*

Reason answer is correct: *The mini-flow valves are normally open and provide the minimum amount of flow to allow proper operation of the CSIPs. With the unit operating at 100% the normal alignment of the CVCS system is for the mini-flow for the CSIPs to return to the top of the VCT via 1CS-318, Seal Water Return Spray to VCT Vlv.*

*A. Incorrect. The first part is correct. The second part is plausible because during emergency operation of the CSIP the mini-flow return path is aligned to the CSIP suction to prevent highly irradiated water from being sent to the VCT from the CNMT Recirc sump, however this is incorrect because this alignment is not the normal flow path for the miniflow protection of the CSIPs.*

*B. Correct.*

*C. Incorrect. The first part is plausible because the recirc valves on the secondary system, i.e. condensate and feedwater,along with the RHR system automatically modulate open to provide a minimum flow for the operation of the repective pumps to prevent overheading of the pump. However this is incorrect because the CSIP mini-flow are normally open and use a check valve and orifice arrangement to provide the minimum flow for the pump. The second part is plausible because during emergency operation of the CSIP the mini-flow return path is aligned to the CSIP suction to prevent highly irradiated water from being sent to the VCT from the CNMT Recirc sump, however this is incorrect because this alignment is not the normal flow path for the miniflow protection of the CSIPs.*

*D. Incorrect. The first part is plausible because the recirc valves on the secondary system, i.e. condensate and feedwater,along with the RHR system automatically modulate open to provide a minimum flow for the operation of the repective pumps to prevent overheading of the pump. However this is incorrect because the CSIP mini-flow are normally open and use a check valve and orifice arrangement to provide the minimum flow for the pump. The second part is correct.*

**Notes**

004 Chemical and Volume Control

004K4.05; Knowledge of CVCS design feature(s) and/or interlock(s) which provide for the interrelationships and design basis, including fluid flow splits in branching networks (e.g., charging and seal injection flow).

(CFR 41.7)

| | |
|---|---|
| Importance Rating: | 3.3 3.2 |
| Technical Reference: | Student Text CVCS |
| References to be provided: | None |
| Learning Objective: | Lesson Plan CVCS-LP-18.0, Objctive 5 |
| Question Origin: | NEW |
| Comments: | NRC provided outline listed K/A 004AK4.05. There should not be a 'A' in this K/A the statement is for a knowledge. Confirmed with David Lanyi 5/7/2014 the K/A is 004K4.05 is correct. |
| Tier/Group: | T2/G1 |

31. 2014 NRC RO 031/BANK/C/A///NONE//005K6.03/

Given the following plant conditions:

- The plant is in Mode 4
- RHR Train 'A' is in service
- 1RH-20, RHR Heat XCHG A BYP Flow Cont FK-605A1 is in manual with the output at 40% to maintain 3750 GPM
- 1RH-30, RHR Heat XCHG A Out Flow Cont HC-603A1 demand position is set at 30%

Plant final conditions:

- The Instrument Air supply line to RHR Heat Exchanger Outlet Valve 1RH-30 has become severed and is completely detached

Which ONE of the following describes the RHR system parameter changes from the initial steady state condition to final steady state condition?

| | TI-606A (RHR HX Outlet Temp) | FI-605A1 (HX 'A' RHR HDR FLOW) |
|---|---|---|
| A. | Higher | Lower |
| B. | Higher | Higher |
| C. ✔ | Lower | Higher |
| D. | Lower | Lower |

**Feedback**

*Plausibility and Answer Analysis*

Reason answer is correct: AOP-017, *On a loss of air to RH-30 the fail position is OPEN, so there is less bypass flow mixing with more HX flow, resulting in a lower temperature on the HX outlet. Total RHR flow will be higher since RH-30 opening will open 70% more increasing flow more than 1RH-20 can compensate by auto closing. NOTE: during mid-loop operation 1RH-30 is locally throttled and a limiter is installed to prevent the valve from failing OPEN.*

*A. Incorrect. The first part is plausible since this is this would occur if the valve failed shut. The second part is plausible if the valve failed shut and less flow went through either the Heat Exhanger or Bypass around the Heat Exchanger since the flow measured is total flow of the Heat Exchanger and bypass flow around the Heat Exchanger.*

*B. Incorrect. The first part is plausible since this is this would occur if the valve failed shut. A failed shut condition would cause the Heat Exchanger temperature to be higher than the initial condition. The second part is correct.*

*C. Correct.*

*D. Incorrect. The first part is correct. The second part is plausible if the valve failed shut and less flow went through either the Heat Exhanger or Bypass around the Heat Exchanger since the flow measured is total flow of the Heat Exchanger and bypass flow around the Heat Exchanger.*

**Notes**

005 Residual Heat Removal

005K6.03; Knowledge of the effect of a loss or malfunction on the RHR heat exchanger will have on the RHRS.

(CFR 41.7 / 45.7)

| | |
|---|---|
| Importance Rating: | 2.5 2.6 |
| Technical Reference: | AOP-017, Attachment 1, Page 43, Rev. 36 |
| References to be provided: | None |
| Learning Objective: | RHR Objective 4b |
| Question Origin: | Bank, OIT Exam Bank RHR (04B) 1 |
| Comments: | None |
| Tier/Group: | T2/G1 |

32. 2014 NRC RO 032/NEW/FUNDAMENTAL///NONE//005G2.4.1/

Given the following plant conditions:
- The unit is in Mode 6 with a core reload in progress
- 'A' RHR pump is in operation
- 'B' RHR pump is in standby
- Cavity level is 23 feet 3 inches above the Reactor Vessel Flange

The following occurs:
- RP reports to the MCR that a large crack has developed in a pipe in Containment
- 'A' RHR pump discharge pressure is lowering
- Refueling Cavity level is very slowly lowering
- The Refueling SRO reports that the Containment side upender has an assembly in it and the upender will not raise

Entry conditions are satisfied for which of the following procedures?

1) AOP-013, Fuel Handling Accident
2) AOP-020, Loss of RCS Inventory or Residual Heat Removal While Shutdown
3) AOP-031, Loss of Refueling Cavity Integrity

A. 1 and 2 ONLY

B. 1 and 3 ONLY

C. ✔ 2 and 3 ONLY

D. 1, 2 and 3

**Feedback**

*Plausibility and Answer Analysis*

Reason answer is correct: *AOP-020 and AOP-031 entry conditions were met with a loss of RCS inventory and/or fuel movement in progress as indicated by notification by plant personnel of a pipe break and dropping Refueling Cavity level.*

*A. Incorrect. Plausible since fuel handling is in progress and a report by the Refueling SRO indicates that some fuel handling equipment has malfunctioned. But the entry conditions for AOP-013 require that there is notification to the Control Room of fuel assembly damage or a fuel assembly being dropped. Neither of which have occurred. AOP-020 entry conditions met but the answer is incorrect since AOP-013 entry is not met.*

*B. Incorrect. Plausible since fuel handling is in progress and a report by the Refueling SRO indicates that some fuel handling equipment has malfunctioned. But the entry conditions for AOP-013 require that there is notification to the Control Room of fuel assembly damage or a fuel assembly being dropped. Neither of which have occurred. AOP-031 entry conditions are met but the answer is incorrect since AOP-013 entry is not met.*

*C. Correct.*

*D. Incorrect. Plausible since fuel handling is in progress and a report by the Refueling SRO indicates that some fuel handling equipment has malfunctioned. But the entry conditions for AOP-013 require that there is notification to the Control Room of fuel assembly damage or a fuel assembly being dropped. Neither of which have occurred. AOP-020 and AOP-031 entry conditions are met but the answer is incorrect since AOP-013 entry is not met.*

**Notes**

005 Residual Heat Removal

005 G2.4.1 Knowledge of EOP entry conditions and immediate action steps.

(CFR 41.10 / 43.5 / 45.13)

| | |
|---|---|
| Importance Rating: | 4.6 4.8 |
| Technical Reference: | AOP-020 Entry Conditions, Page 3, Rev. 38 |
| References to be provided: | None |
| Learning Objective: | Lesson Plan AOP-LP-3.20, (AOP-020), Objective 1 and AOP-LP-31, (AOP-031), Objective 1 |
| Question Origin: | NEW |
| Comments: | 5/07/2014 Dave Lanyi (NRC Chief Examiner) says it is OK to write question to AOP-020 entry conditions since the EOP's don't have any relationship to RHR with regard to entry condtions or immediate actions. |
| Tier/Group: | T2/G1 |

33. 2014 NRC RO 033/NEW/FUNDAMENTAL//TS 3.5.4/NONE//006A1.15/

Given the following plant conditions:

- The unit is operating at 100% power
- Refueling Water Storage Tank parameters are as follows:

| | 11/3 0300 | 11/3 1500 | 11/4 0300 |
|---|---|---|---|
| Level | 93% | 92% | 91% |
| Temperature | 67°F | 65°F | 63°F |
| Chloride | 0.09 ppm | 0.11 ppm | 0.16 ppm |
| Boron Concentration | 2590 ppm | 2584 ppm | 2578 ppm |

Which ONE of the following completes the statement below to identify the parameter that is NOT in compliance with Technical Specification 3.5.4, Emergency Core Cooling System - Refueling Water Storage Tank?

Restore _____ to within limits within 1 hour.

**(Assume no operator actions)**

A. Level

B. Temperature

C. Chloride

D. Boron concentration

**Feedback**

*Plausibility and Answer Analysis*

Reason answer is correct: Technical specification 3.5.4 requires the RWST to meet the following to be considered operable:

a. A minimum contained borated water volume of 436.000 gallons. which is equivalent to 92% indicated level.
b. A boron concentration of between 2400 and 2600 ppm of boron.
c. A minimum solution temperature of 40°F. and
d. A maximum solution temperature of 125°F.

Based on the current indications for each parameter the RWST level of 91% at 0300 on 11/4/2014 would require the level to be restore above 92% within 1 hour. All other would remain in the required band (dissolved oxygen is not required by Technical Specifications for the RWST).

*A. Correct.*

*B. Incorrect. Plausible since the RWST is required to be above a minimum temperature to maintain the boron in solution. A candidate could confuse the RWST minimum temperature with another tank containing borated water which is the Boric Acid Tank. This tank is used to provide boric acid to refill the RWST. The minimum temperature for the BAT is 65°F while the minimum temperature for the RWST is 40°F.*

*C. Incorrect. Plausible since the RWST is a makeup water source for the RCS . Since it is a souce of makeup to the RCS and the RCS has a chloride concentration limit it would be a plausible that a candidate may assume that the RWST would also have a chloride limit. The numbers used in this question would have exceeded the chloride limit of the RCS for steady state conditions in Technical Specification 3.4.7 table 3.4-2 of $\leq$0.15 ppm.*

*D. Incorrect. Plausible since another tank of borated water has a limit that would be exceeded at this boron concentration. The ASI Tank boron concentration is maintained in the required band of 4000 +/- 200 ppm the candidate may confuse this band with the RWST boron band and believe the RWST boron concentration is low.*

**Notes**

006 Emergency Core Cooling

006A1.15; Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating the ECCS controls including RWST level and temperature.

(CFR 41.5 / 45.5)

| | |
|---|---|
| Importance Rating: | 3.3 3.9 |
| Technical Reference: | Technical Specification 3.5.4 |
| References to be provided: | None |
| Learning Objective: | SIS Student Text Obj 9.e |
| Question Origin: | NEW |
| Comments: | None |
| Tier/Group: | T2/G1 |

34. 2014 NRC RO 034/NEW/FUNDAMENTAL///NONE/EARLY/006K2.01/SAT

Which ONE of the following completes the statements below?

The 'C' CSIP can be powered from ___(1)___ .

A ___(2)___ is a design feature that prevents two CSIPs from being aligned to the same power supply.

A. ✔ (1) Either 6.9 KV Emergency Bus 1A-SA or 6.9 KV Emergency Bus 1B-SB

(2) A Kirk key operated interlock

B. (1) Either 480V Emergency Bus 1A2-SA or 480V Emergency Bus 1B2-SB

(2) A Kirk key operated interlock

C. (1) Either 6.9 KV Emergency Bus 1A-SA or 6.9 KV Emergency Bus 1B-SB

(2) A manual transfer switch

D. (1) Either 480V Emergency Bus 1A2-SA or 480V Emergency Bus 1B2-SB

(2) A manual transfer switch

**Feedback**

*Plausibility and Answer Analysis*

Reason answer is correct: *The 'C' CSIP pump can be powered from either the 6.9kV Emergency Bus 1A-SA or 1B-SB via a manual transfer switch which is operated in accordance with OP-107, Chemical and Volume Control. The manual transfer is utilized to align breaker 1A-SA-7 or 1B-SB-7 to supply power to 1C-SAB CSIP. A Kirk Key interlock prohibits having both 'C' CSIP and 'A' or 'B' CSIP aligned to the same 6.9Kv Emergency Bus at the same time.*

*The 'C' CSIP Manual Transfer Switch includes four (4) Kirk Key Locks. Two of the locks are for personnel safety and prevent the Main Cabinet Doors from being opened with either switch in the CLOSED position. The other two locks are an interlock which prevents paralleling of the two safety feeds to the 'C' CSIP. Only one feed can be connected (switch CLOSED) at any time.*

***OP-107 CAUTIONS:***
*Only one CSIP shall be connected to the 1A-SA emergency bus at a time. A Kirk Key interlock prohibits having A CSIP and C CSIP connected to 6.9KV Emergency Bus 1A-SA at the same time.*
*The 6.9 KV circuits from bus 1A-SA and 1B-SB to the C CSIP manual transfer switch shall not be energized at the same time. A Kirk Key interlock prohibits having both circuits energized at the same time.*

*A. Correct.*

*B Incorrect. Plausible since the RHR (ECCS), Containment Spray Pump and Chiller P-4 which are all safety related equipment, are powered from these 480V Emergency buses. The second part is correct (key interlock prevents racking the breaker in if either 'A' or 'B' CSIP is racked in on the bus).*

*C. Incorrect. The first part is correct. The second part is plausible since a transfer switch is used to energize the pump but the switch is a manual not automatic switch. The manual transfer switch allows for rapid pump swaps per OP-107 if required.*

*D. Incorrect. Plausible since the RHR (ECCS), Containment Spray Pump and Chiller P-4 which are all safety related equipment, are powered from these 480V Emergency buses. The second part is plausible since a transfer switch is used to energize the pump but the switch is a manual not automatic switch. The manual transfer switch allows for rapid pump swaps per OP-107 if required.*

**Notes**

006 Emergency Core Cooling

006K2.01; Knowledge of bus power supplies to the ECCS pumps.

(CFR 41.7)

| | |
|---|---|
| Importance Rating: | 3.6 3.9 |
| Technical Reference: | HNP Electrical Load List |
| References to be provided: | None |
| Learning Objective: | Lesson Plan CVCS, Objective 2 |
| Question Origin: | NEW |
| Comments: | None |
| Tier/Group: | T2/G1 |

35. 2014 NRC RO 035/NEW/FUNDAMENTAL///NONE//007A1.03/

Given the following plant conditions:

- The unit is operating at 100% power
- The crew is responding to a leaking PRZ Safety valve

| Time | PRT Temp | Safety Tailpipe Temp |
|---|---|---|
| 1000 | 95°F | 145°F |
| 1005 | 115°F | 255°F |
| 1010 | 122°F | 275°F |
| 1015 | 146°F | 403°F |

Which ONE of the following is the first time that annunciator ALB-009-8-1, PRT High-Low Level Press or Temp, will alarm?

