

1. 007 EK2.03 001/BANK/SQN/HIGHER//RO/SEQUOYAH/1/2009/NO

Given the following plant conditions:

- Unit 2 was at 60% power when a reactor trip occurred as a result of an inadvertent Train "A" Feedwater Isolation Signal.
- After the plant was stabilized, the OATC observed the following on Annunciator Panel 2-XA-55-4D, "Reactor First Out":
 - LS-3-97B, "STM GEN LOOP 3 LEVEL LOW-LOW REACTOR TRIP" window lit and NOT flashing.
 - "P-9 TURBINE TRIP REACTOR TRIP" window flashing.

Which ONE of the following identifies the cause of the reactor trip and the status of the Reactor Trip First Out Panel?

- A. The reactor tripped due to the turbine trip;
The Reactor Trip First Out panel has been acknowledged, but NOT reset.
- B. The reactor tripped due to the turbine trip;
The Reactor Trip First Out panel has NOT been acknowledged and the SG Low-Low level window came in after the reactor trip occurred.
- C. The reactor tripped due to the SG low level;
The Reactor Trip First Out panel has been acknowledged, but NOT reset.
- D. The reactor tripped due to the SG low level;
The Reactor Trip First Out panel has been acknowledged and the P-9 Turbine Trip Reactor Trip window came in after the panel was acknowledged.

DISTRACTOR ANALYSIS:

- A. *Incorrect, The reactor did trip due to the turbine tripping but with the window flashing the first out annunciator has not been acknowledged. Plausible because the acknowledge function could be confused with the reset function.*
- B. *Correct, A feedwater isolation signal will cause a turbine trip and with the reactor power greater than 50% a turbine trip will cause a reactor trip. This results in the P-9 "Turbine Trip Reactor Trip" window flashing. Subsequent windows that come into alarm will come in solid lit and not flash.*
- C. *Incorrect, the reactor tripped from the turbine trip signal and the SG low-low level alarm came in after the trip. Plausible because a feedwater isolation would result in a reactor trip from low SG levels if the turbine did not get a direct trip signal from the feedwater isolation and if the first out panel was acknowledged the SG low level alarm window would solid lit.*
- D. *Incorrect, the reactor tripped from the turbine trip signal and the SG low-low level alarm came in after the trip. Plausible because a feedwater isolation would result in a reactor trip from low SG levels if the turbine did not get a direct trip signal from the feedwater isolation and acknowledgement of alarms on other annunciator panels would result in the acknowledged window being lit solid and subsequent alarms flashing.*

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Question Number: 1

Tier: 1 **Group** 1

K/A: 007 Reactor Trip - Stabilization
EK2.03 Knowledge of the interrelations between a reactor trip and the following:
Reactor trip status panel

Importance Rating: 3.5 / 3.6

10 CFR Part 55: 41.7

10CFR55.43.b: N/A

K/A Match: This question matches the K/A by having the candidate determine from the indication provided by the Reactor Trip first out panel what the cause of the reactor trip was and based on the information whether or not the alarm panel has been reset.

Technical Reference: TI-28 att 9
2-AR-M4-D

Proposed references to be provided: None

Learning Objective: OPT200ANN obj. B.4 e & f

Question Source:

New	<u> </u>
Modified Bank	<u> </u>
Bank	<u> X </u>

Question History: SQN bank question used on 1/2009 ILT exam

Comments:

1603 NRC RO Exam

2. 009 EK.2.03 302/NEW//LOWER//RO/SQN/03/2016/NO

Given the following plant conditions:

- Unit 2 is manually tripped from 100% power due to rapidly lowering PZR level and pressure.
- The crew has entered E-1, "Loss of Reactor or Secondary Coolant"
- The crew is directed to MAINTAIN Intact S/G narrow range levels.

Which ONE of the following completes the statement below?

S/G level is required for (1) events because heat removal by S/Gs (2).

- A. (1) SBLOCA
(2) ensures no core uncovery occurs
- B✓ (1) SBLOCA
(2) is needed during recovery to achieve Cold Shutdown
- C. (1) LBLOCA
(2) ensures no core uncovery occurs
- D. (1) LBLOCA
(2) is needed during recovery to achieve Cold Shutdown

DISTRACTOR ANALYSIS:

- A. *Incorrect, Plausible however Small Break LOCAs can result in core uncovery as well as Large Break LOCAs.*
- B. *Correct, Per Background for E-1, secondary heat sink is not required for Large Break LOCAs, secondary heat sink is required for Small Break LOCAs to achieve Cold Shutdown conditions due to limited SI flow and heat removals for some small break LOCAs.*
- C. *Incorrect, Plausible however Small Break LOCAs can result in core uncovery as well as Large Break LOCAs.*
- D. *Incorrect, Plausible since S/Gs are depressuized during the later stages of large break LOCA events however the S/Gs are needed for heat removal during the small break LOCA events to aid in core heat removal to achieve Cold Shutdown.*

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Question Number: 2

Tier: 1 **Group** 1

K/A: 009 Small Break LOCA
EK 2.03 Knowledge of the interrelations between the small break LOCA
and the following:
S/Gs

Importance Rating: 3.0 / 3.3*

10 CFR Part 55: 41.7

10CFR55.43.b: n/a

K/A Match: This question matches the K/A by having the candidate identify the relationship between S/G and RCS heat removal during the stabilization and recovery of the plant during a SBLOCA event.

Technical Reference: EPM-3-E-1 Basis document for E-1 Loss of Reactor or Secondary Coolant, Step 3, rev 7

Proposed references to be provided: None

Learning Objective: OPL271-E-1 obj. 5

Question Source:

New	<u> X </u>
Modified Bank	<u> </u>
Bank	<u> </u>

Question History: New question written for 1603 ILT exam

Comments:

1603 NRC RO Exam

3. 015 AK3.03 303/BANK/SQN/HIGHER//RO/SEQUOYAH/6/2009/NO

Given the following plant conditions:

- Unit 1 is operating at 100% power
- Subsequently an automatic reactor trip signal is generated
- An ATWS is in progress
- Reactor power is at 9% and lowering
- #2 RCP Lower Motor Bearing temp is 285°F and rising rapidly.

In accordance with FR-S.1, "Nuclear Power Generation/ATWS," which ONE of the following identifies when #2 RCP can be tripped and what is the basis?

- A. immediately to conserve secondary inventory
- B. Immediately to protect the pump for later use
- C. wait until below 5% reactor power to prevent fuel integrity challenge
- D. wait until below 5% reactor power to allow SG levels to be recovered prior to securing pump.

DISTRACTOR ANALYSIS:

- A. *Incorrect, Plausible since the normal trip criteria for #2 RCP has been exceeded and since the plant is below P-8 an RCP can trip without causing an automatic Rx trip, also since in FR-H.1, turning off the RCPs to conserve secondary heat sink is an action, the candidate could get these actions confused and think that tripping the RCP immediately would be appropriate.*
- B. *Incorrect, Plausible since the normal trip criteria for #2 RCP has been exceeded and since during FR-C.1 turning on RCPs one at time is a strategy to restore core cooling the candidate could get these actions confused and think that tripping the RCP immediately would be appropriate.*
- C. *Correct, Per EPM-3-FR-S.1, with reactor power greater than 5%, the RCPs are to remain running, the normal tripping criteria do not apply. This is in order to prevent a challenge to fuel integrity by losing forced flow while the reactor is remains in Mode 1 following a trip signal.*
- D. *Incorrect, Plausible since the first part is correct. Also plausible if the candidate recognizes that since only AFW is available and with Rx power greater than the capacity of AFW, that waiting until less than 5% would be correct to allow SG inventory to be recovered.*

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Question Number: 3

Tier: 1 **Group** 1

K/A: 015 RCP Malfunctions
AK3.03 Knowledge of the reasons for the following responses as they apply to the Reactor Coolant Pump Malfunctions (Loss of RC Flow) :
Sequence of events for manually tripping reactor and RCP as a result of an RCP malfunction.

Importance Rating: 3.7 / 4.0

10 CFR Part 55: 41.5, 41.10

10CFR55.43.b: N/A

K/A Match: This question matches the K/A by having the candidate determine the proper sequence of tripping RCPs when a Rx trip is has occurred however the reactor failed to trip (ATWAS). Also it requires the candidate to recall the reason for tripping (or not tripping) the #2 RCP following a reactor trip.

Technical Reference: EPM-3-FR-S.1

Proposed references to be provided: None

Learning Objective: OPL271ES02, Obj 2.b
OPL273C0524, Obj 5

Question Source:

New	<u> </u>
Modified Bank	<u> </u>
Bank	<u> X </u>

Question History: SQN bank question used on 2009 Retake exam (6/2009)

Comments: Reformatted the question stem and changed distractors to improve plausibility.

1603 NRC RO Exam

4. 022 AG2.2.4 104/NEW//LOWER//RO/SQN/03/2016/NO

Given the following plant conditions:

- Both Units are at 100% power
- The "B" BAT has been removed from service due to a leak
- The "C" BAT is being placed in service on Unit 2.
- The RWST boron concentration is 2600 ppm.

Which ONE of the following identifies both:

(1) the minimum allowable "C" BAT volume and boron concentration required by TRM 8.1.1 "Boration Systems - Operating,"

and

(2) the location that BAT "C" level indicator 0-LI-62-242, can be read?

REFERENCE PROVIDED

- A. (1) 9250 gals at 6650 ppm Boron
(2) 1-M-6 ONLY
- B✓ (1) 9500 gals at 6600 ppm Boron
(2) 1-M-6 ONLY
- C. (1) 9250 gals at 6650 ppm Boron
(2) 1-M-6 and 2-M-6
- D. (1) 9500 gals at 6600 ppm Boron
(2) 1-M-6 and 2-M-6

DISTRACTOR ANALYSIS:

- A. *Incorrect, Plausible if the candidate does not read the graph correctly for the required combination of boron concentration and level for the given RWST boron concentration. 9250 gals at 6650 ppm would be acceptable for a RWST boron of 2650 ppm but not for 2600 ppm. Also the second part is correct, the 0-LI-62-242, "C" BAT level indicator can only be read on 1-M-6 (Unit 1).*
- B. *Correct, The combination of boron concentration and level of 9500 gals at 6600 ppm would meet the requirements of TRM for a RWST boron concentration of 2600 ppm, as indicated by TRM Figure 3.1.2.6 Boric Acid Tank Limits based on RWST Boron Concentrations. Also the 0-LI-62-242, "C" BAT level indicator can only be read on 1-M-6 (Unit 1), even though the "C" BAT can be used on either unit.*
- C. *Incorrect, Plausible if the candidate does not read the graph correctly for the required combination of boron concentration and level for the given RWST boron concentration. 9250 gals at 6650 ppm would be acceptable for a RWST boron of 2650 ppm but not for 2600 ppm. Also plausible, since "C" BAT can be used for either CVCS system, it would be plausible that level could be read from either location, however C BAT level can only be read on Unit 1 control board.*
- D. *Incorrect, Plausible since the first part is correct. Also plausible, since "C" BAT can be used for either CVCS system, it would be plausible that level could be read from either location, however C BAT level can only be read on Unit 1 control board.*

1603 NRC RO Exam

Question Number: 4

Tier: 1 **Group** 1

K/A: 022 Loss of Reactor Coolant Makeup
AG2.2.4 (multi-unit license) Ability to explain the variations in control board/control room layouts, systems, instrumentation, and procedural actions between units at a facility.

Importance Rating: 3.6 / 3.6

10 CFR Part 55: 41.6, 41.7, 41.10

10CFR55.43.b: N/A

K/A Match: This question matches the K/A by having the operator recall the unit differences associated with a portion of CVCS (reactor coolant makeup).

Technical Reference: TRM figure 8.1.1
Main Control Board Layout.

Proposed references to be provided: TRM Figure 8.1.1, Boric Acid Tank Limits based on RWST Boron Concentration Rev 27

Learning Objective: OPT200.CVCS obj. 4.h

Question Source:

New	<u> X </u>
Modified Bank	<u> </u>
Bank	<u> </u>

Question History: New question written for 1603 ILT exam.

Comments:

1603 NRC RO Exam

5. 025 AK1.01 005/BANK/SQN/HIGHER//RO/SEQUOYAH/4/2007/NO

Given the following plant conditions:

- Unit 2 is in Mode 6.
- RCS drained to elevation 701 feet.
- RCS temperature is 110°F.
- Upper Internals are not installed.
- Core decay heat is approximately 5 MW.
- A total loss of RHR cooling has occurred.

Which ONE of the following identifies the amount of time it will take to reach 212°F in the RCS?

Reference Provided

- A. 30 minutes
- B. 36 minutes
- C. 49 minutes
- D. 347 minutes

DISTRACTOR ANALYSIS:

- A. *Incorrect, Plausible if the candidate uses the wrong equation from Appendix U. Equation 1 was used to determine this value.*
- B. *Incorrect, Plausible if the candidate uses the wrong equation from Appendix U. Equation 2 was used to determine this value.*
- C. *Correct, In accordance with 0-GO-15, the correct equation in Appendix U is equation #3. $Time = 2390 [(212 - 110)/5 \text{ mw}] = 49 \text{ min}$*
- D. *Incorrect, Plausible if the candidate uses the wrong equation from Appendix U. Equation 4 was used to determine this value.*

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Question Number: 5

Tier: 1 **Group** 1

K/A: 025 Loss of Residual Heat Removal (RHRS)
AK1.01 Knowledge of the operational implications of the following concepts as they apply to Loss of Residual Heat Removal System:
Loss of RHRS during all modes of operation.

Importance Rating: 3.9 / 4.3

10 CFR Part 55: 41.8, 41.10

10CFR55.43.b: n/a

K/A Match: This question matches the K/A by having the candidate determine the operational impact of a loss of RHR system as it effects the potential for the RCS water to rise to the temperature of boiling.

Technical Reference: 0-GO-15, App. U rev 39

Proposed references to be provided: 0-GO-15, Appendix U rev 39

Learning Objective: OPL271AOP-R.03, Obj 1
OPL271GO-15, Obj 16

Question Source:

New	<u> </u>
Modified Bank	<u> </u>
Bank	<u> X </u>

Question History: SQN bank question

Comments:

1603 NRC RO Exam

6. 026 AA2.01 006/NEW//HIGHER//RO/SEQUOYAH/03/ 2016/NO

Given the following plant conditions:

- Unit 1 is in Mode 3 for maintenance.
- One event occurs which results in all of the following annunciators:
 - "MISC EQUIP SUP HDR FLOW LOW," (M27B-B, A-3).
 - "LETDOWN HX OUTLET FLOW/TEMP ABNORMAL," (M27B-B, A-5)
 - "TS-62-78 LTDN HX OUTLET TO DEMIN TEMP HIGH," (M6C, A4)
 - "TURB AUX OR REAC BLDG FLOODED" (M15B, D3)

Which ONE of the following identifies the cause of these alarms?

A leak on the ____ .

A. charging header

B. letdown line

C. "A" train of CCS

D. ERCW header

DISTRACTOR ANALYSIS:

- A. *Incorrect, Plausible if the candidate does not recognize that the Letdown HX outlet flow/temp abnormal alarm is associated with CCS flow not letdown flow. Thus the alarmed conditions do not indicate a letdown heat exchanger tube failure, however if the candidate did think the a leak in letdown heat exchanger was the cause of the alarm, in accordance with AOP-M.09 step 7 if there is indications of a charging header leak/rupture the crew is directed to Dispatch personnel to identify and isolate rupture, thus entry into AOP-M.09 would be correct.*

- B. *Incorrect, Plausible if the candidate does not recognize that the Letdown HX outlet flow/temp abnormal alarm is associated with CCS flow, not letdown flow. The lack of Aux bldg rad monitor alarms could also be plausible if the leak was on the charging line (after the water had gone through the demineralizers and filters. Also if the candidate thinks that a leak has developed in the charging line, then going to AOP-R.05 for leak identification and isolation would be the appropriate procedure.*

- C. *Correct, At SQN the "A" CCS supply header supplies flow which cools the letdown heat exchanger. A rupture for the "A" train of CCS would cause both the Misc Equip Header flow low and the Letdown Hx outlet flow flow/temp abnormal alarm. The reduction in flow through the "A" CCS header would require the crew to implement AOP-M.03 sect 2.3 to mitigate this condition.*

- D. *Incorrect, Plausible if the candidate determines that the indications are that of an ERCW rupture due to the sump alarm and thus would go to AOP-M.01. However the sump alarm would also come in if there was a CCS leak. This alarm along with the others provided would indicate a CCS leak not a ERCW leak.*

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Question Number: 6

Tier: 1 **Group** 1

K/A: 026 Loss of Component Cooling Water (CCWS)
AA2.01 Ability to determine and interpret the following as they apply to the
Loss of Component Cooling Water:
Location of a leak in the CCWS .

Importance Rating: 2.9 / 3.5

10 CFR Part 55: 41.10

10CFR55.43.b: 5

K/A Match: This question matches the K/A by having the candidate review the alarms presented in the stem and prioritize the alarms to determine the correct course of action to take. SRO by having the candidate assess plant conditions and select the appropriate procedure or sect of the procedure that will correct or mitigate the event.

Technical Reference: AOP-M.03 rev 17
AR-M27B-B-A3
AR-M27B-B-A5
AR-M6C-A4

Proposed references to be provided: None

Learning Objective: OPT200.CCS obj.5 t & v; obj. 11.
OPL271AOP.M-03 obj. 2, 4, 14

Question Source:

New X
Modified Bank _____
Bank _____

Question History: New question written for 1603 ILT exam

Comments:

1603 NRC RO Exam

7. 027 AG2.1.7 107/BANK/SQN/HIGHER//RO/SEQUOYAH/AUDIT 02/2010/NO

Given the following plant conditions:

- Unit 2 is operating at 100% power.
- A failure of the controlling input to the Pressurizer Pressure Master Controller caused actual pressurizer pressure to increase to 2273 psig.
- The Pressurizer Pressure Master Controller, PIC-68-340A, has been placed in MANUAL.

WHICH ONE of the following describes the action required to return pressure to 2235 psig?

- A✓ Raise the master controller output
- B. Lower the master controller output
- C. Raise the controller pressure setpoint adjustment
- D. Lower the controller pressure setpoint adjustment

DISTRACTOR ANALYSIS:

- A. *Correct, Increasing the master controller output will cause PZR spray valves to open to lower pressure.*
- B. *Incorrect, Plausible however decreasing the master controller output will cause the spray valves to close and the heaters to come on, raising pressure.*
- C. *Incorrect, Plausible, if the candidate does not recall the operation of the controller, adjusting the setpoint pressure has no effect with the controller in manual.*
- D. *Incorrect, Plausible, if the candidate does not recall the operation of the controller, adjusting the setpoint pressure has no effect with the controller in manual.*

Requirement to lower pressure is same as pressure deviation for spray operation, except it must be done manually. In auto, the input would have to be 25 - 50 psig above the setpoint to induce spray. In manual, the input is manually lowered to energize heaters, or raised to de-energize heaters or open spray valves.

1603 NRC RO Exam

Question Number: 7

Tier: 1 **Group** 1

K/A: 027 Pressurizer Pressure Control System (PZR PCS) Malfunction
AG2.1.7 Ability to evaluate plant performance and make operational judgements based on operating characteristics, reactor behavior, and instrument interpretation.

Importance Rating: 4.4 / 4.7

10 CFR Part 55: 41.5

10CFR55.43.b: n/a

K/A Match: This question matches the K/A by having the candidate determine the effect of a failure of master pressure controller and the action necessary to gain control of RCS pressure.

Technical Reference: AOP-I.04,

Proposed references to be provided: None

Learning Objective: OPL271AOP-I.04 Objective 3

Question Source:

New	<u> </u>
Modified Bank	<u> </u>
Bank	<u> X </u>

Question History: SQN 07 Audit question 027 AK2.03 001

Comments:

1603 NRC RO Exam

8. 029 EK2.06 008/BANK/SQN/HIGHER//RO/SEQUOYAH/2/2010/NO

Given the following plant conditions:

- Unit 1 is at 100% power
- SSPS testing in progress
- RTA and BYB Reactor Trip Breakers are shut
- Reactor Trip Breaker "B" is open
- Subsequently, a transient occurs that requires a reactor trip but the reactor fails to trip from the trip switch.

Which ONE of the following completes the statements below?

The RTA & BYB 125V dc trip coils failed to (1) .

If only BYB is opened locally, the reactor (2) trip.

- A✓ (1) energize
(2) will
- B. (1) energize
(2) will **NOT**
- C. (1) de-energize
(2) will
- D. (1) de-energize
(2) will **NOT**

DISTRACTOR ANALYSIS:

- A. *Correct, the shunt trip coils should be energized from the reactor trip hand switches (and from the SSPS for the reactor trip breaker) and if this did not occur then one of the two breaker trip devices would not function, thus contributing to the ATWS along with whatever caused the UV coil on the breakers to also fail to trip the breakers. Opening either one of the breakers would cause the reactor to trip.*

- B. *Incorrect, The failure to energize the reactor trip breaker shunt coils contributing to the reactor failing to trip is correct but both breakers do not have to be open to cause a reactor trip, only one has to be opened. Plausible because the failure to energize the shunt coils is correct and the breakers scheme could be mistaken to be in parallel instead of series because there is a bypass breaker in parallel with each reactor trip breaker*

- C. *Incorrect, The the reactor trip switch actuation (and SSPS signal for RTA) energizes the shunt trip coils to cause a trip, so the failure would be to energize not failure to de-energize and the reactor would trip when either breaker was opened. Plausible because the failure to deenergize the coils would be correct concerning the undervoltage coils and the reactor tripping after either of the breakers opening is correct.*

- D. *Incorrect, The the reactor trip switch actuation (and SSPS signal for RTA) energizes the shunt trip coils to cause a trip, so the failure would be to energize not failure to de-energize and the reactor trip would not required both breakers to be open. It would trip when either breaker was opened. Plausible because the failure to deenergize the coils would be correct concerning the undervoltage coils and the breakers scheme could be mistaken to be in parallel instead of series because there is a bypass breaker in parallel with each reactor trip breaker*

1603 NRC RO Exam

Question Number: 8

Tier: 1 **Group** 1

K/A: 029 Anticipated Transient Without Scram (ATWS)
EK2.06 Knowledge of the interrelations between the and the following an ATWS:
Breakers, relays, and disconnects

Importance Rating: 2.9* / 3.1*

10 CFR Part 55: 41.7 / 45.7

10CFR55.43.b: Not applicable

K/A Match: Applicant is required demonstrate the knowledge of how the reactor trip breakers and relays that control their operation are related to the reactor trip system if malfunctions occur and actions required to disconnect the power to control rods locally during an ATWS event.

Technical Reference: 1,2-45N699-1 R10
1,2-47w611-99-1 R11

Proposed references to be provided: None

Learning Objective: OPT200RPS
3. Explain the purpose/function of each major component in the flow path of the Reactor Protection & Engineered Safety Features Actuation Systems as illustrated on a simplified system drawing.
4. Describe the following characteristics of each major component in the Reactor Protection & Engineered Safety Features Actuation Systems:
c. Support equipment and systems
5. Describe the operation of the Reactor Protection and Engineered Safety Features Actuation Systems:
e. How a support system failure will affect system operation.

Question Source:
New _____
Modified Bank _____
Bank X

Question History: SQN bank question E-0-B.0 001modified and modeled on question used on Diablo Canyon 2007 exam

Comments:

1603 NRC RO Exam

9. 054 AA1.04 009/BANK/WBN/HIGHER//RO/SEQUOYAH/03/2016/NO

Given the following plant conditions:

- Unit 1 tripped from 100% power due to a loss of all main feedwater
- 6.9 kV Shutdown Board 1A-A is deenergized and cannot be reenergized
- The 1B-B charging pump is out of service for motor bearing replacement
- All S/G NR levels are 5% and lowering
- RCS pressure is 2235 psig and stable
- The crew has not been able to establish AFW flow per E-0, "Reactor Trip or Safety Injection"
- The SRO has just announced that the Heat Sink status tree is Red

Which ONE of the following identifies the action(s) the crew will take to establish RCS cooling after entering FR-H.1, "Loss of Secondary Heat Sink?"

- A. Establish flow to at least one S/G using a MFW pump
- B. Depressurize at least one S/G and align HPFP to the depressurized S/G(s)
- C. Establish RCS feed and bleed using the 1B-B SI pump and both PZR PORVs
- D. Depressurize at least one S/G and establish condensate flow to the depressurized S/G(s)

DISTRACTOR ANALYSIS:

- A. *Incorrect, RCS feed and bleed is required due to no running charging pumps. Plausible because S/G levels and RCS pressure do not meet feed and bleed criteria. Also plausible if applicant believes one SI pump is not sufficient for RCS feed (step 19 RNO). Implementing RCS feed and bleed (Step 17) at Step 3 bypasses the step to use the standby MFW pump (step 10).*
- B. *Incorrect, Plausible because this action appears in the RNO column when an adequate RCS bleed path cannot be established.*
- C. *Correct, With no charging pumps running, RCS feed and bleed is required. With no charging pumps running and bus 1A-A deenergized, the RCS feed path will be via the 1B-B SI pump. Injection will not occur until RCS pressure is less than SI pump shutoff head.*
- D. *Incorrect, Plausible because this action would be performed if feed and bleed criteria were not met and both AFW and MFW could not be restored. This step (step 15) is bypassed when bleed and feed (step 17) is initiated at step 3.*

1603 NRC RO Exam

Question Number: 9

Tier: 1 **Group** 1

K/A: 054 Loss of Main Feedwater (MFW)
AA1.04 Ability to operate and/or monitor the following as they apply to the
Loss of Main Feedwater (MFW):
HPI, under total feedwater loss conditions.

Importance Rating: 4.4 / 4.5

10 CFR Part 55: 41.7

10CFR55.43.b: N/A

K/A Match: This question matches the K/A by having the candidate determine the operational lineup of HPI necessary to maintain core cooling during a condition where a loss of main feedwater has resulted in a loss of secondary heat sink.