A. 1000

B. 1005

C. ✔ 1010

D. 1015

**Feedback**

*Plausibility and Answer Analysis*

Reason answer is correct: *Annunciator ALB-009-8-1 has multiple inputs that causes the annunciator to alarm. One of which is high temperature which has a setpoint of 120°F. At 1010 the PRT temperature is above the temperature at which the annunciator will go into alarm.*

*A. Incorrect. Plausible since at this PRT input temperature annunciator ALB-009-8-2, Pressurizer Relief Discharge High Temp goes into alarm. The alarm comes on when the PRZ PORV discharge line temperature exceeds 140°F as sensed by TI-463. To confirm the alarm the operator checks PRT level, pressure, and temperature for corresponding changes.*

*B. Incorrect. Plausible since at this PRT input temperature annunciator ALB-009-8-3, Pressurizer Safety Relief Discharge High Temp goes into alarm. The alarm comes on when the PRZ Safety valve discharge line temperature exceeds 250°F as sensed by TI-465, TI-467, or TI-469. To confirm the alarm the operator checks Safety valve discharge line temperatures and PRT level, pressure, and temperature for corresponding changes.*

*C. Correct.*

*D. Incorrect. Plausible since an input temperature of > 400°F would require that the Safety valve be declared inoperable. It is an indication that there has been a loss of loop seal. The loss of loop seal may cause the associated safety lift setpoint to shift down to normal operating pressure. PRT input temperature annunciator ALB-009-8-3, Pressurizer Safety Relief Discharge High Temp would have already been in alarm when the PRZ Safety valve discharge line temperature exceeded 250°F as sensed by TI-465, TI-467, or TI-469. The alarm would have been confirmed by they operator checking Safety valve discharge line temperatures and PRT level, pressure, and temperature for corresponding changes.*

**Notes**

007 Pressurizer Relief/Quench Tank

007A1.03; 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

(CFR 41.5 / 45.5)

| | |
|---|---|
| Importance Rating: | 2.6 2.7 |
| Technical Reference: | ALB-009-8-1, Page 29, Rev. 16 |
| References to be provided: | None |
| Learning Objective: | PRZ Objective 5.d |
| Question Origin: | NEW |
| Comments: | None |
| Tier/Group: | T2/G1 |

36. 2014 NRC RO 036/BANK/C/A//TAA-LP-2.25/NONE//003K5.02/

Given the following plant conditions:

- The unit is operating at 30% power
- The 'C' RCP trips due to an electrical fault

Which ONE of the following competes the statement below?

As 'C' RCP coasts down, Loops 'A' and 'B' $\Delta T$ will ___(1)___ and the Loops 'A' and 'B' OT$\Delta T$ setpoint will ___(2)___ .

**(Assume that Reactor power is maintained at 30%)**

A. (1) lower

(2) rise

B. (1) lower

(2) lower

C. (1) rise

(2) rise

D. ✓ (1) rise

(2) lower

**Feedback**

*Plausibility and Answer Analysis*

Reason answer is correct: Core ΔT remains the same but only two loops have forced flow and the OTΔT setpoint is lower because $T_{avg}$ rises initially and ΔT rises.

*A. Incorrect. The first part is plausible since the total flow in the loops is lower with one RCP is secured. The second part is plausible since the ΔT setpoint has penalties and rewards as $T_{avg}$ rises and lowers. The candidate may misunderstand the relationship with $T_{avg}$ and determine the higher $T_{avg}$ will result in the OTΔT setpoint rising.*

*B. Incorrect. The first part is plausible since the total flow in the loops is lower with one RCP is secured. The second part is correct.*

*C. Incorrect. The first part is correct. The second part is plausible since the ΔT setpoint has penalties and rewards as $T_{avg}$ rises and lowers. The candidate may misunderstand the relationship with $T_{avg}$ and determine the higher $T_{avg}$ will result in the OTΔT setpoint rising.*

*D. Correct.*

**Notes**

003 Reactor Coolant Pump System (RCPS)

003 K5.02 Knowledge of the operational implications of the following concepts as they apply to the RCPS: Effects of RCP coastdown on RCS parameters

(CFR 41.5 / 45.7)

| | |
|---|---|
| Importance Rating: | 2.8 3.2 |
| Technical Reference: | TAA-LP-2.25 |
| References to be provided: | None |
| Learning Objective: | TAA-LP-2.25, Obj 3.d |
| Question Origin: | OIT Developement Bank 003 K5.01 1 |
| Comments: | Development of this question to meet K/A was difficult. Question suggestion from David Lanyi provided to HNP exam development team on 8/29/2014. The way this question is written is how David said we could meet the K/A.<br><br>Unable to write a operationally valid question that is significantly different than 007A1.03.<br><br>Replace with randomly selected K/A 003 K5.02 by David Lanyi 9/08/2014 |
| Tier/Group: | T2/G1 |

37. 2014 NRC RO 037/BANK/FUNDAMENTAL///NONE//008K4.02/

Given the following plant conditions:

- The unit is operating at 100% power
- ALB-005-6-1, CCW Surge Tank High-Low Level has just alarmed
- CCW Surge Tank level is 39% and lowering

Which ONE of the following automatic actions are required to be verified in accordance with ALB-005-6-1?

A. CCW Makeup valve, DW-15, has opened

B. CCW Drain Tank Transfer Pump has tripped

C. Holdup Tank Transfer Pump has tripped

D. ✔ GFFD and Primary Sample Panel have isolated

**Feedback**

*Plausibility and Answer Analysis*

Reason answer is correct: The GFFD and RCS sample panel will isolate on low CCW Surge Tank level of less than or equal to 40%.

*A. Incorrect. Plausible since a CCW low level actions would be to implement AOP-014, Loss of Component Cooling and then open DW-15 to return level to normal but it is a manual valve and does not have an auto open function.*

*B. Incorrect. Plausible since this pump has an auto trip feature but trips on high CCW Surge Tank level (75%) not at 40%.*

*C.Incorrect. Plausible since this pump has an auto trip feature but it also trips on high CCW Surge Tank level (75%) not at 40%*

*D. Correct.*

**Notes**

008 Component Cooling Water

008K4.02; Knowledge of CCWS design feature(s) and/or interlock(s) which provide for the operation of the surge tank, including the associated valves and controls.

(CFR 41.7)

| | |
|---|---|
| Importance Rating: | 2.9 2.7 |
| Technical Reference: | ALB-005-6-1, AOP-014, Note page 15, Rev. 37 |
| References to be provided: | None |
| Learning Objective: | CCW Objective 7.d |
| Question Origin: | Bank, OIT Exam Bank GFFD (5A) 2 |
| Comments: | None |
| Tier/Group: | T2/G1 |

38. 2014 NRC RO 038/NEW/C/A///NONE/2014 BIENNIAL/010G2.1.28/

Given the following plant conditions:
- The unit is at 100% power

The following conditions occur:
- PT-445, PRZ Press Control, fails high

Which ONE of the following completes the statement below?

Pressurizer PORV(s) ___(1)___ will OPEN and remain OPEN until PRZ pressure reaches ___(2)___.

A. (1) 1RC-116 and 1RC-118

   (2) 1960 psig

B. ✔ (1) 1RC-116 and 1RC-118

   (2) 2000 psig

C. (1) 1RC-114

   (2) 1960 psig

D. (1) 1RC-114

   (2) 2000 psig

**Feedback**

*Plausibility and Answer Analysis*

Reason answer is correct: *PT-455 is PRZ control channel that controls response of PRZ PORVs 1RC-116 and 1RC-118 respond. When PT-455 fails high, 1RC-116 and 1RC-118 open in response to the high pressure signal from PT-455. All PRZ PORV operation is blocked <2000 psig (P-11), so at 2000 psig, 1RC-116 and 1RC-118 would go closed.*

*A. Incorrect. The first part correct. The second part is plausible because with pressure lowering PRZ Pressure Reactor Trip will also occur but at 1960 psig, this does not close PORVS but they would have already closed from P-11 at 2000 psig.*

*B. Correct.*

*C. Incorrect. The first part plausible because 1RC-114 will also open on a high pressure signal, however that valve response comes from PT-444, which is not failed, and would be lowering because PORVs are open. The second part plausible because with pressure lowering PRZ Pressure Reactor Trip will also occur but at 1960 psig, this does not close PORVS but they would have already closed from P-11 at 2000 psig.*

*D. Incorrect. The first part plausible because 1RC-114 will also open on a high pressure signal, however that valve response comes from PT-444, which is not failed, but would be lowering because PORVs are open. The second part is correct.*

**Notes**

010 Pressurizer Pressure Control

010G2.1.28; Knowledge of the purpose and function of major system components and controls.

(CFR 41.7)

| | |
|---|---|
| Importance Rating: | 4.1 4.1 |
| Technical Reference: | AOP-019, Attachment 3, Page 24, Rev. 24,<br>APP-ALB-009-5-5 Page, 22, Rev. 16 |
| References to be provided: | None |
| Learning Objective: | Lesson Plan PZRPC, Objective 8 |
| Question Origin: | NEW |
| Comments: | None |
| Tier/Group: | T2/G1 |

39. 2014 NRC RO 039/BANK/C/A//E-0, AOP-024, RPS ST/NONE//012K6.02/

Given the following plant conditions:

- A startup is in progress with the unit operating at 7% Reactor power

Subsequently Instrument Bus S-I de-energizes.

Fiven the above plant conditions, which ONE of the following will result in a Reactor trip signal being generated?

A. LT-461, PZR Level Channel III, fails high

B. ✔ LT-496, 'C' SG Level Channel III, fails low

C. PT-951, Containment Pressure Channel II, fails high

D. A and C Aux buses are crosstied and breaker 107, Aux Bus A supply, fails open

**Feedback**

*Plausibility and Answer Analysis*

Reason answer is correct: *The SG low-low water level circuit trips the reactor if two out of three level indicators of any one SG indicate below the low-low trip setpoint of 25% NR SG level. 2/3 'C' Levels are < 25% (Ch. I and III) which would result in a reactor trip.*

*A. Incorrect. Plausible since one channel for Pressurizer High Level (92%) would be acutated due to the failure of Instrument Bus S-1 and the second failure would actuate a Reactor trip signal but since Reactor power and Turbine power is <10% the Hi PZR level Reactor trip is blocked by P-7. Reactor Trip logic for PZR High Level - two of the three water level signals from LS-459A, LS-460A, or LS-461A above the trip setpoint (92% of span) will initiate a reactor trip. The trip function is automatically blocked below P-7.*

*B. Correct.*

*C. Incorrect. Plausible since a Reactor trip is actuated any time a Safety Injection signal is actuates. Since Instrument Bus S-1 is de-energized the candidate could assume that one channel for Containment Hi Pressure (HI-1 3 psig) is tripped. Since there has been a second failure a Safety Injection signal could have been actuated but the Hi-1 singal actuates off channels II, III, IV. The given conditions would result in channels I and II only and therefore not actuate a SI and Reactor trip.*

*D. Incorrect. Plausible since this would cause 2 RCPs to loose power and a Reactor trip signal for loss of Reactor Coolant Flow (2 of 3 channels on one loop < 90.5%) would be activated but because the Reactor power and Turbine power is <10% this trip is blocked by P-7.*

**Notes**

012 Reactor Protection

012K6.02 Knowledge of the effect of a loss or malfunction of the following will have on the RPS: Redundant channels

(CFR: 41.7 / 45/7)

| | |
|---|---|
| Importance Rating: | 2.9 |
| Technical Reference: | EOP-E-0 Reactor Trip setpoints,<br>AOP-024, Attachment 1, page 28, Rev. 54,<br>Student Text RPS |
| References to be provided: | None |
| Learning Objective: | RPS Objective 4.a |
| Question Origin: | Bank, LOR, RPS-1, 7 |
| Comments: | Original K/A statement read 010K6.02 Knowledge of the effect of a loss or malfunction of the PZR will have on the PZR PCS. Not the correct K/A statement. Reviewed with David Lanyi on 5/7/14 and determined that 012K6.02 is the correct K/A and should read as listed above. |
| Tier/Group: | T2/G1 |

40. 2014 NRC RO 040/NEW/C/A///NONE//012A4.02/

Given the following plant conditions:

- The unit is being taken off line in accordance with GP-006, Normal Plant Shutdown From Power Operation To Hot Standby
- Main Turbine load is being held at 25 DEH units for Trip Status light verifications
- Trip Status Light Box 4 bistable status lights are as follows:
  - PR P-7/P-10 NC 41M Bistable Light 4-1
  - PR P-7/P-10 NC 42M Bistable Light 4-2
  - PR P-7/P-10 NC 43M Bistable Light 4-3
  - PR P-7/P-10 NC 44M Bistable Light 4-4

In accordance with GP-006, which ONE of the following completes the statements below?

**(NOTE: Consider each statement independently)**

The OATC should find these Trip Status Light Box 4 bistable lights ___(1)___ .

IF the bistable lights are NOT in the expected condition then a method used to correct this condition would be to ___(2)___ .

A. (1) ON

(2) manually insert Control Rods

B. (1) ON

(2) reduce Turbine load

C. (1) OFF

(2) manually insert Control Rods

D. ✔ (1) OFF

(2) reduce Turbine load

**Feedback**

*Plausibility and Answer Analysis*

Reason answer is correct: *In accordance with GP-006 as power is reduced Trip Status Light Box 4 bistable lights for PR P-7/P-10 NC 41M through 44M should be OFF indicating that both Turbine and Reactor power is <10% and allowing the low power Reactor trips to be automatically blocked. A note preceeding the step to check these bistable lights states: It may be necessary to reduce Turbine load below the 25 DEH units originally set in to go below the reset setpoint for P-10 and P-7. This is permissible in small (up to 5 DEH unit) increments.*

*A. Incorrect. The first part is plausible since the lights could be ON because Turbine steam demand could be high enough to still have Reactor Power >10%. The second part is plausible since during the power decrease a procedure note dealing with Intermediate Range rod shadowing states that Rod insertion may be necessary to reduce IR current below the trip reset.*

*B. Incorrect. The first part is plausible since the lights could be ON because Turbine steam demand could be high enough to still have Reactor Power >10%. The second part is correct.*

*C. Incorrect. The first part is correct. The second part is plausible since during the power decrease a procedure note dealing with Intermediate Range rod shadowing states that Rod insertion may be necessary to reduce IR current below the trip reset.*

*D. Correct.*

**Notes**

012 Reactor Protection

012A4.02; Ability to manually operate and/or monitor in the control room components for individual channels.

(CFR 41.7 / 45.5 to 45.8)

| | |
|---|---|
| Importance Rating: | 3.3 3.4 |
| Technical Reference: | GP-006, Step 29, Page 29, Rev. 72 |
| References to be provided: | None |
| Learning Objective: | Lesson Plan GP3-6, Objective 4 |
| Question Origin: | NEW |
| Comments: | None |
| Tier/Group: | T2/G1 |

41. 2014 NRC RO 041/BANK/C/A//CSS ST/NONE//013K5.02/

Given the following plant conditions:
- An automatic Containment Spray Actuation Signal (CSAS) has occurred
- Both Containment Spray pumps have been manually stopped
- The CSAS has NOT been reset

Subsequently the following occurs:
- Containment Pressure is 2.5 psig and rising

**(Assume no futher operator action)**

Which ONE of the following describes the operation of the Containment Spray system as pressure rises above the CSAS setpoint?

Containment Spray pumps _____ .

A. do NOT automatically start, but can be manually started

B. ✔ do NOT automatically start and cannot be manually started until CSAS has been reset

C. automatically start when Containment Pressure exceeds 3 psig

D. automatically start when Containment Pressure exceeds 10 psig

**Feedback**

*Plausibility and Answer Analysis*

Reason answer is correct: *All of the start signals for a Containment Spray System pump input a common single shot circuit. With any start signal active, the CSS pump cannot receive another start, including another manual start attempt. A second start can occur only after the CSAS circuit is reset.*

*A. Incorrect. The first part is correct that CSAS must be reset before the CSS pump will automatically restart but the second part is not correct because the CSS pumps will not start automatically or manually until after the CSAS is reset.*

*B. Correct.*

*C. Incorrect. Plausible because a Containment pressure of 3 psig is a Safety Injection signal setpoint and the Containment Spray pumps are part of the ECCS. All other ECCS pumps are components receive a signal from the Safety Injection system. The setpoint for Containment Spray actuation does not occur until Containment pressure increases to 10 psig.*

*D. Incorrect. Plausible since this is the pressure that Containment Spray actuation would have occurred at and this would normally have actuated Containment Spray but it has already been actuated and has not been reset.*

**Notes**

013 Engineered Safety Features Actuation

013K5.02; Knowledge of the operational implications of safety system logic and reliability as they apply to the ESFAS.