Technical Reference: FR-H.1 rev 20

Proposed references to be provided: None

Learning Objective: OPL271.FR-H.1 obj

Question Source:

New	<u> </u>
Modified Bank	<u> </u>
Bank	<u> X </u>

Question History: WBN bank question

Comments:

1603 NRC RO Exam

10. 055 EA1.07 110/NEW//HIGHER//RO/SEQUOYAH/03/2016/NO

Given the following plant conditions:

- Unit 1 was operating at 100% power when a loss of all 161kv and 500kv lines occurred.
- Both 1A-A and 1B-B D/Gs failed to automatically and manually start.
- The operating crew is responding in accordance with ECA-0.0, "Loss of All AC Power"
- Subsequently off-site power has been restored to the Start Bus 1A and 1B
- Neither shutdown board is re-energized.
- The following indications are observed:
 - All 480 V transformer breaker indicating lights for XFMR 1A-A, XFMR 1A1-A and XFMR 1A2-A all indicate RED
 - All 480 V Transformer breaker indicating lights for XFMR 1B-B, XFMR 1B1-B and XFMR 1B2-B all indicate GREEN

In accordance with ECA-0.0, which ONE of the following identifies the 6.9KV shutdown board(s) that is/are to be energized?

- A✓ 6.9KV Shutdown BD 1A-A, ONLY
- B. 6.9KV Shutdown BD 1B-B, ONLY
- C. Both
- D. Neither, until TSC evaluation

DISTRACTOR ANALYSIS:

- A. *Correct, In accordance with ECA-0.0 when re-energizing a shutdown board if a differential relay has actuated then that bus is not to be re-energized until the cause has been determined and corrected. As given in the stem, with the 480V XFMR breaker lights for the 1B-B, 1B1-B and 1B2-B lights all GREEN it would indicate that those breakers are all open which is not normal for a loss of power but would indicate that a differential fault has occurred on bus 6.9KV BD 1B-B. Thus only the 6.9KV BD 1A-A is to be energized.*
- B. *Incorrect, Plausible if the candidate gets the indications for the 480 V feeder breakers confused and thinks that GREEN would be the expected indications and RED would not be normal indications.*
- C. *Incorrect, Plausible if the candidate does not recall the requirement of ECA-0.0 that a bus with a differential lockout should not be re-energized until the cause is determined and corrected. Thus both could be right.*
- D. *Incorrect, Plausible if the candidate thinks that neither bus should be energized since there is conflicting information and since bus 1A-A did not automatically energize when power was restored. But per ECA-0.0 direction the crew is to manually energize any 6.9KV bus that does not have a differential fault.*

1603 NRC RO Exam

Question Number: 10

Tier: 1 **Group** 1

K/A: 055 Loss of Offsite and Onsite Power (Station Blackout)
EA1.07 Ability to operate and monitor the following as they apply to a
Station Blackout:
Restoration of power from offsite

Importance Rating: 4.3 /4.5

10 CFR Part 55: 41.7

10CFR55.43.b: n/a

K/A Match: K/A is matched because the question requires the ability to monitor conditions to enable the crew to know which buses should be and should not be re-energized when offsite power as been restored to the site.

Technical Reference: ECA-0.0, Loss of All AC Power, Revision 0027

Proposed references to be provided: None

Learning Objective: OPL271.ECA-0.0

Cognitive Level:

Higher X
Lower _____

Question Source:

New X
Modified Bank _____
Bank _____

Question History: New question for the 1603 ILT Exam

Comments:

1603 NRC RO Exam

11. 057 AA2.20 311/NEW//HIGHER//RO/SEQUOYAH/03/2016/NO

Given the following plant conditons:

- Unit 1 is operating at 100% power.
- A Loss of Vital Instrument Power Board 1-1 has occurred.
- The Unit has been **tripped** and control of AFW to loops 1 and 2 is required.

Which ONE of the following identifies the required actions to control AFW to loops 1 and 2 after the loss of 120V AC Vital Instrument Power Board 1-I?

___(1)___ the 1A-A MD AFW pump.

Accident Reset ___(2)___ to be depressed to open loops 1 and 2 MDAFW **bypass** valves.

- A. (1) Manually start
(2) is required
- B. (1) Manually start
(2) is **NOT** required
- C✓ (1) Verify AMSAC started
(2) is required
- D. (1) Verify AMSAC started
(2) is **NOT** required

DISTRACTOR ANALYSIS:

- A. *Incorrect, Plausible since the first part is correct. Also plausible if the candidate does not recall that the MDAFW LCVs for SG 1 & 2 cannot be controlled by their controller in the main control room.*
- B. *Incorrect, Plausible if the candidate does recalls that a failure of VIPB 1-1, affects the auto-starts of MDAFW pump 1A, however the auto-start from AMSAC will still cause an auto-start (after a short time delay. Also plausible if the candidate does not recall that MDAFW LCVs will also be affected. They cannot be controlled from the control room.*
- C. *Correct, In accordance with AOP-P.03, Appendix A AMSAC will start 1A-A MDAFW pump (should actuate after trip from 100% power after a short time delay). The operators cannot close or modulate loop 1 or 2 MDAFW LCVs from their controllers. If necessary the MDAFW pump will be stopped and started to control SG level.*
- D. *Incorrect, Plausible if the candidate does recalls that a failure of VIPB 1-1, affects the auto-starts of MDAFW pump 1A, however the auto-start from AMSAC will still cause an auto-start (after a short time delay. Also plausible since the second part is correct.*

1603 NRC RO Exam

Question Number: 11

Tier: 1 **Group** 1

K/A: 057 Loss of Vital AC Instrument Bus
AA2.20 Ability to determine and interpret the following as they apply to the
Loss of Vital AC Instrument Bus:
Interlocks in effect on loss of Vital AC Instrument Bus that must be
bypassed to restore normal equipment operation.

Importance Rating: 3.6 / 3.9

10 CFR Part 55: 41.10

10CFR55.43.b: 5

K/A Match: This question matches the K/A by having the candidate recall an
interlock for the control of AFW LCVs that will not function during a
loss of vital instrument bus failure and the compensatory actions
needed to control the plant equipment.

Technical Reference: AOP-P.03 rev 28

**Proposed references
to be provided:** None

Learning Objective: OPL271AOP-P.03, obj.

Question Source:

New	<u> X </u>
Modified Bank	<u> </u>
Bank	<u> </u>

Question History: New question for 1603 ILT exam

Comments:

1603 NRC RO Exam

12. 058 AA1.02 012/BANK/SQN/LOWER//RO/SEQUOYAH/1/2008/NO

Which ONE of the following identifies the transfer scheme associated with 120VAC Vital Inverters Static Switch?

If Inverter <u>fails</u>	Transfer back <u>to Inverter</u>
A. AUTOMATICALLY transfers to the isolimiter	Must be MANUALLY transferred back after inverter output voltage returns to normal
B✓ AUTOMATICALLY transfers to the isolimiter	AUTOMATICALLY transfers back after a time delay if inverter output voltage returns to normal
C. Must be MANUALLY transferred to the isolimiter	Must be MANUALLY transferred back after inverter output voltage returns to normal
D. Must be MANUALLY transferred to the isolimiter	AUTOMATICALLY transfers back after a time delay if inverter output voltage returns to normal

DISTRACTOR ANALYSIS:

- A. *Incorrect, Plausible since the first part is correct. Also plausible for the candidate to think that the inverter would be manually transferred back when the problem has been corrected.*
- B. *Correct, In accordance with 0-SO-250-2, Precaution G, " the static switch on the vital inverters will automatically transfer from the inverter to the isolimiter if a failure occurs. The Auto Retransfer feature on the Vital Inverters Static Switch will automatically return to the "inverter to load" position following a 10 sec time delay if inverter output voltage returns to normal.*
- C. *Incorrect, Plausible since there problems that develop that would require the operators to transfer the static switch manually. Also plausible for the candidate to think that the inverter would be manually transferred back when the problem has been corrected.*
- D. *Incorrect, Plausible since there problems that develop that would require the operators to transfer the static switch manually. Also plausible for the candidate to think that the inverter would transfer back to the preferred souce when conditions have bee corrected.*

1603 NRC RO Exam

Question Number: 12

Tier: 1 **Group** 1

K/A: 058 Loss of DC Power
AA1.02 Ability to operate and/or monitor the following as they apply to the Loss of DC Power:
Static inverter dc input breaker, frequency meter, ac output breaker, and ground fault detector.

Importance Rating: 3.1* / 3.1

10 CFR Part 55: 41.7

10CFR55.43.b: n/a

K/A Match: This question matches the K/A having the candidate identify how the static inverter supply breaker responds to a loss of power and then a restoration of power to the inverter.

Technical Reference: 0-SO-250-2, 120 Volt AC Vital Instrument Power System, precaution G, rev 57

Proposed references to be provided: None

Learning Objective: OPT200.AC120V obj. 7.a

Question Source:

New	<u> </u>
Modified Bank	<u> </u>
Bank	<u> X </u>

Question History: SQN bank question

Comments:

1603 NRC RO Exam

13. 062 AG2.4.47 013/BANK/SQN/HIGHER//RO/SEQUOYAH/13/05/NO

Given the following plant conditions:

- Both Units are at 100% power.
- ERCW is in normal alignment.
- Subsequently: ERCW header 1A & 2A start indicating LOW flow.
- The following MCR alarms are LIT:

MECH EQUIP SUMP LVL HI (1-M-15A, B-6)
UNIT 1 HEADER A PRESSURE LOW (0-M-27A, A-1)
UNIT 2 HEADER A PRESSURE LOW (0-M-27A, B-3)

- NO OTHER alarms are lit associated with the ERCW system.

Which ONE of the following ERCW conditions accounts for the above indications?

- A. Supply header 1A/2A has ruptured in the Yard Area.
- B. A discharge header has ruptured in the Yard Area.
- C. ✓ A rupture has occurred upstream of the 2A strainer.
- D. A rupture has occurred in the CCW Intake Pumping Station.

DISTRACTOR ANALYSIS:

- A. *Incorrect, Plausible since these would also be indications of a supply header rupture, however there would be High system flow associated with this failure not Low flow.*
- B. *Incorrect, Plausible since a pipe rupture would cause system pressure to do down, but a rupture is this location would be accompanied with high system flow, not low flow.*
- C. *Correct, The diagnostic section (Section 2.1) of AOP-M.01, "Loss of ERCW," uses the annunciators and indications listed in the stem to indicate that a supply header has ruptured upstream of a train A supply strainer. Since both Unit 1 and Unit 2 supply headers are cross connected upstream of the strainers a leak or rupture on one strainer will affect the other train.*
- D. *Incorrect, Plausible since a pipe rupture would cause system pressure to do down, but a rupture is this location would be accompanied with high system flow, not low flow. The main ERCW headers go right through the CCW pumping station.*

1603 NRC RO Exam

Question Number: 13

Tier: 1 **Group** 1

K/A: 062 Loss of Nuclear Service Water
AG2.4.47 Ability to diagnose and recognize trends in an accurate and timely manner utilizing the appropriate control room reference material.

Importance Rating: 4.2 / 4.2

10 CFR Part 55: 41.10

10CFR55.43.b: Not applicable

K/A Match: Questions matches the K/A by requiring the candidate to interpret the indications presented and determine the location the a leak in the SWS (ERCW).

Technical Reference: AOP-M.01, Loss of ERCW, Revision 28
1,2-47W845-5 rev 55
1-AR-M15-A R33
0-AR-M27-A R20

Proposed references to be provided: None

Learning Objective: OPL271.AOP-M.01
#3 Given a set of initial plant conditions, determine initial operator response to stabilize the plant.

Question Source:

New	<u> </u>
Modified Bank	<u> </u>
Bank	<u> X </u>

Question History: SQN bank question. Was new question for the SQN 05/2013 NRC exam.

Comments:

1603 NRC RO Exam

14. 065 AA2.07 014/BANK/SQN/LOWER//RO/SQN/1311/NO

Given the following plant conditions:

- Unit 1 has experienced a station blackout.
- The crew is responding in accordance with ECA-0.0, "Loss of All AC Power".

Which ONE of the following completes the statement below?

The reason for the Turbine Driven AFW Pump LCV's backup air supply is to allow the LCVs to be ____ (1) ____ and the backup air supply will ____ (2) ____.

- A. (1) OPENED
(2) require manual alignment locally when needed
- B. (1) OPENED
(2) automatically be supplied when air pressure drops below regulator setpoint
- C. (1) CLOSED
(2) require manual alignment locally when needed
- D. (1) CLOSED
(2) automatically be supplied when air pressure drops below regulator setpoint

DISTRACTOR ANALYSIS:

- A. *Incorrect, the backup supply is to allow the valves to be closed, not opened, during a station blackout where the normal air is lost. The manual alignment of the supply is correct. Plausible because other AFW LCVs do fail closed and the manual alignment is required to use the backup supply.*
- B. *Incorrect, the backup supply is to allow the valves to be closed, not opened, during a station blackout where the normal air is lost and while there is a regulator, the backup supply is not automatically until it is manually aligned. Plausible because other AFW LCVs do fail closed and there are regulators to maintain pressure to the LCVs at 75 psig when using the backup supply.*
- C. **CORRECT**, *the backup supply is from high pressure air cylinders that allow the valves to be closed a limited number of times after the normal air pressure is lost during a station blackout and its use requires manual valve alignment in accordance with EA-3-4, Local Alignment of TD AFW LCV Backup Air Supply.*
- D. *Incorrect, the backup supply is to allow the valves to be closed during a station blackout where the normal air is lost but it requires a manual valve to be opened to enable its use. Plausible because its purpose is to allow the valve to be closed and there are regulators to maintain pressure to the LCVs at 75 psig when using the backup supply*

1603 NRC RO Exam

Question Number: 14

Tier: 1 **Group** 1

K/A: 065 Loss of Instrument Air
AA2.07 Ability to determine and interpret the following as they apply to
Loss of Loss of Instrument Air:
Whether backup air supply is controlling valve position.

Importance Rating: 2.8* / 3.2*

10 CFR Part 55: 41.7

10CFR55.43.b: Not applicable

K/A Match: Question matches the K/A because it test applicants knowledge of
the reason that a backup air supply is needed for TDAFW Pump
LCVS during a station blackout.

Technical Reference: ECA-0.0, Loss of ALL AC" R25
EA-3-4, Local Alignment of TD AFW LCV Backup
Supply, R4

**Proposed references
to be provided:** None

Learning Objective: OPT200.AFW #14
Given specific plant conditions, ANALYZE the effect taht
a loss or malfunctioni of the following will have on the
AFW system:
b. Control air

Question Source:

New	<u>X</u>
Modified Bank	<u> </u>
Bank	<u>X?</u>

Question History: (may new Question for 1603 depending on how much
change needs to be done)
SQN ILT NRC Exam 0109, SQN ILT 1311 NRC Exam

Comments: Original question from 1311 ILT exam

1603 NRC RO Exam

15. W/E04 EK1.2 215/BANK/SQN/LOWER//RO/SEQUOYAH/1/2008/NO

Given the following plant conditions:

- Unit 1 is operating at 100% power
- Subsequently, a Loss Of Coolant Accident (LOCA) outside containment has resulted in RCS Subcooling dropping to 0°F.
- The crew has transitioned to ECA-1.2, "LOCA Outside Containment."
- Actions are being taken to isolate the leak.

In accordance with ECA-1.2, which ONE of the following:

(1) is the initial mitigating strategy

and

(2) what would be the indication used to confirm the LOCA has been isolated?

- A. (1) Ensure RHR suction from RCS Isolated
(2) Pressurizer level rising
- B✓ (1) Ensure RHR suction from RCS Isolated
(2) RCS pressure rising
- C. (1) Isolate RHR Cold Leg Injection
(2) Pressurizer level rising
- D. (1) Isolate RHR Cold Leg Injection
(2) RCS pressure rising

DISTRACTOR ANALYSIS:

- A. *Incorrect; Plausible if student remembers that the initial strategy of ECA-1.2 is to Ensure RHR suction isolation from the RCS but does not remember that the indication is RCS pressure increasing. Pressurizer level rising is plausible since the student could reason that it may be rising if the leak was isolated. The procedure directs the use of RCS pressure increasing as the method used to indicate the leak has been isolated.*
- B. *Correct; The procedure directs the initial strategy of ensuring RHR suction isolation from the RCS and the use of RCS pressure increasing as the method to indicate the leak has been isolated.*
- C. *Incorrect; Plausible because isolation of RHR Cold Leg injection is a strategy contained in the procedure but it is not the initial mitigating strategy. Pressurizer level rising is a plausible indication since the student could reason that it may be rising if the leak was isolated. The procedure directs the use of RCS pressure increasing as the method used to indicate the leak has been isolated.*
- D. *Incorrect; Plausible because isolation of RHR Cold Leg injection is a strategy contained in the procedure but it is not the initial mitigating strategy. The procedure directs the use of RCS pressure increasing as the method used to indicate the leak has been isolated.*

1603 NRC RO Exam

Question Number: 15

Tier: 1 **Group** 1

K/A: W/E04 LOCA Outside Containment
EK1.2 Knowledge of the operational implications of the following concepts as they apply to LOCA Outside Containment:
Normal, abnormal, and emergency operating procedures associated with (LOCA Outside Containment).

Importance Rating: 3.5 / 4.2

10 CFR Part 55: 41.8 , 41.10

10CFR55.43.b: n/a

K/A Match: This question matches the K/A by having the candidate recall the AOP procedural guidance for isolating a LOCA outside containment and the indications used to verify that the leak was isolated.

Technical Reference: ECA-1.2 Rev 10
EPM-3-ECA-1.2 Rev 2

Proposed references to be provided: None

Learning Objective: OLP271ECA-1.2

Question Source:

New	<u> </u>
Modified Bank	<u> </u>
Bank	<u> X </u>

Question History: SQB bank question, Question modified from a combination of ECA-1.2-B.1.A 001 and question from Diablo Canyon 1999

Comments:

1603 NRC RO Exam

16. W/E11 EK3.2 016/BANK/SQN/LOWER//RO/SEQUOYAH/12/2012/NO

Given the following plant conditions:

- A LOCA has occurred on Unit 1.
- The crew is implementing ECA-1.1, "Loss of RHR Sump Recirculation."

Which ONE of the following completes the statement below in accordance with EPM-3-ECA-1.1, "Basis Document for ECA-1.1 Loss of RHR Sump Recirculation?"

Initiation of RCS cooldown to Cold Shutdown will be performed (1) RCS depressurization

AND

the reason for the RCS depressurization is (2) .

 (1)

 (2)

- A✓ before to reduce the break flow
- B. before to refill the pressurizer
- C. after to reduce the break flow
- D. after to refill the pressurizer

DISTRACTOR ANALYSIS:

- A. *Correct, In accordance with EPM-3-ECA-1.1, initiating a RCS cooldown at 100°F/hr is performed at step 15 to start cooling the RCS and the Rx vessel head before the RCS is depressurized. The cooldown rate is limited to minimize the thermal shock of the Rx vessel. Also the RCS depressurization is to reduce RCS leakrate and maximize the time until the RWST is depleted, since CNMT recirculation is not available.*
- B. *Incorrect, Plausible because the first part is correct, also plausible since in other EOPs the RCS is depressurized to refill the PZR to re-establish normal RCS pressure control.*
- C. *Incorrect, Plausible if the operators think that depressurizing the RCS to limit the break flow is of high priority than cooldown the RCS. Also the second part is correct, the RCS is depressurized to limit RCS break flow to maximize the time until the RWST is depleted.*
- D. *Incorrect, Plausible if the operators think that depressurizing the RCS to limit the break flow is of high priority than cooldown the RCS. Also there are other EOPs that will have the operators depressurize the RCS to refill the PZR to establish normal RCS pressure control.*

1603 NRC RO Exam

Question Number: 16

Tier: 1 **Group** 1

K/A: W/E11 Loss of Emergency Coolant Recirculation
EK3.2 Knowledge of the reasons for the following responses as they apply to the (Loss of Emergency Coolant Recirculation):
Normal, abnormal and emergency operating procedures associated with (Loss of Emergency Coolant Recirculation)

Importance Rating: 3.5 / 3.9

10 CFR Part 55: 41.5 / 41.10

10CFR55.43.b: not applicable

K/A Match: Question requires knowledge of the reason for the action performed first when entering the Loss of Emergency Coolant Recirculation procedure.

Technical Reference: EPM-3-ECA-1.1, Basis Document for ECA-1.1 Loss of ECCS Sump Recirculation, Revision 5
WOG ECA-1.1 Background

Proposed references to be provided: None

Learning Objective: OPL271ECA-1.1
4. Summarize the mitigating strategy for ECA-1.1.

Question Source:

New	<u> </u>
Modified Bank	<u> </u>
Bank	<u> X </u>

Question History: SQN bank question W/E11 G2.4.6 018 with wording changes and correct answer relocated., SQN ILT 1211, SQN ILT 1311 Audit

Comments: Shuffled answers for SQN ILT 1311 Audit

1603 NRC RO Exam

17. W/E05 EK1.1 017/BANK MOD/SQN/HIGHER//RO/SEQUOYAH/09/2010/NO

Given the following plant conditions:

- Unit 2 is at 100% power.
- The TDAFW Pump is tagged out of service.
- A Loss of Feedwater causes a reactor trip.
- Coincident with the trip, 6.9KV Shutdown Board 2A-A de-energizes on fault.

Which ONE of the following identifies the SGs that will receive AFW flow and the expected flow rate to those SGs?

- A. 1 and 2 SGs being fed at 220 GPM each
- B. 1 and 2 SGs being fed at 440 GPM each
- C. 3 and 4 SGs being fed at 220 GPM each
- D. 3 and 4 SGs being fed at 440 GPM each

DISTRACTOR ANALYSIS:

- A. *Incorrect, Plausible if candidate does not remember that only the B MDAFW would be aligned to only 2 SGs, not all 4 SGs. With a capacity of 440 gpm and aligned to all 4 SGs, this would be 110 gpm each. Also the A MDAFW pump does not have power.*
- B. *Incorrect, Plausible if the candidate does not remember that only the B MDAFW pump would have power, also the capacity listed is the total capacity of B MDAFW not the flow available for each SG.*
- C. *Correct, On a loss of 2A-A SD Board, Only B MDAFW Pump is available. Capacity is 440 GPM, and it is aligned to automatically feed #3 and #4 SGs, only. Distractors are for TDAFW capacity and flow alignments*
- D. *Incorrect, Plausible since this would be the alignment if the TDAFW Pump (capacity of 880 gpm) was the only operating pump, however it is out of service as defined in the stem.*

Question Number: 17

Tier: 1 Group 1

K/A: W/E05 Loss of Secondary Heat Sink
EK1.1 Knowledge of the operational implications of the following concepts as they apply to the (Loss of Secondary Heat Sink):
Components, capacity, and function of emergency systems.

1603 NRC RO Exam

10 CFR Part 55: 41.7

10CFR55.43.b: Not applicable

K/A Match: This question matches the K/A by having the candidate determine how the listed malfunctions of the AFW system would affect the overall system response.

Technical Reference: 1,2-47W803-2, rev 64

Proposed references to be provided: None

Learning Objective: OPT200.AFW Obj. B.5.d

Cognitive Level:

Higher X
Lower

Question Source:

New
Modified Bank X
Bank

Question History: SQN bank question 059 K3.02 used on Sept 2010 exam

Comments: Modified the stem such that B MDAFW pump would be available vs A MDAFW and TDAFW pump not available this changes the answer

Original question

Given the following:

- Unit 1 is starting up from a refueling outage and is currently at 30% rated thermal power with all appropriate systems aligned for that power level.
- A loss of off-site power occurs.
- The 1B EDG fails to start.

Assuming no operator actions, which ONE of the following correctly identifies the status of the AFW system one (1) minute after the accident?

- A. MDAFW pump A running feeding SGs 1 & 3
TDAFW pump running feeding SGs 1, 2, 3 & 4
- B. MDAFW pump A running feeding SGs 1&3
TDAFW pump running feeding SGs 2 & 4
- v C. MDAFW pump A running feeding SGs 1 & 2
TDAFW pump running feeding SGs 1, 2, 3 & 4
- D. MDAFW pump A running feeding SGs 1 & 2
TDAFW pump running feeding SGs 3 & 4

1603 NRC RO Exam

18. 077 AK3.01 018/NEW//LOWER//RO/SEQUOYAH/03/ 2016/NO

Given the following plant conditions:

- Unit1 is operating at 80% power.
- Due to grid disturbances the crew had entered AOP-P.07, "Degraded Grid Conditions or Generator Voltage Regulator Malfunction."
- Grid frequency has held steady at 59 Hz for twenty minutes.
- The Unit Supervisor directs the OATC to trip the reactor.

In accordance with AOP-P.07, "Degraded Grid Conditions or Generator Voltage Regulator Malfunction," which ONE of the following identifies the reason for this required action?

- A. The Tech Spec limit for frequency on a D/G has been exceeded.
- B. To prevent exceeding improper bearing loading and turbine misalignment.
- C. The auto reactor trip setpoint for RCP Underfrequency has been exceeded.
- D✓ To prevent exceeding 25% of lifetime limit of off-frequency operation of LP turbine.

DISTRACTOR ANALYSIS:

- A. *Incorrect, Plausible since there is a Tech Spec low frequency limit, and the candidate could choose this reason, since the setpoint is < 59.9 Hz, however this setpoint is for the operability of the EDG not for the LP turbine.*
- B. *Incorrect, Plausible since there is direction in O-GO-4, to limit the bearing loading and misalignment which would raise turbine vibration, however this limit is for temperature difference between condensers not low grid frequency.*
- C. *Incorrect, Plausible there are low grid frequency trip values and the candidate could get the values confused. The low frequency trip is 57 Hz not 59 Hz.*
- D. *Correct, In accordance with AOP-P.07, Appendix B, if frequency is < 59.5 Hz for more than 15 minutes a manual Rx trip is directed as an Administrative limit to prevent exceeding more than 25% of lifetime limit for off-frequency operation of the LP turbine.*

1603 NRC RO Exam

Question Number: 18

Tier: 1 **Group** 1

K/A: 077 Generator Voltage and Electric Grid Disturbances
AK3.01 Knowledge of the reasons for the following responses as they apply to Generator Voltage and Electric Grid Disturbances:
Reactor and turbine trip criteria

Importance Rating: 3.9 / 4.2

10 CFR Part 55: 41.4, 41.5, 41.7 and 41.10

10CFR55.43.b: n/a

K/A Match: KA is matched because the question requires the ability to interpret the criteria to trip the reactor or turbine as they apply to conditions with a Generator Voltage and Electric Grid Disturbance.

Technical Reference: AOP-P.07 Rev 5

Proposed references to be provided: None

Learning Objective: OPTSTG200.SWYD obj. 12.g

Cognitive Level:

Higher X
Lower _____

Question Source:

New X
Modified Bank _____
Bank _____

Question History: New question developed for 1603 ILT exam

Comments:

1603 NRC RO Exam

19. 024 AG2.1.31 019/BANK/SQN/HIGHER//RO/SEQUOYAH/1/2009/NO

Given the following plant conditions:

- A Reactor Trip occurred on Unit 1.
- Due to excessive RCS cooldown, the crew is implementing EA-68-4, Section 4.2, "Emergency Boration from BAT".
- After placing 1-HS-62-138A, Emergency Boration FCV in OPEN, the OATC released the handswitch after observing flow indicated on 1-FI-62-137A, Emerg Boration Flow.
- Two minutes later, the OATC observed both 1-HS-62-138A RED and GREEN lights LIT and flow stable at 50 gpm.

Which ONE of the following identifies the status of FCV-62-138, Emergency Boration FCV and the corresponding emergency boration flow rate?

FCV-62-138...

- A. stopped opening when the handswitch was released and the flow rate is BELOW the minimum required.
- B. stopped opening when the handswitch was released and the flow rate is ABOVE the minimum required.
- C. should be full open but has stopped due to thermal overload and the flow rate is BELOW the minimum required.
- D. should be full open but has stopped due to thermal overload and the flow rate is ABOVE the minimum required.

DISTRACTOR ANALYSIS:

- A. *Incorrect, the emergency boration valve would stop when the handswitch was released and both the red and green lights would remain lit, however the flow is below the minimum required flow of 35 gpm. Plausible because the MOV does stop when the handswitch is released and flow rate is only slightly higher than the minimum required.*
- B. *Correct, the emergency boration valve is a motor operated valve but unlike most MOVs, there is no seal in to cause the valve to run full open after the hand switch is placed to open. Thus the valve would stop when the handswitch was released and the Red and Green indicating lights would both be lit. EA-68-4, Emergency Boration, requires a minimum flow rate of 35 gpm when emergency borating from the BAT.*
- C. *Incorrect, the emergency boration valve should not be full open. Unlike most MOVs it does not have a seal in contact in the control circuit to cause the valve to come full open and the flow rate is not below the required minimum. Plausible because most MOVs do run full open after the handswitch is placed to the open position and released unless the valve travel is stopped due to thermal overload and flow rate is only slightly higher than the minimum required.*
- D. *Incorrect, the emergency boration valve should not be full open. Unlike most MOVs it does not have a seal in contact in the control circuit to cause the valve to come full open but the flow rate is above the required minimum. Plausible because most MOVs do run full open after the handswitch is placed to the open position and released unless the valve travel is stopped due to thermal overload and flow rate is above the minimum required.*

1603 NRC RO Exam

Question Number: 19

Tier: 1 **Group** 2

K/A: 024 Emergency Boration
AG2.1.31 Ability to locate control room switches, controls, and indications,
and to determine that they correctly reflect the desired plant lineup.

Importance Rating: 4.6 / 4.3

10 CFR Part 55: 41.10

10CFR55.43.b: N/A

K/A Match: This question matches the K/A by having the candidate determine if the indications of flow and valve position are the expected indications following the operation that is outlined in the stem.

Technical Reference: EA-68-4, Emergency Boration, Rev 10
1-47W611-62-2 R5
1,2-45N779-24 R23

Proposed references to be provided: None

Learning Objective: OPT200.CVCS obj. 2. r & s

Question Source:

New	<u> </u>
Modified Bank	<u> </u>
Bank	<u> X </u>

Question History: SQN bank question

Comments:

1603 NRC RO Exam

20. 028 AK1.01 220/BANK/SQN/HIGHER//RO/SEQUOYAH/03/ 2016/NO

Given the following plant conditions:

- Unit 1 is at 100% power.
- Pressurizer Level Channel Selector, 1-XS-68 339E, is in the LT-68-339 & 335 position.
- Subsequently, the REFERENCE LEG for 1-LI-68-339 develops a leak.

Which ONE of the following identifies the short term (25 to 30 min.) response to this condition?

1-LI-68-339 level Indication Will	1-LI-68-335 & 320 level Indication Will	VCT level Indication Will
A. Rise	Lower	Rise
B. Lower	Rise	Rise
C. Rise	Lower	Lower
D. Lower	Rise	Lower

DISTRACTOR ANALYSIS:

- A. *Correct, LI-68-339 will increase due to the loss of level in the reference leg. Since this is the controlling channel, FCV-62-93 will throttle close due to the indicated level increase and reduce charging flow. This will cause LI-68-335 and 320 indications to decrease, in response to actual level decrease. VCT level will increase due to constant letdown flow with reduced charging flow.*
- B. *Incorrect, Plausible if the candidate thinks that a leak in the reference leg for LT-68-339 would cause indicated level to lower, however it would cause indicated level to rise. This will have the opposite effect on LT-68-335 & 320. Also VCT level would rise.*
- C. *Incorrect, Plausible since the first part is correct. However with charging flow being throttled back, VCT level would rise.*
- D. *Incorrect, Plausible if the candidate thinks that a leak in the reference leg for LT-68-339 would cause indicated level to lower, however it would cause indicated level to rise. However with charging flow being throttled back, VCT level would rise.*

1603 NRC RO Exam

Question Number: 20

Tier: 1 **Group** 2

K/A: 028 Pressurizer (PZR) Level Control Malfunction
AK1.01 Knowledge of the operational implications of the following concepts as they apply to Pressurizer Level Control Malfunction:
PZR reference leak abnormalities

Importance Rating: 2.8* / 3.1*

10 CFR Part 55: 41.8, 41.10

10CFR55.43.b: n/a

K/A Match: This question matches the K/A by having the candidate the effects of PZR reference leak on indications and controls.

Technical Reference: AOP-I.04, rev 12

Proposed references to be provided: None

Learning Objective: OPT200.PZRLCS obj 9a, 11a,

Question Source:

New	<u> </u>
Modified Bank	<u> </u>
Bank	<u> X </u>

Question History: SQN bank question

Comments:

1603 NRC RO Exam

21. 036 AK1.02 121/BANK/DC COOK/LOWER//RO/SEQUOYAH/03/ 2016/NO

Given the following plant conditions:

- Unit 2 is in Mode 6.
- The core is being off-loaded.
- It has just been identified (and verified) that the RCS boron concentration is 1975 ppm.
- The refueling boron concentration required by the COLR is 2000 ppm.

Which ONE of the following completes the statement below?

The crew is required to ...

- A✓ suspend positive reactivity changes and initiate boration.
- B. suspend positive reactivity changes and establish containment integrity.
- C. initiate boration and remove all personnel from the containment building.
- D. suspend core alterations and establish containment integrity.

DISTRACTOR ANALYSIS:

- A. *Correct, In accordance with (ITS)Tech Spec 3.9.1 with boron concentration less than required the operators are to immediately suspend any positive reactivity additions and also immediately commence boration to restore the required boron concentration.*
- B. *Incorrect, Plausible since the first part is correct. Also plausible to think that containment integrity would need to be established to ensure that a potential release to the public would need to be avoided, however containment integrity is not required during fuel movement.*
- C. *Incorrect, Plausible since the first part is correct. Also plausible that the containment would need to be evacuated which is required for fuel handling accidents.*
- D. *Incorrect, Plausible to think that core alterations would need to be stopped however not all core alterations add positive reactivity thus only those actions which add positive reactivity are required to be suspended immediately.*

1603 NRC RO Exam

Question Number: 21

Tier: 1 **Group** 2

K/A: 036 Fuel Handling Accidents
AK1.02 Knowledge of operational implications of the following concepts as they apply to Fuel Handling Accidents:
SDM

Importance Rating: 3.4 / 3.8

10 CFR Part 55: 41.8, 41.10

10CFR55.43.b: n/a

K/A Match: This question matches the K/A by having the candidate determine the actions necessary when, during refueling operations, an accident occurs which reduces the required boron concentration below that which is required to maintain shutdown margin.

Technical Reference: Tech Spec 3.9.1 Refueling Operations - Boron Concentration

Proposed references to be provided: None

Learning Objective: OPT200.FH obj 18.b

Question Source:

New	<u> </u>
Modified Bank	<u> </u>
Bank	<u> X </u>

Question History: Bank question from 2012 DC Cook ILT exam

Comments:

1603 NRC RO Exam

22. 037 AA2.12 022/BANK/SQN/HIGHER//RO/SQN/1311/NO

Given the following plant conditions:

- Unit 1 was at 100% power.
- Subsequently, a Steam Generator Tube Leak develops and the crew enters AOP-R.01, "Steam Generator Tube Leak."
- A unit shutdown is commenced in accordance with AOP-C.03, "Rapid Shutdown Or Load Reduction," with reactor power currently at 85%.
- Current plant conditions are:
 - PZR Level is 55% and stabilized
 - Charging flow is 105 gpm
 - RCP seal leak off is 3 gpm per pump
 - RCP seal injection is 8 gpm per pump
 - Letdown is isolated

Which ONE of the following completes the statement below?

The estimated magnitude of the tube leak is (1) gpm and leak rate will (2) as power is reduced.

- A✓ (1) 93
 (2) lower
- B. (1) 93
 (2) remain the same
- C. (1) 125
 (2) remain the same
- D. (1) 125
 (2) lower

DISTRACTOR ANALYSIS:

- A. *Correct, since the charging flow meter is inclusive of seal injection flow – total charging flow is 105 gpm. With PZR level stable the leak rate is 105 gpm – 12 gpm (3 X 4 RCPs = 12) = 93 gpm. As power is reduced SG pressures rise, lowering the D/P between the SG and the RCS. This causes the leak rate to lower.*
- B. *Incorrect, the first part is correct. The second part is plausible as it is logical to think that the leak rate is independent of power level as a primary leak would be not associated with a SG.*
- C. *Incorrect, plausible if the applicant does not understand that the charging flow meter includes seal injection flow. If the calculation is done with this understanding, calculated leak rate is 105 gpm + 32 gpm – 12 gpm = 125 gpm. The second part is plausible as it is logical to think that the leak rate is independent of power level as a primary leak would be not associated with a SG.*
- D. *Incorrect, plausible if the applicant does not understand that the charging flow meter includes seal injection flow. If the calculation is done with this understanding, calculated leak rate is 105 gpm + 32 gpm – 12 gpm = 125 gpm. The second part is correct.*

1603 NRC RO Exam

Question Number: 22

Tier: 1 **Group** 2

K/A: 037 Steam Generator (S/G) Tube Leak
AK1.02 Knowledge of the operational implications of the following concepts as they apply to Steam Generator Tube Leak:
Leak rate vs. pressure drop

Importance Rating: 3.5 / 3.9

10 CFR Part 55: 41.8 / 41.10

10CFR55.43.b: Not applicable

K/A Match: Question matches KA in that it gives the situation of a SGTL and examines on the interrelationship between leak magnitude and effect on RCS pressure.

Technical Reference: AOP-R.01, SGTL R31
AOP-R.05, RCS Leak. R18

Proposed references to be provided: None

Learning Objective: OPL271AOP-R.01 Obj 10
Given a set of initial plant conditions, determine the S/G Tube leak rate.

Question Source:

New	<u> </u>
Modified Bank	<u> </u>
Bank	<u> X </u>

Question History: SQN bank question written for ILT 1311 NRC Exam

Comments:

1603 NRC RO Exam

23. 069 AK2.03 123/BANK/SQN/HIGHER//RO/SQN/03/2016/NO

Given the following plant conditions:

- Unit 1 reactor is shutdown.
- The RCS is being maintained at normal operating temperature and pressure.
- Containment entry is in progress for maintenance.
- The following annunciators on 1-M12-C are locked in:
 - LWR PERS ACCESS OUTER DR LOCK
 - LWR PERS ACCESS INNER DR LOCK
 - UPR/LWR AIR LOCK BREACH
- Containment pressure has rapidly equalized with the Aux. Building.
- Containment pressure currently indicates 0.18 psid.
- It is determined that the overall containment leakage rate has been exceeded.

Based on the conditions above, which ONE of the following identifies the Tech Spec(s) with actions required to be performed within 1 hour?

- A. TS 3.6.1 CONTAINMENT, ONLY
- B. TS 3.6.2 CONTAINMENT AIR LOCKS, ONLY
- C. TS 3.6.2 CONTAINMENT AIR LOCKS and TS 3.6.4 CONTAINMENT PRESSURE
- D. TS 3.6.1 CONTAINMENT and TS 3.6.2 CONTAINMENT AIRLOCKS

DISTRACTOR ANALYSIS:

- A. *Incorrect, Plausible if the candidate considers the Containment INOPERABLE thus action is needed to be performed within 1 hr to restore the containment to OPERABLE status, however T.S. 3.6.1 is not the only Tech Spec which requires action within 1 hr for the condition listed.*
- B. *Incorrect, Plausible since T.S. 3.6.2 has actions which are required to be performed within 1 hr, however T.S.3.6.1 also applies and thus 3.6.2 is not the only Tech Spec with required actions for the given condition.*
- C. *Incorrect, Plausible since the first part is correct. However the Containment Pressure Tech Spec 3.6.4 requires pressure to be within ≥ -1 and $\leq +3$ psig. The given containment pressure is within the limits and thus no action required.*
- D. *Correct, In accordance with LCO 3.6.2, Condition C, the action of evaluating that containment leakage is within limits is required to be performed immediately and the associated actions of LCO 3.6.1 must be evaluated. Thus LCOs 3.6.1 and 3.6.2 are both required to be entered and action taken within 1 hr.*

1603 NRC RO Exam

Question Number: 23

Tier: 1 **Group** 2

K/A: 069 Loss of Containment Integrity
AK2.03 Knowledge of the interrelationships between the Loss of Containment Integrity and the following:
Personnel Access hatch and emergency access hatch.

Importance Rating: 2.8* / 2.9

10 CFR Part 55: 41.7

10CFR55.43.b: n/a

K/A Match: This question matches the K/A by having the candidate identify how the Personnel hatch and emergency access hatch are identified in Tech Spec for a potential loss of containment integrity.

Technical Reference: ITS LCO 3.6.1
ITS LCO 3.6.2
ITS LCO 3.6.4

Proposed references to be provided: None

Learning Objective: OPT200.CntmtStructure obj. 3.a, b

Question Source:

New	<u> </u>
Modified Bank	<u> </u>
Bank	<u> X </u>

Question History: SQN bank question updated for ITS

Comments:

1603 NRC RO Exam

24. 068 AA1.12 124/NEW//LOWER//RO/SQN/03/2016/NO

Given the following plant conditions:

- Due to a fire, the Main Control Room has been evacuated.
- The crew has implemented AOP-C.04, "Shutdown From Auxiliary Control Room," and have commenced a cooldown of Unit 1.

Which ONE of the following identifies the required procedure actions to control PZR level within the operating band?

Charging flow will be via (1) path and letdown will be via (2) path.

- A. (1) its normal
(2) its normal
- B. (1) its normal
(2) excess letdown
- C. (1) seal injection
(2) its normal
- D✓ (1) seal injection
(2) excess letdown

DISTRACTOR ANALYSIS:

- A. *Incorrect, Plausible since normal charging and letdown can be controlled from the Aux Control Panel (1-L-10). However normal charging and letdown are isolated due to fire interaction concerns. The candidates could get this wrong and determine that normal charging and letdown can be used.*
- B. *Incorrect, Plausible since normal charging can be controlled from the Aux Control Panel (1-L-10). However normal charging is isolated due to fire interaction concerns. Also the use of excess letdown is correct.*
- C. *Incorrect, Plausible since charging flow thru the RCP seals is the required path, however even though normal letdown can be controlled from the Aux Control Panel (1-L-10) it is isolated due to fire interaction concerns. Also wrong if the candidate does not recall that without normal charging flow, letdown would not be cooled by the regenerative heat exchanger, and would flash.*
- D. *Correct, In accordance with AOP-C.04, RCS inventory (PZR level) is controlled by controlling charging flow thru the RCP seals and letdown is provided by the excess heat exchanger.*

1603 NRC RO Exam

Question Number: 24

Tier: 1 **Group** 2

K/A: 068 Control Room Evacuation
AA1.12 Ability to operate and/or monitor the following as they apply to the
Control Room Evacuation:
Auxiliary shutdown panel controls and indicators

Importance Rating: 4.4 / 4.4

10 CFR Part 55: 41.7

10CFR55.43.b: n/a

K/A Match: This question matches the K/A by having the candidate recall the
guidance provided in Control Room Abandonment procedure on
the equipment/systems used to control PZR while operating from the
Aux Control Board.

Technical Reference: AOP-C.04

**Proposed references
to be provided:** None

Learning Objective: OPL271.AOP-C.04 obj.

Question Source:

New X
Modified Bank _____
Bank _____

Question History: New question written for 1603 NRC exam

Comments:

25. 076 AK3.06 325/NEW//LOWER//RO/SEQUOYAH/03/ 2016/NO

Given the following plant conditions:

- Unit 2 is operating at 100%

Which one of the following identifies...

(1) the minimum DOSE EQUIVALENT Xe-133 activity value that will require entry into
AOP-R.06, "High RCS Activity,"

and

(2) the reason for contacting Chemistry during performance of AOP-R.06?

- A. (1) ≥ 1200.0 microCi/gm
(2) To ensure the Fuel Reliability Assessment Program is implemented.
- B✓ (1) ≥ 1200.0 microCi/gm
(2) To recommend letdown alignment for maximizing the cleanup of the RCS.
- C. (1) ≥ 1612.6 microCi/gm
(2) To recommend letdown alignment for maximizing the cleanup of the RCS.
- D. (1) ≥ 1612.6 microCi/gm
(2) To ensure the Fuel Reliability Assessment Program is implemented.

DISTRACTOR ANALYSIS:

- A. *Incorrect, Plausible since the first part is correct. Also plausible because fuel integrity monitoring is initiated when activity increases to the entry conditions of AOP-R.06,utilizing 0-SI-CEM-000-050.0 and is conducted by Reactor Engineering. The operators contact chemistry to get guidance on RCS cleanup using CVCS.*

- B. *Correct, In accordance with AOP-R.06, if the specific activity of Xe-133 exceeds the value of 1200.0 microCi/gm then AOP-06 is to be implemented. Also Chemistry is contacted to ask for their guidance as to their recommendation on RCS cleanup using CVCS system.*

- C. *Incorrect, Plausible since this is the Tech Spec value for RCS activity and the operators could get the values confused. Also plausible because fuel integrity monitoring is initiated when activity increases to the entry conditions of AOP-R.06,utilizing 0-SI-CEM-000-050.0 and is conducted by Reactor Engineering. The operators contact chemistry to get guidance on RCS cleanup using CVCS.*

- D. *Incorrect, Plausible since this is the Tech Spec value for RCS activity and the operators could get the values confused. Also plausible since the second part is correct.*

1603 NRC RO Exam

Question Number: 25

Tier: 1 **Group** 2

K/A: 076 High Reactor Coolant Activity
AK3.06 Knowledge of the reasons for the following responses as they apply to High Reactor Coolant Activity:
Actions contained in EOP for high reactor coolant activity

Importance Rating: 3.2 / 3.8

10 CFR Part 55: 41.5 / 41.10

10CFR55.43.b: Not applicable

K/A Match: This question matches the K/A by testing the candidates knowledge of the reasons for actions taken in AOP-R.06, High Coolant Activity and knowledge of Tech Spec 3.4.16 requirements.

Technical Reference: AOP-R.06
Tech Spec 3.4.16

Proposed references to be provided: None

Learning Objective: OPL271AOP-R.06, Obj 9

Cognitive Level:

Higher _____
Lower X

Question Source:

New X
Modified Bank _____
Bank _____

Question History: New question written for 1603 ILT exam

Comments:

1603 NRC RO Exam

26. W/E10 EG2.4.20 026/BANK/WBN/LOWER//RO/SEQUOYAH/03/2016/NO

Given the following plant conditions:

- Unit 1 was operating at 100% power.
- Subsequently, the unit has experienced a reactor trip and loss of offsite power.
- The crew is performing ES-0.4, "Natural Circulation Cooldown With Steam Void in Vessel (Without RVLIS)".

While performing RCS depressurization steps in ES-0.4, which ONE of the following explains a function served by using the Pressurizer heaters to repressurize the RCS by 100 psig when Pressurizer level exceeds 90%?

- A✓ Promotes heat removal from the upper head region of the vessel by collapsing the steam void.
- B. Maintains Pressurizer conditions that allow restarting the Reactor Coolant Pumps when power is restored.
- C. Provides exchange of liquid in the pressurizer to maintain Pressurizer and RCS boron concentrations within 50 ppm.
- D. Allows transfer of the upper head void into the RCS hot legs where the RCS subcooled mass will collapse the void.

DISTRACTOR ANALYSIS:

- A. *Correct, Raising the pressure by 100 psig will lower the pressurizer level, collapse head voids, and assist in cooling the upper head. This allows the depressurization to continue. This is identified in a note in ES-0.4. Collapsing the head voids allows the vessel level to rise.*
- B. *Incorrect, ES-0.4 directs the pressurizer level to be raised to >90% to allow the restart of an RCP. Plausible because 90% is the level associated with conditions required prior to starting a RCP during performance of ES-0.4.*
- C. *Incorrect, Maintaining the pressurizer and RCS boron concentrations within 50 ppm is not the reason for energizing the pressure heaters. Plausible because maintaining the pressurizer and RCS boron concentrations within 50 ppm is a precaution during normal operations and the heaters are energized to promote out flow and mixing of the water.*
- D. *Incorrect, Transferring the voids out of the head and into the RCS hot legs would provide for collapsing the voids but this is not the function of repressurizing during the depressurization steps in the procedure. Plausible because the action described would cause the collapse of voids.*

NOTE before Step 12 in R3

Raising RCS pressure by 100 psi when pressurizer level exceeds 90% collapses head voids, lowers pressurizer level, and assists in cooling upper head. This will allow RCS depressurization to be returned.

1603 NRC RO Exam

Question Number: 26

Tier: 1 **Group** 2

K/A: W/E10 Natural Circulation with a Steam Void in the Vessel with/without RVLIS
EK 1.1 Knowledge of the operational implications of the following concepts as they apply to the (Natural Circulation with Steam Void in Vessel with/without RVLIS):
Components, capacity, and function of emergency systems.

Importance Rating: 3.3 / 3.6

10 CFR Part 55: 41.8, 41.10

10CFR55.43.b: n/a

K/A Match: This question matches the K/A by having the candidate recall the operational concepts of raising RCS pressure during Nat Circ cooldown conditions to promote cooling of the Rx vessel head region to support continued cooldown and depressurization of the RCS.

Technical Reference: ES-0.4, " Natural Circulation Cooldown with Steam Void in Vessel (Without RVLIS) Rev 3

Proposed references to be provided: None

Learning Objective: OPL271ES-0.4 B.4
Summarize the mitigating strategy for the failure that initiated entry into ES-0.4.

Question Source:

New	<u> </u>
Modified Bank	<u> </u>
Bank	<u> X </u>

Question History: WBN bank question

Comments:

1603 NRC RO Exam

27. W/E08 EK3.4 027/BANK/SQN/LOWER/RO/SEQUOYAH/03/ 2016/NO

Given the following plant conditions:

- Unit 1 is operating at 100% power
- Subsequently, a small break LOCA occurs requiring a Reactor trip and SI
- Current plant conditions require the crew to implement FR-P.1, "Pressurized Thermal Shock"

While performing the steps of FR-P.1, after verifying adequate subcooling and RVLIS level, the crew is directed to establish normal charging to _____.

- A. allow use of auxiliary spray in the event the RCPs cannot be used during RCS depressurization.
- B. reduce subsequent RVLIS minimum level requirements and thereby allow RCP restart to equalize system temperature.
- C. eliminate ECCS flow as a source of RCS cooldown and to eliminate the possibility of SI causing a subsequent repressurization.
- D. reduce unnecessary injection flow because subsequent minimum values for subcooling will be lower than normal SI termination criteria.

DISTRACTOR ANALYSIS:

- A. *Incorrect, Plausible, however if aux spray is not available at step 28, the procedure returns to the step allowing the use of a PORV. A PORV is the first method of depressurization if normal spray is unavailable in step 20.*
- B. *Incorrect, Plausible however minimum RVLIS level does not change from before and after ECCS termination.*
- C. *Correct, SI flow partially contributed to the initial cooldown and may hinder efforts to perform subsequent depressurization steps. If this procedure was entered with an intact RCS (faulted or ruptured S/G), then RCS repressurization will occur after pressurizer level recovers.*
- D. *Incorrect, Plausible, however the subcooling value used for determining depressurization termination is 50°F vice the normal 40°F in the EOP network.*

1603 NRC RO Exam

Question Number: 27

Tier: 1 **Group** 2

K/A: W/E08 Pressurized Thermal Shock
EK3.4 Knowledge of the reasons for the following responses as they apply to the (Pressurized Thermal Shock):
RO or SRO function within the control room team as appropriate to the assigned position, in such a way that procedures are adhered to and the limitations in the facilities license and amendments are not violated.

Importance Rating: 3.4 / 3.7

10 CFR Part 55: 41.5 / 41.10

10CFR55.43.b: n/a

K/A Match: This question matches the K/A by having the candidate recall the reasons that the control room crew is directed to re-establish normal charging flow and terminate ECCS flow during PTS conditions.

Technical Reference: FR-P.1
EPM-3-FR-P.1

Proposed references to be provided: None

Learning Objective: OPL271FR-P.1, Obj. 2.a
OPL273C0519, Obj 2

Question Source:

New	<u> </u>
Modified Bank	<u> </u>
Bank	<u> X </u>

Question History: SQN bank question

Comments:

1603 NRC RO Exam

28. 003 G2.2.36 028/BANK/SQN/HIGHER//RO/SEQUOYAH/03/ 2016/NO

Given the following plant conditions:

- Unit 1 is at 32% power.
- USST 1A and USST 1B are out of service for corrective maintenance.
- 1B Start Bus trips out on differential relay actuation.

Which ONE of the following identifies the plant response?

- A✓ Reactor trips due to the loss of power to RCP #2 and RCP #4.
- B. Reactor trips due to the loss of power to RCP #1 and RCP #3.
- C. Only the 1B-B D/G starts and connects to the 1B-B 6.9 KV SD Bd.
- D. All 4 D/Gs start but ONLY the 1B-B D/G connects to the 6.9 KV SD Bd.