(CFR 41.5 / 45.7)

| | |
|---|---|
| Importance Rating: | 2.9 3.3 |
| Technical Reference: | CSS Student Text |
| References to be provided: | None |
| Learning Objective: | CSS Objective 4.b |
| Question Origin: | Bank, OIT Exam Bank CSS (04B) 2 |
| Comments: | None |
| Tier/Group: | T2/G1 |

42. 2014 NRC RO 042/NEW/FUNDAMENTAL///NONE//022A4.03/

Containment Cooling has been placed in Maximum Cooling Mode in accordance with OP-169, Containment Cooling And Ventilation, due to a 1 gpm RCS leak.

Which ONE of the following completes the statement below?

AH-3 and AH-4, Containment Fan Cooler Units, will be running in ___(1)___ speed with their post-accident dampers ___(2)___.

A. ✔ (1) HI

(2) OPEN

B. (1) HI

(2) SHUT

C. (1) LO

(2) OPEN

D. (1) LO

(2) SHUT

**Feedback**

*Plausibility and Answer Analysis*

Reason answer is correct: During this mode of operation, both Train A and Train B are in operation. AH-3 and AH-4 will be discharging to the post accident dampers. All containment fan coolers will be operating in Hi Speed during this mode of operation.

*A. Correct.*

*B. Incorrect. The first part is correct. The second part is plausible since the dampers are shut in the normal cooling mode (High speed).*

*C. Incorrect. This first part is plausible because the containment cooling fans will normally be running in Low speed during accident conditions, however the containment pressure is not expected to reach the actuaction setpoint of 3.0 psig since this transient is an RCS leak and not an RCS break. The second part is correct.*

*D. Incorrect. The first part is plausible because the containment cooling fans will normally be running in Low speed during accident conditions, however the containment pressure is not expected to reach the actuaction setpoint of 3.0 psig since this transient is an RCS leak and not an RCS break.. The second part is plausible since the dampers are shut in the normal cooling mode (High speed).*

**Notes**

022 Containment Cooling

022A4.03; Ability to manually operate and/or monitor in the control room Dampers in the CCS.

(CFR 41.7 / 45.5 to 45.8)

| | |
|---|---|
| Importance Rating: | 3.2 3.2 |
| Technical Reference: | OP-169, Section 8.1, Page 20, Rev 24<br>CCS Student Text, Page 14, Rev 7 |
| References to be provided: | None |
| Learning Objective: | Containment Cooling System Obj. 8.c |
| Question Origin: | Bank OIT Exam Bank, CCS (08C) 003 |
| Comments: | None |
| Tier/Group: | T2/G1 |

43. 2014 NRC RO 043/NEW/C/A///NONE//026A2.08/

Given the following plant conditions:
- The unit was operating at 100% power

At 0900 a steam line break occurred on the 'B' SG in Containment
At 0910 the Shift Manager activates the ERO
At 0930 Containment pressure peaked at 15.3 psig

At 1018 the current plant conditions are as follows:
- The crew is implementing EOP-E-1, Loss of Reactor or Secondary Coolant
- Containment pressure is 9.8 psig

In accordance with EOP-E-1 and based on the current plant conditions when can the Containment Spray pumps be secured?

A. After verifying that the pressure rise in Containment was due to a secondary break.

B. ✔ After plant operations staff consultation once the Containment Spray actuation has been reset and Containment pressure is < 8 psig.

C. After plant operations staff consulation and after 4 hours of running a minimum of one train of Containment Spray and one train of Containment Fan Coolers.

D. After resetting both Phase A and Phase B isolation signals and the completion of channel checks to verify that Containment pressure channels are < 10 psig.

**Feedback**

*Plausibility and Answer Analysis*

Reason answer is correct: *EOP-E-1, Attachment 1 provides guidance on when the Containment Spray Pumps should be placed in standby following activation. The note prior to step 1 reads: the "plant operations staff" is generally considered to be TSC and OSC personnel; however, the evaluation may be performed by senior Operations management available at the time including control room personnel. If the CNMT spray actuation is known to be exclusively from a secondary break (steam line or feed line) consideration should be given to securing CNMT spray as soon as CNMT pressure is below the actuation reset setpoint of 8 PSIG. This will minimize the quantity of water depleted from the RWST and that which must be removed from CNMT.*

*A. Incorrect. Plausible since the Containment pressure increase was caused by a steam line rupture that is non-radioactive. Since the Containment Spray system purpose is to remove heat and fission products (primarily Iodine) from a post-accident Containment atmosphere and there is no Iodine associated with this type of break then securing the Containment Spray system after verifying the break is a secondary break would be plausible.*

*B. Correct.*

*C. Incorrect. Plausible since the guidance found in EOP-E-1, Attachment 1 directs running one train of CS and one train of Cnmt Fan coolers for a minimum of 4 hours but this guidance would be used after a Large Break LOCA. In this question the Containment pressure increase was caused by a non-radioactive steam line rupture.*

*D. Incorrect. Plausible since resetting the Phase A and Phase B isolation signals purpose is to regain control of the plant components after auto actions have occurred during accident conditions. Verifying that the Containment pressure channels are < 10 psig would verify that Containment pressure is below the actuation setpoint and the Containment Spray system could be reset at this time. But IAW EOP-E-1 this is not the correct action.*

**Notes**

026 Containment Spray

026A2.08; Ability to (a) predict the impacts of Safe securing of containment spray (when it can be done) on the CSS; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences.

(CFR 41.5 / 43.5 / 45.3 / 45.13)

| | |
|---|---|
| Importance Rating: | 3.2 3.7 |
| Technical Reference: | EOP-E-1, Step 6, Page 8 and Attachment 1, Page 29, Rev. 0 |
| References to be provided: | None |
| Learning Objective: | Lesson Plan CSS, Objective 4 |
| Question Origin: | NEW |
| Comments: | On 9/8/2014 HNP contacted David Lanyi and reviewed the question we have written for this K/A. HNP asked if the question we have written focusing on the "when it can be done" part of the K/A will be an adequate match for the K/A. David said that what we have written will be accepted as a K/A match. |
| Tier/Group: | T2/G1 |

44. 2014 NRC RO 044/NEW/C/A///NONE//026K3.02/

Given the following plant conditions:
- The plant is operating at 100% power
- 'A' Containment Spray Pump is running on recirculation per OST-1118, Containment Spray Operability Train A Quarterly Interval Modes 1-4

Subsequently:
- A LOCA occurs in Containment
- Containment pressure is now 14.8 psig and rising

Which ONE of the following completes the statement below?

The 'A' Containment Spray Pump has been tripped by the Containment Phase ___(1)___ signal.

To place the 'A' CT train in service the operator must reset the ___(2)___ then manually align the system.

A. (1) A Isolation (T)

(2) Phase 'B' actuation signal

B. ✔ (1) A Isolation (T)

(2) Containment Spray actuation signal

C. (1) B Isolation (P)

(2) Phase 'B' actuation signal

D. (1) B Isolation (P)

(2) Containment Spray actuation signal

**Feedback**

*Plausibility and Answer Analysis*

Reason answer is correct: *Before CSS operation may begin, a certain system lineup must be present. An abnormal CSS lineup would only occur during system testing. The Phase A 'T' signal assures the presence of this lineup by automatically actuating (if necessary) the following components:*

- *Containment Spray Pumps - If running, upon receipt of the 'T' signal with associated recirc valve open, the pumps will stop.*
- *Containment Spray Recirculation Valves (1CT-47 and 1CT-95) - If the CSS is being tested Containment Spray Pumps - If running, upon receipt of the 'T' signal with associated, these valves will be open to provide a flow path back to the RWST. Upon receipt of a 'T' signal they will close.*
- *Containment Spray Eductor Test Valves (1CT-24 and 1CT-25) - A 'T' signal will close these valves if they are open for eductor testing.*

*In order to align the 'A' CT train for operation the operator must clear the single shot start interlock. All of the start signals for a CSS pump input a common single shot circuit. With any start signal active, the CSS pump cannot receive another start, including manual. A second start signal can occur only after the single shot circuit is reset. The single shot signal can be cleared in one of two ways.*

*1) Resetting the CSAS signal – This removes the start signal and allows the single shot circuit to reset. Once the signal has been reset, then the operator can start the pump from the MCB, provided that the sequencer has reached LB9.*

*2) Cycling control power to the breaker*

*A. Incorrect. The first part is correct. The second part is plausible since a Phase 'B' actuation signal occurs when 2 of 4 Containment pressure instruments reach 10 psig (Hi-3 signal). This is the same pressure setpoint that the Containment Spray actuation signal uses.*

*B. Correct.*

*C. Incorrect. The first part is plausible since the Phase 'B' (P) signal is occurs when 2 of 4 Containment pressure instruments reach 10 psig (Hi-3 signal) and can be misapplied to the Containment Spray actuation signal that also occurs at the same setpoint. The second part is plausible for the same reason as in the second part of answer 'A'.*

*D. Incorrect. The first part is plausible for same reason as first part in answer 'C'. The second part is correct.*

**Notes**

026 Containment Spray

026K3.02; .Knowledge of the effect that a loss or malfunction of the CSS will have on the following: Recirculation spray system

(CFR 41.7 / 45.6)

| | |
|---|---|
| Importance Rating: | 4.2 4.3 |
| Technical Reference: | OST-1118, Precaution and Limitation #1, Rev. 48<br>Student Text CSS Modes of Operation |
| References to be provided: | None |
| Learning Objective: | Lesson Plan CSS Objective 6.b |
| Question Origin: | NEW |
| Comments: | The containment spray system at HNP is not designed with a heat exchanger. Unable to write operationally valid question to original K/A 026 A3.02 due to the lack of a heat exchanger in the system.<br><br>Replace with randomly selected K/A 026 K3.02 by David Lanyi 5/07/2014. |
| Tier/Group: | T2/G1 |

45. 2014 NRC RO 045/NEW/FUNDAMENTAL///NONE/EARLY/039A3.02/SAT

Given the following plant conditions:
- The unit is operating at 100% power
- A main steam line rupture in the Turbine building has occurred
- The crew has manually tripped the Reactor

Which ONE of the following completes the statement below?

The Turbine Ventilating valves 1GS-97, 1GS-98 are expected to ___(1)___ AND the MSR Non-Return valves 1HD-2, 1HD-3, 1HD-302, 1HD-303 are expected to ___(2)___ .

**(NOTE: Listed below are the associated valve noun names)**

Turbine Ventilating valves
1GS-97, HP Turbine Vent to Cond (FCV-01TA-0415B)
1GS-98, HP Turbine Vent to Cond (FCV-01TA-0415A)

MSR Non-Return valves
1HD-2, MSR 1A-NNS Outlet to MSDT 1A-NNS
1HD-3, MSRDT 1A-NNS Outlet to 5-1A-NNS
1HD-302, MSR 1B-NNS Outlet to MSDT 1B-NNS
1HD-303, MSRDT 1B-NNS Outlet to 5-1B-NNS

A. (1) shut

   (2) shut

B. (1) shut

   (2) open

C. ✓ (1) open

   (2) shut

D. (1) open

   (2) open

**Feedback**

*Plausibility and Answer Analysis*

Reason answer is correct: *Any Reactor Trip generates a Turbine Trip signal. Since a Turbine Trip signal is present all of the Turbine Throttle valves would be shut and the Auto Stop Trip header would be depressurized causing the Turbine Ventilating valves to OPEN and MSR Non-Return valves to SHUT. 1GS-97 and 1GS-98 automatically open, while 1HD-2, 1HD-3, 1HD-302 and 1HD-303 shut automatically based on the status of the Turbine Throttle valves or the Auto Stop Trip header pressure which are used to determine if the Turbine is tripped or latched.*

*A. Incorrect. The first part is plausible since with the Turbine tripped 1st stage pressure is reduced to the pressure of the Main Condenser which is less than the 5 psig. The Gland Sealing Steam Spillover Regulator to the condenser to modulates open if header pressure is > 5 psig and therefore the valve would be shut on a turbine trip, however the ventilating valve open to provide a flowpath to the condenser for the steam trapped in the HP turbine. The second part is correct.*

*B. Incorrect. The first part is plausible since with the Turbine tripped 1st stage pressure is reduced to the pressure of the Main Condenser which is less than the 5 psig. The Gland Sealing Steam Spillover Regulator to the condenser to modulates open if header pressure is > 5 psig and therefore the valve would be shut on a turbine trip, however the ventilating valve open to provide a flowpath to the condenser for the steam trapped in the HP turbine. The second part is plausible since the turbine drain valves automatically open following a turbine trip to provide a drain path for the residual steam trapped in the turbine as this steam begins to condense, however this is .*

*C. Correct.*

*D. Incorrect. The first part is correct. The second part is plausible since the turbine drain valves automatically open following a turbine trip to provide a drain path for the residual steam trapped in the turbine as this steam begins to condense.*

**Notes**

039 Main and Reheat Steam

039A3.02; Ability to monitor automatic operation of the MRSS, including isolation of the MRSS.

(CFR 41.5 / 45.5)

| | |
|---|---|
| Importance Rating: | 3.1 3.5 |
| Technical Reference: | MT Student text<br>MSR Student text |
| References to be provided: | None |
| Learning Objective: | Lesson Plan MT, Objective 9<br>Lesson Plan MSR, Objective 4.e |
| Question Origin: | NEW |
| Comments: | None |
| Tier/Group: | T2/G1 |

46. 2014 NRC RO 046/BANK/C/A//AOP-010/NONE//059K4.02/

Given the following plant conditions:
- The unit is operating at 84% power

Subsequently:
- 'A' Main Feedwater pump trips

In accordance with AOP-010, Feedwater Malfunctions, which ONE of the following describes (1) the Turbine runback status AND (2) the REQUIRED operator action?

A. (1) Turbine runback is initiated

(2) Isolate Steam Generator Blowdown

B. (1) Turbine runback is initiated

(2) Trip the Reactor

C. (1) Turbine runback is NOT initiated

(2) Isolate Steam Generator Blowdown

D. (1) Turbine runback is NOT initiated

(2) Trip the Reactor

**Feedback**

*Plausibility and Answer Analysis*

Reason answer is correct: *Trip of one of the MFW pumps causes a Turbine runback to < 60% when power > 60%. This runback will reduce steam flow to within the feed flow capacity of one MFP. AOP-010 directs the operator to isolate SG blowdown to conserve SG inventory and maintain SG levels which will prevent an automatic trip due to lowering SG water level.*

*A. Correct.*

*B. Incorrect. The first part is correct.*
*The second part is plausible because a Reactor trip is required for initial Reactor power levels of > 90%. HNP is designed for a loss of one Main Feedwater pump from an initial power level of < 90% but SG levels will deplete to less than Reactor Trip criteria if the initial power level is > 90%.*

*C. Incorrect. The first part is plausible if the auto Turbine runback is misunderstood and thought to be caused only above 90% power as in the case of the loss of both Heater Drain pumps. The second part of the answer is correct.*

*D. Incorrect. The first part is plausible if the auto Turbine runback is misunderstood and thought to be caused only above 90% power as in the case of the loss of both Heater Drain pumps..*
*The second part is plausible because a Reactor trip is required for initial Reactor power levels of > 90%. HNP is designed for a loss of one Main Feedwater pump from an initial power level of < 90% but SG levels will deplete to less than Reactor Trip criteria if the initial power level is > 90%*

**Notes**

059 Main Feedwater

059K4.02; Knowledge of MFW design feature(s) and/or interlock(s) which provide for automatic turbine/reactor trip runback.