DISTRACTOR ANALYSIS:

- A. *Correct. UV due to 1B Start Bus trip on RCP#2 and 4 meets 2 of 4 logic for a reactor trip under 35% RTP.*
- B. *Incorrect, Plausible if student does not know power supplies to RCP's 1 and 3 comes through Start bus 1A and student understands Reactor will trip under 35% RTP.*
- C. *Incorrect, Plausible if student does not understand trip logic under 35% RTP. This part is plausible due to 1B start bus loss of power and student understands loss of power to S/D boards will start EDG's. The student may think only the 1B D/G would start due to 1B start bus loss of power and connect to the 1B SD Bd. All 4 D/G start, but only the 1A would connect which is the wrong D/G identified in the distractor. 1B start bus feeds 1A shutdown boards.*
- D. *Incorrect, Plausible if student does not understand trip logic under 35% RTP. This part is plausible due to 1B start bus loss of power and student understands loss of power to S/D boards will start EDG's. The student may know ALL EDG's start but confuse which EDG would connect with the Shutdown boards. All 4 D/G start, but only the 1A would connect which is the wrong D/G per the answer listed. 1B start bus feeds 1A shutdown board.*

1603 NRC RO Exam

Question Number: 28

Tier: 2 **Group** 1

K/A: 003 Reactor Coolant Pump
G2.2.36 Ability to analyze the effect of maintenance activities, such as degraded power sources, on the status of limiting conditions for operations

Importance Rating: 3.1 / 4.2

10 CFR Part 55: 41.10

10CFR55.43.b: n/a

K/A Match: This question matches the K/A by having the candidate determine the effects on the plant with USST 1A & 1B out of service for maintenance and then an electrical problem occurs on the one of the operating unit's start buses.

Technical Reference: 15E500-1
45N721-1
TI-28 att 9

Proposed references to be provided: None

Learning Objective: OPT200.RCP B.4, 5

Question Source:

New	<u> </u>
Modified Bank	<u> </u>
Bank	<u> X </u>

Question History: SQN bank question

Comments:

1603 NRC RO Exam

29. 004 K6.27 029/BANK/SQN/LOWER//RO/SQN/03/2016/NO

Given the following plant conditions:

- Unit 1 is in Mode 5 with the PZR solid.
- Train "A" RHR is aligned to provide shutdown cooling.
- An equipment malfunction occurs causing RCS pressure to rise.
- 1A-A RHR pump has just been tripped.
- It is reported that **RCS** pressure is 375 psig and rising.

In accordance with AOP-R.03, "RHR System Malfunctions," which ONE of the following identifies the **RCS** pressure at which FCV-74-1 & FCV-74-2 are closed and the reason for this action?

- A. 380 psig, to prevent LTOP from initiating.
- B. 410 psig, to ensure RCP #1 seals are not damaged.
- C. 450 psig, to prevent inventory loss through the suction relief valve.
- D. 600 psig, to prevent over-pressurization of the PRT.

DISTRACTOR ANALYSIS:

- A. *Incorrect, Plausible since this is the pressure at which actions are dictated in AOP-R.03 to be taken and attempt to control RCS pressure at this value. However this pressure is not the setpoint directed by AOP where RHR is to be isolated.*
- B. *Incorrect, Plausible since this is the pressure setpoint of RHR Pressure Hi alarm, but this pressure is not the pressure where RHR is directed to be isolated. Also plausible since this action is in AOP-R.03 but to check for 200 psid across the pump.*
- C. *Correct, AOP-R.03 states that if RCS pressure cannot be kept below 450 psig then close FCV-74-1 & FCV-74-2. This is to isolate the system due to lifting the suction relief valve which will reduce the RCS inventory.*
- D. *Incorrect, Plausible since this is the design pressure of the system. AOP-R.03 directs isolation at 450 psig. Also plausible since the RHR suction and discharge relief valves go to PRT.*

1603 NRC RO Exam

Question Number: 29

Tier: 2 **Group** 1

K/A: 004 Chemical and Volume Control System (CVCS)
K6.27 Knowledge of the effect of a loss or malfunction on the following
CVCS components:
Purpose of RHR relief and isolation valves.

Importance Rating: 3.4 / 3.6

10 CFR Part 55: 41.7

10CFR55.43.b: n/a

K/A Match: This question matches the K/A by having the candidate identify the pressure the RHR isolation valves are required to be closed and the reason for closing the valves at that pressure.

Technical Reference: AR-M6-C, E-7 rev
AOP-R.03 rev
0-SO-74-1, Residual Heat Removal System, rev

Proposed references to be provided: None

Learning Objective: OPT200.RHR obj.
OPL271AOP-R.03 obj. 6

Question Source:

New	<u> </u>
Modified Bank	<u> </u>
Bank	<u> X </u>

Question History: SQN bank question used on ILT 10/02 exam.

Comments:

1603 NRC RO Exam

30. 004 K5.09 030/NEW//HIGHER//RO/SQN/03/2016/NO

Given the following plant conditions:

- Unit 2 was manually tripped and Safety Injection initiated from 100% power due to a Steam Generator Tube Rupture.
- Coincident with the reactor trip, all four (4) Unit 2 6.9KV Unit boards lock out.
- When attempting to de-pressurize the RCS, neither PZR PORV would open.
- The crew decides to use Auxiliary Spray to depressurize the RCS.

Which ONE of the following identifies the operational concern of using Auxiliary spray?

- A. an additional loss of reactor coolant will occur.
- B. excessive thermal stresses of spray nozzle may occur.
- C. excessive thermal stresses of the PZR surge line will occur.
- D. the rate of RCS pressure reduction could be so rapid that it is difficult to control.

DISTRACTOR ANALYSIS:

- A. *Incorrect, Plausible, if the candidate gets the loss of inventory associated with using PZR PORVs to depressurize confused with the use of AUX. spray. Using AUX spray actually adds inventory (charging flow) not cause a loss of inventory.*
- B. *Correct, The use of Aux spray is the third and last choice for RCS depressurization during SGTR events. Given the conditions in the stem, letdown has been isolated thus there is no heating of the charging flow used for Aux spray. With the charging pumps taking a suction from the RWST there will be a large (~400°F) delta T between charging flow and the PZR spray nozzle. This is to be accounted for as a logged event and reported as one of the allowed spray line delta T events.*
- C. *Incorrect, Plausible since the PZR surge line does see a reverse in flow through the surge line which could cause a large thermal gradient during any event in which SI has been initiated. However the use of aux spray causes a large thermal stress on the spray nozzle not the surge line.*
- D. *Incorrect, Plausible if the candidate gets the pressure response when using a PORV confused with using Aux spray. The flow to the PZR spray nozzles is actually fairly small and it takes longer to depressurize using Aux spray than any other form of depressurization.*

1603 NRC RO Exam

Question Number: 30

Tier: 2 **Group** 1

K/A: 004 Chemical and Volume Control System (CVCS)
K5.09 Knowledge of the operational implications of the following concepts as they apply of the CVCS:
Thermal Shock: high component stress due to rapid temperature change.

Importance Rating: 3.7 / 4.2

10 CFR Part 55: 41.5

10CFR55.43.b: n/a

K/A Match: This question matches the K/A by having the candidate determine the operational concerns that are presented when using the PZR Aux spray system without having letdown in service.

Technical Reference: E-3 SGTR
EPM-3-E-3, step 20 basis

Proposed references to be provided: None

Learning Objective: OPT200.PZR-PCS obj
OPL271-E-3 obj.

Question Source:
New X
Modified Bank _____
Bank _____

Question History: New question written for 1603 ILT exam

Comments:

1603 NRC RO Exam

31. 005 K5.05 031/NEW//HIGHER//RO/SEQUOYAH/03/2016/NO

Given the following plant conditions:

- Unit 1 is in solid plant operation
- 1A-A RHR pump is in service for shutdown cooling
- Charging and RHR letdown are in service
- The air line to Letdown Pressure Control Valve PCV-62-81 fails



Which ONE of the following identifies how the plant will respond to this failure?

- A. Charging flow will auto increase to maintain constant RCS inventory.
- B. RCS pressure will increase until the Cold Overpressure Protection system actuates.
- C. RCS pressure will decrease due to letdown line flow being greater than charging flow.
- D. Train A RHR flow will increase resulting in RHR pump discharge relief valve lifting.

DISTRACTOR ANALYSIS:

- A. *Incorrect, Plausible if the candidate thinks that PCV-62-81 will affect charging flow, however charging flow will remain unchanged.*
- B. *Incorrect, Plausible, if the candidate does not recognize that PCV-62-81 fails open not closed, however RCS pressure will decrease due to the increased flow when PCV-62-81 fails open on loss of air.*
- C. *Correct, During solid plant operation charging and letdown are balanced thus pressure remains constant. If PCV-62-81 loses air pressure it will fail Open, thus letdown flow increases. With charging flow remaining the same, RCS pressure will decrease.*
- D. *Incorrect, Plausible since Train A flow will increase when PCV-62-81 fails, however RCS pressure will decrease not increase.*

1603 NRC RO Exam

Question Number: 31

Tier: 2 **Group** 1

K/A: 005 Residual Heat Removal System (RHRS)
K5.05 Knowledge of the operational implications of the following concepts as they apply to the RHRS:
Plant response during "solid plant:" pressure change due to the relative incompressibility of water.

Importance Rating: 2.7* / 3.1*

10 CFR Part 55: 41.5

10CFR55.43.b: n/a

K/A Match: This question matches the K/A by having the candidate by having the candidate diagnose a component failure and then determine how the RCS pressure will respond during solid plant operation.

Technical Reference: 1-47W611-62-3

Proposed references to be provided: None

Learning Objective: OPT200.RHR obj 13.e
OPL273C0611, obj 1

Question Source:

New X
Modified Bank _____
Bank _____

Question History: New question written for 1603 ILT exam

Comments:

1603 NRC RO Exam

32. 006 A2.05 132/NEW//HIGHER//RO/SEQUOYAH/03/2016/NO

Given the following plant conditions:

- Unit 1 is at 100% power.
- Subsequently, a LOCA has occurred.
- RCS pressure dropped rapidly to 1300 psig.
- While performing ES.05, "Equipment Verifications, step 11. Monitor ECCS operation," the following indications associated with 1B-B SI pump is observed:
 - the "RED" indicating light on the pump control switch is LIT
 - motor amps are at minimum
 - flow is off-scale low
 - discharge pressure is equal to that of 1A-A SI pump

Based on the above indications, which ONE of the following completes the statement below?

The 1B-B SI pump indications (1) expected and the operators are directed to (2) .

- A. (1) are
(2) continue with ES-0.5 actions, no further action associated with SI pumps is required
- B. (1) are
(2) ensure SI pump valve alignment is correct before proceeding on in ES-0.5
- C✓ (1) are NOT
(2) ensure SI pump valve alignment is correct before proceeding on is ES-0.5
- D. (1) are NOT
(2) close FCV-63-153, SI Pump B-B discharge crosstie before continuing on in ES-0.5.

DISTRACTOR ANALYSIS:

- A. *Incorrect, Plausible since no discharge flow and very little motor amps would be correct if the SI pump was operating on the recirc valve. Such is the case if RCS pressure were greater than 1500 psig, however with RCS pressure at 1300 psig, there should be normal flow and pump amps. Also plausible if the candidate thinks that the SI pump is operating correctly that no action is required and they would continue with ES-0.5 actions.*

- B. *Incorrect, Plausible since no discharge flow and very little motor amps would be correct if the SI pump was operating on the recirc valve. Such is the case if RCS pressure were greater than 1500 psig, however with RCS pressure at 1300 psig, there should be normal flow and pump amps. Also plausible to think that the operators would still be required to Ensure there was a correct valve lineup, however this would be an RNO response and not in accordance with procedure useage.*

- C. *Correct, These indications are not expected for the current RCS pressure. These are of a sheared shaft. The Red light indicates that the pump motor is energized, but with no discharge flow and very little motor amps, the motor is free wheeling. The Operators would implement the RNO column actions which would be Ensure that the SI pump suction, discharge and discharge cross-connect valves are all in their required Open position.*

- D. *Incorrect, Plausible since the first part is correct. Also plausible for the operators to think that a potential failure of the 1B-B SI could jeopardize both trains of ECCS and decide to seperate the A & B ECCS headers by closing the B train cross-tie valve.*

1603 NRC RO Exam

Question Number: 32

Tier: 2 **Group** 1

K/A: 006 Emergency Core Cooling System (ECCS)
A2.05 Ability to (a) predict the impacts of the following malfunctions or operations on the ECCS; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations:
Improper amperage to the pump.

Importance Rating: 3.3 / 4.1

10 CFR Part 55: 41.5

10CFR55.43.b: n/a

K/A Match: This question matches the K/A by having the candidate diagnose improper pump amps for an ECCS pump and determine the correct procedural actions needed to verify system operation.

Technical Reference: ES-0.5 rev 0009
EPM-4
EA-63-5 rev 0

Proposed references to be provided: None

Learning Objective: OPT200.ECCS obj

Question Source:

New X
Modified Bank
Bank

Question History: New question written for 1603 ILT exam.

Comments:

1603 NRC RO Exam

33. 006 K6.18 033/NEW//HIGHER//RO/SQN/03/2016/NO

Given the following plant conditions:

- Unit 2 was manually tripped from 100% due to a small break LOCA
- A loss of Off-Site power occurred concurrently with the reactor trip
- The crew is performing ES-1.2, "Post LOCA Cooldown and Depressurization," Step 17, Depressurize RCS to establish pZR level greater than 20%
- Core Exit Temperature (auctioneered high core quadrant average) is 582°F
- All RCS Hot Leg Temperatures (T_{hot}) are 562°F
- RCS average temperature (T_{ave}) is 557°F
- RCS wide range pressure is 2200 psig
- Containment pressure is 1.0 psig

Which ONE of the following identifies the approximate (+/- 5 psig) RCS pressure at which RCS subcooling may be lost (subcooling margin equals 0°F)?

- A. 1347 psig
- B✓ 1332 psig
- C. 1167 psig
- D. 1120 psig

DISTRACTOR ANALYSIS:

- A. *Incorrect, Plausible because this is P_{sat} (psia) for core exit TCs.*
- B. *Correct, The margin to subcooling is normally determined from the RCS Subcooling Margin Monitor. ICCM calculates subcooling margin using RCS wide range pressure and auctioneered high core quadrant average temperature, with the option to select the calculation based on hot leg temperature. The highest pressure at which subcooling would be lost is determined using the higher of either core exit TC or T_{hot} .*
- C. *Incorrect, Plausible because this is P_{sat} for T_{hot} .*
- D. *Incorrect, Plausible because this is P_{sat} for T_{ave} .*

1603 NRC RO Exam

Question Number: 33

Tier: 2 **Group** 1

K/A: 006 Emergency Core Cooling System (ECCS)
K6.18 Knowledge of the effect of a loss or malfunction on the following will have on the ECCS:
Subcooling margin indicators

Importance Rating: 3.6 / 3.9

10 CFR Part 55: 41.7

10CFR55.43.b: n/a

K/A Match: This question matches the K/A by having the candidate determine that the installed sub-cooling margin monitors are disabled and have the candidate determine subcooling margin manually.

Technical Reference: ES-1.2, rev 20

Proposed references to be provided: None

Learning Objective: OPL271-ES1.2 obj.

Question Source:

New	<u> X </u>
Modified Bank	<u> </u>
Bank	<u> </u>

Question History: New question written for 1603 NRC exam

Comments:

1603 NRC RO Exam

34. 007 A1.01 134/NEW//LOWER//RO/SEQUOYAH/03/2016/NO

While operating in Mode 1, in accordance with 1-SO-68-5, "Pressurizer Relief Tank," which ONE of the following completes the statement below?

The maximum level allowed in the Pressurizer Relief Tank (PRT) before it is required to be drained is (1) and the RCDT Pump B (2) when 1-FCV-68-310, PRT Drain to RCDT, is opened.

- A. (1) 64%
(2) auto-starts
- B. (1) 64%
(2) must be manually started
- C✓ (1) 88%
(2) auto-starts
- D. (1) 88%
(2) must be manually started

DISTRACTOR ANALYSIS:

- A. *Incorrect, Plausible if the candidate gets the maximum level of the Reactor Coolant Drain Tank (RCDT) (64%) confused with the high level condition of the Pressurizer Relief Tank (PRT), since RCDT pumps are used to pump down the PRT as well as the RCDT. Also the auto start feature of Pump "B" is correct.*
- B. *Incorrect, Plausible if the candidate gets the maximum level of the Reactor Coolant Drain Tank (RCDT) (64%) confused with the high level condition of the Pressurizer Relief Tank (PRT), since RCDT pumps are used to pump down the PRT as well as the RCDT. Also plausible since the "A" RCDT would have to be manually started, and the candidate could get the starts for the "A" pump and "B" pump confused.*
- C. *Correct, In accordance with 1-SO-68-5, P&L (G), the maximum level before draining the Pressurizer Relief Tank (PRT) is 88%. Also when the drain valve to the RCDT (1-FCV-68-310) is opened, the "B" RCDT auto starts to pump down the tank.*
- D. *Incorrect, Plausible since the first part is correct. Also plausible since the "A" RCDT would have to be manually started, and the candidate could get the starts for the "A" pump and "B" pump confused.*

There are two installed RCDT pumps, A (50 gpm) and B (150 gpm).
RCDT pump A does not have an auto-start feature associate with PRT.
RCDT pump B starts when the PRT drain valve 1-FCV-68-310 opens.

RCDT pump A auto-stops at the RCDT low level setpoint.
RCDT pump B auto-stops at the RCDT low level setpoint IF the PRT drain valve is closed.

1603 NRC RO Exam

Question Number: 34

Tier: 2 **Group** 1

K/A: 007 Pressurizer Relief Tank / Quench Tank System (PRTS)
A1.01 Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating the PRTS controls including:
Maintaining quench tank water level within limits.

Importance Rating: 2.9 / 3.1

10 CFR Part 55: 41.5

10CFR55.43.b: n/a

K/A Match: This question matches the K/A by having the candidate predict the response of the RCDT pumps when controlling level in the PRT. Also question requires applicant to recall automatic control logic for valves and pumps used to lower quench tank (PRT) water level.

Technical Reference: 1-SO-68-5 rev

Proposed references to be provided: None

Learning Objective: OPT200.PZR-PRT obj.

Question Source:

New	<u> </u>
Modified Bank	<u> </u>
Bank	<u> X </u>

Question History: SQN Bank question

Comments:

1603 NRC RO Exam

35. 008 A3.08 035/NEW//LOWER//RO/SQN/03/2016/NO

Given the following plant conditions:

- Both units are at 100% power.
- Spent Fuel Pool Cooling is aligned to Unit 2
- A spurious SI signal is generated on Unit 2

Which ONE of the following identifies the heat exchanger(s) that will lose Component Cooling System (CCS) cooling water?

- A. The Spent Fuel Pool Cooling Heat Exchanger.
- B. The Reactor Coolant Pump Seal (Leakoff) Water Heat Exchangers.
- C. The CVCS Excess Letdown Heat Exchanger.
- D. The Reactor Coolant Pump Thermal Barrier Heat Exchangers.

DISTRACTOR ANALYSIS:

- A. *Incorrect, Plausible since Spent Fuel Pool cooling can be provided from either Unit so candidate could think that Spent Fuel Pool cooling will need to be aligned to Unit 1, although there is procedural guidance to make this alignment it is not automatic and could be manually done if Unit 2 cannot support the emergency heat loads associated with an SI and also the heat load of the spent fuel pool heat exchanger.*
- B. *Incorrect, Plausible since the RCPs are not required and are assumed tripped during Design basis accidents, thus the candidate could conclude that the seal leakoff heat exchangers would not be needed and would isolate.*
- C. *Correct, An SI signal on either Unit will cause a Phase A isolation. The Phase A isolation will cause the Excess Letdown inlet and outlet valves to close.*
- D. *Incorrect, Plausible since these heat exchangers do get isolated during accident conditions, however they are isolated during a Phase B isolation, not a Phase A which is caused by an SI signal.*

1603 NRC RO Exam

Question Number: 35

Tier: 2 **Group** 2

K/A: 008 Component Cooling Water System (CCWS)
A3.08 Ability to monitor automatic operation of the CCWS, including:
Automatic actions associated with the CCWS that occur as a result of a
safety injection signal.

Importance Rating: 3.6* / 3.7*

10 CFR Part 55: 41.7

10CFR55.43.b: n/a

K/A Match: This question matches the K/A by having the candidate determine
the equipment that is cooled by CCS that would be required to be
monitored during or following a SI signal.

Technical Reference: 0-47W611-70-7

**Proposed references
to be provided:** None

Learning Objective: OPT200.CCS obj. 6

Question Source:

New X
Modified Bank
Bank

Question History: New question written for 1603 ILT exam.

Comments:

1603 NRC RO Exam

36. 010 K2.01 036/BANK/SQN/LOWER//RO/SEQUOYAH/03/ 2016/NO

Given the following plant conditions:

- Unit 1 is operating at 100% power
- Subsequently, a loss of off-site power occurs

With **NO** operator action outside of the MCR, which pressurizer heaters are available to control RCS pressure?

- A. Group A and Group C heaters will be automatically controlled.
- B. Group C and Group D heaters can be manually controlled from M-4.
- C. Group A and Group B heaters will be automatically controlled.
- D. All heater groups can be manually controlled from M-4.

DISTRACTOR ANALYSIS:

- A. *Incorrect, Plausible since the first part is correct, A-A PZR heater would be available, however C-C would not be available without additional local action.*
- B. *Incorrect, Plausible since C-C and D-D can be manually controlled, however they can only be manually controlled after local operator action.*
- C. *Correct, In accordance with AOP-P.01, appendix B with a loss of off-site power, PZR heater groups A-A and B-B only are available after a 90 sec time delay from the time that the power has been restored.*
- D. *Incorrect, Plausible to think that all PZR heater groups could be manually controlled, which is normally correct, however following a loss of off-site power only the A-A and B-B heaters can be controlled from the main control room without local operation action.*

1603 NRC RO Exam

Question Number: 36

Tier: 2 **Group** 1

K/A: 010 Pressurizer Pressure Control System (PZR PCS)
K2.01 Knowledge of bus power supplies to the following:
PZR heaters

Importance Rating: 3.0 / 3.4

10 CFR Part 55: 41.7

10CFR55.43.b: n/a

K/A Match: This question matches the K/A by having the candidate determine the PZR heaters that will have power available and be able to be controlled in the main control room following a loss of off-site power.

Technical Reference: AOP-P.01, Loss of Off-Site Power rev 34

Proposed references to be provided: None

Learning Objective: OPL271AOP-P.01 obj. 2a
OPT200.DG obj. 12.i

Question Source:

New	<u> </u>
Modified Bank	<u> </u>
Bank	<u> X </u>

Question History: SQN bank question

Comments:

1603 NRC RO Exam

37. 012 K1.05 237/BANK/SQN/HIGHER//RO/SEQUOYAH//NO

Given the following plant conditions:

- Unit 1 is operating at 100% power.
- Channel #3 of the containment "HIGH-HIGH PRESS" pressure switches is out of service for surveillance testing with its bistable BYPASSED.
- The associated channel 3 "HIGH PRESS" bistable has been tripped as allowed by Tech. Specs.
- Subsequently, channel #2 of the containment "HIGH PRESS" pressure switch fails high such that a high pressure signal is initiated.

Which ONE of the following describes the response of the Containment Spray System and the plant to the pressure switch failure?

- A. Containment Spray will actuate; Rx trip, SI and Cont. Phase A actuate.
- B. Containment Spray will NOT actuate; Rx trip, SI and Cont. Phase A actuate.
- C. Containment Spray will actuate; Rx trip, SI and Cont. Isolation Phase B actuate.
- D. Containment Spray will NOT actuate; Rx trip, SI and Cont. Isolation Phase B actuate.

DISTRACTOR ANALYSIS:

- A. *Incorrect, Plausible since one channel of Hi-Hi pressure is out of service, and placed in bypass, the candidate could get the logic confused and think that all logic needed to actuate RPS trip and ESF operation are made up and all actuations will occur.*
- B. *Correct, With a High-High Press switch in BYPASS, the logic for Phase B and containment spray becomes 2/3; with the High Press switch in Tripped, the logic for SI becomes 1/2. When channel 2 fails high, it makes up the logic for SI only, which then causes a Rx trip.*
- C. *Incorrect, Plausible since one channel of Hi-Hi pressure is out of service, and placed in bypass, the candidate could get the logic confused and think that all logic needed to actuate RPS trip and ESF operation. However the Cont Isolation Phase B will not occur, due to not meeting the 2/3 logic for Containment Hi-Hi pressure.*
- D. *Incorrect, Plausible since the first part is correct, Containment Spray will not actuate. Also plausible to think that all other actuations will occur including Containment Isolation phase B.*

1603 NRC RO Exam

Question Number: 37

Tier: 2 **Group** 1

K/A: 012 Reactor Protection System (RPS)
K1.05 Knowledge of the physical connections and/or cause effect relationships between the RPS and the following:
ESFAS

Importance Rating: 3.8* / 3.9

10 CFR Part 55: 41.2 to 41.9

10CFR55.43.b: n/a

K/A Match: This question matches the K/A by having the candidate recall the relationship of instrument inputs to both RPS and ESFAS following alternate system alignments.

Technical Reference: 45N699-1

Proposed references to be provided: None

Learning Objective: OPL271RPS obj 2.9

Question Source:

New	<u> </u>
Modified Bank	<u> </u>
Bank	<u> X </u>

Question History: SQN bank question

Comments:

1603 NRC RO Exam

38. 013 A4.01 038/BANK/SQN/HIGHER//RO/SEQUOYAH/13/05/NO

Given the following plant conditions:

- Unit 1 is initially at 100% power when an event occurred.
- The crew has just restored power to FCV-63-1 at step 6 of ES-1.3, "Transfer to RHR Containment Sump."
- RWST level is 20% and lowering.
- CNTMT pressure is 1.5 psig and lowering.
- CNTMT sump level is 41% and rising.
- 1-HS-63-72A, CNTMT Sump Suct To RHR Pump 1A, Red light **LIT**
- 1-HS-63-73A, CNTMT Sump Suct To RHR Pump 1B, Red light **LIT**
- 1-HS-72-39A, CNTMT Spray Hdr 1A Isol, Green light **LIT**
- 1-HS-72-2A, CNTMT Spray Hdr 1B Isol, Green light **LIT**

Which ONE of the following completes the statement below?

Based on the above indications the RHR CNTMT Sump suction valves _____ (1) _____
in the expected positions and the CNTMT Spray Header isolations _____ (2) _____
in the expected positions.

- A✓ (1) are
(2) are
- B. (1) are
(2) are **NOT**
- C. (1) are **NOT**
(2) are
- D. (1) are **NOT**
(2) are **NOT**

DISTRACTOR ANALYSIS:

- A. *Correct, With RWST level less than 27% the RHR suction auto switchover should have occurred and the 72 and 73 valves should be open and is normal. The CNTMT Spray Hdr discharge valves will be open as well with CNTMT pressure above the phase B setpoint and CSPs running. At this point only one CSP would be running, however its discharge valve is left open. The discharge valves would have been closed if CNTMT pressure had dropped to less than 2 psig and the CSPs secured. This action would have occurred by the time the RWST level had went from 27% to 20%.*

- B. *Incorrect, The first part is correct. The second part is incorrect as both CS discharge Hdr valves would be open. Plausible as the second step in ES-1.3 secures one spray pump and it is logical to shut the header isolation valve for that pump. In fact the RNO for this step secures both CSPs and closes the Discharge Hdr Isolation valves.*

- C. *Incorrect, The RHR Sump suction valves will be open on the auto switchover on RWST level < 27%. This is plausible as other ECCS suction valves do not auto switch over (SIP's). The second part is correct.*

- D. *Inorrect, The RHR Sump suction valves will be open on the auto switchover on RWST level < 27%. This is plausible as other ECCS suction valves do not auto switch over (SIP's). The second part is correct. The second part is incorrect as both CS discharge Hdr valves would be open. Plausible as the second step in ES-1.3 secures one spray pump and it is logical to shut the header isolation valve for that pump. In fact the RNO for this step secures both CSPs and closes the Discharge Hdr Isolation valves.*

1603 NRC RO Exam

Question Number: 38

Tier: 2 **Group** 1

K/A: 013 Engineered Safety Features Actuation (ESFAS)
A4.01 Ability to manually operate and/or monitor in the control room:
ESFAS-initiated equipment which fails to actuate.

Importance Rating: 4.5 / 4.8

10 CFR Part 55: 41.10

10CFR55.43.b: Not applicable

K/A Match: This question matches the K/A because the applicant is required assess indications and determine if the correct lineup exists for current plant conditions during a LB LOCA.

Technical Reference: ES-1.3, Transfer to RHR Containment Sump, Rev 19,
1-AR-M6-E, E-3 R23

Proposed references to be provided: None

Learning Objective: OPT200.ECCS
#1 Describe the purpose and/or functions of the ECCS and subsystems, and major components:
c. valves automatically operated upon SUI actuation
OPL271ES-1.3 B.5.6 a&b
Given a set of initial plant conditions use ES-1.3 to correctly:
a. Identify required actions
b. Respond to Contingencies

Question Source:

New	<u>X</u>
Modified Bank	<u> </u>
Bank	<u> </u>

Question History: New for NRC ILT 1305 Exam

Comments:

1603 NRC RO Exam

39. 013 K3.03 039/BANK/SALEM 2002/HIGHER//RO/SEQUOYAH/4/2007/NO

Given the following plant conditions:

- Unit 1 is at 100% power
- Subsequently, a Loss of Off-Site Power occurs
- A steam line break has generated a safety injection signal but Engineered Safety Feature Actuation System (ESFAS) Train "A" did **NOT** actuate.
- Containment pressure indicates 2.9 psig and rising.

Assuming **NO** manual actions have been initiated, which ONE of the following identifies a consequence of that failure?

- A. 1A-A MDAFW pump will remain in standby.
- B. Only the B Train load sequencer will be operating.
- C. Only two Main Steam Isolation Valves (MSIV's) will be closed.
- D. Only one Phase A Containment Isolation Valve in each penetration will be closed.

DISTRACTOR ANALYSIS:

- A. *Incorrect, Plausible if the candidate thinks that the failure of "A" train of ESFAS will prevent the MDAFW pump from starting, however the A MDAFW pump would have started on the trip and will be running anyway.*
- B. *Incorrect, Plausible if the candidate thinks that the failure of "A" train of ESFAS will prevent the load sequencer from operating, however the "A" train Sequencer will operate in blackout mode.*
- C. *Incorrect, Plausible if the candidate does not recall that the MSIVs get signals from both trains, so only 2 closing is incorrect.*
- D. *Correct, Failure of 1 train of ESFAS will result in 1 group of CIA valves closing.*

1603 NRC RO Exam

Question Number: 39

Tier: 2 **Group** 1

K/A: 013 Engineered Safety Features Actuation
K3.03 Knowledge of the effect that a loss or malfunction of the ESFAS will have on the following:
Containment

Importance Rating: 4.3 / 4.7

10 CFR Part 55: 41.7

10CFR55.43.b: N/A

K/A Match: This question matches the K/A by having the candidate recall how a malfunction of one train of ESFAS will effect plant equipment and containment isolation.

Technical Reference: 47W611-88-1, 63-1

Proposed references to be provided: None

Learning Objective: OPT200.CtmtStructure obj
OPT200.RPS

Question Source:

New	<u> </u>
Modified Bank	<u> </u>
Bank	<u> X </u>

Question History: SQN bank question

Comments:

1603 NRC RO Exam

40. 025 K5.01 040/BANK/SQN/LOWER//RO/SEQUOYAH/12/01/NO

Given the following plant conditions:

- Unit 1 is operating at 100% power.

Which ONE of the following statements identifies both the maximum containment ice bed temperature allowed in accordance with 1-SI-OPS-000-002.0, "Shift Logs," and a potential effect of operating above the maximum temperature?

	<u>Maximum Temperature.</u>	<u>Potential Effect</u>
A.	20°F	Exceeding 12 psig inside Containment during a LOCA
B.	20°F	Exceeding 12 psig inside Containment during a Steam Line Break
C✓	27°F	Exceeding 12 psig inside Containment during a LOCA
D.	27°F	Exceeding 12 psig inside Containment during a Steam Line Break

DISTRACTOR ANALYSIS:

- A. *Incorrect, Plausible since 20°F is the maximum temperature by procedure for the optimal range of temperature for normal operation. The candidate may get confused between the optimal temperature and maximum Tech Spec temperature. Also the second part is correct.*
- B. *Incorrect, Plausible since 20°F is the maximum temperature by procedure for the optimal range of temperature for normal operation. The candidate may get confused between the optimal temperature and maximum Tech Spec temperature. Also the second part is not correct, although plausible since steam line breaks also release a lot of thermal energy and would result in high containment temperatures during an accident.*
- C. *Correct, In accordance with 1-SI-OPS-000-002.1, Shift Log the ice condenser temperature may exceed the optimal range (18-20°F) as long as the Tech Spec 3.6.12 limit of $\leq 27^\circ\text{F}$ is not exceeded. The entire ice condenser system is designed to limit the inside containment pressure to 12 psig for any LOCA accident.*
- D. *Incorrect, Plausible since the first part is correct, however the design is to limit peak containment pressure during LOCA events. Also the second part is not correct, although plausible since steam line breaks also release a lot of thermal energy and would result in high containment temperatures during an accident.*

1603 NRC RO Exam

Question Number: 40

Tier: 2 **Group** 1

K/A: 025 Ice Condenser System
K5.01 Knowledge of operational implications of the following concepts as they apply to the ice condenser system:
Relationships between pressure and temperature

Importance Rating: 3.0 / 3.4

10 CFR Part 55: 41.5

10CFR55.43.b: not applicable

K/A Match: This question matches the K/A by testing the candidates knowledge of the relationship of temperature of ice condenser bed and containment pressure during accident conditions.

Technical Reference: 1-SI-OPS-000-002.1 rev 0111
ITS 3.6.12
0-SO-61-1 rev 40

Proposed references to be provided: None

Learning Objective: OPT200.ICE, Obj 12 & 16

Question Source:

New	<u> </u>
Modified Bank	<u> </u>
Bank	<u> X </u>

Question History: SQN bank updated from a question written for 1201 NRC exam

Comments:

1603 NRC RO Exam

41. 022 K3.02 041/BANK/SQN/HIGHER//RO/SEQUOYAH/1/2009 RETAKE/NO

Given the following plant conditions:

- Unit 2 is operating at 100% power.
- Due to a loss of Lower Compartment Cooling, lower containment temperature has risen from 110°F to 119°F.
- Actions are in progress to restore cooling.

If the temperature continues to rise in containment, which ONE of the following describes the effect on pressurizer level indication?

The controlling pressurizer level channel will indicate slightly...

- A. higher than actual level, and remain lower than the cold-calibrated pressurizer level instrument.
- B. lower than actual level, and remain lower than the cold-calibrated pressurizer level instrument.
- C. higher than actual level, and remain higher than the cold-calibrated pressurizer level instrument.
- D. lower than actual level, and remain higher than the cold-calibrated pressurizer level instrument.

DISTRACTOR ANALYSIS:

- A. *Incorrect, When the containment atmospheric temperature rises, the pressurizer reference leg will heat up, causing density to decrease, and exerting less pressure on the reference leg side of the transmitter, resulting in an increase in the indicated level, however the controlling level channel will remain higher than the cold-calibrated instrument. Plausible because the level indicating slightly higher is correct and the relationship with the cold calibrated instrument could be reversed.*
- B. *Incorrect, The controlling level channel will indicate higher than the cold-calibrated channel not lower. Plausible if the effects of the temperature rise and relationship with the cold calibrated instrument are reversed.*
- C. *Correct, The cold calibrated pressurizer level instrument is calibrated for temperatures far lower than normal operating temperatures and will indicate lower. When the containment atmospheric temperature rises, the pressurizer reference leg will heat up, causing density to decrease, and exerting less pressure on the reference leg side of the transmitter. This will result in an increase in indicated level.*
- D. *Incorrect, The controlling level channel will indicate higher than the cold-calibrated channel not lower. Plausible if the effect of the temperature rise is reversed; because the relationship with the cold calibrated instrument is correct.*

1603 NRC RO Exam

Question Number: 41

Tier: 2 **Group** 1

K/A: 022 Containment Cooling System
K3.02 Knowledge of the effect that a loss or malfunction of the CCS will have on the following:
Containment instrumentation readings

Importance Rating: 3.0 / 3.2

10 CFR Part 55: 41.7

10CFR55.43.b: n/a

K/A Match: This question matches the K/A by having the candidate identify the effects of changing CNMT temperature on PZR level instrumentation which is located inside CNMT.

Technical Reference: 0-GO-13, Reactor Coolant Drain and Fill Operations, rev 59

Proposed references to be provided: None

Learning Objective: OPT200PZRLCS B.4.e, .h,& .j

Question Source:

New	<u> </u>
Modified Bank	<u> </u>
Bank	<u> X </u>

Question History: SQN bank question used on 1305 Audit exam

Comments:

1603 NRC RO Exam

42. 025 K4.02 042/BANK/SQN/LOWER//RO/SEQUOYAH/2/2010/NO

Given the following plant conditions:

- Unit 1 at 100% power.
- An inadvertent Reactor Trip and Safety Injection occurred.
- Ice Condenser System glycol trapped between the inside and outside Containment penetration's return isolation valves expanded due to heating.

Which ONE of the following identifies the system response to the glycol expansion?

- A. The penetration's inside glycol isolation valve disks are designed to relieve trapped glycol into the Containment side glycol supply header.
- B. The penetration's outside glycol isolation valve disks are designed to relieve trapped glycol into the Auxiliary Building side glycol supply header.
- C. A bypass line with a check valve is installed around the penetration's inside isolation valve to relieve trapped glycol into the Containment side glycol supply header.
- D. A bypass line with a check valve is installed around the penetration's outside isolation valve to relieve trapped glycol into the Auxiliary Building side glycol supply header.

DISTRACTOR ANALYSIS:

- A. *Incorrect, The containment isolation valves are designed to completely seal off the penetration. The valve disc are not designed to relieve trapped glycol. A common plant misconception is that the valve disc have a small hole drilled into them to relieve trapped pressure and some valves are drilled in that fashion.*
- B. *Incorrect, The containment isolation valves are designed to completely seal off the penetration. The valve disc are not designed to relieve trapped glycol. A common plant misconception is that some valve disc have a small hole drilled into them to relieve trapped pressure. A common plant misconception is that the valve disc have a small hole drilled into them to relieve trapped pressure and some valves are drilled in that fashion.*
- C. *Correct, As shown on 47W814-2. This check valve relieves trapped glycol back into the containment which is more conservative from a containment isolation perspective.*
- D. *Incorrect, The small bypass line with a check valve is correct, however it relieves back into the containment side glycol header and not to the auxiliary building side header. Plausible to prevent relieving into containment.*

1603 NRC RO Exam

Question Number: 42

Tier: 2 **Group** 1

K/A: 025 Ice Condenser system
K4.02 Knowledge of ice condenser system design feature(s) and/or interlock(s) which provide for the following:
System control

Importance Rating: 2.8* / 3.0*

10 CFR Part 55: 41.7

10CFR55.42.b: Not applicable

K/A Match: Applicant is required to identify the design feature of the ice condenser cooling system that can control a pressure rise in order to prevent an overpressurization of the system due to the expansion of trapped fluid.

Technical Reference: 0-SO-61-1, Ice Condenser Cooling, Rev 30
1,2-47W814-2, Rev 22

Proposed references to be provided: None

Learning Objective: OPT200ICE B.4.i

Question Source:

New	<u> </u>
Modified Bank	<u> </u>
Bank	<u> X </u>

Question History: SQN bank question

Comments:

1603 NRC RO Exam

43. 026 K4.07 043/BANK/SQN/HIGHER//RO/SQN/03/2016/NO

Given the following plant conditions:

- Unit 1 tripped from 100% power due to a LOCA.
- The crew is implementing ES-1.3, "Transfer to RHR Containment Sump," and preparing to align the suction of the Containment Spray pumps to the containment sump.

In accordance with ES-1.3, which ONE of the following identifies an electrical interlock associated with containment sump level which must be satisfied before 1-FCV-72-23, Containment Spray Pump 1A Suction from Containment Sump will open?

Containment sump level must be at least _____ .

- A. 8%
- B✓ 11%
- C. 18%
- D. 56%

DISTRACTOR ANALYSIS:

- A. *Incorrect, Plausible since this is a number listed in ES-1.3 associated with the containment spray pumps however this is the minimum level in the RWST that requires all pumps to be turned off. The candidate could get the minimum RWST level that requires the pumps to be turned off confused with the minimum level in the containment sump.*
- B. *Correct, 11% is the minimum required containment sump level required for the sump suction swap-over for the RHR pumps. Containment sump level must be at least 11% for 1-FCV-74-3, RHR Pump 1A Suction isolation from RWST to close. 1-FCV-74-3 is required to be closed to allow 1-FCV-72-23 to open from the control room. Although not a direct interlock, it is a minimum containment sump level that is required to allow the alternate sump suction to open. Also at SQN RHR spray is an allowable backup to normal containment spray, thus at least 11% in the containment sump would be a direct interlock for that system.*
- C. *Incorrect, Plausible since 18% is a procedural requirement in ES-1.3 to switch containment spray pumps to their alternate containment sump suction. Although this is a procedural requirement it is NOT an electrical interlock.*
- D. *Incorrect, Plausible since there is a procedure step in ES-1.3 that has the operators check containment sump level and directs the containment spray pump suction to be shifted to the containment sump if sump level is $\geq 56\%$. Again this is a procedural requirement not an electrical interlock.*

1603 NRC RO Exam

Question Number: 43

Tier: 2 **Group** 1

K/A: 026 Containment Spray System (CSS)
K4.07 Knowledge of the CSS design feature(s) and/or interlock(s) which provide for the following:
Adequate level in containment sump for suction (interlock)

Importance Rating: 3.8* / 4.1*

10 CFR Part 55: 41.7

10CFR55.43.b: n/a

K/A Match: This question matches the K/A by having the candidate recall the interlock(s) necessary to open the containment sump supply valves for the Containment Spray Pumps.

Technical Reference: ES-1.3 rev 20

Proposed references to be provided: None

Learning Objective: OPT200.CS obj B.4.g
OPL271ES-1.3 obj B.2

Question Source:

New	<u> </u>
Modified Bank	<u> </u>
Bank	<u> X </u>

Question History: SQN bank question

Comments:

1603 NRC RO Exam

44. 039 K1.05 044/NEW//HIGHER//RO/SEQUOYAH/03/2016/NO

Given the following plant conditions:

- Unit 1 is operating at 100% power.
- Subsequently, a tube rupture occurs in the second stage reheat bundle of the 1A1 MSR.

Which ONE of the following completes the statements below?

(1) The tube rupture will cause the enthalpy of the steam leaving the MSR and entering the LP turbine to (1) .

and

(2) Assuming the turbine EHC control is in IMP OUT, the electrical output of Main Generator will (2) .

- A. (1) rise
(2) rise
- B. (1) rise
(2) lower
- C. (1) lower
(2) rise
- D. (1) lower
(2) lower

DISTRACTOR ANALYSIS:

- A. *Incorrect, Plausible if the candidate thinks that the higher pressure steam being introduced into the MSR exhaust will cause the enthalpy to increase. Also plausible that with the increased enthalpy that more electrical power will be produced.*
- B. *Incorrect, Plausible if the candidate thinks that the higher pressure steam being introduced into the MSR exhaust will cause the enthalpy to increase. Also plausible since the second part is correct.*
- C. *Incorrect, Plausible since the first part is correct. Also plausible if the candidate does not recognize that turbine controls are in IMP OUT mode which would prevent the turbine control valves from opening thus electrical output would lower slightly.*
- D. *Correct, A tube leak in an MSR while operating at power will reduce the enthalpy of steam entering the LP turbine thus reducing the work done. With the turbine EHC control in IMP OUT the steam flow into the HP turbine would remain the same and thus electrical output would lower slightly.*

1603 NRC RO Exam

Question Number: 44

Tier: 2 **Group** 1

K/A: 039 Main and Reheat Steam System (MRSS)
K1.05 Knowledge of the physical connections and/or cause-effect relationships between Main Steam/Reheat Steam system and the following:
T/G

Importance Rating: 2.5* 2.6*

10 CFR Part 55: 41.2 to 41.9

10CFR55.43.b: n/a

K/A Match: This question matches the K/A by having the candidate determine the cause-effect relationship between a tube failure associated with a MSR and its effect on the M/TG, both steam quality and electrical output.

Technical Reference: OPT200.MSR
1,2-SO-5-1 rev

Proposed references to be provided: None

Learning Objective: OPT200.MSR obj 4, 6, 7

Question Source:

New X
Modified Bank
Bank

Question History: New question written for 1603 ILT exam

Comments:

1603 NRC RO Exam

45. 039 K4.02 045/BANK/SQN/HIGHER//RO/SEQUOYAH/1/2008/NO

Given the following plant conditions:

- Unit 2 is in Mode 3
- RCS pressure is 2235 psig
- T_{avg} is being maintained by the steam dumps at 547°F in steam pressure mode.
- Atmospheric steam dumps have been set per SO-1-1 after placing steam dumps to condenser in service.
- All four RCP's are running.
- Subsequently, a complete loss of Condenser vacuum occurs.

Which ONE of the following identifies the value at which RCS T_{avg} is expected to stabilize? (Assume NO operator action)

- A. 547°F
- B. 549°F
- C. 552°F
- D. 554°F

DISTRACTOR ANALYSIS:

- A. *Incorrect, Plausible if the candidate thinks that the RCS temperature would remain unchanged due to transfer of steam dumps to atmosphere.*
- B. *Correct, Failure of steam dump (C-9, Loss of vacuum) causes heat removal by ARVs. The following derived from steam tables: 1025 psig + 15 psi = 1040 psia (1025 psig is the nominal setpoint for S/G ARVs)
 T_{sat} for 1040 psia = 549°F.*
- C. *Incorrect, Plausible if the candidate thinks that the steam dumps will control at the Reactor trip controller setpoint = 552°F*
- D. *Incorrect, Plausible if the candidate thinks that the steam dumps will control at the Reactor trip controller setpoint and makes a math error when adjusting for psia.*

1603 NRC RO Exam

Question Number: 45

Tier: 2 **Group** 1

K/A: 039 Main and Reheat Steam System (MRSS)
K4.02 Knowledge of MRSS design feature(s) and/or interlock(s) which provide for the following:
Utilization of Tave program control when steam dumping through atmospheric relief/dump valves, including Tave limits.

Importance Rating: 3.1 / 3.2

10 CFR Part 55: 41.7

10CFR55.43.b: n/a

K/A Match: This question matches the K/A by having the candidate determine how (and at which temperature) the steam dump control system will control the temperature of the RCS when steam is dumped through the atmospheric relief valves.

Technical Reference: 2-SO-1-1
Steam Tables

Proposed references to be provided: None

Learning Objective: OPL271C433, B.2
OPL273C0511, Obj 3, 8

Question Source:

New	<u> </u>
Modified Bank	<u> </u>
Bank	<u> X </u>

Question History: SQN bank question

Comments:

1603 NRC RO Exam

46. 059 G2.1.32 146/NEW//LOWER//RO/SQN/03/2016/NO

Given the following plant conditions:

- Unit 1 is in Mode 2 performing a plant startup.
- Breaker 523 "MFPT A 250V DC Trip" bus supply breaker is OPEN.
- Breaker 524 "MFPT B 250V DC Trip" bus supply breaker is CLOSED.
- The "B" MFWP turbine is RESET.
- Subsequently, Injection water supply pressure drops to <220 psig for 25 seconds before returning to normal.

Which ONE of the following completes the statements below?

The "B" MFWP (1) auto trip.

and

If the "B" MFWP does trip, the AFW pumps (2) receive an auto start signal.

- A. (1) will
(2) will
- B✓ (1) will
(2) will NOT**
- C. (1) will NOT
(2) will
- D. (1) will NOT
(2) will NOT

DISTRACTOR ANALYSIS:

- A. *Incorrect, Plausible since the first part is correct. Also plausible if the candidate thinks that with one MFWP turbine trip bus de-energized that half of the auto start feature for SSPS is present and that a loss of the other MFW pump would cause an auto start of AFW pumps.*
- B. *Correct, In accordance with the precautions and limitations of 1-SO-2/3-1; P&L DD, if the injection water supply pressure lowers to <220 psig for > 20 sec the 1B MFWP will trip. Also for the auto start feature of the AFW pumps on a trip of both MFW pumps to be functional, both MFWP turbine trip buses must be energized and the non-running MFW pump control Tripped. This will send the proper signal to SSPS that both MFWP Turbines are tripped and auto start the AFW pumps.*
- C. *Incorrect, Plausible since the 1A MFWP will trip if injection water pressure is <220 psig for > 28 sec and the candidate could get these numbers confused. Also plausible if the candidate thinks that with one MFWP turbine trip bus de-energized that half of the auto start feature for SSPS is present and that a loss of the other MFW pump would cause an auto start of AFW pumps.*
- D. *Incorrect, Plausible since the 1A MFWP will trip if injection water pressure is <220 psig for > 28 sec and the candidate could get these numbers confused. Also plausible since the second part is correct.*

1603 NRC RO Exam

Question Number: 46

Tier: 2 **Group** 1

K/A: 059 Main Feedwater (MFW)
G 2.1.32 Ability to explain and apply system limits and precautions.

Importance Rating: 3.8 / 4.0

10 CFR Part 55: 41.10

10CFR55.43.b: n/a

K/A Match: This question matches the K/A by having the candidate explain the system limit and precaution associated with the operation of MFW system.

Technical Reference: 1-SO-2/3-1 rev

Proposed references to be provided: None

Learning Objective: OPT200.MFW obj.

Question Source:

New	<u>X</u>
Modified Bank	_____
Bank	_____

Question History: New question written for 1603 ILT exam

Comments:

1603 NRC RO Exam

47. 061 K3.01 047/BANK/SQN/HIGHER//RO/SEQUOYAH/1/2009/NO

Given the following conditions:

- Unit 2 is operating at 100% power.
- Subsequently, instrument failures cause a spurious Main Feedwater Isolation Signal.
- **NO** Auxiliary Feedwater Pumps start.
- The reactor does **NOT** trip.
- AMSAC fails to actuate.

Assuming **NO** operator action, which ONE of the following is the primary concern to plant systems and why?

- A. Main steamline break due to thermal shock on Steam Generator shell.
- B. SG tube rupture due to high primary-to-secondary differential pressure.
- C. Challenge to PZR PORVs and safety valves due to overpressure transient in the RCS.
- D. Overpower condition due to the failure of the turbine to receive a trip signal.

DISTRACTOR ANALYSIS:

- A. *Incorrect, Steam generator pressure would increase but a steam generator shell failure is not the primary concern but not the primary concern during the transient. Plausible because the pressure transient will occur.*
- B. *Incorrect, Differential pressure across the steam generator tubes is a concern but not the primary concern during the event if no AFW pumps start. Plausible because the steam generator tube differential pressure can be a concern during other events.*
- C. *CORRECT, With no AFW to supply inventory to the steam generators, the condition would reach a point where the RCS pressure would increase and could not be restored to normal resulting in an overpressure transient on the RCS without operator action prior to losing minimum inventory.*
- D. *Incorrect, The CCPs shutoff head is greater than the PORV lift pressure and will deliver flow through the CCPIT. Plausible because some plants are designed where the charging pumps would not deliver flow.*

1603 NRC RO Exam

Question Number: 47

Tier: 2 **Group** 1

K/A: 061 Auxiliary/Emergency Feedwater System (AFW)
K3.01 Knowledge of the effect that a loss or malfunction of the AFW will have on the following:
RCS

Importance Rating: 4.4 / 4.6

10 CFR Part 55: 41.7

10CFR55.43.b: n/a

K/A Match: This question matches the K/A by having the candidate identify the effect that a loss of AFW following a reactor trip would have on the RCS (temperature and pressure).

Technical Reference: EPM-3-FR-H.1

Proposed references to be provided: None

Learning Objective: OPL271FR-H.1 obj B.5

Question Source:

New	<u> </u>
Modified Bank	<u> </u>
Bank	<u> X </u>

Question History: SQN bank question

Comments:

1603 NRC RO Exam

48. 061 K6.01 048/BANK/SQN/LOWER//RO/SQN/1311/NO

Given the following plant conditions:

- Unit 1 is operating at 100% power
- During the performance of a surveillance test on the TDAFW pump, the following alarm is received:

AUX FWP TURBINE 1A-S MECHANICAL OVERSPEED TRIP (1-M-3C, A-4)

- The cause of the alarm is determined to be 1-FIC-46-57 failed to control the pump outlet flow.