(CFR 41.7)

| | |
|---|---|
| Importance Rating: | 3.3 3.5 |
| Technical Reference: | AOP-010, Step 3, Rev. 37<br>AOP-010-BD, Discussion item page 2, Rev. 19 |
| References to be provided: | None |
| Learning Objective: | Lesson Plan CFW, Objective 9.c |
| Question Origin: | Bank, OIT Development Bank, 2009A Audit RO 48 |
| Comments: | None |
| Tier/Group: | T2/G1 |

47. 2014 NRC RO 047/BANK/FUNDAMENTAL///NONE//061K2.01/

Which ONE of the following supplies power to the Turbine-Driven AFW pump steam admission valves 1MS-70 and 1MS-72?

**(NOTE: Listed below are the associated valve noun names)**

TDAFW pump steam admission valves
1MS-70, MAIN STEAM B TO AUX FW TURBINE
1MS-72, MAIN STEAM C TO AUX FW TURBINE

| | 1MS-70 | 1MS-72 |
|---|---|---|
| A. | 1DP-1A-SI | 1DP-1A-SIII |
| B. | 1DP-1A-SII | 1DP-1A-SIII |
| C. ✔ | DP-1A2-SA | DP-1B2-SB |
| D. | MCC 1A31-SA | MCC 1B31-SB |

**Feedback**

*Plausibility and Answer Analysis*

Reason answer is correct: *Both 1MS-70 and 1MS-72 MOV's are powered from 125V Emergency DC. 1MS-70: DP-1A2-SA; 1MS-72: DP-1B2-SB*

*A. Incorrect. Plausible since these are safety related power supplies that power multiple safety related componets that could be confused with the DC distribution panel names. But these are AC power supplies and 1MS-70 and 1MS-72 are DC powered.*

*B. Incorrect. Plausible since these are safety related power supplies that power multiple safety related componets that could be confused with the DC distribution panel names. But these are AC power supplies and 1MS-70 and 1MS-72 are DC powered.*

*C. Correct.*

*D. Incorrect. Plausible since the Motor Driven AFW isolation MOV's are powered from 480V MCC1B31-SB and these MCC's are Safety related.*

**Notes**

061 Auxiliary/Emergency Feedwater

061K2.01; Knowledge of bus power supplies to the AFW system MOVs.

(CFR 41.7)

| | |
|---|---|
| Importance Rating: | 3.2 3.3 |
| Technical Reference: | OP-137, Page 69, Rev. 37 |
| References to be provided: | None |
| Learning Objective: | AFW Objective 2.e |
| Question Origin: | Bank, OIT Exam Bank, AFS (02E) 1 |
| Comments: | Changed distractor 'C' to safety related MCC's that power AFW MOV's |
| Tier/Group: | T2/G1 |

48. 2014 NRC RO 048/NEW/C/A///NONE//061K3.02/

Given the following plant conditions:

- A plant heat up is in progress in accordance with GP-002, Normal Plant Heatup From Cold Solid To Hot Subcritical Mode 5 To Mode 3
- 'A' MDAFW pump is feeding the SGs

Subequently the following annunciator alarms:

- ALB-017-5-4, Aux Feedwater Pump 'A' Trip Or Close CKT Trouble

Which ONE of the following completes the statements below?

SG levels will lower to ___(1)___ where the 'B' MDAFW pump will automatically start, to restore SG levels.

Entry in to AOP-010, Feedwater Malfunctions, ___(2)___ required.

**(Assume NO Operator actions)**

A. (1) 20%

(2) is

B. (1) 20%

(2) is NOT

C. (1) 25%

(2) is

D. ✔ (1) 25%

(2) is NOT

**Feedback**

*Plausibility and Answer Analysis*

Reason answer is correct:
With any SG level less than 25% (2 out of 3 NR detectors), the following occurs:
(1) Reactor trip
(2) Both MDAFW Pumps start
(3) All three MDAFW FCVs receive an auto open signal

AOP-010 Entry Conditions are any Main Feedwater or Condensate System malfunction causing a flow transient and may also be entered as directed by other approved procedures.

*A. Incorrect. The first part is plausible since the AMSAC system generates a start signal to the AFW pumps when it is actuated at 20% SG level, however the AMSAC system is not is service until power is above 35%. The second part is plausible since AOP-010 is the abnormal procedure used to lowering SG water levels, however the procedure is designed to address issues caused by the loss of Main feedwater or Condensate.*

*B. Incorrect. The first part is plausible since the AMSAC system generates a start signal to the AFW pumps when it is actuated at 20% SG level, however the AMSAC system is not is service until power is above 35%. The second part is correct.*

*C. Incorrect. The first part is correct. The second part is plausible since AOP-010 is the abnormal procedure used to lowering SG water levels, however the procedure is designed to address issues caused by the loss of Main feedwater or Condensate.*

*D. Correct.*

**Notes**

061 Auxiliary/Emergency Feedwater

061K3.02; Knowledge of the effect that a loss or malfunction of the AFW will have on the S/G.

(CFR 41.7 / 45.6)

| | |
|---|---|
| Importance Rating: | 4.2 4.4 |
| Technical Reference: | APP-ALB-014-5-4B, Page 32, Rev 24<br>AOP-010, Page 3, Rev 37 |
| References to be provided: | None |
| Learning Objective: | Lesson Plans AFW Objective 7.a AND<br>AOP-LP-3.10 Objective 1 |
| Question Origin: | NEW |
| Comments: | None |
| Tier/Group: | T2/G1 |

49. 2014 NRC RO 049/BANK/FUNDAMENTAL///NONE//062K2.01/

Given the following plant conditions:

- The unit is operating at 100% power
- An electrical fault occurs on 6.9-kV Aux Bus 1D causing breaker 102, Unit Aux Xfmr A to Aux Bus D, to open

Which ONE of the following components are expected to be running after the loss of the 1D bus?

A. Heater Drain Pump 1A

B. ✔ Circulating Water Pump 1A

C. Normal Service Water Pump 1A

D. Cooling Tower Makeup Pump 1X

**Feedback**

*Plausibility and Answer Analysis*

Reason answer is correct: Circulating Water Pump 1A is powered from 6.9Kv Aux Bus 1A. Since the plant is at 100% the pump would be running and the loss of power to Aux Bus 1D will have no effect on the CWP's operation.

*A. Incorrect. Plausible since each 6.9Kv bus is load balanced between the RCP's, HD Pumps, CW Pumps, NSW Pumps and CT MU Pumps. The student must know the power supply for the 1A Heater Drain to determine if the pump is running.*

*B. Correct.*

*C. Incorrect. Plausible since each 6.9Kv bus is load balanced between the RCP's, HD Pumps, CW Pumps, NSW Pumps and CT MU Pumps. The student must know the power supply for the 1A Normal Service Water Pump to determine if the pump is running.*

*D. Incorrect. Plausible since each 6.9Kv bus is load balanced between the RCP's, HD Pumps, CW Pumps, NSW Pumps and CT MU Pumps. The student must know the power supply for the 1X Cooling Tower Makeup Pump to determine if the pump is running.*

**Notes**

062 AC Electrical Distribution

062K2.01; Knowledge of bus power supplies to major system loads.

(CFR 41.7)

| | |
|---|---|
| Importance Rating: | 3.3 3.4 |
| Technical Reference: | HNP Electrical Load List |
| References to be provided: | None |
| Learning Objective: | LP 6.9Kv Objective 4 |
| Question Origin: | Bank, OIT Exam Bank, 6.9KV (04), 4 |
| Comments: | Changed distractor 'D' from "1A-SA EDG will remain in standby alignment" to Cooling Tower Makeup Pump 1X to make the list choices all pumps |
| Tier/Group: | T2/G1 |

062 AC Electrical Distribution

50. 2014 NRC RO 050/NEW/FUNDAMENTAL///NONE//063A2.01/

Given the following plant conditions:
- 250 VDC Battery Charger 1A is in service
- Annunciator ALB-015-3-4, 250 VDC Bus Trouble has alarmed
- Local observation confirms that a ground condition exists

Which ONE of the following completes the statement below concerning this ground?

The impact of this condition on the 250 VDC Bus is that ___(1)___ .

In accordance with APP-ALB-015-3-4, the crew should implement OP-156.06, Ground Isolation and Bus Drop, and ___(2)___ .

A. ✔ (1) the ground could result in the degradation of the DC system reliability

(2) energize the 1B 250 VDC Battery Charger then remove the 1A 250 VDC Battery Charger from service

B. (1) the ground could result in the degradation of the DC system reliability

(2) open the 1A charger DC output breaker allowing the batteries to power the 250 VDC bus and then place the 1B 250 VDC Battery Charger in service

C. (1) the battery charger will automatically trip on a high ground condition if left in operation

(2) energize the 1B 250 VDC Battery Charger then remove the 1A 250 VDC Battery Charger from service

D. (1) the battery charger will automatically trip on a high ground condition if left in operation

(2) open the 1A charger DC output breaker allowing the batteries to power the 250 VDC bus and then place the 1B 250 VDC Battery Charger in service

**Feedback**

*Plausibility and Answer Analysis*

Reason answer is correct: *In accordance with ALB-15-3-4 a NOTE in the response guidance to the annunciator states that a ground on the 250 VDC Bus could result in the degradation of the DC system reliability. Step 3.a response states that if a ground is suspected (reported by AO that a ground condtion exists) then implement OP-156.06. Since one charger is already in service (1A 250 VDC Battery Charger) the procedure section that would be used to place the standby battery charger in service would be section 8.1, Rotation of 250 VDC Battery Chargers. This section will place the standby charger in service then remove the initially running charger from service. At no time during this charger sway will the DC bus be powered solely on the batteries.*

*A. Correct.*

*B. Incorrect. The first part is correct. The second part is plausible since opening the chargers DC output breaker would stop the ground associated with the DC charger from affecting the DC bus. Allowing the batteries to power the bus is a function of the batteries when the chargers do not have power and are not powering the bus. Therefore it is plausible to have the batteries power the bus for a short amount of time to power up the standby charger.*

*C. Incorrect. The first part is plausible since there could be a misconception on what trips the AC input or DC output breakers for the battery chargers. There is a high voltage trip associated with the AC Input Breaker but there isn't a ground trip for the breakers on the bus. A note in OP-156.1 states that to prevent an inadvertent High Voltage trip, the output filters should be allowed to charge for a minimum of 30 seconds before closing theAC Input Breaker. The AC Input and Feeder Breaker may trip if the filter capacitors are not fully charged when the AC Input Breaker is closed. The second part is correct.*

*D. Incorrect. The first part is plausible since there could be a misconception on what trips the AC input or DC output breakers for the battery chargers. There is a high voltage trip associated with the AC Input Breaker but there isn't a ground trip for the breakers on the bus. A note in OP-156.1 states that to prevent an inadvertent High Voltage trip, the output filters should be allowed to charge for a minimum of 30 seconds before closing theAC Input Breaker. The AC Input and Feeder Breaker may trip if the filter capacitors are not fully charged when the AC Input Breaker is closed. The second part is plausible since opening the chargers DC output breaker would stop the ground associated with the DC charger from affecting the DC bus. Allowing the batteries to power the bus is a function of the batteries when the chargers do not have power and are not powering the bus. Therefore it is plausible to have the batteries power the bus for a short amount of time to power up the standby charger.*

**Notes**

063 DC Electrical Distribution

063A2.01; Ability to (a) predict the impacts of grounds on the DC electrical systems; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences.

(CFR 41.5 / 43.5 / 45.3 / 45.13)

| | |
|---|---|
| Importance Rating: | 2.5 3.2 |
| Technical Reference: | APP-ALB-015-3-4, pg 19, Rev. 27<br>OP-156.06, Section 9.2 DC Bus Ground, pg 16, Rev. 3<br>OP-156.01, Section 8.1, Rotation of 250 VDC Battery Chargers, pg 36, Rev. 36 |
| References to be provided: | None |
| Learning Objective: | Lesson Plan DCP Objective 8 |
| Question Origin: | New |
| Comments: | Original Importance rated provided by the NRC was 2.9. Determined the RO Importance rating of 2.5 is correctly listed above |
| Tier/Group: | T2/G1 |

51. 2014 NRC RO 051/NEW/FUNDAMENTAL///NONE//064A2.04/

Given the following plant conditions:

- The EDG 1A-SA is loaded to 6.3 MW from the MCR in accordance OP-155, Diesel Generator Emergency Power System
- The crew is preparing to shutdown the EDG in accordance with OP-155

Which ONE of the following completes the statement below concerning the continued shutdown of the EDG?

The EDG should be shutdown from 35% load in a maximum of ___(1)___ minutes AND the impact of this action is it will ___(2)___ .

A. (1) 5

(2) prevent stator winding overheating

B. ✔ (1) 5

(2) minimize carbon buildup

C. (1) 20

(2) prevent stator winding overheating

D. (1) 20

(2) minimize carbon buildup

**Feedback**

*Plausibility and Answer Analysis*

Reason answer is correct: *In accordance with OP-155 note during EDG shutdown the EDG should be shutdown from 35% load in < 5 minutes to minimize carbon buildup.*

A. Incorrect. *The first part is correct. The second part is plausible since the procedure has the EDG load held at 2.2 to 2.4 MW and 1 MVAR or less until stator winding temperature is < 135°C. Additionally precaution and limition #29.b warns that if generator winding temperatures reach 155°C the EDG should be secured per normal shutdown procedure unless operating in response to an actual emergency ESF signal (non-test). A visual winding inspection and stator insulation resistance check should be performed after the EDG has been secured.*

B. *Correct.*

C. Incorrect. *The first part is plausible since load has to verified to be < 5.2 to 6.4 MW for at least 20 minutes prior to reducing load to 0.5 MW and then securing the EDG. The second part is plausible since the procedure has the EDG load held at 2.2 to 2.4 MW and 1 MVAR or less until stator winding temperature is < 135°C. Additionally precaution and limition #29.b warns that if generator winding temperatures reach 155°C the EDG should be secured per normal shutdown procedure unless operating in response to an actual emergency ESF signal (non-test). A visual winding inspection and stator insulation resistance check should be performed after the EDG has been secured.*

D. Incorrect. *The first part is plausible since load has to verified to be < 5.2 to 6.4 MW for at least 20 minutes prior to reducing load to 0.5 MW and then securing the EDG. The second part is correct.*

**Notes**

064 Emergency Diesel Generator

064A2.04; Ability to (a) predict the impacts of Unloading prior to securing an ED/G on the ED/G system; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences.

(CFR 41.5 / 43.5 / 45.3 / 45.13)

| | |
|---|---|
| Importance Rating: | 2.7 3.0 |
| Technical Reference: | OP-155, Note on Page 39, Rev. 75 |
| References to be provided: | None |
| Learning Objective: | Lesson Plan DE, Objective 6 |
| Question Origin: | NEW |
| Comments: | None |
| Tier/Group: | T2/G1 |

52. 2014 NRC RO 052/NEW/FUNDAMENTAL///NONE//073G2.1.30/

Which ONE of the following completes the statements below?

1CC-23, REM 3501 A CCW Inlet Solenoid Valve, will ___(1)___ automatically if REM-01CC-3501A-SA, CCW Train A, loses power.

Upon restoration of power to REM-01CC-3501A-SA, 1CC-23 must be operated locally on the ___(2)___ elevation of the RAB.