Which ONE of the following identifies:

- (1) the setpoint for this alarm

AND

- (2) after the Mechanical Overspeed mechanism is RESET and LATCHED, the action required prior to attempting to restart the TDAFW pump in accordance with 1-SO-3-2, "Auxiliary Feedwater System?"

- A. (1) 4300 rpm
(2) Hold 1-HS-1-51A-S, Trip/Throttle Valve, closed for 10 seconds to clear the overspeed alarm, then open Trip/Throttle valve using 1-HS-51-A-S.
- B. (1) 4300 rpm
(2) Place speed controller in MANUAL and set controller output at 20%, then open Trip/Throttle valve using 1-HS-1-51A-S.
- C. (1) 4900 rpm
(2) Hold 1-HS-1-51A-S, Trip/Throttle Valve, closed for 10 seconds to clear the overspeed alarm, then open Trip/Throttle valve using 1-HS-51-A-S.
- D. (1) 4900 rpm
(2) Place speed controller in MANUAL and set controller output at 20%, then open Trip/Throttle valve using 1-HS-1-51A-S.**

DISTRACTOR ANALYSIS:

- A. *Incorrect. First part is incorrect. Plausible since 4300 rpm is the setpoint of the electrical overspeed trip device for the TDAFW pump. Second part is incorrect. Plausible since these are the actions required to reset and clear the alarm for an electrical overspeed trip.*
- B. *Incorrect. First part is incorrect (see item A). Second part is correct. These are the actions required when a mechanical overspeed trip occurs due to 1-FIC-46-57 failing to control pump flow automatically.*
- C. *Incorrect. First part is correct. 4900 rpm is the setpoint of the mechanical overspeed trip device. Second part is incorrect (see item A).*
- D. *Correct. First part is correct. 4900 rpm is the setpoint of the mechanical overspeed trip device. Second part is correct. These are the actions required when a mechanical overspeed trip occurs due to 1-FIC-46-57 failing to control pump flow automatically.*

1603 NRC RO Exam

Question Number: 48

Tier: 2 **Group** 1

K/A: 061 Auxiliary / Emergency Feedwater (AFW) System
K6.01 Knowledge of the effect of a loss or malfunction of the following will have on the AFW components: Controllers and positioners

Importance Rating: 2.5/2.8

10 CFR Part 55: 41.7

10CFR55.43.b: Not applicable

K/A Match: Question matches KA by having candidate determine the actions necessary to re-start the TDAFW pump following a malfunction of the pump speed controller in accordance with plant procedures

Technical Reference: 1-SO-3-2, Rev 48
1-AR-M3-C Rev 19 (window A-4)

Proposed references to be provided: None

Learning Objective: OPT200.AFW Obj 8.e
Explain the AFW system design features and/or operational interlocks that provide the following: Turbine trip, including overspeed

Question Source:

New	<u> </u>
Modified Bank	<u> </u>
Bank	<u> X </u>

Question History: New for ILT NRC 1311 Exam

Comments:

1603 NRC RO Exam

49. 062 A3.04 049/BANK/SQN/LOWER//RO/SEQUOYAH//NO

Given the following plant conditions:

- Both units are at 100% power.
- The following annunciator was received on Unit 1:
 - XA-55-1C Window A-6
"120V AC VITAL INVERTER 1-I OR INVERTER 0-I ABNORMAL"
- AUOs were dispatched to the inverters and found the yellow "BYPASS SOURCE SUPPLYING LOAD" light lit on the inverter 1-I.

Which ONE of the following completes the statement below?

The inverter has transferred to the (1) .

and

LCO 3.8.7 "Inverters - Operating" (2) be entered.

- A. (1) 125V DC Vital Battery Board
(2) would
- B. (1) 125V DC Vital Battery Board
(2) would **NOT**
- C✓ (1) Isolimiter (Reg) transformer
(2) would
- D. (1) Isolimiter (Reg) transformer
(2) would **NOT**

DISTRACTOR ANALYSIS:

- A. *Incorrect, Plausible if the candidate does not recognize that the inverter has transferred to the isolimiter. Also plausible since the second part is correct.*
- B. *Incorrect, Plausible if the candidate does not recognize that the inverter has transferred to the isolimiter. Also plausible that since the bus is still energized that the Tech Spec LCO would not have to be entered.*
- C. *Correct, In accordance with 1-AR-M1-C, The yellow light lit locally means that the inverter has swapped to the isolimiter. The isolimiter is not an inverted source, therefore, the inverter does not meet the LCO.*
- D. *Incorrect, Plausible since the first part is correct. Also plausible that since the bus is still energized that the Tech Spec LCO would not have to be entered.*

Reference 1-AR-M1-C. The yellow light lit locally means that the inverter has swapped to the isolimiter. The isolimiter is not an inverted source, therefore, the inverter does not meet the LCO.

NOTE

An automatic transfer to the Regulated Bypass will occur in the event Inverter 1-I fails or experiences overload. The bypass supply is not an inverter and does not meet Tech Spec requirements.

- [3] **IF** the bypass power source is supplying the load (Yellow light on the Isolimiter panel illuminated, **THEN**
EVALUATE TS LCO 3.8.2.1 and 3.8.2.2.

1603 NRC RO Exam

Question Number: 49

Tier: 2 **Group** 1

K/A: 062 AC Electrical Distribution
A3.04 Ability to monitor automatic operation of the AC distribution system,
including:
Operation of inverter (e.g. precharging synchronizing light, static transfer).

Importance Rating: 2.7 / 2.9

10 CFR Part 55: 41.7

10CFR55.43.b: N/A

K/A Match: This question matches the K/A by having the candidate identify from the alarm given how the inverter operated to maintain power and whether or not the system has degraded to the point the a Tech Spec entry is required.

Technical Reference: Tech Spec 3.8.7
1-AR-M1-C

Proposed references to be provided: None

Learning Objective: OPT200.120VAC obj. 4b, 5a

Question Source:

New	<u> </u>
Modified Bank	<u> </u>
Bank	<u> X </u>

Question History: SQN bank question

Comments:

1603 NRC RO Exam

50. 063 A4.01 250/BANK/SQN/HIGHER//RO/SEQUOYAH/09/2010/NO

Given the following plant conditions:

- Unit 1 is operating at 100% power

Which ONE of the following would indicate that the 125V DC Vital Battery Charger 1-I output breaker tripped open?

Panel 1M-C annunciator (1) would alarm and indicator EI-57-92, Batt BD I AMPS, would be indicating (2) from zero.

- A. (1) "125V DC VITAL BAT BD I ABNORMAL" (A-5)
(2) upscale
- B. (1) "125V DC VITAL BAT BD I ABNORMAL" (A-5)
(2) downscale
- C✓ (1) "125 V DC VITAL CHGR I FAILURE OR VITAL BAT I DISCHARGE" (A-4)
(2) upscale
- D. (1) "125 V DC VITAL CHGR I FAILURE OR VITAL BAT I DISCHARGE" (A-4)
(2) downscale

DISTRACTOR ANALYSIS:

- A. *Incorrect, Plausible since the opening of the charger output breaker would cause an alarm, however this is the wrong alarm, however the second part of the answer is correct, the battery would show discharge.*
- B. *Incorrect, Plausible since the opening of the charger output breaker would cause an alarm, however this is the wrong alarm, also the battery discharge meter would be reading upscale (or battery discharge) vs downscale (battery charging).*
- C. *Correct, With the Vital Battery Charger 1-I no longer connected to Vital battery I the trouble alarm would annunciate and the Battery would show a discharge due to the normal loads not being supplied by the charger.*
- D. *Incorrect, Plausible since first part of the answer is correct, however the battery discharge meter would be reading upscale (or battery discharge) vs downscale (battery charging).*

1603 NRC RO Exam

Question Number: 50

Tier: 2 **Group** 1

K/A: 063 D.C Electrical Distribution
A4.01 Ability to manually operate and/or monitor in the control room.
Major breakers and control power fuses

Importance Rating: 2.8* / 3.1

10 CFR Part 55: 41.7

10CFR55.43.b: Not applicable

K/A Match: This question matches the K/A by having the candidate identify the indications that would be present if a major breaker (Battery Charger 1-I output breaker) were to trip open.

Technical Reference: 1-AR-M1-C, 125 DC VITAL CHGR I FAILURE OR
VITAL BAT I DISCHARGE, (A,4)
Rev 41

Proposed references to be provided: None

Learning Objective: OPT200.DC B.5.c., d.

Cognitive Level:

Higher X
Lower _____

Question Source:

New _____
Modified Bank _____
Bank X

Question History: SQN Bank question 063 A4.01 048 used on 1/2009 audit exam.

Comments:

1603 NRC RO Exam

51. 064 K2.02 051/BANK/SQN/HIGHER//RO/SEQUOYAH//NO

Given the following plant conditions:

- Unit 1 is in Mode 3
- The Diesel Generator 1A-A Day Tank Fuel Oil Transfer Pump #1 is running in automatic due to a low level in a 1A-A Day Tank caused when maintenance pumped out the day tank .
- The D/G 1A-A is **NOT** running at this time.
- Subsequently, 6.9Kv Unit Bd 1B trips on a ground fault.

Which ONE of the following is completes the statement below?

The Diesel Generator Day Tank Fuel Oil Transfer Pump will

- A. continue to run since it is DC powered from the D/G battery.
- B. stop and after the 1A-A D/G ties onto the 1A-A 6.9 kv Shutdown Bd., the pump will re-start.
- C. stop and require manual restart after 6.9 kv Shutdown Bd 1A-A is energized.
- D. continue to run since it is powered from "B" train shutdown power.

DISTRACTOR ANALYSIS:

- A. *Incorrect, Plausible since other equipment/pumps associated with the EDG are powered from DC, however the pump's power supply is Diesel Aux Bd 1A1-A, not DC powered.*
- B. *Correct, the pump's power supply is Diesel Aux Bd 1A1-A which will be energized when the D/G 1 A-A ties on to 6.9 kv Shutdown Bd. 1 A-A.*
- C. *Incorrect, Plausible since the pump was running in auto when the 6.9 unit bd tripped therefore the switch position remains the same and the transfer pump will start again since the day tank level was not increased to normal level.*
- D. *Incorrect, Plausible, however the pump's power supply is Diesel Aux Bd 1A1-A which is fed from the 480v Shutdown Bd 1A1-A.*

1603 NRC RO Exam

Question Number: 51

Tier: 2 **Group** 1

K/A: 064 Emergency Diesel Generator (EDG)
K2.02 Knowledge of the bus power supplies to the following:
Fuel oil pumps.

Importance Rating: 2.8 / 3.1

10 CFR Part 55: 41.7

10CFR55.43.b: N/A

K/A Match: This question matches the K/A by having the candidate determine the available power supply for the EDGs.

Technical Reference: 45N771-4
15N500

Proposed references to be provided: None

Learning Objective: OPL271 D/G B.10

Question Source:

New	<u> </u>
Modified Bank	<u> </u>
Bank	<u> X </u>

Question History: SQN bank question

Comments:

1603 NRC RO Exam

52. 073 A1.01 052/BANK/WBN/HIGHER//RO/SEQUOYAH/09/2010/NO

Given the following plant conditions:

- Unit 1 is operating at 100% power
- Total primary to secondary leakage is 70 gpd
- Identified RCS leakage is 0.18 gpm
- Unidentified RCS leakage is 0.2 gpm
- Pzr level, VCT level, charging flow, and letdown flow are all stable

Which ONE of the following conditions would provide the first indications in the control room of a developing fuel element defect?

- A. Annunciator "1-RA-272A UPPR IN CNTMT HI RAD" alarms and a rapidly increasing count rate on 1-RM-90-112A/B/C "Upper Containment Air Monitor."
- B. A rapidly increasing count rate on 1-RM-90-119 "Condenser Vacuum Exhaust Monitor" and a rapidly increasing count rate on 1-RM-90-112A/B/C "Upper Containment Air Monitor."
- C. A slowly increasing count rate on 1-RM-90-130A and -131A "Containment Purge Exhaust Monitors" and Annunciator "1-RA-272A UPPR IN CNTMT HI RAD" alarms.
- D. A slowly increasing count rate on 1-RM-90-106A/B "Lower Containment Air Monitor" and a slowly increasing count rate on 1-RM-90-119 "Condenser Vacuum Exhaust Monitor."

DISTRACTOR ANALYSIS:

- A. *Incorrect, Plausible because both 1-RE-90-272 and 1-RM-90-112 are containment radiation monitors, but both are in upper containment instead of lower containment. The alarm for 1-RE-90-272 is set at 20R for accident monitoring.*
- B. *Incorrect, Plausible because condenser vacuum pump radiation will be increasing and containment radiation will be increasing but the increase will be in lower containment not upper containment.*
- C. *Incorrect, Plausible because 1-RM-90-130 and 131 may increase due to the developing fuel failure and the 1-RE-90-272 is a containment radiation monitor.*
- D. *Correct, As per the NOTE in AOP-R.06, RCS High Activity, as RCS activity increases containment activity will increase due to RCS leakage and secondary activity will increase due to primary to secondary leakage.*

1603 NRC RO Exam

Question Number: 52

Tier: 1 **Group** 2

K/A: 073 A1.01
Process Radiation Monitoring (PRM) System
Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating the PRM system controls including:
Radiation levels

Importance Rating: 3.2 / 3.5

10 CFR Part 55: 41.5

10CFR55.43.b: Not applicable

K/A Match: Question requires applicant to predict or recognize changes in process rad monitor radiation levels associated with a developing fuel element defect.

Technical Reference: AOP-R.06, High RCS Activity, Rev 10
AOP-R.01, Steam Generator Tube Leak, Rev 26

Proposed references to be provided: None

Learning Objective: OPL271AOP-R.06, Obj B.4

Cognitive Level:
Higher X
Lower

Question Source:
New
Modified Bank
Bank X

Question History: WBN bank question used on 2006 exam

Comments:

1603 NRC RO Exam

53. 076 A2.01 053/BANK/SQN/HIGHER//RO/SEQUOYAH/1/2008/NO

Given the following plant conditions:

- Both Units operating at 100% power
- All systems aligned normally

If a large ERCW leak developed at the inlet to the 1A1 CCS Heat Exchanger, which ONE of the ERCW Headers would have increased flow, and when the leak was isolated, how would the 1A and 2A ERCW header pressures be effected?

	<u>Header with Flow Increase</u>	<u>Effect on Header Pressure after leak is isolated</u>
A.	1A	Both 1A and 2A header pressures would increase
B.	1A	Only the 1A header pressure would increase
C✓	2A	Both 1A and 2A header pressures would increase
D.	2A	Only the 2A header pressure would increase

DISTRACTOR ANALYSIS:

- A. *Incorrect, The 1A ERCW supply header is not the header supplying the flow for the 1A1&1A2 CCS Heat Exchangers, the 2A header ERCW is the supply. However, because the headers are common at the pumping station, isolating the leak would cause both 1A and 2A header pressures to increase. Plausible because the component with the leak is a Unit 1 heat exchanger and standard configuration would be for a Unit 1 water header to supply the cooling and if so the flow would increase in the 1A header and the candidate could correctly relate the reduction in flow when the leak is isolated to only effecting pressures in both the 1A and 2A headers.*

- B. *Incorrect, The 1A ERCW supply header is not the header supplying the flow for the 1A1&1A2 CCS Heat Exchangers, the 2A header ERCW is the supply. Additionally, because the headers are common at the pumping station, isolating the leak would cause both 1A and 2A header pressures to increase. Plausible because the component with the leak is a Unit 1 heat exchanger and standard configuration would be for a Unit 1 water header to supply the cooling and if so the flow would increase in the 1A header and the candidate could relate the reduction in flow when the leak is isolated to only effecting pressure in the 1A header and not consider the connection at the pumping station.*

- C. *Correct, The 2A ERCW supply header is the normal supply for the 1A1&1A2 CCS Heat Exchangers and the 2A1&2A2 CCS Heat Exchangers. Isolating the leak would cause both 1A and 2A header pressures to increase because the headers are common at the ERCW Pumping Station.*

- D. *Incorrect, The 2A ERCW supply header is the normal supply for the 1A1&1A2 CCS Heat Exchangers and the 2A1&2A2 CCS Heat Exchangers. However because the headers are common at the pumping station, isolating the leak would cause both 1A and 2A header pressures to increase. Plausible because the flow would increase in only the 2A header and the candidate could relate the reduction in flow when the leak is isolated to only effecting pressure in the 2A header and not consider the connection at the pumping station.*

1603 NRC RO Exam

Question Number: 53

Tier: 2 **Group** 1

K/A: 076 Service Water System (SWS)
A2.01 Ability to (a) predict the impacts of the following malfunctions or operations on the SWS, and (b) based on those predictions, use procedures to correct, control or mitigate the consequences of those malfunction or operations:
Loss of SWS.

Importance Rating: 3.5 / 3.7

10 CFR Part 55: 41.5

10CFR55.43.b: N/A

K/A Match: This question matches the K/A by having the candidate determine the effect of a leak on the Essential Raw Cooling water header and the required actions necessary to mitigate the event.

Technical Reference: 0-SO-67-1, Essential Raw Cooling Water
1, 2-47W845-1 R47;
1, 2-47W845-2 R93;
1, 2-47W845-5 R59,

Proposed references to be provided: None

Learning Objective: OPT200ERCW

Question Source:

New	<u> </u>
Modified Bank	<u> </u>
Bank	<u> X </u>

Question History: SQN bank question

Comments:

1603 NRC RO Exam

54. 078 K2.02 054/BANK/SQN/HIGHER//RO/SEQUOYAH/03/ 2016/NO

Given the following plant conditions:

- Unit 1 is in Mode 5 with 6.9kV Shutdown Board 1A-A tagged for maintenance.
- Subsequently, 6.9kV Shutdown Board 2B-B trips and locks out due to relay operation.

Which ONE of the following identifies the status of the Auxiliary Air Compressor power supplies?

- A. Both Auxiliary Air Compressors have a power supply available.
- B. Neither Auxiliary Air Compressor has a power supply available.
- C. Only the Auxiliary Air Compressor A-A has a power supply available.
- D. Only the Auxiliary Air Compressor B-B has a power supply available.

DISTRACTOR ANALYSIS:

- A. *Incorrect, The B-B Aux Air Compressor is supplied from the C&A Vent Board 2B-1B which is supplied from Shutdown Board 2B-B (de-energized). Plausible if the candidate reverses the unit shutdown board (1B-B instead of 2B-B) that supplies the B-B Aux Air Compressor and correctly identifies the power supply to the A-A Aux Air Compressor.*
- B. *Incorrect, The A-A Aux Air Compressor is supplied from the C&A Vent Board 2A-1A which is supplied from Shutdown Board 2A-A (energized). Plausible if the candidate correctly identifies the power supply to the B-B Aux Air Compressor and reverses the unit shutdown board (1A-A instead of 2A-A) that supplies the A-A Aux Air Compressor.*
- C. **CORRECT** *The A-A Aux Air Compressor is supplied from the C&A Vent Board 2A-1A which is supplied from Shutdown Board 2A-A (energized). The B-B Aux Air Compressor is supplied from the C&A Vent Board 2B-1B which is supplied from Shutdown Board 2B-B (de-energized).*
- D. *Incorrect, The B-B Aux Air Compressor is supplied from the C&A Vent Board 2B-1B which is supplied from Shutdown Board 2B-B (de-energized). Plausible if the candidate reverses the unit shutdown boards where compressors get their power supply and concludes the Shutdown Board 1B-B supplies B-B Aux Air Compressor (and the Shutdown Board 1A-A supplies A-A Aux Air Compressor.)*

1603 NRC RO Exam

Question Number: 54

Tier: 2 **Group** 1

K/A: 078 Instrument Air System (IAS)
K2.02 Knowledge of the bus power supplies to the following:
Emergency air compressor

Importance Rating: 3.3* / 3.5*

10 CFR Part 55: 41.7

10CFR55.43.b: n/a

K/A Match: This question matches the K/A by having the candidate determine air compressors that would be available given the loss of 6.9KV power in the stem.

Technical Reference: 0-SO-32-2, Attachment 1, Auxiliary Compressed Air System Power Checklist, Rev 2.
1,2-15E500-1 R26.

Proposed references to be provided: None

Learning Objective: OPT200.CSA B.4.b

Question Source:

New	<u> </u>
Modified Bank	<u> </u>
Bank	<u> X </u>

Question History: SQN bank question

Comments:

1603 NRC RO Exam

55. 103 A3.01 055/BANK/SQN/HIGHER//RO/SEQUOYAH/2/2010/NO

Given the following plant conditions:

- Unit 2 experienced a Manual Safety Injection (SI).
- Containment Purge Rad Monitor, 2-RM-90-130, was in high rad alarm but has been reset.
- Containment Purge Rad Monitor, 2-RM-90-131, indicates normal.
- Containment Vent Isolation occurred on Train A.
- Containment Vent Isolation did NOT occur on Train B.
- Phase A has been RESET.
- SI signal has NOT been RESET.

Which ONE of the following identifies the status of the Containment Vent Isolation (CVI) system?

The CVI _____ and _____.

- A✓ should have occurred on A and B Train;
the CVI can be reset with the SI signal present.
- B. should have occurred on A and B Train;
the SI signal must be reset before the CVI can be reset.
- C. should NOT have occurred on B Train;
the CVI can be reset with the SI signal present.
- D. should NOT have occurred on B Train;
the SI signal must be reset before the CVI can be reset.

DISTRACTOR ANALYSIS:

- A. *Correct, A SI signal will initiate CVI on both trains. A reset switch exists that is self sealing which will allow CVI to be reset with a SI signal still present.*
- B. *Incorrect, First part correct, should have occurred on both trains. Second part incorrect. Plausible if candidate believes since an SI signal initiates a CVI that the SI must be cleared before resetting the CVI can be accomplished.*
- C. *Incorrect, Plausible if candidate does not know an SI signal will initiate CVI on both trains, and concludes since radiation levels did not go up on the B Train Rad monitor CVI Train B should not have occurred.*
- D. *Incorrect, Plausible to conclude that with radiation levels normal on the B Train Rad monitor, CVI Train B should not have occurred. Second part plausible if candidate concludes since an SI signal initiates isolation signals that the SI must be cleared before resetting the CVI can be accomplished.*

1603 NRC RO Exam

Question Number: 55

Tier: 2 **Group** 1

K/A: 103 Containment System
A3.01 Ability to monitor automatic operation of the containment system,
including: Containment isolation

Importance Rating: 3.9/4.2

10 CFR Part 55: 41.7 / 45.5

10CFR55.43.b: N/A

K/A Match: This question matches K/A by having the candidate determine status of CNMT isolation given the conditions in the stem and the actions necessary to reset the signal.

Technical Reference: 2-47W611-63-1 R3, 2-47W611-88-1R17

Proposed references to be provided: None

Learning Objective: OPT200.RPS, Obj. B.4.f & g
OPT200.PIS, Obj. B.4.f & g

Question Source:

New	<u> </u>
Modified Bank	<u> </u>
Bank	<u> X </u>

Question History: SQN bank question

Comments:

1603 NRC RO Exam

56. 002 K3.03 056/BANK/SQN/HIGHER//RO/SEQUOYAH/03/ 2016/NO

Given the following plant conditions:

- Unit 2 is at 100% power.
- Subsequently, a Reactor trip and SI have actuated.
- RCS pressure is 300 psig and LOWERING.
- PZR level is offscale LOW.
- RCS temperature is 504°F and LOWERING.
- Containment pressure is 6 psig and RISING slowly.
- S/G pressures are 690 psig and LOWERING slowly.
- Crew is performing E-0, "Reactor Trip or Safety Injection".

Which ONE of the following identifies the cause of these conditions?

- A. PZR Safety Valve failed OPEN.
- B✓ Loss of Coolant Accident (LOCA).
- C. Main Feed Line Break inside containment.
- D. Main Steam Line Break inside containment.

DISTRACTOR ANALYSIS:

- A. *Incorrect, Plausible since a failed safety valve would result in Pressurizer level increase. An operator who does not understand the difference between a vapor space LOCA and a LOCA may choose this distractor.*
- B. *Incorrect, With S/G pressures at ~ T_{sat} for RCS temperature. And RCS pressure < S/G pressures. Therefore, RCS cooldown is causing S/G pressure decrease, no faulted S/Gs are indicated.*
- C. *Incorrect, Plausible since a main feedline break would result in S/G pressures much lower than the saturation pressure for the RCS temperature of 504°F. An operator who does not understand the difference between a feedline break and a LOCA may choose this distractor.*
- D. *Incorrect, Plausible since a main steamline break would result in S/G pressures much lower than the saturation pressure for the RCS temperature of 504°F and pressure would decrease rapidly in the faulted S/G. An operator who does not understand the difference between a MSLB and a LOCA may choose this distractor.*

1603 NRC RO Exam

Question Number: 56

Tier: 2 **Group** 2

K/A: 002 Reactor Coolant System (RCS)
K3.03 Knowledge of the effect that a loss or malfunction of the RCS will have on the following:
Containment

Importance Rating: 4.2 / 4.6

10 CFR Part 55: 41.7

10CFR55.43.b: N/A

K/A Match: This question matches the K/A by having the candidate identify how a loss of RCS would effect the Containment.

Technical Reference: E-0, Step 11, 13
Steam Tables

Proposed references to be provided: None

Learning Objective: OPL271E-0, Obj 0

Question Source:

New	<u> </u>
Modified Bank	<u> </u>
Bank	<u> X </u>

Question History: SQN bank question

Comments:

1603 NRC RO Exam

57. 015 K2.01 057/BANK/SQN/LOWER//RO/SEQUOYAH/1/2009 RETAKE/NO

Which ONE of the following identifies all nuclear instruments that are powered from 120V AC Vital Instrument Power Board 1-I?

- A. N-31 and N-41 only
- B. N-35 and N-41 only
- C. N-31 and N-35 only
- D. N-31, N-35, and N-41

DISTRACTOR ANALYSIS:

- A. *Incorrect, Intermediate Range instrument N-35 is also powered from 120V AC Vital Instrument Power Board 1-I. Plausible because the two nuclear instruments listed are powered from the 120 VAC Vital Instrument Power Board 1-I.*
- B. *Incorrect, Source Range instrument N-31 is also powered from 120V AC Vital Instrument Power Board 1-I. Plausible because the two nuclear instruments listed are powered from the 120V AC Vital Instrument Power Board 1-I.*
- C. *Incorrect, Power Range instrument N-41 is also powered from 120V AC Vital Instrument Power Board 1-I. Plausible because the two nuclear instruments listed are powered from the 120V AC Vital Instrument Power Board 1-I.*
- D. *Incorrect, All three of the nuclear instruments listed (N-31, N-35, and N-41) are the nuclear instruments powered from 120V AC Vital Instrument Power Board 1-I.*

1603 NRC RO Exam

Question Number: 57

Tier: 2 **Group** 2

K/A: 015 Nuclear Instrumentation System
K2.01 Knowledge of bus power supplies to the following:
NIS channels, components, and interconnections

Importance Rating: 3.3 / 3.7

10 CFR Part 55: 41.7

10CFR55.43.b: n/a

K/A Match: This question matches the K/A by having the candidate identify the power supply for NIS components.

Technical Reference: AOP-I.01, Nuclear Instrumentation Malfunction, rev 13

Proposed references to be provided: None

Learning Objective: OPT200.NIS B.4.b, .i & .j

Question Source:

New	<u> </u>
Modified Bank	<u> </u>
Bank	<u> X </u>

Question History: SQN bank question used on Sept 09 ILT exam and 1311 Audit

Comments:

1603 NRC RO Exam

58. 017 K1.01 258/BANK/SQN/LOWER//RO/SEQUOYAH/03/ 2016/NO

Given the following plant conditions:

- Unit 1 is at 100% power
- Subsequently, a small break LOCA has occurred.
- Core exit thermocouples (T/C) are being monitored by the STA.

In accordance with GOI-6, "Apparatus Operations," which ONE of the following identifies **both** the indication range **and** the display code which indicates that a Core Exit Thermocouple is out of electrical limits?

	<u>Indication Range</u>	<u>Code for out of electrical limits</u>
A.	200 - 2300 °F	"XXX "
B✓	200 - 2300 °F	" ? " (question mark)
C.	0 - 3000 °F	" ? " (question mark)
D.	0 - 3000 °F	" XXX "

DISTRACTOR ANALYSIS:

- A. *Incorrect, Plausible since the first part is correct. Also plausible if the candidate does not recall that an "XXX" in the display indicates that the signal has been deleted.*
- B. *Correct, In accordance with GOI-6, sect 16, the range of the core exit thermocouples is 200 - 2300°F. Also a "?" display on the plasma display unit would indicate that the signal is outside of electrical limits and that the parameter will not be used to calculate any of the indicated parameter.*
- C. *Incorrect, Plausible if the candidate does not recall the range of the core exit thermocouples and gets the value of wide range pressure (0 - 3000 psig) confused with the actual range of the core exit thermocouples. Also plausible since the second part is correct.*
- D. *Incorrect, Plausible if the candidate does not recall the range of the core exit thermocouples and gets the value of wide range pressure (0 - 3000 psig) confused with the actual range of the core exit thermocouples. Also plausible if the candidate does not recall that an "XXX" in the display indicates that the signal has been deleted.*

1. Display Notations:

- * Denotes TC outside of physical limits
- ? Denotes TC outside of electrical limits
- XXX Denotes a deleted TC

2. Indicated ranges:

DETECTOR RANGE

- Thermocouples 200 - 2300°F
- Ref Junction RTDs 32 - 420°F
- RCS Wide Range RTDs 0 - 700°F
- Saturation Margin 35 - 200°F
- RCS Wide range PT 0 - 3000 psig

1603 NRC RO Exam

Question Number: 58

Tier: 2 **Group** 2

K/A: 017 In-Core Temperature Monitoring System (ITM)
K1.01 Knowledge of the physical connections and/or cause effect relationships between ITM and the following systems:
Plant computer

Importance Rating: 3.2* / 3.2*

10 CFR Part 55: 41.2 to 41.9

10CFR55.43.b: n/a

K/A Match: This question matches the K/A by having the candidate identify the range to of the In-Core Temperature Monitoring instruments and how a potential faulty signal is displayed by the plant computer.

Technical Reference: GOI-6, section 16
ES-1.2

Proposed references to be provided: None

Learning Objective: OPT200.INCORE obj. 9.a, b, 11.a

Question Source:

New	<u> </u>
Modified Bank	<u> </u>
Bank	<u> X </u>

Question History: SQN bank question

Comments:

1603 NRC RO Exam

59. 028 A1.02 059/BANK/SQN/HIGHER//RO/SEQUOYAH/09/2010/NO

Given the following:

- Unit 1 has experienced a Large break LOCA.
- FR-C.1, "Inadequate Core Cooling," is being implemented.
- Containment pressure is 10 psig and slowly lowering.
- Containment hydrogen concentration is 6.5% and slowly rising.

Which ONE of following identifies the Hydrogen Recombiner operation?

Hydrogen recombiner operation....

- A. is not allowed because of the operation of containment spray.
- B. is allowed provided the hydrogen igniters have previously been placed in service.
- C. is allowed however the maximum power setting is limited due to elevated containment pressure.
- D. is not allowed because it may cause a sudden rise in containment pressure that may challenge containment Integrity.

DISTRACTOR ANALYSIS:

- A. *Incorrect, Plausible, if the candidate thought that to prevent equipment damage, since the recombiners would be wetted by the spray flow, the recombiners would not be operated.*
- B. *Incorrect, Plausible since the hydrogen igniters may have been placed in service during the transition out of E-0 at step 13 if a LOCA has been identified and a transition to E-1 is being made. Incorrect because the hydrogen concentration is too high to place the igniters in service at this time.*
- C. *Incorrect, Plausible since the power setting of the recombiners is affected by CNMT pressure, however power is actually increased as pressure in containment rises not lowered.*
- D. *Correct. In accordance with EPM-3-FR-C-1, Basis document for FR-C.1, step 10 with CNMT hydrogen concentration greater than 6% a rapid burn would cause a sudden rise in CNMT pressure that may challenge CNMT integrity. The ignition source would be the recombiner if placed in service.*

1603 NRC RO Exam

Question Number: 59

Tier: 2 **Group** 2

K/A: 028 Hydrogen Recombiner and Purge Control System (HRPS)
A1.02 Ability to predict and/or monitor changes in parameter (to prevent exceeding design limits) associated with operating the HRPS controls including:
Containment pressure

Importance Rating: 3.4* / 3.7*

10 CFR Part 55: 41.5

10CFR55.43.b: Not applicable

K/A Match: This question matches the K/A by having the candidate predict the impact of Hydrogen Recombiner operation on containment pressure if a high hydrogen concentration is present when the recombinder is placed in service.

Technical Reference: EPM-3-FR-C-1, step 10, rev 6

Proposed references to be provided: None

Learning Objective: OPT200.CGCS, Obj B.5.a rev 2

Cognitive Level:

Higher _____
Lower X

Question Source:

New _____
Modified Bank _____
Bank X

Question History: SQN bank question written for 1009 NRC exam

Comments:

1603 NRC RO Exam

60. 034 G2.4.31 060/NEW//HIGHER//RO/SEQUOYAH/03/ 2016/NO

Given the following plant conditions:

- Unit 1 core has been off-loaded.
- Irradiated fuel shuffles are in progress in the spent fuel pool.
- Main Control Room Radiation Monitor, 0-RM-90-125, fails due to an instrument malfunction.

Which ONE of the following identifies if the radiation monitor failure would require an LCO entry on Unit 1 and the effect the failure would have on the movement of irradiated fuel in the spent fuel pit?

<u>LCO entry</u>	<u>Fuel Movement</u>
A. <input checked="" type="checkbox"/> Required	Can continue
B. <input type="checkbox"/> Required	Must be stopped
C. <input type="checkbox"/> NOT required	Can continue
D. <input type="checkbox"/> NOT required	Must be stopped

DISTRACTOR ANALYSIS:

- A. *Correct, both Main Control Room Radiation Monitors 1-RM-90-125 and 1-RM-90-126 are required during the movement of irradiated fuel. If one failed an LCO entry would be required which would require action but fuel movement could continue.*
- B. *Incorrect, both Main Control Room Radiation Monitors 1-RM-90-125 and 1-RM-90-126 are required during the movement of irradiated fuel. If one failed an LCO entry would be required which would require action but fuel movement would not be required to be stopped due to the failure. Plausible because the LCO entry being required is correct and other conditions in the LCO would have required the fuel movement to be stopped.*
- C. *Incorrect, an LCO entry is required due to the failure of the radiation monitor and irradiated fuel movement in the spent fuel pool can continue. Plausible because there are other main control room radiation monitors that could fail without causing an LCO entry and fuel movement continuing is correct.*
- D. *Incorrect, an LCO entry is required due to the failure of the radiation monitor but irradiated fuel movement in the spent fuel pool is not required to be stopped. Plausible because there are other main control room radiation monitors that could fail without causing an LCO entry and other conditions in the LCO would have required the fuel movement to be stopped.*

1603 NRC RO Exam

Question Number: 60

Tier: 2 **Group** 2

K/A: 034 Fuel Handling
G2.4.31 Knowledge of annunciator alarms, indications, or response procedures.

Importance Rating: 4.2 / 4.1

10 CFR Part 55: 41.10

10CFR55.42.b: n/a

K/A Match: Question requires knowledge of the radiation monitoring system requirements during irradiation fuel movement in accordance with Technical Specifications thus requiring the knowledge that a malfunction of a monitor would require compliance with required action of the LCO (i.e. the effect of the loss)

Technical Reference: Technical Specification LCO 3.3.3.1, Radiation Monitoring Instrumentation, Amendment 322 0-AR-MI2-B, Unit 1 and Common Radiation Monitor 0-XA-55-12B, Rev 31

Proposed references to be provided: None

Learning Objective: OPT200.CBVENT obj 5f; 6a,b
OPT200.FH obj. 6a, b

Question Source:

New X
Modified Bank _____
Bank _____

Question History: New question written for 1603 ILT exam

Comments:

1603 NRC RO Exam

61. 041 K6.02 061/NEW//HIGHER//RO/SEQUOYAH/03/2016/NO

Given the following plant conditions:

- Unit 1 is at 100% power .
- A reactor trip is initiated by operator action.
- RTB "B" does **NOT** open on the trip.

Which ONE of the following identifies the expected response of the steam dump system?

The steam dumps will attempt to maintain the RCS Tavg at (1) with the (2) controller.

- A. (1) 547°F
(2) reactor trip
- B✓ (1) 547°F
(2) load rejection
- C. (1) 552°F
(2) reactor trip
- D. (1) 552°F
(2) load rejection

DISTRACTOR ANALYSIS:

- A. *Incorrect, Plausible since the first part is correct. Also plausible if the candidate does not recognize that since RTB "B" did not open then the Reactor Trip controller is not in the circuit.*
- B. *Correct, RTB "B" P-4 contacts open when the breaker opens removing the Load Rejection controller from the circuit and placing the Reactor Trip controller in service, thus on a reactor trip the steam dumps will attempt to control Tavg at 552°F. With RTB "B" not opening then the load rejection controller remains in the circuit and will attempt to control Tavg at ~ 547 °F since Tref will be at minimum, since the Mn Turbine was tripped.*
- C. *Incorrect, Plausible since this is normal mode of operation following a reactor trip. When a Rx trip occurs the Rx Trip controller takes over and attempts to modulate the steam dumps such that RCS tave is maintained at 552°F.*
- D. *Incorrect, Plausible if the candidate does not recognize that since RTB "B" did not open then the Reactor Trip controller is not in the circuit, Also plausible since the second part is correct.*

1603 NRC RO Exam

Question Number: 61

Tier: 2 **Group** 2

K/A: 041 Steam Dump/Turbine Bypass Control (SDS)
K6.03 Knowledge of the effect that a loss or malfunction on the following will have on the of the Steam Dump/ Turbine Bypass Control System: Controller and positioners, including ICS, S/G, CRDS.

Importance Rating: 2.7 / 2.9

10 CFR Part 55: 41.7

10CFR55.43.b: n/a

K/A Match: This question matches the K/A by testing if the candidate knows the effect of a failure of a pressure instrument on Steam Dump control and the required operator actions to mitigate the effects of the failure on RCS temperature following a reactor trip.

Technical Reference: TI-28 Attach 9 pg 8 & 14
47W611-1-2 rev 13

Proposed references to be provided: None

Learning Objective: OPT200.SDCS obj. 7

Question Source:

New X
Modified Bank _____
Bank _____

Question History: New question written for 1603 ILT exam

Comments:

1603 NRC RO Exam

62. 045 K5.23 162/BANK/SQN/HIGHER//RO/SEQUOYAH/1/2008/NO

Which ONE of the following identifies:

(a) how main steam header pressure will respond as turbine load is raised from 50% to 70%

and

(b) the method of maintaining Tavg on program which would result in the value for MTC being the **MOST** negative as turbine load was raised?

- A✓ (a) header pressure will lower
(b) maintain rod position constant, while lowering Boron concentration to maintain Tavg on program
- B. (a) header pressure will lower
(b) withdraw control rods to maintain Tavg on program, while holding Boron concentration constant
- C. (a) header pressure will rise
(b) maintain rod position constant, while lowering Boron concentration to maintain Tavg on program
- D. (a) header pressure will rise
(b) withdraw control rods to maintain Tavg on program, while holding Boron concentration constant

DISTRACTOR ANALYSIS:

- A. *Correct, The first part is correct, Main Steam Header pressure would decrease as turbine load is raised.
Also plausible due to candidate could conclude that withdrawing Rods would make MTC more negative which in reality it makes it Less Negative. However a competing affect of Tav_g rising will have a negative affect on MTC.*
- B. *Incorrect, First part Incorrect Main Steam Header pressure would decrease as turbine load is raised. Plausible due to candidate could conclude that withdrawing Rods would make MTC more negative which in reality it makes it Less Negative. However a competing affect of Tav_g rising will have a negative affect on MTC.*
- C. *Incorrect, Plausible if the candidate thinks that since Tave is ramped up as power is raised that the Main Steam header pressure will also rise as turbine load is increased. Also plausible since the second part is correct.
Correct, First part Correct Main Steam Header pressure would decrease as turbine load is raised. Reduction of boron concentration results in more negative MTC, Tav_g rising will have a negative affect on MTC. This additive Negative affects is the MOST negative of all choices given.*
- D. *Incorrect, Plausible if the candidate thinks that since Tave is ramped up as power is raised that the Main Steam header pressure will also rise as turbine load is increased. Also plausible since Tav_g rising will have a negative affect on MTC. This additive Negative affects is the MOST negative of all choices given.*

First part Incorrect Main Steam Header pressure would decrease as turbine load is raised. Reduction of boron concentration results in more negative MTC, Tav_g rising will have a negative affect on MTC. This additive Negative affects is the MOST negative of all choices given.

1603 NRC RO Exam

Question Number: 62

Tier: 2 **Group** 2

K/A: 045 Main Turbine Generator (MTG)
K5.23 Knowledge of the operational implications of the following concepts as they apply to the MT/G system:
Relationship between rod control and RCS boron concentration during T/G load increases.

Importance Rating: 2.7 / 2.8

10 CFR Part 55: 41.5

10CFR55.43.b: N/A

K/A Match: This question matches the K/A by having the candidate determine the relationship of rod control, rod position and RCS boron concentration during T/G load increases.

Technical Reference: Nuclear Design Report Unit 1 Cycle 20

Proposed references to be provided: None

Learning Objective: OPT200.MTG obj

Question Source:

New	<u> </u>
Modified Bank	<u> </u>
Bank	<u> X </u>

Question History: SQN bank question

Comments:

1603 NRC RO Exam

63. 056 A2.04 063/BANK/SQN/LOWER//RO/SEQUOYAH/12/12/NO

Given the following plant conditions;

- Unit 1 is operating at 100% power when CBP 1A trips.
- The operating crew enters AOP-S.04, "Condensate or Heater Drains Malfunction."
- Investigation determines the pump to be damaged and will be out of service for several days.

Which ONE of the following completes the statements below in accordance with AOP-S.04?

An immediate load reduction may be required to maintain MFP suction pressures greater than a minimum of (1) psig.

With the pump being out of service for greater than 24 hours, the procedure directs an evaluation of a power reduction to at least less than (2) to reduce the risk of a unit trip if any additional secondary plant malfunctions occurs.

- | | <u>(1)</u> | <u>(2)</u> |
|----|------------|------------|
| A. | 250 | 85% |
| B. | 250 | 75% |
| C✓ | 320 | 85% |
| D. | 320 | 75% |

DISTRACTOR ANALYSIS:

- A. *Incorrect, Plausible because 250 psig appears in the AOP but 250 psig is the feedwater inlet pressure that if not maintained can result in severe MFW pump cavitation and evaluating the load reduction to less than 85% is correct.*
- B. *Incorrect, Plausible because 250 psig appears in the AOP but 250 psig is the feedwater inlet pressure that if not maintained can result in severe MFW pump cavitation and if the trip had been a Hotwell Pump (section 2.4) the load reduction to less than 75% would be correct.*
- C. *Correct, AOP-S.04 Section 2.5 directs the feedwater inlet pressure to be maintained greater than 320 psig and the section also directs the evaluation of a power reduction to less than 85% power if the pump is to be out of service for greater than 24 hours.*
- D. *Incorrect, Plausible because the feedwater inlet pressure to be maintained greater than 320 psig is correct and if the trip had been a Hotwell Pump (section 2.4) the load reduction to less than 75% would be correct.*

NOTE: Severe MFW pump cavitation is likely if inlet pressure is less than 250 psig.

- 3. **MONITOR** Feedwater pump inlet pressure greater than 320 psig. [M-3, PI-2-129]

EVALUATE starting additional available condensate system pumps (Hotwell, Cond. Booster, Cond. DI Booster).

REDUCE turbine load until MFW pump inlet pressure greater than 320 psig.

NOTE 1: Power reduction is not required for short-term operation with one CBP unavailable if plant is stable and condensate pressure is adequate. For long-term operation, power reduction may be desired to reduce the risk of unit trip if any additional secondary plant malfunction occurs.

NOTE 2: Recommended load rate is 1% per minute if turbine load reduction is needed.

- 10. **IF** Condensate Booster pump CANNOT be restored within 24 hours,
THEN
EVALUATE power reduction to less than 85% **USING** 0-GO-5, Normal Power Operation.

1603 NRC RO Exam

Question Number: 63

Tier: 2 **Group** 2

K/A: 056 Condensate System
A2.04 Ability to (a) predict the impacts of the following malfunctions or operations on the Condensate System; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations:
Loss of condensate pumps

Importance Rating: 2.6 / 2.8*

10 CFR Part 55: 41.5 / 43.5 / 45.3 / 45.13

10CFR55.43.b: not applicable

K/A Match: Question predicts the impact of the load reduction due to the pump trip and the plant parameter required to be maintained by dropping load as well as the requirement for maximum load due to the pump being out of service long term long term .

Technical Reference: AOP-S.04, "Condensate or Heater Drains Malfunction, Revision 19

Proposed references to be provided: None

Learning Objective: OPL271-S.04 obj. 5 & 6

Question Source:

New	<u> </u>
Modified Bank	<u> </u>
Bank	<u> X </u>

Question History: SQN bank question written for Dec 2012 ILT exam

Comments:

1603 NRC RO Exam

64. 072 A3.01 064/BANK/SQN/LOWER//RO/SEQUOYAH/03/2015/NO

Given the following plant conditions:

- Both Units are operating at 100% power.
- 0-RM-90-103A, Spent Fuel Pit Radiation Monitor, fails HIGH.

Which ONE of the following identifies the expected plant response?

- A. ONLY Train B Aux Building Isolation dampers close;
ONLY Train B Aux Building General Supply, Exhaust and Fuel Handling exhaust fans trip.
- B. ONLY Train B Aux Building Isolation dampers close;
ALL Aux Building General Supply, Exhaust and Fuel Handling exhaust fans trip.
- C. BOTH Train A and Train B Aux Building Isolation dampers close;
ONLY Train B Aux Building General Supply, Exhaust and Fuel handling exhaust fans trip.
- D. BOTH Train A and Train B Aux Building Isolation dampers close;
ALL Aux Building General Supply, Exhaust, and Fuel handling exhaust fans trip.

DISTRACTOR ANALYSIS:

- A. *Incorrect, Plausible since the first part of answer is correct and if the candidate thinks that the entire Aux Bldg vent system is train specific then only the train B components will actuate. However due to relaying both Aux Building General Supply, Exhaust and Fuel Handling Exhaust fans will trip.*
- B. *Correct, The Fuel Pool Area Rad monitors are train specific. 0-RM-90-103A will cause a Train B Aux Building Isolation dampers to close. And due to non-train specific relays, both Aux Building General Supply, Exhaust and Fuel Handling exhaust fans trip. It would take both monitors (RM-90-102 and 103) to have both trains of isolation dampers to close.*
- C. *Incorrect, Plausible if the candidate does not know that RM-90-102 would actuate Train A and RM-90-103 will actuate Train B of the Aux Bldg Isolation Dampers to close. This is unlike other automatic isolations. Also plausible however due to relaying both Aux Building General Supply, Exhaust and Fuel Handling Exhaust fans will trip.*
- D. *Incorrect, Plausible if the candidate doesn't know that RM-90-102 and 103 are train specific which is unlike other automatic isolations. Also the second part is correct.*

1603 NRC RO Exam

Question Number: 64

Tier: 2 **Group** 2

K/A: 072 Area Radiation Monitoring(ARM) system
A3.01 Ability to monitor automatic operation of the ARM system, including:
Changes in ventilation alignment.

Importance Rating: 2.9* / 3.1

10 CFR Part 55: 41.7

10CFR55.43.b: not applicable

K/A Match: This question matches the K/A by having the candidate identify the cause-effect relationship associated with Fuel Pool Area Radiation monitors as they apply to Fuel Handling Area Isolation.

Technical Reference: 0-AR-M12b, Windows B-3, B-5
45N630-4
45W657-31

Proposed references to be provided: None

Learning Objective: OPT200.RM obj. 4 & 6

Question Source:

New	<u> </u>
Modified Bank	<u> </u>
Bank	<u> X </u>

Question History: Question used on 2008 Audit exam.

Comments: SQN bank question modified such that RM-90-103A is rad monitor in stem vs RM-90-102.

1603 NRC RO Exam

65. 079 K4.01 065/BANK/SQN/LOWER//RO/SQN/13/05/NO

Given the following plant conditions:

- Maintenance personnel report that a Service Air connection providing air to a pneumatic grinder has broken and cannot be isolated.
- Air Header Pressure indications are as follows:
 - 0-PI-32-104A, AUX CONT AIR HDR A PRESS 92 psig
 - 0-PI-32-105A, AUX CONT AIR HDR B PRESS 92 psig
 - 0-PI-32-200, CONT AIR HDR PRESS 94 psig and slowly lowering
 - 0-PI-33-199, SERV AIR HDR PRESS 90 psig and slowly lowering

Which ONE of the following completes the statements below?

- (1) At the current pressures, PCV-33-4, SERVICE AIR ISOL (1) open.
- (2) If PCV-33-4 automatically closes, once the Service Air Header is repressurized, the valve (2) .

- A✓ (1) is
 (2) must be reset before it will open
- B. (1) is
 (2) will reopen automatically
- C. (1) is NOT
 (2) must be reset before it will open
- D. (1) is NOT
 (2) will reopen automatically

DISTRACTOR ANALYSIS:

- A. *Correct. The valve is open as pressure in the service air header is > 88 psig. AOP-M.02 and 0-SO-33-1 provide instructions for depressing the REST pushbutton on PS-33-4 after Service Header is pressurized.*

- B. *Incorrect. The first part is correct. The second part is incorrect. AOP-M.02 and 0-SO-33-1 provide instructions for depressing the RESET pushbutton on PS-33-4 after Service Header is pressurized. This is plausible as most pressure regulating valves do not require a reset.*

- C. *Incorrect. The valve is open as pressure in the service air header is > 88 psig. AR-M15B window D-7, ZS-33-4 SERVICE AIR ISOL CLOSED provides indication of PCV-33-4 and is not in alarm. It is plausible as the valve is either open or closed and the examinee must know the setpoint at which the valve closes or can be reopen. The second part is incorrect. AOP-M.02 and 0-SO-33-1 provide instructions for depressing the RESET pushbutton on PS-33-4 after Service Header is pressurized. This is plausible as most pressure regulating valves do not require a reset.*

- D. *Incorrect The valve is open as pressure in the service air header is > 88 psig. AR-M15B window D-7, ZS-33-4 SERVICE AIR ISOL CLOSED provides indication of PCV-33-4 and is not in alarm. It is plausible as the valve is either open or closed and the examinee must know the setpoint at which the valve closes or can be reopen. The second part is incorrect. AOP-M.02 and 0-SO-33-1 provide instructions for depressing the RESET pushbutton on PS-33-4 after Service Header is pressurized. This is plausible as most pressure regulating valves do not require a reset.*

1603 NRC RO Exam

Question Number: 65

Tier: 2 **Group** 2

K/A: 079 Station Air System
K4.01 Knowledge of SAS design feature(s) and/or interlock(s) which provide for the following: Cross-connect with IAS.

Importance Rating: 2.9 / 3.2

10 CFR Part 55: 41.7

10CFR55.43.b: Not applicable

K/A Match: Question matches the K/A by since the examinee is required to recall the actions necessary to re-open the valve and remember at what pressure the valve will automatically isolate.

Technical Reference: AR-M15-B rev 35, window D-7
AOP-M.02 rev 21

Proposed references to be provided: None

Learning Objective: OPT200.CSA Obj 7.d
Explain the Control and Service Air System design features and/or interlocks that provide for the following:
Automatic isolation of sections of the air system.

Question Source:

New	<u> </u>
Modified Bank	<u> </u>
Bank	<u> X </u>

Question History: SQN bank question written for SQN ILT 1305 exam

Comments:

1603 NRC RO Exam

66. G 2.1.28 166/BANK/SQN/LOWER//RO/SEQUOYAH/1/2008/NO

Which ONE of the following completes the statement below?

Concerning the operation of the Steam Dump Control System, when the "D" solenoids are energized they ____ .