A. (1) shut

(2) 305'

B. ✔ (1) shut

(2) 236'

C. (1) not shut

(2) 305'

D. (1) not shut

(2) 236'

**Feedback**

*Plausibility and Answer Analysis*

Reason answer is correct: *If REM-01CC-3501A-SA or REM-01CC-3501B-SB loses power, an interlock will cause the respective CCW isolation valve to the monitor (1CC-23 or 1CC-40) to shut. These valves are solenoid operated valves (as opposed to a manually operatable valve) and must be reopened from the local control panel upon power restoration. The Radiation monitor REM-1CC-3501A and B and controls for 1CC-23 and 1CC-40 are located on 236' elevation of the RAB.*

*A. Incorrect. The first part is correct. The second part is plausible since the CCW surge tank is located on the 305' elevation and the student could assume that the associated radiation monitor and valves are located and controlled from this location, however the valve is a solenoid operated valve that is controlled from a panel on the 236' elevation.*

*B. Correct.*

*C. Incorrect. The first part is plausible since the REM-3501A and 1CC-23 are both powered from the power supply 1A21-SA, however this is not correct since they are powered from different power panels. The second part is plausible since the CCW surge tank is located on the 305' elevation and the student could assume that the associated radiation monitor and valves are located and controlled from this location, however the valve is a solenoid operated valve that is controlled from a panel on the 236' elevation.*

*D. Incorrect. The first part is plausible since the REM-3501A and 1CC-23 are both powered from the power supply 1A21-SA, however this is not correct since they are powered from different power panels. The second part is correct.*

**Notes**

073 Process Radiation Monitoring

073G2.1.30; Ability to locate and operate components, including local controls.

(CFR 41.7 / 45.7)

| | |
|---|---|
| Importance Rating: | 4.4 4.0 |
| Technical Reference: | OP-118, P&L 10, Page 8, Rev 32<br>OP-145, Section 5.1.2 Step 8, Page 14, Rev 70 |
| References to be provided: | None |
| Learning Objective: | Lesson Plan RMS Objective 5 |
| Question Origin: | NEW |
| Comments: | None |
| Tier/Group: | T2/G1 |

53. 2014 NRC RO 053/BANK/FUNDAMENTAL///NONE//076K1.01/

Which ONE of the following sets of components are ALL supplied by the Emergency Service Water system?

1. CSIP oil coolers
2. CCW heat exchangers
3. Diesel Generator Jacket water cooler
4. AFW pump emergency makeup
5. RCP bearing oil coolers
6. Containment fan coil units (AH-37, 38, 39)

A. ✔ 1, 2, and 3

B. 4, 5, and 6

C. 1, 3, and 5

D. 2, 4, and 6

**Feedback**

*Plausibility and Answer Analysis*

Reason answer is correct: Cooling is supplied to the following components by:
1. ESW - CSIP oil coolers
2. ESW - CCW heat exchangers
3. ESW - Diesel Generator Jacket water cooler
4. ESW - AFW pump emergency makeup
5. CCW - RCP bearing oil coolers
6. NSW - Containment fan coil units (AH-37, 38, 39)

Components 1 - 4 are all cooled by ESW

*A. Correct.*

*B. Incorrect. Plausible since a component is listed that has ESW for a cooling source. A misconception on which source is the cooling supply for the other two components in this list would be a reason to make this answer plausible.*

*C. Incorrect. Plausible since two components listed have ESW for a cooling source. A misconception on which source is the cooling supply for the other component in this list would be a reason to make this answer plausible.*

*D. Incorrect. Plausible since two components listed have ESW for a cooling source. A misconception on which source is the cooling supply for the other component in this list would be a reason to make this answer plausible*

**Notes**

076 Service Water System (SWS)

076 K1.01 Knowledge of the physical connections and/or cause- effect relationships between the SWS and the following systems: CCW system
(CFR 41.2 to 41.9 / 45.7 to 45.8)

| | |
|---|---|
| Importance Rating: | 3.4 3.3 |
| Technical Reference: | Student Text for ESW, System Plus - ESW |
| References to be provided: | None |
| Learning Objective: | SWS Obj 5. h |
| Question Origin: | Bank, OIT Exam Bank ESWS (05H) 1<br>(with some component changes made) |
| Comments: | None |
| Tier/Group: | T2G1 |

54. 2014 NRC RO 054/BANK/C/A///NONE//078K3.03/

Given the following plant conditions:
- A loss of Instrument Air is in progress
- Instrument Air header pressure is 88 psig and continuing to lower slowly

With the current plant conditions, which ONE of the following completes the statement below?

The current status of 1SA-506, SA Header Isol Valve is ___(1)___ . When IA pressure lowers to ___(2)___ psig then ALB-002-8-1, Instrument Air Header Low Pressure annunciator will go into alarm.

A. (1) Open

(2) 85

B. (1) Open

(2) 75

C. (1) Shut

(2) 85

D. ✔ (1) Shut

(2) 75

**Feedback**

*Plausibility and Answer Analysis*

Reason answer is correct: *When IA pressure lowers to 90 psig 1SA-506 shuts. Instrument Air Low Pressure annunciator alarms when IA pressure is reduced to 75 psig.*

*A. Incorrect. The first part is plausible since at 85 pisg multiple RCS letdown flowpath valves begin to fail to mid-position and a student could have a misconception that 1SA-506 maybe a valve that also changes position at this pressure. The second part is plausible since there are valves that begin to fail in the letdown flowpath at this pressure.*

*B. Incorrect. The first part is plausible since at 85 pisg multiple RCS letdown flowpath valves begin to fail to mid-position and a student could have a misconception that 1SA-506 maybe a valve that also changes position at this pressure. The second part is correct.*

*C. Incorrect. The first part is correct. The second part is plausible since there are valves that begin to fail in the letdown flowpath at this pressure.*

*D. Correct.*

**Notes**

078 Instrument Air

078K3.03; Knowledge of the effect that a loss or malfunction of the IAS will have on the cross-tied units.

K/A is for multiple unit plants - HNP is a single unit facility

(CFR 41.7 / 45.6)

| | |
|---|---|
| Importance Rating: | 3.0 3.4 |
| Technical Reference: | AOP-017, Attachment 7, Page 57, Rev. 39<br>ALB-002-8-1, Page 39, Rev. 49 |
| References to be provided: | None |
| Learning Objective: | Lesson Plan Instrument and Service Air Obj. 9.c |
| Question Origin: | Bank, OIT Exam BankDevelopment ISA (04B) 1 |
| Comments: | We are a single unit plant. Unable to meet the K/A due to design of HNP station. 5/07/2014 David Lanyi (NRC) provided permission to write question to the malfunction of cross-tied air compressor vice cross-tied units. |
| Tier/Group: | T2/G1 |

55. 2014 NRC RO 055/BANK/FUNDAMENTAL///NONE//103K1.03/

Given the following plant conditions:

- RCS Tavg is 124°F
- A plant heatup is to be commenced in accordance with GP-002, Normal Plant Heatup From Cold Solid to Hot Subcritical Mode 5 to Mode 3

Which ONE of the following describes (1) the fan(s) that is (are) required to be placed in service prior to the RCS Tavg exceeding 140°F and (2) the fan's function?

A. (1) Control Rod Drive Mechanism Fans

(2) To prevent insulation degradation and subsequent CRDM failure.

B. (1) Containment Fan Coolers

(2) Provides cooling to the RCPs during normal and abnormal operation

C✔ (1) Primary Shield Cooling Fan

(2) To minimize concrete dehydration and subsequent structural damage

D. (1) Containment Fan Coil Units

(2) Provides cooling to CNMT during normal and abnormal operation

**Feedback**

*Plausibility and Answer Analysis*

Reason answer is correct: *In accordance with GP-002, Precaution and Limitation #8 the Primary Shield Cooling Fans and Reactor Support Cooling Fans are verified to be in service prior to the RCS temperature exceeding 140°F. The function of Primary Shield Cooling Fans are to maintain the Primary Shiled wall temperature approximately 10°F lower than the maximum allowable concrete dehydration temperature of 150°F. (To prevent concrete dehydration).*

*A. Incorrect. The first part is plausible if the temperture requirement is misunderstood and thought that the fans must be placed in service earlier than procedurally directed. These fans are required to be placed in sevice whenever the plant is in Modes 1-3 (> 350°F). The function for this fan is correct.*

*B. Incorrect. Plausible since these fans cool the Containment atmosphere and are required to be in operation to maintain the Containment temperature below the Tech Spec limit of 120°F. Since the RCS heatup is in progress it is plausible that these fans are required to be placed in service before Tavg reaches 140°F to keep the air in Containment from air temperature below the Tech Spec limits. The fans function is switched with the Containment Fan Coolers since there is a common misconception about the Containment Fan Coil Unit and Containment Fan Cooler functions (easy to get the names confused).*

*C. Correct.*

*D. Incorrect. Plausible since these fans cool the Containment air surrounding the RCPs and maintain the RCPs within their operating limits. At least one fan is required to be in operation any time an RCP is in service. Since at least one RCP is required to be in service prior to the RCS temperature exceeding 160°F the requirement to have this fan in operation is plausible. The Containment Fan Coil Units function is switched with the function of the Containment Fan Coolers for the reasons given in the plausibility of answer B*

**Notes**

103 Containment System

103K1.03 Knowledge of the physical connections and/or cause effect relationships between the containment system and the following systems: Shield building vent system
(CFR 41.2 to 41.9 / 45.7 to 45.8)

| | |
|---|---|
| Importance Rating: | 3.1 3.5 |
| Technical Reference: | CCS Student Text, HNP FSAR, GP-002, step 8, Rev. 61 |
| References to be provided: | None |
| Learning Objective: | Containment Cooling System Obj. 1.c |
| Question Origin: | Bank, OIT Exam Bank, CCS (01C) 1 |
| Comments: | None |
| Tier/Group: | T2G1 |

56. 2014 NRC RO 056/BANK/FUNDAMENTAL///NONE//001K2.03/

Which ONE of the following completes the statements below?

The power supply arrangement for the Rod Control Logic Cabinet consists of six ___(1)___ power supplies.

Three of the power supplies are powered from ___(2)___ .

A. (1) AC

(2) a 120 VAC Vital Instrument Bus

B. (1) AC

(2) the Rod Drive MG sets through a 5KVA transformer

C. (1) DC

(2) a 120 VAC Vital Instrument Bus

D. ✓ (1) DC

(2) the Rod Drive MG sets through a 5KVA transformer

**Feedback**

*Plausibility and Answer Analysis*

Reason answer is correct: Using a one line diagram of power supplies to the Rod Control Logic Cabinet (containing the logic circuits) the power supply is from the Rod Drive MG sets through a 5KVA transformer. There are 6 DC power supplies, 3 of which are supplied through the Rod Drive MG sets through the 5KVA transormer and the other from the auxiliary AC power circuits supplied by the 120 V AC Power Panel PP-1E212.

*A. Incorrect. The first part is plausible since the power supplies are AC sources that are rectified to DC. The second part is plausible since this system is part of Reactor Protection and the Reactor Protection system is powered from the Vital Instrument Busses.*

*B. Incorrect. The first part is plausible since the power supplies are AC sources that are rectified to DC. The second part is correct.*

*C. Incorrect. The first part is correct. The second part is plausible since this system is part of Reactor Protection and the Reactor Protection system is powered from the Vital Instrument Busses.*

*D. Correct.*

**Notes**

001 Control Rod Drive

001K2.03; Knowledge of bus power supplies - One-line diagram of power supplies to logic circuits.

(CFR 41.7)

| | |
|---|---|
| Importance Rating: | 2.7 3.1 |
| Technical Reference: | Student Text Rod Control System |
| References to be provided: | None |
| Learning Objective: | Lesson Plan RODCS Objective 2.a |
| Question Origin: | Bank, OIT Development Bank 2009A Audit RO 45 |
| Comments: | None |
| Tier/Group: | T2/G2 |

57. 2014 NRC RO 057/BANK/C/A///NONE//011A4.04/

Given the following plant conditions:

- The unit is operating at 100% power
- PRZ level controller LK-459F has failed in auto
- The operator is making adjustments for current level error

Which ONE of the following responses occurs FIRST once the operator places the PRZ Master level controller in MANUAL and depresses the LOWER pushbutton?

A. The PRZ backup heaters energize.

B. The letdown orifice isolation valves close.

C. 1CS-231, FK-122.1 Charging flow valve will open further from its current position.

D. ✔ 1CS-231, FK-122.1 Charging flow valve will close further from its current position.

**Feedback**

*Plausibility and Answer Analysis*

Reason answer is correct: *The charging flow control valve controller FK-122.1 is operated from the MCB panel 1A2 (FK-122.2 on ACP). This controller has two modes of operation, AUTO and MANUAL. In AUTO, the position of 1CS-231 (FCV-122) is varied to maintain actual charging flow matched with the flow demanded from the master level controller. If the master level controller is in AUTO, then FCV-122 will maintain PRZ level at reference level. If the master level controller is in MANUAL and the charging flow controller is in AUTO, then FCV-122 will maintain the demanded charging flow from the master level controller regardless of actual PRZ level.*

*A. Incorrect. Plausible for the following reasons. First the Pressurizer Pressure and Level Master controller functions can be misunderstood by the candidate. If the PRZ Master Pressure Controller manual is depressed and lowered the PRZ backup heaters will energize when the output reaches 9%. Additionally, a PRZ level deviation of 5% will auto energize the PRZ backup heaters but the level deviation will not occur first and the level deviation signal is generated from the level transmitters not the master level controller demand.*

*B. Incorrect. Plausible since the letdown orifice isolation valves receive a close signal when PRZ level is <17% and depressing the lower pushbutton will cause PRZ level to lower. But the low level signal is generated from the level transmitters not the master level controller demand and reaching 17% level will not be the first response.*

*C. Incorrect. Plausible since the candidate may have a misconception with pressure and level systems. On the letdown system lowering the letdown pressure controller opens the letdown pressure control valve which could be confused with how the PRZ Master level controller operates. (Letdown pressure control is reverse acting).*

*D. Correct.*

**Notes**

011 Pressurizer Level Control

011A4.04; Ability to manually operate and/or monitor in the control room the Transfer of PZR LCS from automatic to manual control

(CFR 41.7 / 45.5 to 45.8)

| | |
|---|---|
| Importance Rating: | 3.2 2.9 |
| Technical Reference: | Student Text PRZ Level Control |
| References to be provided: | None |
| Learning Objective: | PZRLC Objective 3.b |
| Question Origin: | Bank, OIT Exam Bank |
| Comments: | The Letdown system at HNP is not designed with a letdown flow control valve. Unable to write a question for original selected K/A 011A4.05 due to the lack of a letdown flow control valve in this system at HNP<br><br>Replace with randomly selected K/A 011 A4.04 by David Lanyi 5/09/2014 |
| Tier/Group: | T2/G2 |

58. 2014 NRC RO 058/BANK/FUNDAMENTAL///NONE//017K4.03/

Which ONE of the following completes the statements below?

If a Core Exit Thermocouple fails the RVLIS plasma display panel will read __(1)__ .

A method to locally obtain Core Exit Thermocouple temperatures at the Train specific panel OUTSIDE the Control Room is to use the __(2)__.

A. (1) 50°F

(2) CRT monitor and keyboard

B. ✔ (1) 50°F

(2) thumbwheels set to specific points identified by a legend

C. (1) 2500°F

(2) CRT monitor and keyboard

D. (1) 2500°F

(2) thumbwheels set to specific points identified by a legend

**Feedback**

*Plausibility and Answer Analysis*

Reason answer is correct: *RVLIS display for Thermocouples: Thermocouples are used to monitor the temperature of the fluid just above the vessel's upper-core plate (range -245°F to 2500°F). The system must be able to measure up to 2300°F per Reg. Guide 1.97. When a thermocouple fails or is taken out of service, a reading of 50°F will be displayed for that thermocouple on the MCR RVLIS display screen. If the Tc failed high it would be used as an input to one of the 5 hottest therefore the better response would be for the failure to indicate low and then not be part of the calculation. To obtain local reading for CETCs there are 2 cabinets located in different plant areas. 'A' Train RVLIS cabinet is located on at PIC Room C-17 RAB 286'. The 'B' Train is located at the Main Termination Cabinet RAB 305*'. *Local readings can be obtained by moving a thumbwheel to different points with the readouts identified by a placard on the inside of the cabinet door.*

A. *Incorrect. The first part is correct. The second part is plausible because this is the method used to obtain a reading but this method would be used if you were going to obtain a reading in the Main Control Room.*

B. *Correct*

C. *Incorrect. The first part is plausible since this is the highest temperature that the thermocouple can read. The second part is plausible because this is the method used to obtain a reading but this method would be used if you were going to obtain a reading in the Main Control Room.*

D. *Incorrect. The first part is plausible since this is the highest temperature that the thermocouple can read. The second part is correct.*

**Notes**

017 In-core Temperature Monitor

017K4.03; Knowledge of ITM system design feature(s) and/or interlock(s) which provide for the range of temperature indication.

(CFR 41.7)

| | |
|---|---|
| Importance Rating: | 3.1 3.3 |
| Technical Reference: | ICCM Student Text |
| References to be provided: | None |
| Learning Objective: | ICCM Objective 1.b |
| Question Origin: | Bank, mixed two bank questions together to obtain this 2 part question |
| Comments: | None |
| Tier/Group: | T2/G2 |

59. 2014 NRC RO 059/PREVIOUS/C/A///NONE/2012 NRC RO-60/027A2.01/

Given the following plant conditions:
- The plant is operating at 100% power
- S-1A, Air Radioactivity Removal Fan S-1A, is in operation

The following annuciators are received:
- ALB-028-1-4, CNMT Bldg ARR Char Filter Trouble, alarms
- ALB-030-8-1, Fire Detection System Fire, alarms

Subsequently the following conditions exist:
- S-1A, Air Radioactivity Removal Fan S-1A, indicates it is OFF
- S-1B, Air Radioactivity Removal Fan S-1B, indicates it is ON

Which ONE of the following (1) describes the cause of the condition AND (2) the procedure used to midigate the adverse plant conditions?

A. (1) High $\Delta$P across the filter train

   (2) FPP-002, Fire Emergency

B. (1) High $\Delta$P across the filter train

   (2) AOP-036, Safe Shutdown Following A Fire

C. ✔ (1) High charcoal filter temperature

   (2) FPP-002, Fire Emergency

D. (1) High charcoal filter temperature

   (2) AOP-036, Safe Shutdown Following A Fire

**Feedback**

*Plausibility and Answer Analysis*

Reason answer is correct: *ARR charcoal filter trouble annunicator alarms when the temperature sensor exceeds 180°F with a reflash at 280°F. The high temperature causes the runnning fan to trip on the pre-high temperature alarm (at 180°F). The standby fan unit starts 12 seconds after the in-service fan unit trips.*

*A. Incorrect. The first part is plausible because there is a DP alarm for the ARR filter train, which includes the charcoal filter along with the medium efficency and HEPA filter. Therefore, DP across the charcoal filter contributes to actuation of an alarm on the ARR unit, which could lead the candidate to choose this answer. The second part is correct.*

*B. Incorrect. The first part is plausible because there is a DP alarm for the ARR filter train, which includes the charcoal filter along with the medium efficency and HEPA filter. Therefore, DP across the charcoal filter contributes to actuation of an alarm on the ARR unit, which could lead the candidate to choose this answer. The second part is plausible since AOP-036 is a procedure that could be implemented during a plant fire event.*

*C. Correct.*

*D. Incorrect. The first part is correct. The second part is plausible since AOP-036 is a procedure that could be implemented during a plant fire event.*

**Notes**

027 Containment Iodine Removal

027A2.01; Ability to (a) predict the impacts of high temperature in the filter system on the CIRS; and (b) based on those predictions, use Procedures to correct, control, or mitigate the consequences.

(CFR 41.5 / 43.5 / 45.3 / 45.13)

| | |
|---|---|
| Importance Rating: | 3.0 3.3 |
| Technical Reference: | ALB-028, Window 1-4, Page 5, Rev 17 |
| References to be provided: | None |
| Learning Objective: | Plant Procedures- Fire protection, PP2-15 Obj. 1 |
| Question Origin: | Previous 2012 NRC question (RO-60) radomly selected |
| Comments: | None |
| Tier/Group: | T2G2 |

60. 2014 NRC RO 060/NEW/FUNDAMENTAL///NONE//029K3.02/

Given the following plant conditions:
- The unit is in Mode 6 with personnel working in Containment
- The Accumulators are being vented in accordance with OP-110, Safety Injection
- The $O_2$ concentration outside the restricted area is reported 'low'

Subsequently:
- The running Containment Pre-Entry Purge fan tripped on motor overload
- The crew secured venting the Accumulator

In accordance with OP-110, which ONE of the following completes the statements below?

The $O_2$ concentration outside the restricted area is required to be above a MINIMUM of __(1)__ .

Prior to recommencing the Accumulator venting the crew is required to __(2)__ .

A. (1) 23.5%

(2) run all standby Containment Fan coolers for a minimum of 4 hours for Containment atmosphere mixing

B. (1) 23.5%

(2) ensure the $O_2$ concentration is restored above the minimum concentration level

C. (1) 19.5%

(2) run all standby Containment Fan coolers for a minimum of 4 hours for Containment atmosphere mixing

D. ✔ (1) 19.5%

(2) ensure the $O_2$ concentration is restored above the minimum concentration level

**Feedback**

*Plausibility and Answer Analysis*

Reason answer is correct: *In accordance with OP-110 during Accumulator depressurization an area 20 feet on either side of the vent on the 236 foot elevation should be taped off with red and black warning tape and posted to restrict access to the area. The area outside the restricted zone oxygen concentration is monitored and venting must be stopped if the oxygen concetration decreases to < 19.5%. Venting can be restarted when the oxygen concentration outside the restricted area is restored to > 19.5%.*

*A. Incorrect. The first part is plausible if the candidate has a misconception about minimum and maximum oxygen concentrations. A concentration above 23.5% is the maximum oxygen percentage allowed by SAF-NGGC-2174 as higher concentrations have the potential to create mixture that is considered flamable. The second part is plausible since running all of the Containment Fan Coolers would mix the Containment atmosphere and raise the oxygen concentration in both the restricted and non-restricted areas of Containment but this is not a requirement prior to recommencing Accumulator venting. The minimum of 4 hours relates to the minimum amount of time required to run the Containment Spray pumps after a LOCA in Containment.*

*B. Incorrect. The first part is plausible if the candidate has a misconception about minimum and maximum oxygen concentrations. A concentration above 23.5% is the maximum oxygen percentage allowed by SAF-NGGC-2174 as higher concentrations have the potential to create mixture that is considered flamable The second part is correct.*

*C. Incorrect. The first part is correct. The second part is plausible since running all of the Containment Fan Coolers would mix the Containment atmosphere and raise the oxygen concentration in both the restricted and non-restricted areas of Containment but this is not a requirement prior to recommencing Accumulator venting. The minimum of 4 hours relates to the minimum amount of time required to run the Containment Spray pumps after a LOCA in Containment.*

*D. Correct.*

**Notes**

029 Containment Purge

029K3.02; Knowledge of the effect that a loss or malfunction of the Containment Purge System will have on Containment entry.

(CFR 41.7 / 45.6)

| | |
|---|---|
| Importance Rating: | 2.9 3.5 |
| Technical Reference: | OP-110, step 4 Rev. 45 |
| References to be provided: | None |
| Learning Objective: | Lesson Plan SIS Objective 4.i |
| Question Origin: | NEW |
| Comments: | Development of this question to meet K/A was difficult. Question suggestion from David Lanyi provided to HNP exam development team on 8-29-2014. |
| Tier/Group: | T2/G2 |

61. 2014 NRC RO 061/NEW/C/A///NONE//041K6.03/

Given the following plant conditions:

- A 20% Turbine load rejection has occurred from 100% power
- During the transient the Steam Dump control system malfunctioned

After the plant stablilized:

- Reactor power is ~ 7.5% higher than Turbine power
- $T_{avg}$ and $T_{ref}$ are matched

**(Assume no operator action and use THUMBRULE values when determining the answer)**

For this condition, which ONE of the following identifies how far the Steam Dump valves must be open to cause the current plant conditions?

A. 7.5%

B. 25%

C. ✔ 50%

D. 75%

**Feedback**

*Plausibility and Answer Analysis*

Reason answer is correct: *A Turbine load rejection of 20% would have armed the Condenser Steam dumps and caused them to open. The student has to know that during this load rejection 3 Condenser steam dumps (1 group) would have had a signal to open. Based on thumbrule values provided to the students for steam flow values of the steam relief system one Condenser Steam Dump is accountable for approximately 5% of rated steam flow therefore three of these valves at 50% open would account for approximately 7.5% steam flow demand and cause the mismatch between Reactor and Turbine power. There are a total of 14 steam dumps and the total capacity of the Steam dumps is 70% of rated steam flow.*

*Concerning rated steam flow values and Main Steam relief valves the following values are provided to the students as "thumbrules":*
*Steam Dump 5% / valve*
*S/G PORV 6% / valve*
*S/G Safety 7% / valve*

A. Incorrect. *Plausible if there was a misconception on the total capacity of the steam dumps. If the steam dumps were rated for 100% steam demand then if the steam dumps were failed 7.5% open a mismatch on a one to one basis would have the steam dumps open at 7.5%.*

B. Incorrect. *Plausible since this would be correct if the load reduction was of a magnitude which would open all 6 condenser steam dumps (40%), however this is incorrect because a reduction of 20% will only result in the operation of the Group 1 Steam dumps (3 total).*

C. *Correct.*

D. Incorrect. *Plausible since this would be correct if the candidate misunderstood that thumbrule appiled to each group (i.e. 5% per group vice 5% per valve). With both group 1 and 2 of the condenser steam dumps open 75% this would result in the mismatch of 7.5%, however this is incorrect because each condenser steam dump group has 3 steam dumps in the group.*

**Notes**

041 Steam Dump/Turbine Bypass Control

041K6.03; Knowledge of the effect of a loss or malfunction on controller and positioners, including ICS, S/G, CRDS will have on the SDS.

(CFR 41.7 / 45.7)

| | |
|---|---|
| Importance Rating: | 2.7 2.9 |
| Technical Reference: | Student Text Steam Dump System |
| References to be provided: | None |
| Learning Objective: | Lesson Plan Steam Dump System Objective 8.f |
| Question Origin: | Bank, OIT Exam Bank, SDS (02F) 6 |
| Comments: | Note: ICS is an acronym for integrated control system for Babcock and Wilcox |
| Tier/Group: | T2/G2 |

62. 2014 NRC RO 062/BANK/C/A///NONE//045A1.06/

Given the following plant conditions:
- The unit is operating at 100% power

Subsequently:
- A Turbine Trip signal occurs
- One Throttle Valve failed to close
- All Governor Valves are indicating closed

Which ONE of the following completes the statements below?

Assuming NO operator actions have occured after the Turbine has tripped SG pressure will __(1)__ immediately following the trip.

In accordance with EOP-E-0, Reactor Trip Or Safety Injection, the operator is FIRST required to __(2)__ .

A. (1) RISE

(2) manually run back the Turbine

B. ✔ (1) RISE

(2) manually actuate a Turbine Trip

C. (1) LOWER

(2) manually run back the Turbine

D. (1) LOWER

(2) manually actuate a Turbine Trip

**Feedback**

*Plausibility and Answer Analysis*

Reason answer is correct: *SG pressure rises from 100% load value of approximately 1035 psig to the setpoint of steam dumps (1092 psig) / SG PORVs (1105 psig) following the Turbine trip due to the Main Steam isolation from Governor Valve closure. The actions of EOP-E-0 will direct the candidate to first give the turbine a manual trip signal from the MCB and check the status of the Throttle and Govenor Valves before attempting to manually runback the Turbine.*

*A. Incorrect. The first part is correct. The second part is plausible since the actions of EOP-E-0 have the operator check ALL Throttle valves shut and if not then manually trip the Turbine. If one of the throttle valves and one of the governor valves still indicated OPEN then the next action would be to manually run back the Turbine.*

*B. Correct.*

*C. Incorrect. The first part is plausible if the candidate has a misconception that steam flow will continue if the Throtte valve remains open but the Governor valves also shut during a Turbine trip isolating steam flow. Therefore steam pressure will rise not lower. The second part is plausible since the actions of EOP-E-0 have the operator check ALL Throttle valves shut and if not then manually trip the Turbine. If one of the throttle valves and one of the governor valves still indicated OPEN then the next action would be to manually run back the Turbine.*

*D. Incorrect. The first part is plausible if the candidate has a misconception that steam flow will continue if the Throtte valve remains open but the Governor valves also shut during a Turbine trip isolating steam flow. Therefore steam pressure will rise not lower. The second part is correct.*

**Notes**

045 Main Turbine Generator

045A1.06; Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating the MT/G system controls including expected response of secondary plant parameters following T/G trip.

(CFR 41.5 / 45.5)

| | |
|---|---|
| Importance Rating: | 3.3 3.7 |
| Technical Reference: | Plant Curve G-4, student text Main Steam, Steam Dumps and Main Turbine<br>EOP-E-0, Page 6, Rev 3 |
| References to be provided: | None |
| Learning Objective: | LP MT Objective 12 |
| Question Origin: | Bank, OIT Exam Bank BD-3.9 (02) 2 |
| Comments: | None |
| Tier/Group: | T2/G2 |

63. 2014 NRC RO 063/BANK/FUNDAMENTAL///NONE//055G2.1.28/

Given the following plant conditions:

- The unit is operating at 100% Power
- 'A' Condenser Vacuum Pump running
- 'B' Condenser Vacuum Pump is in AUTO
- Main Condenser backpressure begins to degrade

Which ONE of the following completes the statements below?

For 'B' Vacuum pump to automatically start the 'A' Vacuum Pump breaker must be ___(1)___.

In addition to the breaker position, the setpoint for the Condenser backpressure required for auto start of the 'B' Vacuum Pump is ___(2)___ .

**(Assume NO operator actions)**

A. (1) CLOSED

(2) 6.5 inches Hg

B. (1) CLOSED

(2) 4.0 inches Hg

C. (1) OPEN

(2) 6.5 inches Hg

D. (1) OPEN

(2) 4.0 inches Hg

**Feedback**

*Plausibility and Answer Analysis*

Reason answer is correct: *The standby Condenser Vacuum Pump will automatically start on degrading condenser vacuum provided its start permissive is met and the running Condenser Vacuum Pump breaker remains CLOSED. The Condenser Vacuum Pump auto starts when the Condenser Low-Vacuum Pre-Trip Alarm comes in (6.5 Inches Hg. Absolute when Turbine Load is >60%; 4.0 Inches Hg. Absolute when Turbine Load is < 60%). This automatic start setpoint provides a 1.0 Inch Hg margin from the Turbine Trip setpoint, allowing for the second Condenser Vacuum Pump to autostart and mitigate the lowering vacuum event prior to a turbine trip. It must be recognized that the automatic start of the standby Condenser Vacuum Pump is dependent on the breaker of the running Condenser Vacuum Pump. The breaker of the running Condenser Vacuum Pump must be CLOSED for the automatic start to occur. This requirement results in the disabling of the automatic start feature if the running Condenser Vacuum Pump trips on electrical fault.*

*A. Correct.*

*B. Incorrect. The first part is correct. The second part is plausible since this is the setpoint that would cause an auto start of the standby vacuum pump IF the initial power level was < 60%.*

*C. Incorrect. The first part is plausible since there could be a misconception and thought that the vacuum pump start logic functions like the the Main Feedwater pump logic. The FW logic will start the idle MFW pump if the running pump tripped. The second part is correct.*

*D. Incorrect. The first part is plausible since there could be a misconception and thought that the vacuum pump start logic functions like the the Main Feedwater pump logic. The second part is plausible since this is the setpoint that would cause an auto start of the standby vacuum pump IF the initial power level was < 60%.*

**Notes**

055 Condenser Air Removal

055G2.1.28; Knowledge of the purpose and function of major system components and controls.

(CFR 41.7)

| | |
|---|---|
| Importance Rating: | 4.1 4.1 |
| Technical Reference: | ALB-020-2-4A, Rev. 44 |
| References to be provided: | None |
| Learning Objective: | MCES Objective 5 |
| Question Origin: | Bank, OIT Exam Bank MCES (05) 2 |
| Comments: | None |
| Tier/Group: | T2/G2 |

64. 2014 NRC RO 064/BANK/C/A//AOP-010 BD/NONE//056K1.03/

Given the following plant conditions:

- The unit is operating at 58%, with a plant shutdown in progress

- The following ALB-019 annunciators alarm:
  - 2-4A, CNDST PUMP A LO FLOW
  - 2-4B, CNDST PUMP A DISCH LO PRESS
  - 2-5A, CNDST PUMP A BKR TRIP/TRBL
- Indications on the 'A' Condensate Pump are as follows:
  - Red light is OFF
  - Green light is LIT

Which ONE of the following identifies the expected response of the CBPs and MFPs?

A. All CBPs and all MFPs will continue to run

B. ✔ The 'A' CBP and 'A' MFP will both trip

C. Only the 'A' CBP will trip

D. Only the 'A' MFP will trip

**Feedback**

*Plausibility and Answer Analysis*

Reason answer is correct: *The annunciators and control board indications indicate that the 'A' Condensate pump has tripped. With both trains of FW and Condensate in service the loss of a Condensate pump will automatically trip the associated Condensate Booster pump, and the loss of the Condensate Booster pump will automatically trip the associated train MFW pump.*

*A. Incorrect. This is plausible since the Feedwater system is crosstied prior to the suction of each pump so it is plausable to believe that the 'B' Train will not be affected.*

*B. Correct.*

*C. Incorrect. Plausible since the auto trip feature for the loss of a Condensate pump is the trip of the assoicated Condensate Booster Pump. This answer does not take into consideration that the loss of the CBP will now cause the loss of the associated MFW pump.*

*D. Incorrect. Plausible to believe that the auto trip feature of either the Condensate pump or the Condensate Booster pump will trip only the associated MFW pump.*

**Notes**

056 Condensate

056K1.03; Knowledge of the physical connections and/or cause-effect relationships between the Condensate System and MFW.

(CFR 41.2 to 41.9 / 45.7 to 45.8)

| | |
|---|---|
| Importance Rating: | 2.6 2.6 |
| Technical Reference: | AOP-010 Basis Document, Automatic Action Discussion Item, page 2, Rev. 19 |
| References to be provided: | None |
| Learning Objective: | CFW Student Text, OBJ 09c |
| Question Origin: | Bank, OIT Exam Bank, CFW (09C) 3 |
| Comments: | None |
| Tier/Group: | T2/G2 |

65. 2014 NRC RO 065/PREVIOUS/C/A///NONE//068K5.04/

Given the following plant conditions:

- The plant is operating at 100% power
- Treated L&HS Tank 'A' contains radioactive liquid that is required to be released.

Which ONE of the following completes the statement below?

In accordance with OP-120.10.04,Treated Laundry And Hot Shower Tanks, the Treated L&HS Tank 'A' should be discharged to the ___(1)___.

A new release permit is required if ___(2)___ before discharging the remaining contents of the tank.

A. (1) Waste Neutralization Settling basin

   (2) a valid High alarm on radiation monitor REM-3540 occurs

B. (1) Waste Neutralization Settling basin

   (2) the release flow rate on WP Computer point FA809 exceeds 80% of the Max Effluent Flow Rate

C. (1) Cooling Tower Blowdown line

   (2) a valid High alarm on radiation monitor REM-3540 occurs

D. (1) Cooling Tower Blowdown line

   (2) the release flow rate on WP Computer point FA809 exceeds 80% of the Max Effluent Flow Rate

**Feedback**

*Plausibility and Answer Analysis*

Reason answer is correct: IAW OP-120.10.04 step 27, the Treated L&HS tank discharge valves should be placed in the Cooling Tower 3LHS-301 position. A caution prior to Section 5.2.2 step 26 states: Radioactive liquids should never be discharged to the Wate Neutralizion System. During the release if radiation monitor REM-3540 goes into High Alarm a new Batch Liquid Effluent Permint must be initiated before discharging the remaining contents of the tank.

*A. Incorrect. The first part is plausible because discharge of the Treated Laundry and Hot Shower Tanks can be aligned to the Waste Neutralization basin but this in not the normal discharge path that would be used for radioactive liquids since this could cause a buildup of contamination in the Waste Nueturalation Settling Basin. The second part of the answer is correct.*

*B. Incorrect. The first part is plausible because discharge of the Treated Laundry and Hot Shower Tanks can be aligned to the Waste Neutralization basin but this in not the normal discharge path that would be used for radioactive liquids since this could cause a buildup of contamination in the Waste Nueturalation Settling Basin. The second part is plausible if the candidate confuses the requirements of setting the max effluent flow rate when when a new permit is required. (A Licensed Operator must provide independent verification that the Release Flow setpoint on HK-6193, Treated Laundry and Hot Shower Tanks to Environmnet flow controller is ≤ 80%of the Max Effluent Flow Rate.)*

*C. Correct.*

*D. Incorrect. The first part is correct. The second part is plausible if the candidate confuses the requirements of setting the max effluent flow rate when when a new permit is required. (A Licensed Operator must provide independent verification that the Release Flow setpoint on HK-6193, Treated Laundry and Hot Shower Tanks to Environmnet flow controller is ≤ 80%of the Max Effluent Flow Rate.)*

**Notes**

068 Liquid Radwaste System (LRS)

068K5.04 Knowledge of the operational implication of the following concepts as they apply to the Liquid Radwaste System: Biological hazards of radiation and the resulting goal of ALARA

(CFR: 41.5 / 45.7)

| | |
|---|---|
| Importance Rating: | 3.2 3.5 |
| Technical Reference: | OP-120.10.04, Section 5.2.2, Step 27, Page 23, Rev 33 |
| References to be provided: | None |
| Learning Objective: | Liquid Waste Processing System Obj. 2.c |
| Question Origin: | Previous 2012 NRC RO randomly selected |
| Comments: | This K/A is being met by the evaluation of the requirement to prepare a new release permit since a new permit requires the sampling and calculation of the dose that will be released to the public and the minimum dilution flow is calculated to maximize the dispersion of the radioactive elements being released to the public. |
| Tier/Group: | T2G2 |

66. 2014 NRC RO 066/BANK/FUNDAMENTAL///NONE//G2.1.38/

For which ONE of the following events will REQUIRE normal alarm response protocol to be suspended, in accordance with AD-OP-ALL-1000, Fleet Conduct of Operations?

A. ✔ Power Range N-43 failing high

B. 'A' SG Channel 1 Level Indication failing low

C. Pressurizer LT-459 failing low with PRZ Level Selector in 459/460

D. 'A' EDG tripping during the performance of OP-155, Diesel Generator Emergency Power System

**Feedback**

*Plausibility and Answer Analysis*

Reason answer is correct: *N-43 failing high would require entry into AOP-001 allowing use of Transient Anunciator Response without direction from the CRS/SM due to entry into an Event Procedure.*

*A. Correct.*

*B. Incorrect. There is no required entry into an Event Procedure for this occurrence. Plausible since the CRS/SM may direct Transient Annunciator Response.*

*C. Incorrect. There is no required entry into an Event Procedure for this occurrence. Plausible since the CRS/SM may direct Transient Annunciator Response.*

*D. Incorrect. There is no required entry into an Event Procedure for this occurrence. Plausible since the CRS/SM may direct Transient Annunciator Response.*

**Notes**

2.1 Conduct of Operations

G2.1.38 Knowledge of the station's requirements for verbal communications when implementing procedures.

(CFR 41.10 / 45.13)

| | |
|---|---|
| Importance Rating: | 3.7 3.8 |
| Technical Reference: | AD-OP-ALL-1000, Page 71, Transient Annunciator Response Excpecations, Rev. 1 |
| References to be provided: | None |
| Learning Objective: | PP-LP-2.0 Objective 3.k |
| Question Origin: | Bank, OIT Development, 2009B NRC RO 67 |
| Comments: | Revised to current fleet procedure |
| Tier/Group: | T3 |

67. 2014 NRC RO 067/BANK/FUNDAMENTAL///NONE//G2.1.44/

Given the following plant conditions:

- The unit is in Mode 6
- Core off-load has been suspended due to Source Range NI-31 indication failure
- NI-31 has been declared inoperable

Before fuel movement in Containment can resume, which ONE of the following describes the MINIMUM actions required by GP-009, Refueling Cavity Fill, Refueling And Drain Of The Refueling Cavity Modes 5-6-5?

In addition to verifying the audio count rate channel is selected to Source Range NI-32, the operability of _____ must be verified.

A. both Wide Range Neutron Flux Monitors

B. either Wide Range Neutron Flux Monitor

C. ✓ the Wide Range Neutron Flux Monitor on the opposite side of the core from NI-32

D. the Wide Range Neutron Flux Monitor on the same side of the core as NI-32

**Feedback**

*Plausibility and Answer Analysis*

Reason answer is correct: *GP-009, Precautions and Limitation #2 - Core Alterations shall be suspended and the situation evaluated by the SM if any of the listed conditions are encountered during fuel handling...one of the items on the list is when a Source Range Monitor becomes inoperable. The note preceeding the inoperable source range condition reads: A Nuclear Flux Monitoring System (N60 or N61) Monitor may be used in place of an inoperable Source Range Monitor to satisfy Tech Spec 3.9.2. The substitute Monitor must be located on the opposite side of the core from the operable Source Range (N60 may substitute for N31 and N61 may substitute for N32). The operable Source Range Monitor must be able to provide audible indication in Containment and the MCR.*

A. *Incorrect. Plausible because the WR Neutron Flux Monitors are capable of Source Range indications and in accordance with Tech Spec 3.9.2 one of the WR Neutron Flux Monitor channels can be subsitued for a failed NI Source Range Channel. But neither of the WR Flux Monitors are required to be operable during Mode 6 operation.*

B. *Incorrect. Plausible because the WR Neutron Flux Monitors are capable of Source Range indications and in accordance with Tech Spec 3.9.2 one of the WR Neutron Flux Monitor channels can be subsitued for a failed NI Source Range Channel. But neither of the WR Flux Monitors are required to be operable during Mode 6 operation.*

C. *Correct.*

D. *Incorrect. Plausible because the WR Neutron Flux Monitors can be subsitued for a failed Source Range NI and there is no requirement for which channel the subsitution is in Tech Spec 3.9.2 The requirement for the opposite side WR Neutron Flux Monitor is only found in the P&L of GP-009.*

**Notes**

2.1 Conduct of Operations

G2.1.44 Knowledge of RO duties in the control room during fuel handling, such as responding to alarms from the fuel handling area, communication with the fuel storage facility, systems operated from the control room in support of fueling operations, and supporting instrumentation.

(CFR 41.10 / 43.7 / 45.12)

| | |
|---|---|
| Importance Rating: | 3.9 3.8 |
| Technical Reference: | GP-009, P&L #2, page 10, Rev. 59<br>Tech Spec 3.9.2, Refueling Operations |
| References to be provided: | None |
| Learning Objective: | Lesson Plan NIS Objective 10.f |
| Question Origin: | Bank, OIT Development Bank, G2.1.44 1 |
| Comments: | None |
| Tier/Group: | T3 |

68. 2014 NRC RO 068/BANK/FUNDAMENTAL///NONE//G2.2.35/

Given the following plant conditions:
- An RCS heatup is in progress
- RCS Tavg is 342°F
- 1A-SA EDG is declared INOPERABLE due to failure of the shutdown relay

Which ONE of the following identifies (1) the current plant OPERATIONAL MODE and (2) the Technical Specification requirements regarding Mode changes?

A. (1) Mode 3

(2) Change to Mode 2 may be performed provided the TS 3.8.1, AC Sources - Operating, Action Statements for 1A-SA EDG inoperability are satisfied.

B. (1) Mode 3

(2) Change to Mode 2 may NOT performed.

C. (1) Mode 4

(2) Change to Mode 3 may be performed provided the TS 3.8.1, AC Sources - Operating, Action Statements for 1A-SA EDG inoperability are satisfied.

D. ✔ (1) Mode 4

(2) Change to Mode 3 may NOT performed.

**Feedback**

*Plausibility and Answer Analysis*

Reason answer is correct: *Mode 4 is defined in Tech Spec Table 1.2 as a plant condition where the average coolant temperature is 350°F > Tavg > 200°F. With RCS Tavg of 342°F Tech Spec Mode 4 applies. Tech Spec 3.8.1.1 states that in Modes 1-4 as a minimum two seperate and independent diesel generators must be operable. With the 1A-SA EDG declared inoperable and is required to be returned to operational within 72 hours or the unit be placed in HSB within the next 6 hours (already below HSB - Mode 3) and in Cold Shutdown (Mode 5) within the following 30 hours. Since the EDG is inoperable Tech Spec 3.0.4 applies. A change of operational modes shall not be made when the conditions for the LCO are not met and the associated action requires a shutdown if they are not met within a specified time interval.*

*A. Incorrect. The first part is plausible since Hot Standby is Mode 3, which is >350°F and the temperature of 342°F is <350°F. The second part allowing a Mode change is plausible because some Tech Specs indicate TS 3.0.4 is not applicable. In this instance, 3.0.4 does apply, and even though action requirements are met, the LCO does not have an indefinite time requirement as defined by TS section 3.0.*

*B. Incorrect. The first part is plausible since Hot Standby is Mode 3, which is >350°F and the temperature of 342°F is <350°F. Actions are correct since they represent the wording in Tech Spec 3.0.4 which does not allow for a Mode change with an inoperable component that has an LCO with an shutdown action time.*

*C. Incorrect. The first part is correct. The second part allowing a Mode change is plausible because some Tech Specs indicate TS 3.0.4 is not applicable. In this instance, 3.0.4 does apply, and even though action requirements are met, the LCO does not have an indefinite time requirement as defined by TS section 3.0.*

*D. Correct.*

**Notes**

2.2 Equipment Control

G2.2.35 Ability to determine Technical Specification Mode of Operation

(CFR 41.7 / 41.10 / 43.2 / 45.13)

| | |
|---|---|
| Importance Rating: | 3.6 4.5 |
| Technical Reference: | TS Table 1.2, Operational Modes, TS 3.0.4, TS 3.8.1, |
| References to be provided: | None |
| Learning Objective: | TS LP-2.0/3.0/5.0/8.0 Objective 3.a and 4.a |
| Question Origin: | Bank, OIT Development Bank, 2009A Audit |
| Comments: | None |
| Tier/Group: | T3 |

69. 2014 NRC RO 069/NEW/C/A//CAR-2166-B-401 S2309/YES//G2.2.41/

Which ONE of the following completes the statements below?

In accordance with AD-HU-ALL-0004, Procedure And Work Instruction Use And Adherence, the ___(1)___ shall be used to verify the current revision of a Control Wiring Diagram (CWD).

Based on CAR-2166-B-401 Sheet 2309, ESW Aux Resevoir Bay No. 1 Traveling Screen 4A-NNS, the green indicating light will be extinguished and the red indicating light will be illuminated when the ___(2)___ relay is energized.

**(Reference provided)**

A. (1) Document Management System, Controlled Documents Module

   (2) 42-H

B. ✔ (1) Document Management System, Controlled Documents Module

   (2) 42-L

C. (1) Records Management System, Records Retrival Module

   (2) 42-H

D. (1) Records Management System, Records Retrival Module

   (2) 42-L

**Feedback**

*Plausibility and Answer Analysis*

Reason answer is correct: AD-HU-ALL-0004 requires the revisions to be verified current using the controlled documents module in passport or controlled documents list. Provided the 42-H relay is de-energized (traveling screen pressure is not rising) depressing the jog pushbutton will energizing the 42-L relay which will open a contact to de-energize the green light, and close a contact to energize the red light.

*A. Incorrect. The first part is correct. The second part is plausible since energizing the 42-H relay opens a contact to de-energize the green light, however this is incorrect since the 42-H relay closes a contact to energize the amber light and also opens a contact to de-energize the 42-L relay which de-energizes the red light.*

*B. Correct.*

*C. Incorrect. The first part is plausible since the Records Management System is the historical record of drawing or procedure changes and the latest revision of a CWD is located in this system, however this is incorrect because the records are updated after the revision is issued within 10 days of a revision and therefore not the required location to obtain a current drawing or procedure revision. The second part is plausible since energizing the 42-H relay opens a contact to de-energize the green light, however this is incorrect since the 42-H relay closes a contact to energize the amber light and also opens a contact to de-energize the 42-L relay which de-energizes the red light.*

*D. Incorrect. The first part is plausible since the Records Management System is the historical record of procedure changes and the latest revision of a CWD is located in this system, however this is incorrect because the records are updated after the revision is issued within 10 days of a revision and therefore not the required location to obtain a current drawing or procedure revision. The second part is correct.*

**Notes**

2.2 Equipment Control

G2.2.41 Ability to obtain and interpret station electrical and mechanical drawings.

(CFR 41.10 / 45.12 / 45.13)

| | |
|---|---|
| Importance Rating: | 3.5 3.9 |
| Technical Reference: | AD-HU-ALL-0004, Attachment 3, page 66, Rev 2<br>CAR-2166-B-401 S2309 |
| References to be provided: | CAR-2166-B-401 S2309 |
| Learning Objective: | PSPR-LP-3.1, Objective 2.b and Objective 4 |
| Question Origin: | New |
| Comments: | None |
| Tier/Group: | T3 |

70. 2014 NRC RO 070/BANK/FUNDAMENTAL///NONE//G2.3.15/

The following radiation monitors are in service:
- REM-3502A, Containment RCS Leak Detection
- REM-3502B, Containment Pre-Entry Purge

Which ONE of the following describes the effect on these monitors if a Containment Isolation Phase 'A' actuation occurs?

| | REM-3502A | REM-3502B |
|---|---|---|
| A. | remains in service | remains in service |
| B. | remains in service | is isolated |
| C✔ | is isolated | remains in service |
| D. | is isolated | is isolated |

**Feedback**

*Plausibility and Answer Analysis*

Reason answer is correct: *A Phase 'A' Containment Isolation signal will shut sample panel valves 1SP-916, 1SP-16, 1SP-918 and 1SP-939. When these valves are shut Radiation monitor REM-3502A will not have any flow. REM-3502B does not have isolation valves that receive a Phase A signal and will remain unisolated when a Phase A signal is generated.*

*A. Incorrect. Plausible since 3502B remains in service on a Phase A, but 3502A isolates.*

*B. Incorrect. Plausible since one of the monitors isolates on a Phase A, but it is 3502A.*

*C. Correct.*

*D. Incorrect. Plausible since 3502A isolates on a Phase A, but 3502B remains in service.*

**Notes**

2.3 Radiation Control

G2.3.15 Knowledge of radiation monitoring systems, such as fixed radiation monitors and alarms, portable survey instruments, personnel monitoring equipment, etc.

(CFR 41.12 / 43.4 / 45.9)

| | |
|---|---|
| Importance Rating: | 2.9 3.1 |
| Technical Reference: | PLP-116, Page 19, Rev. 56, Student Text Radiation Monitoring, Page 35 |
| References to be provided: | None |
| Learning Objective: | LP RMS Objective 6.b |
| Question Origin: | Bank, OIT Exam Bank, RMS (O6B) 2 |
| Comments: | None |
| Tier/Group: | T3 |

71. 2014 NRC RO 071/PREVIOUS/FUNDAMENTAL//PEP-330/NONE/2012 NRC RO-72/G2.3.4/
Which of the following completes the statements below?

In accordance with PEP-330, Radiological Consequences, the dose limit for ANY emergency activity NOT involving protecting valuable property or lifesaving activities is ___(1)___ .

The dose limit for Lifesaving activities is ___(2)___ .

A. (1) 2 rem

(2) 10 rem

B. (1) 2 rem

(2) 25 rem

C. (1) 5 rem

(2) 10 rem

D. ✔ (1) 5 rem

(2) 25 rem

**Feedback**

*Plausibility and Answer Analysis*

Reason answer is correct: Per PEP-330 Attachment 1, the annual limit for TEDE is 5 REM and the limit for life saving activities is 25 REM.

*A. Incorrect. Plausible because 2 REM is the Duke Energy dose limit per PD-RP-ALL-0001 for annual dose without an extension, and 10 REM is the PEP-330 limit for protecting valuable property.*

*B. Incorrect. Plausible because 2 REM is the Duke Energy dose limit per PD-RP-ALL-0001 for annual dose without an extension, and 25 REM is the correct value for life saving activities.*

*C. Incorrect. Plausible because 5 REM is the correct value for the annual limit for TEDE, and 10 REM is the PEP-330 limit for protecting valuable property.*

*D. Correct.*

**Notes**

2.3 Radiation Control

G2.3.4 Knowledge of radiation exposure limits under normal or emergency conditions. (CFR 41.12 / 43.4 / 45.10)

| | |
|---|---|
| Importance Rating: | 3.2 3.7 |
| Technical Reference: | PEP-330, Attachment 1, Page 17, Rev 12 |
| References to be provided: | None |
| Learning Objective: | Health Physics Administrative Guidelines and Procedures, PP3-7 Obj. 1.h & 1.a |
| Question Origin: | Previous 2012 NRC RO-72 radomly selected Bank OIT Exam Bank, PP-3.7 (01H) 1 |
| Comments: | None |
| Tier/Group: | T3 |

72. 2014 NRC RO 072/BANK/FUNDAMENTAL///NONE//G2.3.7/

With the unit at power, which ONE of the following tasks would require utilization of a Specific RWP in order for Operations to perform the activity?

A. Entry into a High Radiation Area on the 261' RAB to evaluate boric acid deposits

B. Entry into a Locked High Radiation Area to hang a clearance

C. ✔ Entry into Containment to inspect for RCS leakage in the PRZ cubicle.

D. Entry into an area with loose surface contamination at 2500 dpm/100cm$^2$ to perform a valve line-up

**Feedback**

*Plausibility and Answer Analysis*

Reason answer is correct: *SRWP is required for entry into the Containment bioshield with the Reactor critical.*

*A. Incorrect. Plausible since the equipment is located inside a HRA with ALARA concerns but SRWP is not required.*

*B. Incorrect. Plausible since the area is locked to prevent entry and a SRWP is required for entry for all except OPS and RP personnel.*

*C. Correct.*

*D. Incorrect. Plausible since the area would be posted as a loose surface contaminated area, but OPS and RP personnel are exempted from requiring a SWRP under these conditions.*

**Notes**

2.3 Radiation Control

G2.3.7 Ability to comply with radiation work permit requirements during normal or abnormal conditions.

(CFR 41.12 / 45.10)

| | |
|---|---|
| Importance Rating: | 3.5 3.6 |
| Technical Reference: | TE-RP-ALL-2000, Attachment 9, page 37, Rev. 0 |
| References to be provided: | None |
| Learning Objective: | PP-LP-3.7 Objective 4 |
| Question Origin: | Bank OIT Development, 2009B NRC RO 72 |
| Comments: | Meets KA by having applicant recognize that a Special RWP is reauired for the task above and beyond a General RWP. |
| Tier/Group: | T3 |

73. 2014 NRC RO 073/BANK/C/A//STEAM TABLES/NONE//G2.4.17/

Given the following plant conditions:

- Due to a small break LOCA the crew is implementing EOP-ES-1.2, Post LOCA Cooldown and Depressurization
- A cooldown to Cold Shutdown has been initiated
- The first CSIP was just secured

- RCS parameter response is as follows:

| Time | RCS Temperature (°F) | RCS Pressure (psig) | Subcooling (°F) |
|---|---|---|---|
| 1400 | 435 | 462 | 27 |
| 1402 | 433 | 460 | 29 |
| 1404 | 431 | 458 | 30 |
| 1406 | 429 | 456 | 32 |

In accordance with guidance provided by the EOP User's Guide, which ONE of the following completes the statement below concerning the RCS evaluation?

RCS pressure should be considered _____ .

A. STABLE because the RCS pressure drop is being controlled

B. ✔ STABLE because RCS subcooling is rising

C. LOWERING even though RCS subcooling is rising

D. LOWERING because the RCS pressure drop cannot be controlled

**Feedback**

*Plausibility and Answer Analysis*

Reason answer is correct: *RCS Pressure should be considered STABLE because RCS subcooling is increasing with an operator controlled cooldown in progress.*

*A. Incorrect. RCS Pressure should be considered STABLE because RCS subcooling is rising with an operator controlled cooldown in progress. No attempt to control RCS Pressure is made. Just because a controlled cooldown is in progress doesn't mean RCS Pressure is controlled.*

*B. Correct.*

*C. Incorrect. RCS Pressure is lowering but with an operator controlled cooldown in progress and subcooling increasing RCS Pressure should be considered stable.*

*D. Incorrect. RCS Pressure is lowering but with an operator controlled cooldown in progress and subcooling increasing RCS Pressure should be considered stable. No attempt has been made to control RCS Pressure. Just because RCS pressure is lowering during a controlled cooldown doesn't mean it is uncontrolled.*

**Notes**

2.4 Emergency Procedures / Plant

G2.4.17 Knowledge of EOP terms and definitions.

(CFR 41.10 / 45.13)

| | |
|---|---|
| Importance Rating: | 3.9 4.3 |
| Technical Reference: | EOP-Users Guide, Page 34 (Stable Pressure/Temperture), Rev. 41, steam tables |
| References to be provided: | None |
| Learning Objective: | LP-EOP-3.19, Obj. 4d |
| Question Origin: | Bank OIT Exam Bank, 2009A NRC RO 73 |
| Comments: | None |
| Tier/Group: | T3 |

74. 2014 NRC RO 074/BANK/FUNDAMENTAL//EOP-ES-1.1/NONE//G2.4.20/

Given the following plant conditions:
- The plant was operating at 100% power

Subsuquently:
- The crew performed a manual Reactor Trip and Safety Injection due to RCS leakage in excess of makeup capability
- The crew has transitioned to EOP-ES-1.1, SI Termination, and have secured one CSIP and realigned the CSIP discharge from the BIT to the normal Charging line

Concerning PRZ level control during these conditions, which ONE of the following completes the statement below?

EOP-ES-1.1 cautions that Charging flow must NOT exceed __(1)__ gpm to prevent __(2)__ .

A. (1) 120

(2) exceeding normal VCT makeup capability

B. (1) 120

(2) damage to the Regenerative Heat Exchanger

C. (1) 150

(2) exceeding normal VCT makeup capability

D. ✓ (1) 150

(2) damage to the Regenerative Heat Exchanger

**Feedback**

*Plausibility and Answer Analysis*

Reason answer is correct: *The caution in EOP-ES-1.1 prior to controlling Charging flow to maintain PRZ level warns the operator that Charging flow should NOT exceed 150 gpm to prevent damage to the regenerative heat exchanger.*

A. *Incorrect.* *The first part is plausible since 120 gpm is the normal makeup capability per the OP, however this is incorrect because the reactor is tripped and the RWST is now the suction source for the CSIPs. The second part is plausible since the normal operation of the CSIPs are limited by the Primary Makeup Sytems ability to make up to the VCT, however this is incorrect because the RWST is now the suction source for the CSIPs.*

B. *Incorrect.* *The first part is plausible since 120 gpm is the normal makeup capability per the OP, however this is incorrect because the reactor is tripped and the RWST is now the suction source for the CSIP. The second part is correct.*

C. *Incorrect.* *The first part is correct. The second part is plausible since the normal operation of the CSIPs are limited by the Primary Makeup Sytems ability to make up to the VCT, however this is incorrect because the RWST is now the suction source for the CSIPs.*

D. *Correct.*

**Notes**

2.4 Emergency Procedures / Plant

G2.4.20 Knowledge of the operational implications of EOP warnings, cautions, and notes.

(CFR: 41.10 / 43.5 / 45.13)

| | |
|---|---|
| Importance Rating: | 3.8 4.3 |
| Technical Reference: | EOP-ES-1.1 Caution prior to step 12, Rev. 0 |
| References to be provided: | None |
| Learning Objective: | EOP-LP-3.1 Objective 5 |
| Question Origin: | Bank, OIT Exam Bank EOP-3.1 (05) 1 |
| Comments: | K/A G2.4.37 HNP was unable to write an operationally valid question that is at the RO level. The K/A lends itself to being SRO level.<br><br>Replace with randomly selected K/A G2.4.39 by David Lanyi 9/08/2014<br><br>On 9/9/2014 HNP contacted David Lanyi and discussed that the replacement K/A G2.4.39 was on the rejected K/A list in 2009 and we are still unable to write a operationally valid RO question to this K/A. David Lanyi supplied another replacement K/A this time G2.4.20. |
| Tier/Group: | T3 |

75. 2014 NRC RO 075/BANK/C/A///NONE//G2.4.9/

Given the following plant conditions:
- The plant is operating in Mode 5
- The RCS is in solid plant operation
- Both Trains of RHR are aligned in the Shutdown Cooling Mode

Subsequently a large RCS leak has developed. Conditions are as follows:
- The crew has aligned flow through the BIT with 'A' CSIP in service as directed by AOP-020, Loss Of RCS Inventory Or Residual Heat Removal While Shutdown
- Core Exit Thermocouples continue to rise
- RCS water level continues to lower

Which ONE of the following is the action required by AOP-020 to mitigate the event?

A. Start the 'B' CSIP with flow through 1SI-3 and 1SI-4, BIT Outlet Valves

B. Start the 'B' CSIP with flow through 1SI-52, Alternate High Head SI to Cold Leg Valve

C. ✔ Align 'A' RHR Pump for Low Head SI with flow through 1SI-340, Low Head SI Train A to Cold Leg Valve

D. Align 'A' RHR Pump for Low Head SI with flow through 1SI-359, Low Head SI Trains to Hot Leg Valve

**Feedback**

*Plausibility and Answer Analysis*

Reason answer is correct: *Align one train of RHR for Low Head SI with flow through 1SI-340, Low Head SI Train A to Cold Leg Valve is directed in AOP-020.*

*A. Incorrect. Starting the second CSIP with flow through 1SI-3 and 1SI-4, BIT Outlet Valves would provide additional flow but only one CSIP is Operable in this mode.*

*B. Incorrect. Start the second CSIP with flow through 1SI-52, Alternate High Head SI to Cold Leg Valve would provide additional flow and this alignment is directed in EOP-ES-1.3 with two CSIPs but only one CSIP is Operable in this mode*

*C. Correct.*

*D. Incorrect. Align one train of RHR for Low Head SI is directed in AOP-020 but flow is through 1SI-340, Low Head SI Train A to Cold Leg Valve not 1SI-359. This alignment is used in EOP-ES-1.4*

**Notes**

2.4 Emergency Procedures / Plant

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.

(CFR 41.10 / 43.5 / 45.13)

| | |
|---|---|
| Importance Rating: | 3.8 4.2 |
| Technical Reference: | AOP-020 Rev. 38 Section 3.6, pages 61-64 |
| References to be provided: | None |
| Learning Objective: | LP-AOP-3.20, Obj. 2 |
| Question Origin: | Bank OIT Developement 2009A NRC RO 75 |
| Comments: | None |
| Tier/Group: | T3 |