- A. prevent the steam dump valves from opening if the condenser is not available
- B✓ allow the steam dump valves to respond more quickly when needed
- C. align control air to supply for modulation control when the steam dumps are armed
- D. allow the steam dump cooldown valves to open when Tavg is below the Lo-Lo Tavg interlock

DISTRACTOR ANALYSIS:

- A. *Incorrect, Condenser available interlocks do not input to the "D" Solenoids, only the "A" and "B" solenoids. Plausible because student may confuse which solenoids are affected by the condenser available interlocks.*
- B. *Correct, "D" solenoids are energized when there is a large Tavg/Tref deviation indicating a large primary/secondary power mismatch requiring an artificial steam load on the reactor. This can occur for a rapid turbine loss of load or reactor trip. Energizing "D" solenoids places full control air header pressure on the valves rather than the modulating control air signal to rapidly open the valves in 2 stages.*
- C. *Incorrect, D solenoid aligns control air for modulation control when de-energized also, arming signals do not input do not input to the "D" Solenoids, only the "A" and "B" solenoids.*
- D. *Incorrect, Steam dump Bypass interlock feature permits opening cooldown valves below the Lo Lo Tavg interlock. This interlock does not not input to the "D" solenoids only the "A" and "B" solenoids for the Cooldown bank. Plausible because student may confuse which solenoids are affected by the Steam dump Bypass interlock.*

1603 NRC RO Exam

Question Number: 66

Tier: 3 **Group:** n/a

K/A: G 2.1 Conduct of Operations
G 2.1.28 Knowledge of the purpose and function of major system components and controls.

Importance Rating: 41.7

10 CFR Part 55: 4.1 / 4.1

10CFR55.43.b: Not applicable

K/A Match: K/A is matched because the question requires knowledge of the purpose and function of the solenoids associated with the Steam Dump System.

Technical Reference: 0-47W611-1-2

Proposed references to be provided: None

Learning Objective: OPT200.SDCS obj 1 c & d

Cognitive Level:

Higher
Lower X

Question Source:

New
Modified Bank
Bank X

Question History: SQN bank question

Comments:

1603 NRC RO Exam

67. G 2.1.30 067/BANK/SQN/LOWER//RO/SEQUOYAH/1/2009/NO

Which ONE of the following identifies the alternate locations available for Charging flow control and indication outside of the Main Control Room?

Aux Control Room
(1-L-10)

Locally in the Aux Building
(1-L-112A)

- | | |
|---|--|
| A. Controller functions and the flow indication reads only with Nor-Aux switch in AUX. | No control function on panel, flow indication only |
| B. Controller functions and the flow indication reads only with Nor-Aux switch in AUX. | Panel has both controller function and flow indication |
| C. Controller functions only with Nor-Aux switch in AUX. Indication reads with Nor-Aux switch in either position. | No control function on panel, flow indication only |
| <input checked="" type="checkbox"/> D. Controller functions only with Nor-Aux switch in AUX. Indication reads with Nor-Aux switch in either position. | Panel has both controller function and flow indication |

DISTRACTOR ANALYSIS:

- A. *Incorrect, The controller functions only with the NOR-Aux switch in AUX but the indication is always live. Plausible because some controls and indicators must be transferred to place them in service and some local panels only have indications.*
- B. *Incorrect, The controller functions only with the NOR-Aux switch in AUX but the indication is always live. Plausible because some controls and indicators must be transferred to place them in service and local panel does have both a controller and flow indication.*
- C. *Incorrect, the Aux Control Room Controller is not functional until 1-XS-62-93 is placed to the AUX position on 1-L-11B directed in AOP-C-04, Checklist 1 but the indicator on 1-L-10 is live all the time. However, the local panel in the Aux Building has both a controller and an indication. Plausible because the Aux Control Room controller and indication are correct and some local panels only have indications.*
- D. *CORRECT, the Aux Control Room Controller is not functional until 1-XS-62-93 is placed to the Aux position on 1-L-11B directed in AOP-C-04, Checklist 1 but the indicator on 1-L-10 is live all the time. the local panel in the Aux Building has both a controller and a flow indication.*

1603 NRC RO Exam

Question Number: 67

Tier: 3 **Group** _____

K/A: G2.1.30 Ability to locate and operate components, including local controls.

Importance Rating: 4.4 / 4.0

10 CFR Part 55: 41.7

10CFR55.43.b: n/a

K/A Match: The question matches the K/A as it requires the applicant to know the location of indications located outside the main control room (locally) and the location of local controls for charging flow control.

Technical Reference: AOP-C.04, Shutdown From Auxiliary Control Room, Rev 37

Proposed references to be provided: None

Learning Objective: OPL271AOP-C.04 Obj 11.a

Question Source:

New	_____
Modified Bank	_____
Bank	<u> X </u>

Question History: SQN bank question

Comments:

1603 NRC RO Exam

68. G 2.2.39 168/BANK/WBN/LOWER//RO/SEQUOYAH/03/2013/YES

Given the following plant conditions:

- Unit 1 RCS preparing for a startup with the RCS at 540°F.

Which ONE of the following completes the statements below?

The RCS Pressure Tech Specification Safety Limit is (1) .

AND

Violation of SL 2.1.2, "RCS Pressure SL", requires the pressure to be reduced to less than the limit within (2) from the time the limit was violated.

- | | <u> (1) </u> | <u> (2) </u> |
|----|--------------------|--------------------|
| A. | 2485 psig | 5 minutes |
| B. | 2485 psig | 1 hour |
| C✓ | 2735 psig | 5 minutes |
| D. | 2735 psig | 1 hour |

DISTRACTOR ANALYSIS:

- A. *Incorrect, Plausible since this is the setpoint of the RCS safety valves and can be easily applied as the TS Safety Limit setpoint and with the unit in Mode 3, the pressure is required to be restored to less than the limit within 5 minutes.*
- B. *Incorrect, Plausible since this is the setpoint of the RCS safety valves and can be easily applied as the TS Safety Limit setpoint and 1 hour would be correct if the unit had been in Mode 1 or 2.*
- C. *Correct, Tech Specs identify the RCS pressure Safety Limit to be 2735 psig and a violation of the RCS pressure Safety Limit in Mode 3 requires the pressure to be restored within 5 minutes.*
- D. *Incorrect, Plausible the RCS pressure Safety Limit is 2735 psig and 1 hour would be correct if the unit had been in Mode 1 or 2.*

1603 NRC RO Exam

Question Number: 68

Tier: 3 **Group:** n/a

K/A: G 2.2.39
Knowledge of \leq one hour Technical Specification action statements for systems.

Importance Rating: 4.0 / 4.7

10 CFR Part 55: 41.5 / 43.2 / 45.2

10CFR55.43.b: Not applicable

K/A Match: K/A is matched because the question requires knowledge of Tech Spec Safety Limits and actions required if the RCS Pressure SL is violated.

Technical Reference: Unit 1 Tech Spec 2.1.2, RCS Safety Limit and Bases

Proposed references to be provided: None

Learning Objective: OPT200.TS-INTRO, Technical Specifications R5, #11 & 13

Cognitive Level:

Higher _____
Lower X

Question Source:

New _____
Modified Bank _____
Bank X

Question History: WBN bank question T/S0200.05 003 modified for use on the WBN 03/2013 NRC exam. SQN ILT 1311 NRC Exam.

Comments:

1603 NRC RO Exam

69. G 2.2.43 069/BANK/SQN/HIGHER//RO/SQN/13/05/NO

Given the following plant conditions:

- A main control room annunciator, 2-M15-A, A-4, "PdS-27-13B TRAV SCREEN 2B DIFF PRESS HI", has alarmed repeatedly over the past hour.
- Traveling Screen delta P on 2-PDI-27-13A reads 1.5 in H₂O and steady.
- An AUO is dispatched to CCW pumping station several times and reports:
 - local screen delta P reads 1.5 in H₂O
 - there are **NO** visible obstructions.
 - Screen wash pumps and traveling screens are **NOT** running.

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

In accordance with OPDP-4, "Annunciator Disablement," this alarm (1) the definition of a nuisance alarm.

and

An annunciator that is disabled due to being a nuisance alarm, (2) required to be logged in the narrative log.

- A✓ (1) meets
(2) is
- B. (1) meets
(2) is NOT
- C. (1) does NOT meet
(2) is
- D. (1) does NOT meet
(2) is NOT

DISTRACTOR ANALYSIS:

- A. *Correct, the given stem conditions meet the definition of a nuisance alarm IAW OPDP-4. OPDP-4 requires that the disablement be logged in both the Disabled Annunciator Book and the narrative log.*
- B. *Incorrect, the first part is correct. The second part is plausible as it may seem trivial to have to log a nuisance alarm in the station log as well as the Disabled Annunciator Book.*
- C. *Incorrect, The first part is plausible as the stem conditions may be interpreted to not meet the criteria of a nuisance alarm. The second part is correct.*
- D. *Incorrect, The first part is plausible as the stem conditions may be interpreted to not meet the criteria of a nuisance alarm. The second part is plausible as it may seem trivial to have to log a nuisance alarm in the station log as well as the Disabled Annunciator Book.*

1603 NRC RO Exam

Question Number: 69

Tier: 3 **Group** _____

K/A: 2.2.43 Knowledge of the process used to track inoperable alarms.

Importance Rating: 3.0 / 3.3

10 CFR Part 55: 41.10

10CFR55.43.b: Not applicable

K/A Match: Question matches the KA by testing the examinees knowledge of the processs used to track inoperable alarms.

Technical Reference: OPDP-4, Annunciator Disablement, rev 5

Proposed references to be provided: None

Learning Objective: OPL271OPDP-4 Obj 2 and 3
2. Describe the General Requirements for Annunciator Disablement
3. Describe the procedure to disable and alarm.

Question Source:

New	_____
Modified Bank	_____
Bank	<u> X </u>

Question History: SQN bank question written for SQN ILT NRC 1305 Exam

Comments: Low Cognitive

1603 NRC RO Exam

70. G 2.3.4 070/BANK/SQN/HIGHER//RO/SEQUOYAH/09/2010/NO

Given the following plant conditions:

- A LOCA has occurred and a Site Area Emergency has been declared.
- The TSC and OSC have been activated.
- To prevent damage to equipment needed for protection of the public, it is recommended that an individual make an entry into the 1A-A Safety Injection Pump Room 1A.
- Projected dose rate in the pump room is 100 R/hr.
- Duration of the exposure is expected to be 6 minutes.

Which ONE of the following individuals must authorize this exposure?

- A. Radcon Manager
- B. ✓ Site Emergency Director
- C. Plant Manager
- D. Site Vice President

DISTRACTOR ANALYSIS:

- A. *Incorrect, per EPIP-15 of the Radiological Emergency plan the Site Emergency Director must authorize emergency dose limits in excess of TVA admin limits and 10 CFR 20. Examinee may select since the Radcon Manager is responsible for completing the paperwork and he must authorize exceeding the limit during non-emergency conditions.*
- B. *Correct, With a projected dose of $1.1E+5$ mR/hr, the total dose to respond to this emergency condition is 11 Rem. ($(1.1E+5$ mR/hr / 60 minutes) x 6 minutes). Per EPIP-15 of the Radiological Emergency plan the Site Emergency Director must authorize emergency dose limits in excess of TVA administrative limits and 10 CFR 20.*
- C. *Incorrect, per EPIP-15 of the Radiological Emergency plan the Site Emergency Director must authorize emergency dose limits in excess of TVA admin limits and 10 CFR 20. Examinee may select since Plant Manager must approve exceeding 5R during non-emergency conditions.*
- D. *Incorrect, per EPIP-15 of the Radiological Emergency plan the Site Emergency Director must authorize emergency dose limits in excess of TVA admin limits and 10 CFR 20. Examinee may select since Site Vice President is the highest management level position staffed in the TSC during an event and additional approval must authorized prior exceeding 5 R during non-emergency conditions.*

1603 NRC RO Exam

Question Number: 70

Tier: 3 **Group** n/a

K/A: G 2.3.4 Radiation Control
Knowledge of radiation exposure limits under normal or emergency conditions.

Importance Rating: 3.2 / 3.7

10 CFR Part 55: 41.12 / 43.4 / 45.10

10CFR55.43.b: Not applicable

K/A Match: This question matches the K/A by having the candidate identify that an emergency exposure will have to be authorized before task can be performed and who is required to authorize the exposure.

Technical Reference: EPIP-15, Emergency Exposure Guidelines, Rev 9

Proposed references to be provided: None

Learning Objective: OPL271REP Obj B.1.f rev 2

Cognitive Level:

Higher X
Lower _____

Question Source:

New _____
Modified Bank _____
Bank X

Question History: SQN bank question used on 1/2009 exam

Comments:

1603 NRC RO Exam

71. G 2.3.11 071/BANK/SQN/LOWER//RO/SEQUOYAH/03/ 2016/NO

A Monitor Tank release is in progress.

- 0-RCV-77-43, Liquid Radwaste Release Valve, closed to terminate the release.

Which ONE of the following identifies the conditions that would cause a Monitor Tank release to automatically terminate?

- I. Less than 2 ERCW pumps per train running
- II. Loss of power to 0-RCV-77-43, Liquid Radwaste Release Valve
- III. 0-RM-90-122, Liquid Radwaste Release Monitor low flow (< 2.5 gpm)

A. I and III ONLY

B. II and III ONLY

C. I and II ONLY

D. I, II, and III

DISTRACTOR ANALYSIS:

- A. *Incorrect, Plausible since there is a minimum ERCW flow required to release a monitor tank and the candidate could get the minimum flow confused with the number of ERCW pumps per train, however the actual number of pumps (2) is not a requirement for releasing or terminating a release.*
- B. *CORRECT, Both a loss of power to the valve and low flow through the detector will cause 0-RCV-77-3 to automatically close and terminate the release.*
- C. *Incorrect, Plausible since there is a minimum ERCW flow required to release a monitor tank and the candidate could get the minimum flow confused with the number of ERCW pumps per train, however the actual number of pumps (2) is not a requirement for releasing or terminating a release. Also the second part is correct.*
- D. *Incorrect, Plausible since both II and III are correct and that minimum ERCW flow is required for a release.*

1603 NRC RO Exam

Question Number: 71

Tier: 3 **Group** na

K/A: G 2.3.11 Ability to control radiation releases.

Importance Rating: 3.8 / 4.3

10 CFR Part 55: 41.11

10CFR55.43.b: n/a

K/A Match: This question matches the K/A by having the candidate identify the conditions (that are under the control of the operator) that could cause an automatic termination of a radioactive release in progress.

Technical Reference: 0-SO-77-1, Waste Disposal System (Liquid), Rev. 46

Proposed references to be provided: None

Learning Objective: OPT200.LRW Obj. 4.e, 4.i.

Question Source:

New	<u> </u>
Modified Bank	<u> </u>
Bank	<u> X </u>

Question History: SQN bank question

Comments:

1603 NRC RO Exam

72. G 2.3.12 072/BANK/SQN/LOWER//RO/SEQUOYAH/12/12/NO

Prior to an entry into lower containment being made, which ONE of the following identifies the verifications that are required relative to the incore flux detector placement and tagging?

<u>Detector Placement</u>	<u>Tagged with a...</u>
A. Storage position, only .	Caution Order
B. Storage position, only.	Hold Order
C. Storage position or inserted to within 10 feet of the core.	Caution Order
D. Storage position or inserted to within 10 feet of the core.	Hold Order

DISTRACTOR ANALYSIS:

- A. *Incorrect, Storage is not the only position allowed for the incore flux detectors, they can also be inserted to within 10 feet of the core. A Caution Order cannot be used to maintain the configuration control. Plausible because storage is one of the two approved positions and a Caution Order is one of the types of clearances used for tagging equipment.*
- B. *Incorrect, Storage is not the only position allowed for the incore flux detectors, they can also be inserted to within 10 feet of the core. A Hold Order is used to maintain the configuration control. Plausible because storage is one of the two approved positions and tagging with a Hold Order is correct.*
- C. *Incorrect, the incore flux detectors must be verified to be in the storage position or inserted to within 10 feet of the core and tagged out. A Caution Order cannot be used to maintain the configuration control. Plausible because the two locations are approved positions and a Caution Order is one of the types of clearances used for tagging equipment.*
- D. *Correct, In accordance with 0-PI-OPS -000-011.0, the incore flux detectors must be verified to be in the storage position or inserted to within 10 feet of the core and tagged out. A Hold Order is used to maintain the configuration control.*

1603 NRC RO Exam

Question Number: 72

Tier: 3 **Group** n/a

K/A: G 2.3 Radiation control
2.3.12 Knowledge of radiological safety principles pertaining to licensed operator duties, such as containment entry requirements, fuel handling responsibilities, access to locked high-radiation areas, aligning filters, etc.

Importance Rating: 3.2 / 3.7

10 CFR Part 55: 41.12 / 45.9 / 45.10

10CFR55.42.b: Not applicable

K/A Match: Question requires knowledge that the Incore flux detectors pose radiation hazards and must be properly positioned and controlled to protect personnel inside lower containment.

Technical Reference: 0-PI-OPS-000-011.0, Containment Access Control During Modes 1 - 4, Rev 0006

Proposed references to be provided: None

Learning Objective: OPT200.INCORE obj. 7.a

Question Source:

New	<u> </u>
Modified Bank	<u> </u>
Bank	<u> X </u>

Question History: SQN bank question

Comments:

1603 NRC RO Exam

73. G 2.4.21 173/BANK/SQN/HIGHER//RO/SEQUOYAH/2/2010/NO

Which ONE of the following sets of plant parameters will result in a RED path on the Heat Sink Status Tree?

A. Containment Pressure is 2 psig

	<u>S/G 1</u>	<u>S/G 2</u>	<u>S/G 3</u>	<u>S/G 4</u>
NR Level	40%	15%	28%	28%
WR Level	----	----	----	----
AFW Flow	60 gpm	130 gpm	80 gpm	50 gpm

B. Containment Pressure is 2 psig

	<u>S/G 1</u>	<u>S/G 2</u>	<u>S/G 3</u>	<u>S/G 4</u>
NR Level	----	----	5%	8%
WR Level	0%	0%	----	----
AFW Flow	0 gpm	0 gpm	190 gpm	255 gpm

C. Containment Pressure is 3 psig

	<u>S/G 1</u>	<u>S/G 2</u>	<u>S/G 3</u>	<u>S/G 4</u>
NR Level	----	----	24%	23%
WR Level	20%	20%	----	----
AFW Flow	100 gpm	100 gpm	100 gpm	100 gpm

D. Containment Pressure is 3 psig

	<u>S/G 1</u>	<u>S/G 2</u>	<u>S/G 3</u>	<u>S/G 4</u>
NR Level	----	22%	21%	23%
WR Level	0%	----	----	----
AFW Flow	0 gpm	160 gpm	155 gpm	140 gpm

DISTRACTOR ANALYSIS:

- A. *Incorrect, Containment conditions are not adverse. NR level in S/G 1 is greater than 10%, so the heat sink safety function cannot be worse than yellow. Plausible if applicant applies total FW criteria (total FW flow is 120 gpm - less than the 440 gpm criteria) before evaluating S/G levels.*
- B. *Incorrect, Containment conditions are not adverse. Although no S/G NR levels are greater than 10%, total FW flow is greater than 440 gpm, so the heat sink safety function cannot be worse than yellow. Plausible if applicant evaluates SG levels and then fails to apply the additional criteria of total FW flow.*
- C. *Correct, Containment conditions are adverse. No S/G level is greater than 25% NR and total FW flow is less than 440 gpm.*
- D. *Incorrect, Containment conditions are adverse. Although no S/G NR level is greater than 25%, total FW flow is greater than 440 gpm (value for FW flow does not change with adverse containment), so the heat sink safety function cannot be worse than yellow. Plausible if applicant evaluates S/G levels and then fails to apply the additional criteria of total FW flow or believes that the required FW flow is greater than 440 gpm for adverse containment conditions.*

1603 NRC RO Exam

Question Number: 73

Tier: 3 **Group** n/a

K/A: G 2.4.21 Emergency Procedures / Plan
Knowledge of the parameters and logic used to assess the status of safety functions including such as reactivity control, core cooling and heat removal, reactor coolant system integrity, containment conditions, radioactivity release control, etc.

Importance Rating: 4.0 / 4.6

10 CFR Part 55: 41.7 / 43.5 / 45.12

10CFR55.43.b: Not applicable

K/A Match: Question requires applicant to recall parameter values and logic used to assess the heat removal safety function and determine which set of parameters fails to satisfy the safety function.

Technical Reference: 1-FR-0, Unit 1 Status Trees Rev 2

Proposed references to be provided: None

Learning Objective: OPL271FR-H.1, Obj 2
Given a set of initial plant conditions, determine if FR-H.1 entry is required

Cognitive Level:

Higher X
Lower _____

Question Source:

New _____
Modified Bank _____
Bank X

Question History: WBN 10/2011 Audit Exam, adjusted to reflect SQN FR-H.1 criteria for SQN ILT 1311 Audit

Comments:

74. G 2.4.29 074/BANK/WBN/LOWER//RO/SEQUOYAH/12/12/NO

Which ONE of the following identifies...

(1) the Emergency Response Organization responsible for dispatching
Emergency Response Teams during a plant emergency

and

(2) the lowest level emergency that will result in the emergency center being
required to be staffed?

(1)

(2)

A. Technical Support Center

Alert

B. Technical Support Center

NOUE

C. ✓ Operations Support Center

Alert

D. Operations Support Center

NOUE

DISTRACTOR ANALYSIS:

- A. *Incorrect, Plausible because the TSC performs many of the actions normally performed by Main Control Room staff during emergency operations and Alert is correct for the lowest level emergency that requires staffing of the emergency centers.*
- B. *Incorrect, Plausible because the TSC performs many of the actions normally performed by Main Control Room staff during emergency operations and an NOUE is the lowest emergency classification level.*
- C. *Correct, The OSC is the organization responsible for dispatching emergency response teams during an emergency and Alert is correct for the lowest level emergency that requires staffing of the emergency centers.*
- D. *Incorrect, Plausible because the OSC is the organization responsible for dispatching emergency response teams during an emergency and an NOUE is the lowest emergency classification level.*

1603 NRC RO Exam

Question Number: 74

Tier: 3 **Group** n/a

K/A: G 2.4 Emergency Procedures /Plan
2.4.29 Knowledge of the emergency plan.

Importance Rating: 3.1 / 4.4

10 CFR Part 55: 41.10

10CFR55.43.b: Not applicable

K/A Match: K/A is matched because the questions requires knowledge of the different emergency response centers and when the centers are required to be staffed.

Technical Reference: EPIP-7, Activation and Operation of the Operations Support Center (OSC), Revision 0030
EPIP-3, Alert, Revision 0033

Proposed references to be provided: None

Learning Objective: OPL271REP obj. 1.d

Cognitive Level:

Higher _____
Lower X

Question Source:

New _____
Modified Bank _____
Bank X

Question History: SQN bank question used on Dec 2012 ILT exam, originally WBN bank question June 2011 exam.

Comments:

1603 NRC RO Exam

75. G 2.4.46 075/BANK/SQN/HIGHER//RO/SEQUOYAH/09/2010/NO

Given the following plant conditions:

- Unit 1 is shutting down and is currently 230°F
- 1A RHR train is being placed in service per 0-SO-74-1, "Residual Heat Removal System."
- RHR Letdown has been placed in service at maximum flow.
- FCV-63-93, RHR Pump A-A Discharge to Loops 2 and 3 Cold Leg, has just been opened.
- Annunciator "RHR HX A OUTLET TEMPERATURE HIGH," (0-M27-B-A, E-6) alarms.

Which ONE of the following identifies the valve leaking by that will result in the alarm and the operator action to mitigate in accordance with the Annunciator Response?

<u>Condition</u>	<u>Action to mitigate</u>
A. FCV-74-16, RHR Hx 1A Outlet Flow Control Valve	Remove RHR Letdown from service.
B. FCV-74-32, RHR Hx 1A and 1B Bypass Flow Control Valve	Remove RHR Letdown from service.
<input checked="" type="radio"/> C. FCV-74-16, RHR Hx 1A Outlet Flow Control Valve	Increase CCS flow through the 1A-A RHR Heat Exchanger.
D. FCV-74-32, RHR Hx 1A and 1B Bypass Flow Control Valve	Increase CCS flow through the 1A-A RHR Heat Exchanger.

DISTRACTOR ANALYSIS:

- A. *Incorrect. Plausible because FCV-74-16 leakage providing a path to the RCS through FCV-63-93 is the correct cause of the alarm but isolating letdown will not reduce the leakage through FCV-74-16.*
- B. *Incorrect. Plausible because FCV-74-32 leakage would provide a path to the RCS through FCV-63-93. Incorrect because this flow path would not increase CCS temperature out of the 1A CCS heat exchanger to cause the alarm stated and isolating letdown would not address the cause of the alarm.*
- C. *Correct. FCV-74-16 may leak through in excess of 1100 gpm when FCV-63-93 is open. The alarm response procedure and the SO provide guidance to increase CCS flow or reduce RHR flow. Reducing RHR flow when FCV-74-16 is leaking through can not be achieved.*
- D. *Incorrect. Plausible because FCV-74-32 leakage would provide a path to the RCS through FCV-63-93 and increasing CCS flow through the heat exchanger is the correct response to the high CCS temperature. Incorrect because this this flow path would not increase CCS temperature out of the 1A CCS heat exchanger to cause the alarm stated.*

1603 NRC RO Exam

Question Number: 75

Tier: 3 **Group** _____

K/A: G2.4.46 Ability to verify that the alarms are consistent with the plant conditions.

Importance Rating: 4.2 / 4.2

10 CFR Part 55: 41.10

10CFR55.43.b: Not applicable

K/A Match: KA is matched because the question requires the ability to relate the alarming condition to the process of placing the system in service with a valve leaking through as identified in the operating procedure.

Technical Reference: 0-SO-74-1, Residual Heat Removal System, Rev 72
0-AR-M27-B-A Annunciator Response "Component Cooling" Rev 11

Proposed references to be provided: None

Learning Objective: OPT200.RHR
5. Describe the residual Heat Removal System alarms, setpoints, and the conditions that initiate alarms.

Cognitive Level:
Higher X
Lower _____

Question Source:
New _____
Modified Bank _____
Bank X

Question History: SQN bank question RHR-B.5.D 001 with correct answer and 2 distractors relocated as well as minor wording changes.

Comments: