EXAMINATION ANSWER KEY

U.S. Nuclear Regulatory Commission 2014 RO Written Exam (Quad Cities)

1 **ID: 1** **Points: 1.00**

The following conditions exist on Unit 1 during a LOCA:

- Reactor pressure is 380 psig
- Indicated Fuel Zone reactor water level is -166 inches
- Drywell temperature is 183°F
- Both Reactor Recirc Pumps are TRIPPED

Using the table from the 901-5 panel provided below, what is the corrected RPV water level?

FUEL ZONE CORRECTION

ACTUAL LEVEL (INCHES)	INDICATED LEVEL (INCHES)		
	> 800 PSIG	> 400 PSIG	> 100 PSIG
10	-62	-40	-13
0	-70	-48	-22
-10	-77	-57	-32
-20	-85	-65	-41
-40	-101	-82	-60
-59	-115	-98	-78
-80	-132	-116	-97
-100	-147	-133	-116
-120	-163	-151	-135
-142	-180	-169	-155
-166	-199	-190	-178
-184	-213	-205	-194
-191	-218	-211	-201
-200	-225	-219	-209
-260	-272	-270	-265
-300	-303	-304	-303

A. -124 inches

B. -154 inches

C. -166 inches

D. -178 inches

Answer: B

Answer Explanation

Use the PRESSURE column and cross reference to ACTUAL LEVEL.

Since 380 psig is less than 400 psig but greater than 100 psig, use the >100 psig column. -166 inches is approximately halfway between -155 and -178, so actual level is halfway between -142 and -166. Therefore, actual water level is -154 inches.

Fuel Zone instruments can only be used to determine Reactor water level when the Reactor Recirculation pumps are OFF and their indicated level has been corrected.

Distractor 1 is incorrect: Plausible if the >800 psig column is used.
Distractor 2 is incorrect: Plausible if assumed that water level indication does not have to be corrected when recirc pumps are off.
Distractor 3 is incorrect: Plausible if indicated and actual water level columns are reversed.

Reference: QCAP 0200-10 Rev 48
Reference provided during examination: None

Cognitive level: High

Level (RO/SRO): RO
Tier: 1 **Group:** 1

K/A: 295001 Partial or Complete Loss of Forced Core Flow Circulation
AA1.07 Ability to operate and/or monitor the following as they apply to PARTIAL OR COMPLETE LOSS OF FORCED CORE FLOW CIRCULATION: Nuclear boiler instrumentation system
(CFR: 41.7 / 45.6)
IMPORTANCE RO 3.1 SRO 3.2

SRO Justification: N/A

Question Source: Quad Cities ILT Exam Bank
Question History: Modified from Quad Cities 2011 ILT NRC Exam

Comments: Per NRC: changed "ACTUAL" RPV water level to "corrected" RPV water level. Added "from the 901-5 panel" to table description in stem.

Associated objective(s):

295001.AA1.07 Nuclear boiler instrumentation system (RO=3.1 / SRO=3.2)

SR-0263-K26 (Freq: LIC=B)
EVALUATE given RPV Instrumentation System indications and various plant conditions and DETERMINE a course of action to correct or mitigate the following abnormal condition(s):
a. Rapid RPV depressurization below 450 psig - (determine correction factor)
b. Normal RPV cooldown - (notching)
c. Elevated drywell/reactor building temperatures - (determine if instruments can be used - QGA Detail A)
d. RPV pressure not at instrument calibration pressure - (correct readings using nomograph)
e. Loss of RPV / loop temperature indications - (determine cooldown rate using saturation pressure/temperature graphs)
f. Using heise gauge for RPV water level indication - (determine level using formulas/chart)
g. Determining reactor/cavity level using QCOP 0201-13 Att.A

2	ID: 2	Points: 1.00

A Unit 1 STARTUP is in progress with reactor pressure at 200 psig.

Unit 2 is in a refuel outage with Bus 24-1 Out Of Service.

A lightning strike occurs in the 345 KV switchyard resulting in the following:

- Unit 1 reactor scram
- Loss of Turbine Building 250 VDC MCC 2
- Annunciator 901-8 F-2, RES AUX TRANS 12 SUDDEN PRESS RELAY is in ALARM
- The Unit One EDG failed to AUTO START
- The Unit Supervisor has entered QGA 100 and directed RPV water level to be maintained between 0 and +48 inches

With NO OPERATOR ACTION to restore the electrical system, which of the following Preferred Injection Systems is available for injection to the RPV from the control room?

A. Condensate

B. SSMP

C. HPCI

D. CRD

Answer: C

Answer Explanation

HPCI valve control power is supplied from 250 Vdc Bus 1A (which is fed from TB 250VDC MCC 1) and can align for injection automatically or manually.

Distractor 1 is incorrect: The Condensate system has no power because Transformer 12 tripped on "sudden pressure" and the Unit 1 scram.

Distractor 2 is incorrect: The SSMP has two power supplies: Bus 14-1 and Bus 24-1. SSMP is not available because it would require restoration of power from Bus 24-1. The Unit ONE EDG did not auto start and will NOT power BUS 14-1.

Distractor 3 in incorrect: The CRD pumps are powered from Bus 13 and Bus 14. With the loss of both the Unit Aux Transformer (scram) and the Reserve Aux Transformer, both busses will be de-energized. Plausible because Bus 13 can be backfed from Bus 13-1 (1/2 EDG will automatically power 13-1) but this requires manual alignment.

Reference: QOA 6900-01 Rev 20
Reference provided during examination: None

Cognitive level: High

Level (RO/SRO): RO
Tier: 1 **Group:** 1

K/A: 295003 AK2.06

Knowledge of the interrelations between PARTIAL OR COMPLETE LOSS OF A.C. POWER and the following: D.C. electrical loads
(CFR: 41.7 / 45.8)
IMPORTANCE RO 3.4 SRO 3.5

SRO Justification: N/A

Question Source: Quad Cities ILT Exam Bank
Question History: N/A

Comments:

Associated objective(s):

295003.AK2.06 D.C. electrical loads (RO=3.4 / SRO=3.5)

SRN-6900-K19 (Freq: LIC=I N=I)
LIST the plant systems which support Station DC Electrical Systems and DESCRIBE the nature of support. (Includes power supplies)

3 **ID: 3** **Points: 1.00**

Unit 1 is operating at 100% power when Annunciator 901-8 B-9, 125V BATTERY GROUND, ALARMS.

Which one of the following describes (1) the indication used to check the magnitude of the ground, and (2) why it is necessary to quickly locate and repair the ground?

	Ground indication	Reason for quickly locating and repairing ground
A.	Ground Detector Recorder in Battery Charger room	Grounds can be indicators or precursors to serious degradation of equipment
B.	Ground Detector Recorder in Battery Charger room	A ground on the Battery Bus makes the 1/2 EDG inoperable due to loss of control power
C.	125 VDC Battery Voltmeter on the 901-8 Panel	Grounds can be indicators or precursors to serious degradation of equipment
D.	125 VDC Battery Voltmeter on the 901-8 panel	A ground on the Battery Bus makes the 1/2 EDG inoperable due to loss of control power

Answer: A

Answer Explanation

QOP 6900-06, 125 VDC Ground Detection procedure step F.2 indicates magnitude of the ground is determined using the ground detector recorder which is located in the battery charger room. QCOP 6900-19, Documenting 125/250 VDC Grounds, step B.3 states grounds can be indicators or precursors to serious degradation of equipment.

Distractor 1 is incorrect: ½ EDG control power is supplied by Div 1 125 VDC however per QOA 6900-02, Total Loss of Unit 1 125 VDC step B.4, control power if lost transfers to Unit 2 125 VDC.
Distractor 2 is incorrect:
Although 125 VDC battery voltage can be read at the 901-8 panel and the voltage value may change, you can NOT determine the magnitude of the ground using this reading.
Distractor 3 is incorrect:
½ EDG control power is supplied by Div 1 125 VDC however per QOA 6900-02, Total Loss of Unit 1 125 VDC step B.4, control power if lost transfers to Unit 2 125 VDC.
Although 125 VDC battery voltage can be read at the 901-8 panel and the voltage value may change, you can NOT determine the magnitude of the ground using this reading.

Reference: QOP 6900-06, 125 VDC Ground Detection, Rev 53, and QCOP 6900-19, Documenting 125/250 VDC Grounds procedures, Rev 12
Reference provided during examination: None

Cognitive level: Memory

Level (RO/SRO): RO
Tier: 1 **Group:** 1

K/A: 295004 AK3.02
Knowledge of the reasons for the following responses as they apply to partial or complete loss of DC power: Ground isolation/fault determination
(CFR: 41.5 / 45.6)

IMPORTANCE RO 2.9 / SRO 3.3

SRO Justification: N/A

Question Source: Bank - Nine Mile Point 2010 ILT NRC Exam
Question History: N/A

Comments:

Associated objective(s):

295004.AK3.02 Ground isolation/fault determination (RO=2.9 / SRO=3.3)

SR-6900-K26 (Freq: LIC=B)
EVALUATE given key Station DC Electrical Systems parameter indications and/or responses depicting a system specific abnormality/failure and DETERMINE a course of action to correct or mitigate the following abnormal condition(s):

a. Partial/complete loss of U1 or U2 24/48 VDC
b. Partial/complete loss of U1 or U2 125 VDC
c. Partial/complete loss of U1 or U2 250 VDC
d. Loss of Non-Essential 250 VDC to a unit

4 **ID: 4** **Points: 1.00**

What is the reason for the automatic reactor scram associated with a Main Turbine trip at 100% reactor power?

A. Limit cycling of the Safety Relief Valves.

B. Mitigate the reactor power rise.

C. Prevent exceeding the Reactor Coolant System Pressure Safety Limit.

D. Minimize heat input to the condenser.

Answer: B

Answer Explanation

Closure of the TSVs results in the loss of a heat sink that produces reactor pressure, neutron flux, and heat flux transients that must be limited. Therefore, a reactor scram is initiated at the start of TSV closure in anticipation of the transients that would result from the closure of these valves.
The reactor scram reduces the amount of energy required to be absorbed and ensures that the MCPR SL is not exceeded.

Distractor 1 is incorrect: Plausible because the scram will limit the pressure rise in the reactor, however, the scram is to protect the reactor from the power excursion, not to protect the SRVs.
Distractor 2 is incorrect: Plausible because the scram will limit the pressure rise in the reactor, however, the scram is to limit the power rise that could challenge the MCPR Safety Limit, not the RPV vessel pressure limit.
Distractor 3 is incorrect: Plausible because this is the reason for the scram on low condenser vacuum.

Reference: TS Bases B 3.3.1.1-18 Rev 9
Reference provided during examination: None

Cognitive level: Memory

Level (RO/SRO): RO
Tier: 1 **Group:** 1

K/A: 295005 K3.01
Knowledge of the reasons for the following responses as they apply to MAIN TURBINE GENERATOR TRIP: Reactor SCRAM
(CFR: 41.5 / 45.6)
IMPORTANCE RO 3.8 SRO 3.8

SRO Justification: N/A

Question Source: New
Question History: N/A

Comments: Per NRC: changed non-plausible distractor 2 from "Prevent a Main Steam Line rupture" to "Prevent exceeding the Reactor Coolant System Pressure Safety Limit."

Associated objective(s):

SR-5600-K24 (Freq: LIC=B)
Given a Main Turbine and Auxiliary Systems operating mode and various plant conditions, PREDICT how each supported system will be impacted by the following Main Turbine and Auxiliary Systems failures:

a. Turbine trip
b. Loss of lube oil pressure

295005.AK3.01 Reactor SCRAM (RO=3.8 / SRO=3.8)

5 **ID: 5** **Points: 1.00**

Which of the following sets of conditions will require entry into a Technical Specification action statement?

A. Reactor power 100%.
RPS normal Electrical Protection Assembly (EPA) 2A-1 frequency is 53 hertz.
All 8 RPS Scram Solenoid Lights are LIT.

B. Reactor power 100%.
APRM 2 fails DOWNSCALE.
ROD OUT PERMIT light is LIT.

C. Reactor power 20%
Turbine Control Valve #4 is CLOSED
All 8 RPS Scram Solenoid Lights are LIT.

D. Reactor power 20%
ROD H-8 is selected and withdrawn 2 notches past its limit.
ROD OUT PERMIT light is LIT.

Answer: A

Answer Explanation

Per SR 3.3.8.2.2 the required frequency for tripping of an EPA is $\geq$55.6 hz. A half scram on RPS A should have occurred but did not and therefore requires entry into LCO 3.3.8.2.

Distractor 1 is incorrect: APRM failing downscale should have resulted in a rod block. However, there are still enough operable APRMs to preclude entering a LCO.
Distractor 2 is incorrect: The TCV closure trip function is only applicable at or above 38.5% power.
Distractor 3 is incorrect: The Rod Worth Minimizer function is only required to be operable below 10% power.

Reference: Technical Specification 3.3.8.2 Amendment 199/195 & 248/243
Reference provided during examination: None

Cognitive level: High

Level (RO/SRO): RO
Tier: 1 **Group:** 1

K/A: 295006 SCRAM
2.2.42
Ability to recognize system parameters that are entry-level conditions for Technical Specifications.
(CFR: 41.7 / 41.10 / 43.2 / 43.3 / 45.3)
IMPORTANCE RO 3.9 SRO 4.6

SRO Justification: N/A

Question Source: New
Question History: N/A

Comments:

Associated objective(s):

295006.2.2.42 Ability to recognize system parameters that are entry-level conditions for Technical Specifications.

SR-0500-K29 (Freq: LIC=I)
Given Reactor Protection System key parameter indications and various plant conditions, DETERMINE, from memory, if the Reactor Protection System Tech Spec LCOs have been met.

6	ID: 6	Points: 1.00

Unit 2 is at 100% power when a fire in the Control Room requires personnel to abandon the area.

Execution of QCARP 0050-02, SB-1-2 INJECTION WITH RCIC AND BRINGING THE UNIT TO COLD SHUTDOWN, requires the following actions to be performed within 10 minutes of scramming the reactor:

- At Bus 21 cubicle 2, XFMR 22 TO BUS 21 RESERVE FEED, remove CLOSE fuses and verify breaker is OPEN.
- At Bus 22 cubicle 11, XFMR 22 TO BUS 22 RESERVE FEED, remove CLOSE fuses and verify breaker is OPEN.

Why are these CLOSE fuses removed?

A. To mitigate spurious equipment operation.

B. To ensure divisional separation of safety-related busses.

C. To prevent overloading the Unit 2 Reserve Auxiliary Transformer (T-22).

D. To prepare for starting the SBO Diesel in the EMERGENCY START mode

Answer: A

Answer Explanation

A fire in the Control Room that requires entry into a QCARP will require Unit 2 to perform QCARP 0050-02. The 10 minute actions are performed to mitigating spurious equipment operation. This action "disables" specific control room controls (as analyzed for this fire location) in anticipation of control room control circuits becoming damaged and leading to spurious equipment operation.

Distractor 1: Plausible because all ECCS busses will be on T-22 following the reactor scram due to the fast-bus transfer.
Distractor 2: Plausible because de-energizing Bus 21 and 22 will lower load on T-22.
Distractor 3: After performing QCARP 0050-02 Attachment C to open the T-22 Reserve Feed Breakers, the ANSO 2 goes directly Attachment D to Emergency start the Unit 2 SBO Diesel. It is plausible for the candidate to believe these actions are related.

Reference: QCARP 0050-02 Attachment D Rev 27
Reference provided during examination: None

Cognitive level: Memory

Level (RO/SRO): RO
Tier: 1 **Group:** 1

K/A: 295016 K3.03
Knowledge of the reasons for the following responses as they apply to CONTROL ROOM ABANDONMENT: Disabling control room controls
(CFR: 41.5 / 45.6)
IMPORTANCE RO 3.5 SRO 3.7

SRO Justification: N/A

Question Source: Quad Cities ILT Exam Bank

Question History: N/A

Comments: None

Associated objective(s):

SRN-ARP-K05 (Freq: LIC=B NF=B)
Given a QCARP procedure, EXPLAIN the reasons for the sequence and time limits (if applicable) of the actions.

295016.AK3.03 Disabling control room controls (RO=3.5 / SRO=3.7)

7	ID: 7	Points: 1.00

Unit 1 was operating at 100% power when a large rupture occurred in the TBCCW system, with the following conditions now present:

- Reactor Mode Switch is in SHUTDOWN
- Reactor pressure is 920 psig
- All TBCCW Pumps are secured
- The ½ Instrument Air Compressor tripped on high air temperature

Based on the above indications, which of the following actions is required to be performed NEXT?

A. Trip the running CRD Pump.

B. Control RPV water level at +30 inches using the LFFRV.

C. Start all Service Air Compressors.

D. Place the Unit 1 Service Water Header Isolation Switch to CLOSE.

Answer: A

Answer Explanation

QCOA 3800-03, Loss of TBCCW, directs all loads cooled by TBCCW to be tripped.
The CRD pump will be tripped since all control rods are in and this pump is a load cooled by TBCCW.

Distractor 1 is incorrect: RPV water level will be raised to +40 inches and then the RFPs will be tripped therefore the LFFRV will not be able to control RPV water level. With loss of Instrument air, the LFFRV will lockup and will drift open over time.
Distractor 2 is incorrect: Service air compressors are supplied cooling water by TBCCW and will be secured as part of the supplementary actions. Plausible with the indication of the ½ Instrument Air Compressor tripping on high temperature since actions for loss of Instrument Air is to start all Instrument and Service Air Compressors.
Distractor 3 is incorrect: Plausible because closing the Service Water Header Isolation valve will isolate Service Water to the TBCCW system, which is an action in the Loss of Service water abnormal procedure. Also, if assumed that Service water could leak out through the rupture in the TBCCW system.

Reference: QCOA 3800-03 Rev 9
Reference provided during examination: None

Cognitive level: High

Level (RO/SRO): RO
Tier: 1 **Group:** 1

K/A: 295018 AA1.02
Ability to operate and/or monitor the following as they apply to PARTIAL OR COMPLETE LOSS OF COMPONENT COOLING WATER: System loads
(CFR: 41.7 / 45.6)
IMPORTANCE RO 3.3 SRO 3.4

SRO Justification: N/A

Question Source: New

Question History: N/A

Comments:

Associated objective(s):

295018.AA1.02 System loads (RO=3.3 / SRO=3.4)

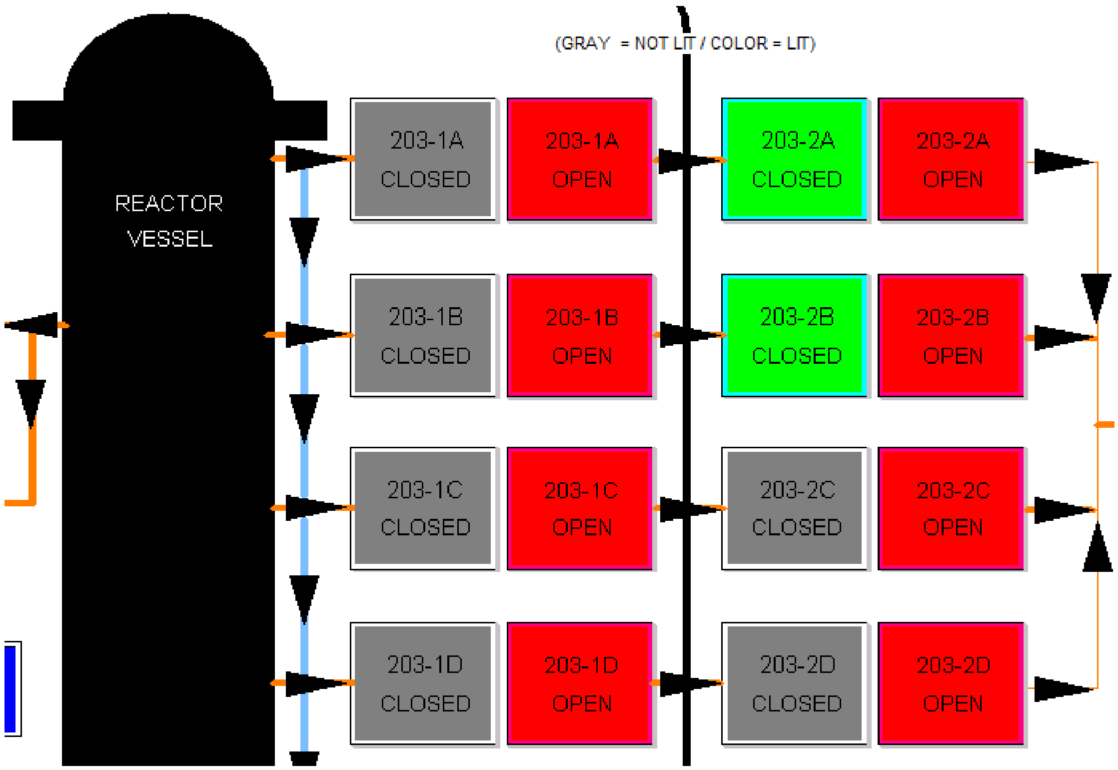
SR-3800-K26 (Freq: LIC=B)
EVALUATE given key TBCCW parameter indications and/or responses depicting a system specific abnormality/failure and DETERMINE a course of action to correct or mitigate the following abnormal condition(s):

a. High or low expansion tank level
b. High TBCCW temperature
c. Low TBCCW pressure

8	ID: 8	Points: 1.00

Unit 1 was at full power when a transient occurred, resulting in the following conditions:

- 912-1 A-11, U-1 INST AIR LOW PRESSURE, in ALARM
- 912-1 A-12, U-1A SERVICE AIR BACKUP VALVE OPEN, in ALARM
- 912-1 D-11, UNIT 1/2B INSTRUMENT AIR LOW PRESSURE, in ALARM
- The Reactor Mode Switch has been placed in 'SHUTDOWN'



Based on the above indications, what actions are required?

A. Give ALL outboard MSIVs a CLOSED signal ONLY. Leave all inboard MSIVs AS IS.

B. Give ALL inboard AND outboard MSIVs a CLOSED signal.

C. Cycle the outboard MSIV control switches between OPEN and CLOSED in the A AND B Steam Lines ONLY.

D. Cycle the inboard AND outboard MSIV control switches between OPEN and CLOSED in the A AND B Steam Lines ONLY.

Answer: B

Answer Explanation

The alarms listed indicate a total loss of Instrument Air, with the picture showing indications of at least two MSIVs drifting shut (open and closed lights both on) due to insufficient air pressure.

QOA 4700-06, Loss of Instrument Air, directs the following:

If Instrument Air pressure can't be maintained >75 psig (as indicated by 1A Service Air Backup Valve Open alarm received at 68 psig) and the MSIVs drift closed (indicated by dual indication), give all inboard and outboard MSIVs a closed signal to prevent inadvertent opening as instrument air pressure is restored (maintain positive control of the plant).

Distractor 1 is incorrect: Plausible because only the outboard MSIVs use Instrument Air as motive force.
Distractor 2 is incorrect: Plausible because only the A and B steam lines are showing drifting closed MSIVs. This would be a correct action if the MSIVs drifted shut with the loss of Instrument Air limited to the MSIVs.
Distractor 3 is incorrect: Plausible because only the A and B steam lines are showing drifting closed MSIVs. This would be a correct action if the MSIVs drifted shut with the loss of Instrument Air limited to the MSIVs and the outboard MSIVs did not shut.

Reference: QOA 4700-06 Rev 24, QCOA 0250-02 Rev 15
Reference provided during examination: None

Cognitive level: High

Level (RO/SRO): RO
Tier: 1 **Group:** 1

K/A: 295019 2.1.30
Partial or Complete Loss of Instrument Air
Ability to locate and operate components, including local controls.
(CFR: 41.7 / 45.7)
IMPORTANCE RO 4.4 SRO 4.0

SRO Justification: N/A

Question Source: New
Question History: N/A

Comments: Per NRC: added "Leave all inboard MSIVs AS IS" to distractor 1.

Associated objective(s):

295019.2.1.30 Ability to locate and operate components, including local controls. (RO=4.4 / SRO=4.0)

SRN-4701-K26 (Freq: LIC=B NF=B) EVALUATE given key Instrument Air System parameter indications and/or responses depicting a system specific abnormality/failure and DETERMINE a course of action to correct or mitigate the following abnormal condition(s):

a. Compressor trip
b. Compressor unloading valve failure (open/closed)
c. Dryer switching failure
d. Loss of instrument air pressure (air leak) (including use of vendor supplied air compressors and dryers)
e. Dryer desiccant breakdown/oil coated
f. Compressor fails to load
g. 1/2B Dryer fails to power up properly

9	ID: 9	Points: 1.00

Unit 2 is shutdown and decay heat is being removed via the 2A RHR Loop in Shutdown Cooling (SDC). The 2B loop of RHR is tagged out and drained.

The 2A RHR pumps trips, and the 2B RHR pump will NOT start.
The problem with the 2A RHR pump has been corrected and the 2A RHR pump is now available for service.

The following conditions are reported:

- MO 2-1001-47, SDC HDR DOWNSTREAM SV, is CLOSED
- MO 2-1001-50, SDC HDR UPSTREAM SV, is CLOSED
- Annunciator 902-3 E-15, SHUTDOWN COOLING LOW PRESS PERM, is CLEAR
- Reactor water level is +31 inches and rising slowly

Which of the following lists the MINIMUM actions, if any, that must be taken PRIOR to re-opening the SDC Isolation valves and starting the 2A RHR pump?

A. REDUCE reactor pressure to less than 100 psig AND RESET the SDC Isolation logic

B. REDUCE reactor pressure to less than 100 psig ONLY

C. RESET the SDC Isolation logic ONLY

D. NO action is required

Answer: A

Answer Explanation

With no RHR pumps running, decay heat will cause reactor pressure to rise. When pressure exceeds 100 psig, the Shutdown Cooling Low Pressure Permissive alarm clears, indicating that an RHR pump CANNOT be started while aligned for Shutdown Cooling. Reactor pressure must be reduced to less than 100 psig and the isolation logic manually reset before a RHR pump is permitted to start.

Annunciator 902-3 E-15 actual setpoint is 118 psig. Reducing reactor pressure to less than 100 psig will cause the annunciator to alarm.

Distractor 1 is incorrect: Plausible if assumed that the isolation logic need only be reset if there were a Group 2 Isolation signal. There is no indication of a Group 2 Isolation from the stem.
Distractor 2 is incorrect: Plausible because the SDC Isolation logic must be reset and if assumed that the SDC low press perm alarm being clear means that a RHR pump start is permitted.
Distractor 3 is incorrect: Combination of distractors 1 and 2.

Reference: QCOA 1000-02 Rev 19, QCOP 1000-05 Rev 49, QCAN 901(2)-3 E-15 Rev 8.
Reference provided during examination: None

Cognitive level: High

Level (RO/SRO): RO
Tier: 1 **Group:** 1

K/A: 295021 AA2.06

Ability to determine and/or interpret the following as they apply to LOSS OF SHUTDOWN COOLING:
Reactor pressure
(CFR: 41.10 / 43.5 / 45.13)
IMPORTANCE RO 3.2 SRO 3.3

SRO Justification: N/A

Question Source: New
Question History: N/A

Comments: Per NRC: added clarification to answer explanation for annunciator 902-3 E-15 setpoint.

Associated objective(s):

295021.AA2.06 Reactor pressure (RO=3.2 / SRO=3.3)

SR-1000-K24 (Freq: LIC=B)
Given an RHR system operating mode and various plant conditions, PREDICT how each supported system will be impacted by the following RHR/RHRSW system failures:
a. RHR pump trip
b. RHRSW pump trip
c. Loss of 125vdc to RHR initiation and/or loop select logic
d. Abnormal RHR discharge header pressure

10	ID: 10	Points: 1.00

A core reload is in progress.
SRM 22 is reading 60 cps INITIALLY.
A fuel bundle is being LOWERED into the core.

Approximately 30 seconds after bundle insertion commences, SRM 22 is reading 180 cps and RISING steadily. Other SRM count rates show a small and sustained RISE.

What actions, if any, are required?

A. NO actions are required; this is NORMAL SRM response for fuel bundle insertion.

B. STOP all fuel movement, DO NOT attempt to raise or lower the fuel assembly, and SCRAM the reactor.

C. LOWER the fuel assembly until fully seated, and then STOP fuel movement.

D. RAISE the fuel assembly until the bottom clears the top guide, and then STOP fuel movement. EVACUATE the reactor building.

Answer: B

Answer Explanation

QCFHP 0110-02, INADVERTENT CRITICALITY DURING FUEL MOVES, states: “True criticality is indicated by a sustained increase in count rate, over 15 to 20 seconds, of the SRM closest to the Fuel Assembly/Bundle OR Control Rod being moved. The other SRMs may also begin to increase as neutron population increases throughout the core."

This procedure provides a contingency plan for the conditions when fuel is being moved and the Reactor becomes critical. The possible cause of criticality may be due to all Control Rods not full in the core and/or mis-loaded fuel. As a result, the indication of criticality will be noticed by the Unit Reactor Operator. Secondary indication that a problem exists, especially related to Control Rods not full in, will be, Rod Position Indication System, the prevented operation of the Refuel Bridge/Hoists and/or the Reactor Building Overhead Crane.
The operator is instructed to stop downward motion of the fuel to terminate the reactivity addition. He is instructed to stop upward motion of the fuel to maximize shielding. The Area Radiation Monitors and Process Radiation Monitors may not discern sufficient radiation to achieve the alarm/isolation due to the water shielding.

Although the name of the referenced procedure does not say "abnormal" or "emergency" in the title, QCFHP 0110-02 is an abnormal operating procedure, and follows normal Fuel Handling procedure naming conventions for Quad Cities Station.

Distractor 1 is incorrect: Plausible if not recognized that counts are rising steadily.
Distractor 2 is incorrect: Plausible because lowering the assembly increases shielding.
Distractor 3 is incorrect: Plausible raising the assembly would stop adding positive reactivity.

Reference: QCFHP 0110-02 Rev 4
Reference provided during examination: N/A

Cognitive level: High

Level (RO/SRO): RO

Tier: 3

K/A: 295023 2.4.4 Refueling Accidents
Ability to recognize abnormal indications for system operating parameters that are entry-level conditions for emergency and abnormal operating procedures.
(CFR: 41.10 / 43.2 / 45.6)
IMPORTANCE RO 4.5 SRO 4.7

SRO Justification: N/A

Question Source: Quad Cities ILT Exam Bank
Question History: N/A

Comments:

Associated objective(s):

295023.2.4.04 Ability to recognize abnormal indications for system operating parameters which are entry-level conditions for emergency and abnormal operating procedures. (RO=4.5 / SRO=4.7)

SRLF-805-K16 (Freq: LIC=B NF=B)
Given a Refueling Operations related casualty, STATE the immediate operator actions of the applicable abnormal procedure.

11 **ID: 11** **Points: 1.00**

Unit 2 was at full power when a severe Loss of Coolant Accident occurred.

Which one of the following conditions/actions could result in containment failure due to exceeding the Primary Containment Pressure Limit Curve?

A. Initiating Drywell Sprays when outside the limits of the Drywell Spray Initiation Limit

B. Initiating Drywell Sprays with Torus water level at 30 ft

C. Drywell temperature of 260ºF

D. Torus pressure of 65 psig

Answer: D

Answer Explanation

The PCPL is the lower of:
• The pressure capability of the primary containment
• The maximum primary containment pressure at which vent valves sized to remove all decay heat from the containment can be opened and closed
• The maximum primary containment pressure at which ADS valves can be opened and will remain open

The pressure capability of the bottom of the torus is limiting at QCNPS.

The curve limits torus pressure as a function of primary containment water level.

Exceeding the PCPL could result in:
• Loss of primary containment integrity.
• Loss of venting capability.
• Loss of ADS valves.

Torus pressure of 65 psig is above the PCPL limit for any primary containment water level.

Distractor 1 is incorrect: Plausible because initiating drywell sprays when outside the limits of the Drywell Spray Initiating Limit could result in containment failure, but the failure mechanism would be due to exceeding the negative pressure rating.
Distractor 2 is incorrect: Plausible because initiating drywell spray at this level might challenge containment integrity, but the failure mechanism would be due to exceeding the negative pressure rating due to the vacuum breakers being covered.
Distractor 3 is incorrect: Plausible because 260ºF is the limit for restarting RBCCW flow to the Drywell coolers, but the actual Drywell integrity limit is 280ºF.

Reference: UFSAR 6.2.1.1 Rev 6, L-QGA200 Rev 10
Reference provided during examination: None

Cognitive level: Memory

Level (RO/SRO): RO
Tier: 1 **Group:** 1

K/A: 295024 EK1.01

Knowledge of the operational implications of the following concepts as they apply to HIGH DRYWELL PRESSURE: Drywell integrity: Plant-Specific
(CFR: 41.8 to 41.10)
IMPORTANCE RO 4.1 / SRO 4.2

SRO Justification: N/A

Question Source: New
Question History: N/A

Comments: Per NRC: added "curve" to end of "Primary Containment Pressure Limit."

Associated objective(s):

295024.EK1.01 Drywell integrity: Plant-Specific. (RO=4.1 / SRO=4.2)

SR-0001-K09 (Freq: LIC=B)
DESCRIBE the purpose of the following QGA curves/tables:
a. QGA Detail A, RPV Water Level Instruments
   1. Figure B, RPV Saturation Curve
   2. Table C, RPV Level Instrument Criteria
b. QGA Figure D, Primary Containment Pressure Limit
c. QGA Detail E, Alternate Injection Systems
d. QGA Detail F, Injection Subsystems
e. QGA Detail G, Preferred ATWS Systems
f. QGA Detail H, Alternate ATWS Systems
g. QGA Table J, Minimum Steam Cooling Pressure
h. QGA Figure K, Drywell Spray Initiation Limit
i. QGA Figure L, Pressure Suppression Pressure
j. QGA Figure M, Heat Capacity Limit
k. QGA Detail O, Emergency Depressurization Systems
l. QGA Detail P, RPV Injection Sources
m. QGA Detail Q, Alternate Flooding Systems
n. QGA Table S, Reactor Building Area Temperatures
o. QGA Table T, Reactor Building Area Radiation Levels
p. QGA Table U, Reactor Building Area Water Levels
q. QCAP 0200-10 Attachments S,T,U,V and W, RHR and CS NPSH Curves
r. QCAP 0200-10 Attachment X, HPCI NPSH Curves
s. QCAP 0200-10 Attachment Y, RCIC NPSH Curves
t. QCAP 0200-10 Attachment Z, ECCS Vortex Limit
u. Cold Shutdown Boron
v. Hot Shutdown Boron
w. Maximum Subcritical Banked Withdrawal Position
x. Minimum Number Of SRVs Required For Emergency Depressurization
y. Minimum Number Of ADS Valves For Decay Heat Removal
z. Decay Heat Removal Pressure
aa. Minimum Steam Cooling RPV Water Level
ab. Minimum Zero-Injection RPV Water Level

12 **ID: 12** **Points: 1.00**

Unit 1 was operating at full power when a transient resulted in a reactor scram.

- HPCI automatically started and was injecting at rated flow
- Reactor pressure then rose from 1000 psig to 1100 psig

Comparing HPCI parameters before and after the rise in reactor pressure:

AFTER the RISE in reactor pressure, HPCI speed has __(1)__ , and injection rate has __(2)__ .

A. (1) remained STABLE
(2) remained STABLE

B. (1) remained STABLE
(2) RISEN

C. (1) RISEN
(2) remained STABLE

D. (1) RISEN
(2) RISEN

Answer: C

Answer Explanation

HPCI discharge pressure is higher than reactor pressure to provide an injection rate. When the differential pressure lowers, flow rate will lower. The flow controller will sense the lowering flow and change the signal sent to the governor to raise turbine speed until the flow rises to match the flow controller setting.

HPCI is periodically tested to reach ~1250 psig discharge pressure at 1000 psig reactor pressure IAW QCOS 2300-05.

Distractor 1 is incorrect: HPCI speed will not remain stable since the required flow is dropping.
Distractor 2 is incorrect: Combination of distractors 1 and 3.
Distractor 3 is incorrect: Injection rate will lower due to the lower differential pressure, and then rise back to the initial setting on the flow controller.

Reference: QCOP 2300-06 Rev 32, QCOS 2300-05 Rev 73
Reference provided during examination: None

Cognitive level: High

Level (RO/SRO): RO
Tier: 1 **Group:** 1

K/A: 295025 EA1.04
Ability to operate and/or monitor the following as they apply to HIGH REACTOR PRESSURE: HPCI: Plant-Specific
(CFR: 41.7 / 45.6)
IMPORTANCE RO 3.8 / SRO 3.9

SRO Justification: N/A

Question Source: New
Question History: N/A

Comments: Clarified in answer explanation that HPCI is tested per surveillance at pressures greater than what is presented in the stem.

Associated objective(s):

295025.EA1.04 HPCI: Plant-Specific (RO=3.8 / SRO=3.9)

SR-2300-K15 (Freq: LIC=I)
DESCRIBE the operation of the following principle HPCI System components:
a. Turbine/pump
b. Drain System
  (1) Drain valves (manual valves / AOVs (including local manual operation))
  (2) Drain pots
  (3) Steam traps
  (4) Gland seal condensate pump (including auto starts and trips)
  (5) Gland seal cooling water pump (including trips)
  (6) Gland seal leakoff blower (including auto starts and trips)
c. Lube oil system
  (1) Auxiliary oil pump (including auto starts and trips)
  (2) Emergency bearing oil pump (including auto starts and trips)
  (3) Shaft driven oil pumps
  (4) Pressure reducing valves and modulating relief valves
  (5) Filter
  (6) Oil temperature indicating switches
  (7) Oil heater and controls
d. Exhaust rupture diaphragm
e. Room cooler (including auto starts and trips)
f. Turning gear (including local engage lever)
g. Flow Controller
h. Motor speed changer
i. Motor gear unit
j. Local throttle linkages
k. Local turbine trip lever and reset mechanism
l. Thrust bearing test solenoids
m. Thrust bearing and wear indicator
n. HPCI MOVs
o. HPCI stop valve
p. HPCI control valve
q. CCST and torus auto suction transfer

13 **ID: 13** **Points: 1.00**

Unit 1 was operating at full power when a Loss Of Offsite Power occurred.

- Power has been restored to all busses
- RCIC was manually started and is injecting at rated flow
- Relief valves 1-203-3B and 1-203-3C are automatically cycling to relieve reactor pressure
- Torus temperature is 96°F and rising 1°F every 5 minutes

Which of the following will have the greatest impact in REDUCING heat addition to the torus?

A. Tripping RCIC.

B. Placing the ADS Inhibit keylock switch to "Inhibit".

C. Re-opening the MSIVs and starting a normal cooldown with bypass valves.

D. Removing the 1-203-3B and 1-203-3C relief valves normal & reserve control power fuses.

Answer: C

Answer Explanation

The relief valves are cycling on high reactor pressure due to decay heat, adding heat to the Torus, causing Torus temperature to rise. Starting a normal cooldown with bypass valves will avoid sending the steam to the torus through the relief valves. Starting a cooldown with bypass valves also reduces the overall time that RCIC runs, reducing the heat input from RCIC.

Distractor 1 is incorrect: While tripping RCIC will cause the steam from running RCIC to stop being admitted to the torus, this will further increase the steam flow through the relief valves. RCIC removes some energy from the steam to drive the turbine/pump, so the discharge contains less energy than the steam going through the relief valves. Plausible because RCIC's steam exhaust goes to the torus.
Distractor 2 is incorrect: Placing the ADS Inhibit keylock switch to Inhibit would only prevent an ADS signal from opening all ADS valves. The relief valves are cycling on high reactor pressure. Plausible because placing the keylock switch to Inhibit is an action to prevent opening the relief valves if the automatic blowdown timer starts.
Distractor 3 is incorrect: Removing the control power fuses removes the electrical signal to the relief valves 1-203-3B and -3C. Relief valves 1-203-3A, -3D, and -3E will continue to lift to remove decay heat steam. Plausible if the candidate fails to recognize the relief valves cycling is a normal response.

Reference: Lesson Plan L-QGA100 (Rev 9), EPG Rev 2 (page B-6-42)
Reference provided during examination: None

Cognitive level: High

Level (RO/SRO): RO
Tier: 1 **Group:** 1

K/A: 295026 EA2.03
Ability to determine and/or interpret the following as they apply to SUPPRESSION POOL HIGH WATER TEMPERATURE: Reactor pressure
(CFR: 41.10 / 43.5 / 45.13)
IMPORTANCE RO 3.9 / SRO 4.0

SRO Justification: N/A

Question Source: New
Question History: N/A

Comments:

Associated objective(s):

295026.EA2.03 Reactor pressure (RO=3.9 / SRO=4.0)

SR-0250-K22 (Freq: LIC=B)
Given a Main Steam System operating mode and various plant conditions, PREDICT how system/plant parameters will respond to the following Main Steam System failures:

a. MSL leak inside the drywell
b. MSL leak outside the drywell
c. MSIV closure (one or more lines)

14 **ID: 14** **Points: 1.00**

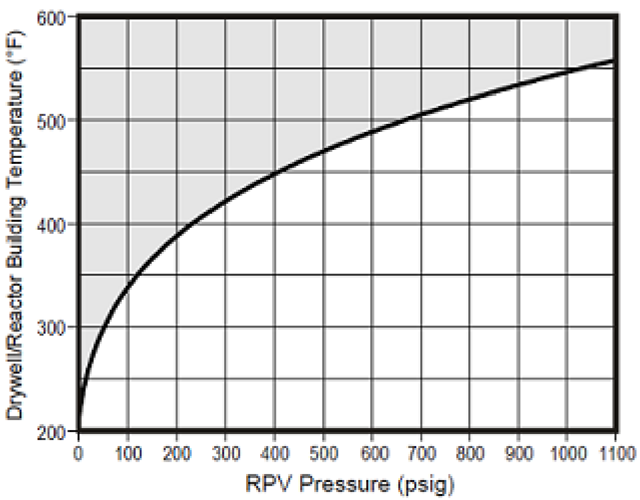
Unit 2 was operating at near rated power, when a LOCA occurred.

Reactor pressure is 100 psig and LOWERING slowly.

Which of the following sets of parameters would result in a USABLE indicated lower wide range RPV Water Level?

Drywell Temperature of __(1)__ and an indicated lower wide range RPV Water Level of __(2)__.

B RPV Saturation Temperature



C RPV Level Instrument Criteria

Instrument	Range (in.)	Use only if...
Fuel Zone	-340 to +60	Indicated level above -303 in.
Lower Wide Range	-344 to +66	Indicated level above -301 in.
Medium Range	-60 to +60	Indicated level above -43 in. **OR** Reactor building temperature below 195°F
Upper Wide Range	-42 to +358	Indicated level above 73 in.
Narrow Range	0 to +60	Indicated level on-scale

A. (1) 250 degrees F
(2) -270 inches

B. (1) 250 degrees F
(2) -340 inches

C. (1) 370 degrees F
(2) +70 inches

D. (1) 370 degrees F
(2) -305 inches

Answer: A

Answer Explanation

Lower wide range RPV water level instrument range is -344 inches to +66 inches however it is only usable if above -301 inches. If above saturation temperature, water level instruments may be unreliable. At 100 psig reactor pressure, saturation temperature is approximately 340 degrees F.

At 250 degrees F and indicated level at -270 inches, the Lower Wide Range reactor water level instruments would still be usable.

It is important for operators to be able to determine whether or not the RPV water level instruments are reading correctly. The operational implications of not having reliable level indications are to flood the RPV.

All distractors are plausible based on interpreting both the graph of RPV pressure vs Drywell temperature and the chart that determines the criteria for usability.

Distractor 1 is incorrect: Below -301 inches is unusable.
Distractor 2 is incorrect: Above +66 inches is unusable.
Distractor 3 is incorrect: Below -301 inches is unusable.

Reference: QGA 100 Rev 9
Reference provided during examination: None

Cognitive level: High

Level (RO/SRO): RO/SRO
Tier: 1 **Group:** 1

K/A: 295028 EK1.01
Knowledge of the operational implications of the following concepts as they apply to High Drywell Temperature: Reactor Water Level measurement.
(CFR: 41.8 to 41.10)
Importance 3.5/3.7

SRO Justification: N/A

Question Source: Bank
Question History: N/A

Comments: None

Associated objective(s):

SR-0263-K22 (Freq: LIC=B)
Given a RPV Instrumentation System operating mode and various plant conditions, PREDICT how the RPV Instrumentation System will respond to the following failures/conditions:
a. RPV pressure not at instrument's calibration pressure
b. Changes in steam flow
c. Changes in recirc flow / RHR injection flow
d. Normal RPV cooldown
e. Rapid RPV depressurization below 450 psig
f. Elevated drywell/reactor building temperatures
g. Reference / Variable leg leaks
h. Sudden increase in RVLIS flow/pressure
i. RPV head seal leak
j. RPV temperature stratification

295028.EK1.01 Reactor water level measurement (RO=3.5 / SRO=3.7)

15	ID: 15	Points: 1.00

The reason for performing an Emergency Depressurization (Blowdown) at 11 ft Torus water level is to prevent...

A. chugging if a primary system break were to occur and drywell sprays are initiated.

B. water hammer if an ERV were to actuate resulting in possible structural damage to the containment.

C. a loss of pressure suppression capability and possibly exceeding primary containment structural limits.

D. the torus becoming pressurized if an ERV were to actuate resulting in possible structural damage to the containment

Answer: C

Answer Explanation

The torus is less capable of accepting heat from a LOCA as torus level lowers. Upon reaching eleven feet torus level, corresponding to the elevation of the bottom of the downcomers, the torus is incapable of accepting any additional heat from a LOCA. The Pressure Suppression Pressure curve and Heat Capacity Temperature Limit curve are both valid only at a minimum of 11 feet torus level. Uncovering the downcomers would result in a loss of pressure suppression capability.

Distractor 1 is incorrect: Plausible because actions are taken within QGA 200 to prevent chugging. Specifically, initiating drywell sprays when torus pressure exceeds 5 psig maintains the drywell noncondensible content above the value at which chugging can occur.
Distractor 2 is incorrect: Plausible because actions are taken within EOP support procedures to prevent damage when actuating relief valves. Specifically, relief valves must not be re-actuated within 14 seconds of closing to ensure the tailpipes are clear of extra water.
Distractor 3 is incorrect: Plausible because it would be true if suppression pool level was below 5 ft (vice 11 ft.).

Reference: L-QGA200 Rev 10, QGA 200 Rev 9
Reference provided during examination: None

Cognitive level: Memory

Level (RO/SRO): RO
Tier: 1 **Group:** 1

K/A: 295030 EK1.03
Knowledge of the operational implications of the following concepts as they apply to LOW SUPPRESSION
POOL WATER LEVEL: Heat capacity
(CFR: 41.8 to 41.10)
IMPORTANCE RO 3.8 SRO 4.1

SRO Justification: N/A

Question Source: Quad ILT Exam Bank
Question History: N/A

Comments: None

Associated objective(s):

295030.EK1.03 Heat capacity. (RO=3.8 / SRO=4.1)

SR-0001-K23 (Freq: LIC=B)
Given QGA 200, 'Primary Containment Control' and QGA 200-5, 'Hydrogen Control', EXPLAIN the reasons for the actions.

16 **ID: 16** **Points: 1.00**

Given:

- A valid automatic Reactor scram from full rated power has occurred
- Drywell pressure is 9 psig and rising slowly
- RPV pressure is being manually controlled between 800 to 1000 psig using ADS valves
- RPV water level is -142 inches and lowering slowly
- A Group V Isolation has occurred

Based on the above conditions, which of the listed systems have automatically started **AND** are currently injecting to the RPV?

1. RCIC
2. HPCI
3. Core Spray

A. 1 ONLY

B. 2 ONLY

C. 3 ONLY

D. 1, 2 AND 3

Answer: B

Answer Explanation

HPCI and RCIC auto start and inject automatically when RPV water level falls to -59 inches. However, RCIC has isolated due to the Group V isolation. Core Spray will have auto started, but the cannot inject until RPV pressure is less than 325 psig.

Distractor 1 is incorrect: Plausible if candidate incorrectly identifies a Group V isolation as a HPCI isolation.
Distractor 2 is incorrect: Plausible because Core Spray will have started but doesn't inject until RPV pressure is less than 325 psig.
Distractor 3 is incorrect: Plausible if candidate incorrectly identifies a Group V isolation.

Reference: QCAN 901(2)-3 G-4 Rev 8
Reference provided during examination: None

Cognitive level: High

Level (RO/SRO): RO
Tier: 1 **Group:** 1

K/A: 295031 EK2.06
Knowledge of the interrelations between REACTOR LOW WATER LEVEL and the following: High pressure (feedwater) coolant injection (FWCI/HPCI): Plant-Specific
(CFR: 41.7 / 45.8)
IMPORTANCE RO 4.1 SRO 4.2

SRO Justification: N/A

Question Source: Modified from Quad Cities 2012 ILT NRC Exam
Question History: Quad Cities 2012 ILT NRC Exam

Comments: Per NRC: removed "all but four control rods are fully inserted to at least position 04" from stem.

Associated objective(s):

295031.EK2.06 High pressure (feedwater) coolant injection (FWCI/HPCI): Plant-Specific (RO=4.1 / SRO=4.2)

SR-2300-K07 (Freq: LIC=I)
LIST the signals which cause a HPCI System auto initiation including setpoints. DESCRIBE how they are reset.

17	ID: 17	Points: 1.00

Unit 1 was at 100% power when an ATWS occurred. Current plant conditions are:

- Reactor power is 18%
- Both SBLC Squib valves failed to fire

Which one of the following is an authorized method that can be used to inject Boron into the RPV?

A. Add Boron to the SBLC Test Tank and inject using the SBLC Pumps.

B. Align the SBLC tank to the RWCU large precoat tank and inject using the RWCU Pumps.

C. Manually fire the Squib valves from the local control station and inject using the SBLC Pumps.

D. Manually add Borax and Boric Acid to the Unit 1 Condensate Demineralizer precoat tank and inject using the Condensate and Feed Pumps.

Answer: B

Answer Explanation

IAW QCOP 1200-10, there are two methods that can be used to inject a Boron mixture into the RPV if the SBLC system flow path is not available. Connect a hose from the drain line of the SBLC tank to the RWCU large precoat tank and inject using the RWCU pumps or add bags of borax and boric acid to the RWCU large precoat tank and inject using the RWCU pumps.

Distractor 1 is incorrect: There is no procedure to add Boron to the SBLC test tank and the flow path would need to go through the SBLC pumps and Squib valve which did not fire. Plausible because the test tank is an injection source for inventory control in QGA 100.
Distractor 2 is incorrect: There is no procedure or method to locally fire the Squib valves. Plausible since the Squib valves can be manually fired and are tested during refuel outages.
Distractor 3 is incorrect: Borax and boric acid are mixed in the precoat tank which in turn is transferred to the RWCU demineralizers, not the Condensate demins. Plausible because it is physically possible, but no procedure exists to do so.

Reference: QCOP 1200-10 Rev 22
Reference provided during examination: None

Cognitive level: Memory

Level (RO/SRO): RO
Tier: 1 **Group:** 1

K/A: 295037 EA1.10
Ability to operate and/or monitor the following as they apply to SCRAM CONDITION PRESENT AND REACTOR POWER ABOVE APRM DOWNSCALE OR UNKNOWN: Alternate boron injection methods: Plant-Specific
(CFR: 41.7 / 45.6)
IMPORTANCE RO 3.7 / SRO 3.9

SRO Justification: N/A

Question Source: New
Question History: N/A

Comments: None

Associated objective(s):

295037.EA1.10 Alternate boron injection methods: Plant-Specific (RO=3.7 / SRO=3.9)

SRN-1200-K02 (Freq: LIC=B NF=B)
DESCRIBE the major flowpaths for each mode of Reactor Water Cleanup System operation.

a. Normal operation
b. Reject (main condenser/radwaste)
c. Filter-demin
   (1) Backwash
   (2) Precoat
   (3) Hold
d. Post-strainer backflush
e. Alternate boron injection
f. RWCU decay heat removal mode

18 **ID: 18** **Points: 1.00**

QGA 400, Radioactivity Release Control, directs the crew to "Run Turbine Building Vent".

Which of the following is the basis for this action?

A. Assures that any radioactivity in the Turbine building is discharged through an elevated and monitored release point.

B. Results in the radioactivity being discharged as a ground level release to limit the dispersion of the radioactivity.

C. To provide dilution flow for elevated releases from the SBGTS through the Main Chimney.

D. To maintain the Secondary Containment differential pressure within operational limits.

Answer: A

Answer Explanation

Continued personnel access to the turbine building, auxiliary building, or other buildings outside the secondary containment boundary may be essential for responding to emergencies or transients which may degrade into emergencies. These buildings are not always airtight structures, and radioactivity release inside the buildings would not only limit personnel access, but would eventually lead to an unmonitored ground level release. Operating HVAC preserves building accessibility and discharges radioactivity through an elevated, monitored release point.

Distractor 1 is incorrect: Plausible because the Reactor Building vent is not considered an elevated release path. Turbine building ventilation discharge is elevated and not at ground level.
Distractor 2 is incorrect: Plausible because Turbine Building ventilation will provide some dilution flow, however, the concern for QGA 400 is release outside secondary containment; diluting SBGTS flow would not address the problem QGA 400 is attempting to address.
Distractor 3 is incorrect: Plausible because this is the basis for restarting Reactor Building Ventilation if the restart will not result in an excessive release of radioactivity to the environment. Incorrect because maximizing Turbine Building ventilation will not assist with Secondary Containment.

Reference: L-QGA400 (Rev 8), BWROG EPGs/SAGs, Appendix B, B-9-4 Rev 2
Reference provided during examination: None

Cognitive level: Memory

Level (RO/SRO): RO
Tier: 1 **Group:** 1

K/A: 295038 EK2.03
Knowledge of the interrelations between HIGH OFF-SITE RELEASE RATE and the following: Plant Ventilation Systems
(CFR: 41.7 / 45.8)
IMPORTANCE RO 3.6 SRO 3.8

SRO Justification: N/A

Question Source: Bank - Columbia Generating Station 2009 ILT NRC Exam
Question History: N/A

Comments:

Associated objective(s):

295038.EK2.03 Plant ventilation systems (RO=3.6 / SRO=3.8)

SR-0001-K35 (Freq: LIC=B)
Given QGA 400, 'Radioactivity Release Control', EXPLAIN the reasons for the actions.

19	ID: 19	Points: 1.00

REFER TO THE DIAGRAM ON THE FOLLOWING PAGE

A FAS alarm is received in the Control Room.

- FAS screen indicates FAS Device "53-28" in alarm.

An EO is dispatched and reports from local protectowire panel 2202-81:

- Zone 2 alarm, and the footage meter reads 1100.

Where is the potential fire?

A. 1A RHR Room

B. 1B RHR Room

C. 2A RHR Room

D. 2B RHR Room

Answer: C

Answer Explanation

QCOA 4100-11 Attachment A shows that FAS device 53-28 is associated with Unit 2 RB 554' South (local panel 2202-81). Zone 2 (footage 954-1267) on Attachment V associates footage with the 2A RHR Room ceiling.

The included diagram is QCOA 4100-11 Rev 27 Attachment V page 4 of 4 (pg 101) - 1 page.

Distractor 1 is incorrect: Plausible if the wrong Unit and zone is used.
Distractor 2 is incorrect: Plausible if the wrong Unit is used.
Distractor 3 is incorrect: Plausible if the wrong zone is used.

Reference: QCOA 4100-11 Rev 27
Reference provided during examination: None

Cognitive level: High

Level (RO/SRO): RO
Tier: 1 **Group:** 1

K/A: 600000 AA2.03
Ability to determine and interpret the following as they apply to PLANT FIRE ON SITE: Fire Alarm
(CFR 41.8)
IMPORTANCE RO 2.8 SRO 3.2

SRO Justification: N/A

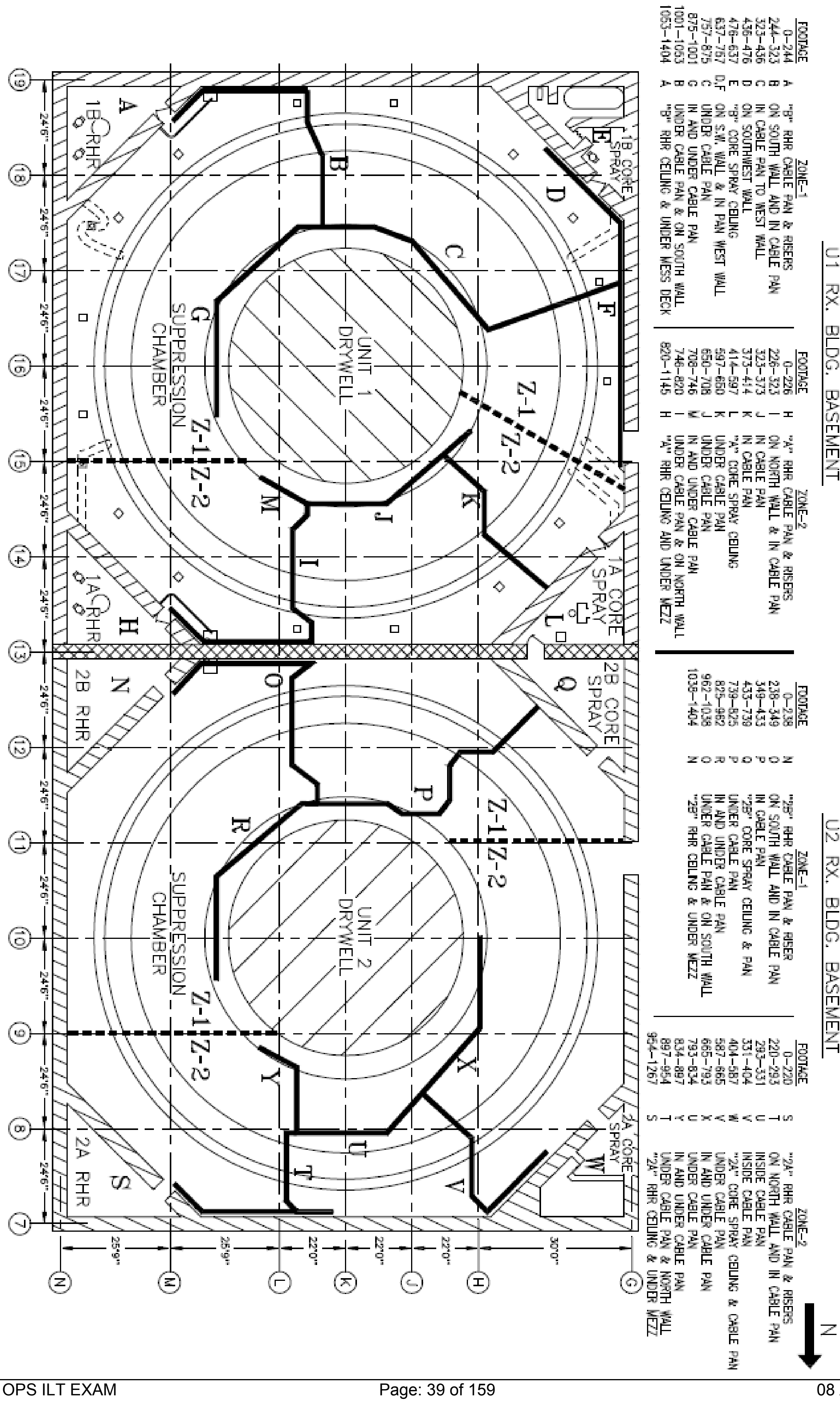
Question Source: New
Question History: N/A

Comments:

Associated objective(s):

SRN-4100-K05 (Freq: LIC=I N=I)
Given the following Protectowire System key parameters, STATE the physical location of the local indicators:
a. Power supply status lights
b. Battery charge indicating discs
c. Alarm point footage meter

600000.AA2.03 Fire alarm (RO=2.8 / SRO=3.2)



U1 RX. BLDG. BASEMENT
FOOTAGE ZONE-1
0-244 A "B" RHR CABLE PAN & RISERS
244-323 B ON SOUTH WALL AND IN CABLE PAN
323-436 C IN CABLE PAN TO WEST WALL
436-476 D ON SOUTHWEST WALL
476-637 E "B" CORE SPRAY CEILING
637-757 D,F ON S.W. WALL & IN PAN WEST WALL
757-875 C UNDER CABLE PAN
875-1001 G IN AND UNDER CABLE PAN
1001-1063 B UNDER CABLE PAN & ON SOUTH WALL
1063-1404 A "B" RHR CEILING & UNDER MESS DECK
FOOTAGE ZONE-2
0-226 H "A" RHR CABLE PAN & RISERS
226-323 I ON NORTH WALL & IN CABLE PAN
323-373 J IN CABLE PAN
373-414 K IN CABLE PAN
414-597 L "A" CORE SPRAY CEILING
597-650 K UNDER CABLE PAN
650-708 J UNDER CABLE PAN
708-746 M IN AND UNDER CABLE PAN
746-820 I UNDER CABLE PAN & ON NORTH WALL
820-1145 H "A" RHR CEILING AND UNDER MEZZ
U2 RX. BLDG. BASEMENT
FOOTAGE ZONE-1
0-238 N "2B" RHR CABLE PAN & RISER
238-349 O ON SOUTH WALL AND IN CABLE PAN
349-433 P IN CABLE PAN
433-739 Q "2B" CORE SPRAY CEILING & PAN
739-825 P UNDER CABLE PAN
825-962 R IN AND UNDER CABLE PAN
962-1038 O UNDER CABLE PAN & ON SOUTH WALL
1038-1404 N "2B" RHR CEILING & UNDER MEZZ
FOOTAGE ZONE-2
0-220 S "2A" RHR CABLE PAN & RISERS
220-293 T ON NORTH WALL AND IN CABLE PAN
293-331 U INSIDE CABLE PAN
331-404 V INSIDE CABLE PAN
404-587 W "2A" CORE SPRAY CEILING & CABLE PAN
587-665 V UNDER CABLE PAN
665-793 X IN AND UNDER CABLE PAN
793-834 U UNDER CABLE PAN
834-897 Y IN AND UNDER CABLE PAN
897-954 T UNDER CABLE PAN & NORTH WALL
954-1267 S "2A" RHR CEILING & UNDER MEZZ
UNIT 1 DRYWELL
UNIT 2 DRYWELL
SUPPRESSION CHAMBER
SUPPRESSION CHAMBER
1B RHR
1A RHR
2B RHR
2A RHR
1B CORE SPRAY
1A CORE SPRAY
2B CORE SPRAY
2A CORE SPRAY
Z-1 Z-2
N

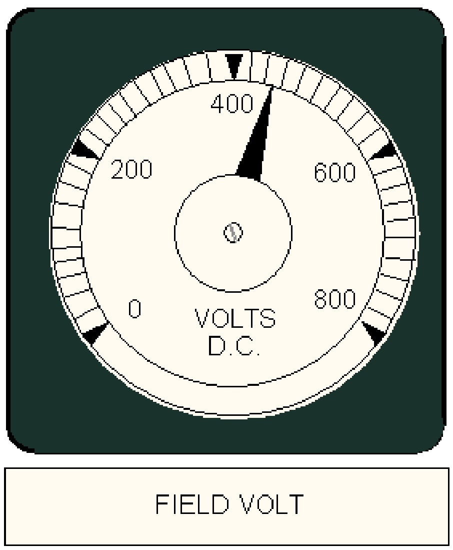
20 **ID: 20** **Points: 1.00**

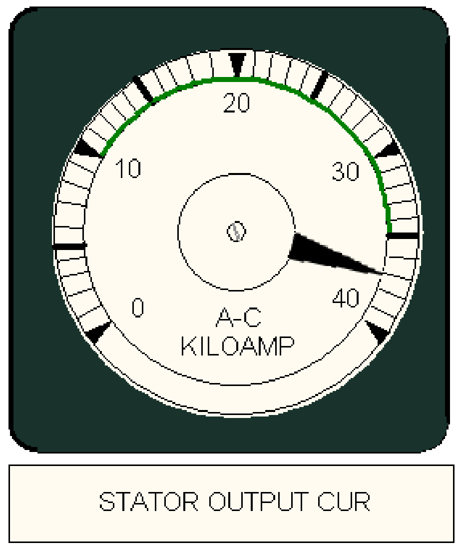
Unit 1 is at rated power.

A Grid disturbance results in steadily LOWERING 345 KV Switchyard voltage.

The Auto Voltage Regulator (AVR) responds as designed by RAISING Main Generator Terminal Voltage, until Annunciator 901-8 H-10, GEN 1 EXCITER FIELD OVERCURRENT, ALARMS.

U1 Generator indications are as shown below:





Main Generator Megawatts and Frequency remain stable at their normal values throughout the transient.

Based on the above indications, operator actions are required in order to prevent...

A. a Main Turbine Overspeed Trip.

B. the Main Generator from slipping a pole.

C. a Main Generator Trip on Reverse Power.

D. the Main Generator rotor and stator from overheating.

Answer: D

Answer Explanation

The given conditions (lowering grid voltage) will cause the generator automatic voltage regulator to raise the rotor excitation current in order to raise generator terminal voltage, in an attempt to raise grid voltage. The AVR will continue to raise excitation current to the field until the over-excitation limit is reached, at which point the Exciter Field Overcurrent annunciator alarms.
The graphics show the Stator Output current beyond the generator nameplate rating (>34,256 amps). Although the generator is designed to exceed nameplate ratings for short periods of time (~2 mins), operator actions are required to control parameters to prevent stator and rotor overheating.

Distractor 1 is incorrect: If conditions continue without operator action, the generator could trip on field over-voltage or generator over-excitation, removing all loads from the generator end of the turbine. A sudden removal of all electrical loads from the generator will cause the turbine to overspeed. However, a generator trip will directly trip the turbine, preventing an overspeed condition. Plausible if the direct turbine trip from the generator trip is not recalled.
Distractor 2 is incorrect: Plausible if assumed the lowering grid voltage would cause the generator field to weaken (a condition that would be true if the field were under-excited).
Distractor 3 is incorrect: A reverse power condition occurs when generator megawatts lower until megawatts are negative, or the generator becomes motorized. Plausible if megawatts are mistaken for megavars, because the lowering grid voltage will initially cause megavars to lower, which could lead to negative megavars.

Reference: QCAN 901-8 H-10 Rev 2, QCOA 6000-02 Rev 20, QCOP 6000-02 Rev 19
Reference provided during examination: None

Cognitive level: Memory

Level (RO/SRO): RO/SRO
Tier: 1 **Group:** 1

K/A: 700000 AK3.02
Knowledge of the reasons for the following responses as they apply to Generator Voltage and Electric Grid Disturbances: Actions contained in abnormal operating procedures for voltage and grid disturbances. (CFR: 41.4, 41.5, 41.7, 41.10 / 45.8)
IMPORTANCE RO 3.6 SRO 3.9

SRO Justification: N/A

Question Source: New
Question History: N/A

Comments: None

Associated objective(s):

700000.AK3.02 Actions contained in abnormal operating procedure for voltage and grid disturbances (RO=3.6 / SRO= 3.9)

SR-6100-K20 (Freq: LIC=B)
Given a 345 KV Switchyard/ Main Transformer System operating mode and various plant conditions, EVALUATE the following 345 KV Switchyard/Main Transformer System indications/responses and DETERMINE if the indication/ response is expected and normal.
a. Bus voltages and status lights
b. Breaker positions
c. 345 KV line current, MW, MVARS and watt-hours
d. System frequency and MW
e. T1 (2) current

21	ID: 21	Points: 1.00

A reactor startup is in progress with the following conditions:

- Reactor power is 8% and stable
- The Reactor Mode Switch is in 'START/HOT STBY'
- Turbine warming is in progress
- Two Turbine Bypass valves are open

The NSO then reports the following:

- Annunciator 901-7 H-3, CONDENSER LO VACUUM, is in ALARM
- Condenser backpressure is 6 inches Hg (24 inches Hg vacuum) and degrading at a rate of 1 inch per minute
- RPV pressure is 920 psig and stable

Which of the following is correct given the above conditions?
(Assume NO operator actions)

A. The reactor will scram on RPV High Pressure in 1 minute due to the Turbine Bypass Valves going closed.

B. The reactor will scram on Low Condenser Vacuum in 3 minutes.

C. The reactor will scram due to the Turbine Trip in 4 minutes.

D. The reactor will NOT scram on Low Condenser Vacuum.

Answer: D

Answer Explanation

In 3 minutes, condenser vacuum will be 21", which is the reactor scram setpoint.
In 4 minutes, vacuum will be 20", which is the turbine trip setpoint.
With the Rx Mode Select switch in START/HOT STBY, the low vacuum and turbine stop valve closure scrams are bypassed.
There is no bypass for the Main Turbine trip on low condenser vacuum.
Turbine bypass valves close at 7 inches vacuum (23 inches backpressure).

Distractor 1 is incorrect: The reactor may scram on high RPV pressure due to the BPVs going closed, but not in 1 minute. Plausible if assumed the closure setpoint is 23 inches vacuum vice backpressure.
Distractor 2 is incorrect: This would be correct if the mode switch was in RUN.
Distractor 3 is incorrect: Plausible because the Turbine will trip in 4 minutes, but it will not cause a reactor scram.

Reference: QCAN 901-5 F-1 Rev 6, QCAN 901-7 H-3 Rev 9, QOA 5600-04 Rev 27
Reference provided during examination: None

Cognitive level: High

Level (RO/SRO): RO
Tier: 1 **Group:** 2

K/A: 295002 AA2.02

Ability to determine and/or interpret the following as they apply to LOSS OF MAIN CONDENSER VACUUM: Reactor power: Plant-Specific
(CFR: 41.10 / 43.5 / 45.13)
IMPORTANCE RO 3.2 / SRO 3.3

SRO Justification: N/A

Question Source: Bank
Question History: N/A

Comments:

Associated objective(s):

295002.AA2.02 Reactor power: Plant-Specific (RO=3.2 / SRO=3.3)

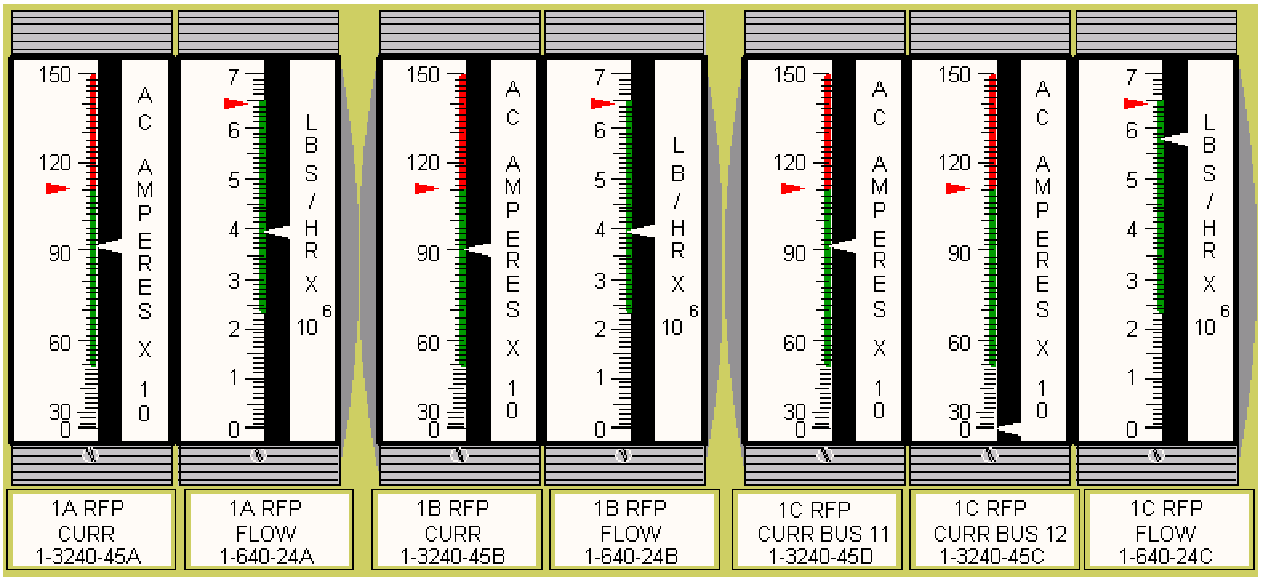
SR-3200-K24 (Freq: LIC=B)
Given a Condensate/Feedwater System operating mode and various plant conditions, PREDICT how each supported system will be impacted by the following Condensate/Feedwater System failures:

a. Loss of condensate reject flow
b. Feed header rupture inside the drywell
c. Loss of vacuum
d. Condenser tube rupture

22 **ID: 22** **Points: 1.00**

Unit 1 is operating at rated power, when the NSO reports that Annunciator 901-5 G-8, FW PUMP MAXIMUM CAPACITY, is in ALARM.

Reactor Feed Pump indications are as shown below:



RPV water level is +26 inches and LOWERING at 2 inches per minute.

(1) What is the reason for the LOWERING RPV water level, and

(2) Assuming NO operator actions, what is the expected response of RPV water level for the next 2 minutes?

A. (1) Flow indication 1-640-24C is failing high
(2) RPV water level will return to 30 inches due to DFWLC de-selecting the 1C RFP Feed Flow input

B. (1) Flow indication 1-640-24C is failing high
(2) RPV water level will continue to LOWER due to Runout Flow Control

C. (1) AO 1-3201C, 1C RFP RECIRC VLV has failed OPEN
(2) RPV water level will return to 30 inches due to DFWLC de-selecting the 1C RFP Feed Flow input

D. (1) AO 1-3201C, 1C RFP RECIRC VLV has failed OPEN
(2) RPV water level will continue to LOWER due to Runout Flow Control

Answer: B

Answer Explanation

RFP flow indication is significantly higher for the 1C RFP than the other two pumps and there has been no change in 1C RFP run current as compared to the other RFPs.

Based on total RFP flow indication (3.8 + 3.8 + 5.6 = 13.2 Mlbm/hr), you are in runout flow control (setpoint 13.15 Mlbm/hr with 3 RFPs) and based on indications that RPV water level is lowering this is confirmed.

The FW PUMP MAXIMUM CAPACITY alarm indicates the FRVs are in Runout Flow Control and will not open any further.

Since RPV water level is lowering at 2 inches/min, and the FRVs unable to open any further, RPV water level will continue to lower.

Distractor 1 is incorrect: RPV water level will not return to 30 inches. Plausible since DFWLC will de-select invalid inputs from feed and steam flows. However, when runout flow control is entered, the FRVs will not open any further.
Distractor 2 is incorrect: If 1C RFP RECIRC VLV had failed OPEN the RFP would be working harder and you would expect to see higher amps but there has been no change. RPV water level will not return to 30 inches. Plausible since DFWLC will de-select invalid inputs from feed and steam flows. However, when runout flow control is entered, the FRVs will not open any further.
Distractor 3 is incorrect: If 1C RFP RECIRC VLV had failed OPEN the RFP would be working harder and you would expect to see higher amps but there has been no change. Plausible since a failed open RFP RECIRC VLV would indicate higher flow on 1-640-24C.

Reference: QCAN 901-5 G-8 Rev 7, QCOA 0201-09 Rev 25, QCOA 0600-09 Rev 11, QCOP 0600-21 Rev 18
Reference provided during examination: None

Cognitive level: High

Level (RO/SRO): RO
Tier: 1 **Group:** 2

K/A: 295009 K3.02
Knowledge of the reasons for the following responses as they apply to LOW REACTOR WATER LEVEL : Reactor feedpump runout flow control
(CFR: 41.5 / 45.6)
IMPORTANCE RO 2.7 / SRO 2.8

SRO Justification: N/A

Question Source: New
Question History: N/A

Comments:

Associated objective(s):

295009.AK3.02 Reactor feedpump runout flow control: Plant-Specific. (RO=2.7 / SRO=2.8)

SR-0600-K22 (Freq: LIC=B)
Given a Feedwater Level Control System operating mode and various plant conditions, PREDICT how feedwater level control/plant parameters will respond to the following failures:

a. Feedflow sensor fails high/low
b. Steam flow sensor fails high/low
c. RPV level sensor fails high/low
d. Reactor level SMS value error
e. RFP suction pressure SMS value error
f. Steam flow SMS value error
g. Feedflow error with calculated feedwater flow activated
h. Loss of 480vac
i. Loss of Essential Service or Instrument Bus power
j. Loss of instrument air
k. FWLC Hydraulic Skid failures:
    (1) Pump trip
    (2) Loss of FWLC position feedback
    (3) Oil leak
    (4) Tracking error

23 **ID: 23** **Points: 1.00**

Unit 1 is in Mode 2 during a normal reactor startup.

QCOS 2300-05, HPCI Pump Operability Test, is in progress, with the following plant conditions:

- Torus Cooling is running on the 'A' Loop
- Reactor pressure is 920 psig and steady
- ONE Turbine Bypass Valve is FULL OPEN
- The HPCI turbine is being operated at rated conditions for data collection
- Annunciator 901-4 G-17, TORUS WTR HIGH TEMP, is in ALARM

At time 1300 the NSO reports that average Torus temperature is 93°F and rising at 1°F/min.

Assuming current trends continue at the same rate, what is the EARLIEST time that HPCI testing MUST be suspended, in order to comply with Technical Specifications?

A. 1302

B. 1312

C. 1317

D. 1327

Answer: B

Answer Explanation

Based on plant conditions the candidate must determine that the plant is > 1% RTP (Bypass valve capacity is 4%). Additionally the candidate must interpret that with torus temperature >105°F and performance of testing that adds heat to the torus, all testing that adds heat to the suppression pool must be immediately suspended.

At time 1312, torus temperature will be 105°F
At 105°F, immediately suspend all testing that adds heat to the suppression pool (torus) per TS 3.6.2.1 Condition C

Distractor 1: At time 1302, torus temperature will be 95°F. Plausible because TS 3.6.2.1 Condition A must be entered when pool temperature is > 95°F with no testing.
Distractor 2: At time 1317, torus temperature will be 110°F. Plausible because TS 3.6.2.1 Condition D must be entered when pool temperature is > 110°F.
Distractor 3: At time 1327, torus temperature will be 120°F. Plausible because TS 3.6.2.1 Condition E must be entered when pool temperature is > 120°F.

Reference: TS LCO 3.6.2.1 Amendment No. 199/195
Reference provided during examination: None

Cognitive level: High

Level (RO/SRO): RO
Tier: 1 **Group:** 2

K/A: 295013.AA1.02

Ability to operate and/or monitor the following as they apply to HIGH SUPPRESSION POOL TEMPERATURE: Systems that add heat to the suppression pool
(CFR: 41.7 / 45.6)
IMPORTANCE RO 3.9 SRO 3.9

SRO Justification: N/A

Question Source: New
Question History: N/A

Comments: None

Associated objective(s):

295013.AA1.02 Systems that add heat to the suppression pool (RO=3.9 / SRO=3.9)

SR-1601-K28 (Freq: LIC=B)
EXPLAIN the reasons for given Containment Systems operating limits and precautions.
a. Torus temperature limits (95/110/160)
b. Torus level limits (+2/-2 adjusted for dp)
c. Drywell/torus differential pressure limitations
d. Drywell Spray Initiation Limit
e. Primary Containment Pressure Limit
f. Pressure Suppression Limit
g. Heat Capacity Limit

24	ID: 24	Points: 1.00

Unit 2 is operating at rated power when a Loss of Feedwater Heating occurred.

The QNE reports Minimum Critical Power Ratio (MCPR) is 1.11.

This value of MCPR is...

A. within the Safety Limit; NO operator actions are required.

B. at the Safety Limit; it is required to insert in-sequence rods to obtain adequate margin.

C. in violation of the Safety Limit; it is required to insert all insertable control rods within two hours.

D. in violation of the Safety Limit; it is required to reduce reactor power to less than 25% RTP within four hours.

Answer: C

Answer Explanation

A loss of feedwater heating is an inadvertent reactivity addition, the operational implications of which are exceeding thermal limits and the required actions to address them.
MCPR limit on Unit 2 with both recirc loops is ≥1.12. Required actions are to restore compliance with all safety limits and insert all insertable control rods within two hours (T.S. 2.0)

Distractor 1 is incorrect: Below the required MCPR limit for Unit 2. Plausible because Unit 1's MCPR limit is 1.11.
Distractor 2 is incorrect: Below the required MCPR limit for Unit 2 however this is at the safety limit for Unit 1 with both recirc loops. Plausible because Unit 1's MCPR limit is 1.11.
Distractor 3 is incorrect: Must insert all insertable control rods within 2 hours; not reduce power less than 25%. Plausible because this is an action from LCO 3.2.2

Reference: T.S. 2.0 amendment No.250/245
Reference provided during examination: None

Cognitive level: Memory

Level (RO/SRO): RO
Tier: 1 **Group:** 2

K/A: 295014 AK1.05
Knowledge of the operational implications of the following concepts as they apply to INADVERTENT REACTIVITY ADDITION: †Fuel thermal limits
(CFR: 41.8 to 41.10)
IMPORTANCE RO 3.7 / SRO 4.2

SRO Justification: N/A

Question Source: Bank. Modeled from Perry 2013 ILT NRC Exam
Question History: N/A

Comments:

Associated objective(s):

295014.AK1.05 Fuel thermal limits (RO=3.7 / SRO=4.2)

SR-0800-K32 (Freq: LIC=B)
Given Nuclear Fuel operability status OR key parameter indications, various plant conditions and a copy of Tech Specs, DETERMINE Tech Spec compliance and required actions, if any.

25	ID: 25	Points: 1.00

Unit 1 is in an ATWS condition.

- RPV pressure is 940 psig
- RPV water level is -142 inches
- 10 Control Rods did NOT fully insert
- All 8 RPS scram solenoid group indicating lights are NOT LIT
- CRD drive water pressure is 280 psig
- All Blue Scram Valve lights are LIT
- Annunciator 901-5 A-1, SCRAM VALVE AIR SUPPLY LOW PRESSURE, is in ALARM
- Annunciator 901-5 B-1, SDV HIGH LVL SCRAM BYPASSED, is NOT LIT

Based on the above indications, what action(s) should be performed FIRST to insert control rods in accordance with QCOP 0300-28, Alternate Control Rod Insertion?

A. Individually scram control rods by using the Control Rod scram toggle switches located on the 901-16 panel.

B. Bypass the RWM and manually insert control rods using the Reactor Manual Control System.

C. De-energize the RPS scram solenoids by removing the associated fuses at the 901-15 and 901-17 panels.

D. De-energize ARI Valves by removing the associated fuses at the 2201-70A and 2201-70B panels, and insert a manual scram.

Answer: B

Answer Explanation

QCOP 0300-28, Alternate Control Rod Insertion, is an abnormal procedure used for inserting control rods when rods did not insert normally on a reactor scram condition (ATWS).
The conditions given in the stem indicate that there is a hydraulic ATWS, with the scram air header depressurized and all RPS solenoids deenergized.
The correct action is to bypass the RWM and insert control rods one at a time using the RMCS.

Distractor 1 is incorrect: Individually scramming control rods will not work until the scram signal is reset and the scram air header has been re-pressurized. Plausible because this method will eventually be used in the procedure, but not first and not under the given conditions.
Distractor 2 is incorrect: Scram solenoids are already de-energized based on the indication provided that the scram lights are lit. Plausible because this would be correct for an Electric ATWS.
Distractor 3 is incorrect: Pulling ARI fuses and reinserting a scram will not work since the SDV high level scram signal has not yet been bypassed. Plausible because this will be the correct action after the signal has been bypassed.

Reference: QCOP 0300-28, Rev 31
Reference provided during examination: None

Cognitive level: High

Level (RO/SRO): RO
Tier: 1 **Group:** 2

K/A: 295015 Incomplete SCRAM
2.4.11
Knowledge of abnormal condition procedures.
(CFR: 41.10 / 43.5 / 45.13)
IMPORTANCE RO 4.0 / SRO 4.2

SRO Justification: N/A

Question Source: New
Question History: N/A

Comments:

Associated objective(s):

295015.2.4.11 Knowledge of abnormal condition procedures. (RO=3.4 / SRO=3.6)

SR-0500-K26 (Freq: LIC=B)
EVALUATE given key Reactor Protection System parameter indications and/or responses depicting a system specific abnormality/failure and DETERMINE a course of action to correct or mitigate the following abnormal condition(s):

a. Partial half scram
b. Failure to reset
c. Failure to scram
d. Half-scram
e. Loss of one RPS bus
f. Loss of both RPS bus

26 **ID: 26** **Points: 1.00**

Unit 2 is operating at 100% power.

- Annunciator 902-3 G-3, RX BLDG VENT CHANNEL A HI HI RADIATION, is in ALARM
- The NSO reports RX BLDG VENT CH A indicates 15 mr/hr on the 902-10 panel
- The NSO reports RX BLDG STACK GAS ACTIVITY is trending up on the 912-1 panel

Based on the above indications, what action must the NSO perform?

A. Attempt a reset of Rx BLDG VENT CH A radiation monitor since the current reading is below the alarm setpoint.

B. Verify the Reactor Building and Control Room ventilation systems isolate, “A” SBGTS starts, and make a PA announcement to evacuate the Reactor Building.

C. Verify the Reactor Building and Control Room ventilation systems isolate, “B” SBGTS starts, and make a PA announcement to evacuate the Reactor Building.

D. Manually start EITHER train of SBGTS and make a PA announcement to evacuate the Reactor Building.

Answer: C

Answer Explanation

902-3 G-3 alarm setpoint is 3 mr/hr, (analytical setting is 10 mr/hr) and 15 mr/hr is above the alarm setpoint. Automatic actions are for the Rx building and control room ventilation systems to isolate and SBGTS starts. Since “B” SBGTS is selected to primary, the “B” SBGTS will start. Operator actions include evacuation of the reactor building for personnel protection.

Distractor 1 is incorrect: The reading provided is above the alarm setpoint. Plausible because Fuel pool radiation monitors alarm at 50 mr/hr.
Distractor 2 is incorrect: The “A” SBGTS should not start since the SBGTS selected for primary is "B". Plausible because the "A" SBGTS is on the Unit 2 side and a common misconception is that the "A" train starts for Unit 2.
Distractor 3 is incorrect: SBGTS should automatically start therefore no manual start is warranted. Plausible because other radiation monitors require both monitors to be upscale to cause the protective action (e.g., both unit's drywell radiation monitors are required to cause a group 2 isolation)

Reference: QCAN 901(2)-3 G-3 Rev 9
Reference provided during examination: None

Cognitive level: Memory

Level (RO/SRO): RO
Tier: 1 **Group:** 2

K/A: 295033 EK1.02
Knowledge of the operational implications of the following concepts as they apply to HIGH SECONDARY CONTAINMENT AREA RADIATION LEVELS: Personnel protection
(CFR: 41.8 to 41.10)
IMPORTANCE RO 3.9 / SRO 4.2

SRO Justification: N/A

Question Source: New
Question History: N/A

Comments:

Associated objective(s):

295033.EK1.02 Personnel protection (RO=3.9 / SRO=4.2)

SR-1702-K06 (Freq: LIC=B)
Given a Chimney/Stack Radiation Monitoring System annunciator tile inscription or rad monitor panel alarm light label, DESCRIBE the condition causing the alarm and any automatic actions which occur when the alarm actuates. EXPLAIN the consequences of the condition if not corrected.

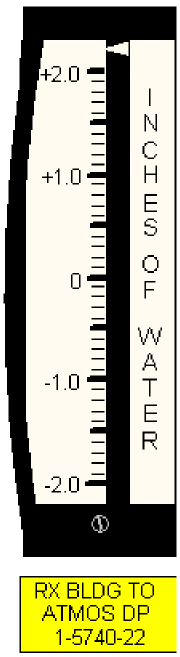
27 **ID: 27** **Points: 1.00**

Unit 1 was operating at rated power with a Tornado Warning issued for the surrounding areas.

A transient causes the reactor to scram, with an un-isolable Reactor Coolant leak developing in the Reactor Building.

Multiple Area Radiation Monitor alarms throughout the Reactor Building are ALARMING, and the Standby Gas Treatment System has automatically started.

Several minutes into the casualty, an extreme low pressure condition causes atmospheric pressure to drop 1 psid below Reactor Building pressure, causing the following indication in the Main Control Room:



Atmospheric pressure returned to normal 3 minutes later.

As a result of the atmospheric pressure transient, offsite release rate...

A. REMAINED THE SAME since the RB ventilation is filtered as it flows through the SBGTS.

B. REMAINED THE SAME since RB ventilation is filtered as it flows up the RB chimney.

C. ROSE due to loss of RB seal via the RB blowoff panels.

D. ROSE due to the SBGTS tripping on high RB to atmospheric differential pressure.

Answer: C

Answer Explanation

SBGTS will auto start on high radiation on the refuel floor or the drywell and it is designed to maintain <-.25 inches water pressure and filter the RB atmosphere. UFSAR 6.2.3.2.1 discusses the blowoff panels and indicates they are installed as part of the RB superstructure siding designed to relieve pressure and control the damage under short term tornado loadings. The designed fracture of the panels is 70 lb/ft^2 or .486 psi. Based on the information provided, the tornado reduced pressure by 1 psi; therefore the blowoff panels will relieve the pressure and release radiation to the environment. Due to the high winds it would be expected that any activity released outside the building would travel offsite.

Distractor 1 is incorrect: Will NOT remain the same since a flow path will exist separate from SBGTS. SBGTS is plausible since the SBGTS will be running with the high radiation conditions.
Distractor 2 is incorrect: Will NOT remain the same since a flow path will exist separate from SBGTS which is the expected flow path. RB ventilation flow path is normally through the RB chimney (without SBGTS running) making it plausible however it is not filtered as it flows up the chimney.
Distractor 3 is incorrect: SBGTS does NOT have a trip on high D/P however it is plausible since RB supply fans have a trip on high water pressure.

Reference: UFSAR 6.2.3.2.1
Reference provided during examination: None

Cognitive level: High

Level (RO/SRO): RO
Tier: 1 **Group:** 2

K/A: 295035 EK2.03
Knowledge of the interrelations between SECONDARY CONTAINMENT HIGH DIFFERENTIAL PRESSURE and the following: †Off-site release rate
(CFR: 41.7 / 45.8)
IMPORTANCE RO 3.3 / SRO 4.1

SRO Justification: N/A

Question Source: New
Question History:

Comments:

Associated objective(s):

295035.EK2.03 Off-site release rate (RO=3.3 / SRO=4.1)

SRN-1601-K14 (Freq: LIC=I N=I) STATE the physical location and function of the following principal Containment Systems components:

a. Primary Containment - Drywell
  (1) Drywell, drywell head and seal
  (2) Refuel bulkhead and bellows
  (3) Reactor cavity hatches
  (4) Drywell personnel airlock
  (5) Drywell equipment hatch
  (6) Drywell CRD maintenance hatch
  (7) Torus to Drywell vacuum breakers
  (8) Clean demin to drywell isolation (1(2)-4399-45)
  (9) Service air to drywell isolations (1(2)-4699-46/48)
  (10) Drywell Environs recorder
  (11) ILRT Spool piece
  (12) ILRT compressor
  (13) Electrical penetrations.
b. Primary Containment - Torus
  (1) Torus
  (2) Drywell to torus vent pipes and jet deflectors
  (3) Ring header and downcomer pipes
  (4) Reactor building to Torus vacuum breakers (AOV and accumulators)
  (5) Torus hatches
  (6) Special RHR to FPC spool piece with sump pump discharge
  (7) ECCS suction header and screens
c. Secondary Containment - Reactor Building
  (1) Reactor building blowout panels
  (2) Interlock doors (8 personnel airlocks)
  (3) Equipment airlock (1/2 trackway doors)
  (4) Torus area submarine doors
  (5) MSIV Rooms
    (a) Floor drain
    (b) Exhaust duct
    (c) Vent door to reactor building
    (d) U1 MSIV room suction damper
    (e) U1 D heater bay vent door
  (6) Turbine building/reactor building corner room concrete floor plugs
d. Seismograph and Designated PC

28	ID: 28	Points: 1.00

Unit 1 was at rated power when Annunciator 901-8 D-6, 480V BUS 15-19 DC CONT PWR FAILURE, ALARMS.

Operators in the field report that ONLY the Control Power feed breaker FROM the Normal 125 VDC Bus TO Bus 19 has tripped.

Bus 19 remains ENERGIZED.

Before 125 VDC Control Power to Bus 19 can be restored, a Loss Of Coolant Accident occurs.

Current conditions are now as follows:

- HPCI and RCIC have automatically started and are injecting at rated flow
- Reactor pressure is at 200 psig and lowering
- Reactor water level is -180 inches and lowering

Assuming NO operator actions have been taken, which RHR pumps are currently injecting to the reactor?

A. NO RHR Pumps are injecting.

B. ONLY the 1A and 1B RHR pumps are injecting.

C. ONLY the 1C and 1D RHR pumps are injecting.

D. ALL RHR Pumps are injecting.

Answer: D

Answer Explanation

125 VDC control power to Bus 19 is used for all breakers on Bus 19, including the breaker going to MCC 18/19-5.

Without control power, all of the breakers on those buses will remain de-energized in the state they lost power in.

When the LOCA occurs, the Unit will scram and the Unit Aux Transformer (UAT) will de-energize. All electrical loads will automatically fast transfer to the Reserve Aux Transformer (RAT), without any loss of power.

The LPCI Injection valves are powered from swing MCC 18/19-5, which is normally aligned to Bus 19. When Bus 19 loses control power, the MCC will no longer have control power to open the breaker from Bus 19.

Because all RHR pump buses are energized from the RAT and MCC 18/19-5's source bus has power, all RHR pumps and LPCI injection valves operate correctly.

With Reactor pressure less than 325 psig, the injection valves will open and all RHR pumps will inject.

Distractor 1 is incorrect: Plausible if assumed that the loss of control power to Bus 19 will cause the breakers on Bus 19 to trip. A failure of Bus 19 to supply MCC 18/19-5 would cause the LPCI injection valves to remain shut.

Distractor 2 is incorrect: Plausible if assumed that 125 VDC power to the RHR B loop initiation logic was lost. If RHR B loop logic power were lost, only the A and B RHR pumps would start. 125 VDC Bus 1B-1 provides power to RHR B initiation logic. 125 VDC Bus 1B-1 provides control power to Bus 19.
Distractor 3 is incorrect: Plausible if assumed that 125 VDC power to the RHR A loop initiation logic was lost. If RHR A loop logic power were lost, only the C and D RHR pumps would start. 125 VDC Bus 1A-1 provides power to RHR A initiation logic.

Reference: QOA 6900-09 Rev 18, QOA 6700-08 Rev 6
Reference provided during examination: None

Cognitive level: High

Level (RO/SRO): RO
Tier: 2 **Group:** 1

K/A: 203000 K6.02
Knowledge of the effect that a loss or malfunction of the following will have on the RHR/LPCI: INJECTION MODE (PLANT SPECIFIC): D.C. electrical power
(CFR: 41.7 / 45.7)
Importance 2.8/3.0

SRO Justification: N/A

Question Source: New
Question History: N/A

Comments:

Associated objective(s):

203000.K6.02 D.C. electrical power (RO=2.8 / SRO=3.0)

SR-1000-K23 (Freq: LIC=B)
Given an RHR system operating mode and various plant conditions, PREDICT how the RHR system will be impacted by the following support system failures: (Includes power supplies)
a. ECCS Keep Fill high or low pressure
b. Loss of 125vdc to RHR initiation and/or loop select logic
c. Loss of 480vac power to RHR/RHRSW valves and/or room coolers
d. Loss of 250vdc
e. Loss of DGCWP
f. Loss of ADS logic
g. ECCS suction strainer clogging

29	ID: 29	Points: 1.00

Given the following:

- Unit 1 is operating at rated power
- Unit 2 is shutdown in Mode 5, with Shutdown Cooling aligned to RHR Loop B

Annunciator 902-8 E-2, RESERVE TRANS 22 TRIP, is in ALARM.

Based on the above indications, what actions are required to re-energize the pumps necessary to restore Shutdown Cooling on RHR Loop B?

A. Backfeed Bus 23 from Bus 23-1.

B. Backfeed Bus 24 from Bus 24-1.

C. Crosstie Busses 13-1 and 23-1.

D. Crosstie Busses 14-1 and 24-1.

Answer: B

Answer Explanation

Power to “B” loop RHR pumps is Bus 24-1 and power to “B” loop RHRSW pumps is Bus 24. Both EDGs will auto start when T22 trips and power busses 24-1 and 23-1. Bus 24 will need to be backfed from Bus 24-1 using U2 EDG.

Distractor 1 is incorrect: Plausible if B "loop" is mistaken for B "pumps" because the B pumps are powered from Busses 23 and 23-1.
Distractor 2 is incorrect: Crosstying ECCS busses provides power from an offsite line, but won’t supply the RHRSW pump associated with that loop. In addition, this is not the preferred loop. Plausible because having an offsite line from the opposite unit to a dash bus is a tech spec requirement and if the “A” loop is the preferred loop on Unit 2.
Distractor 3 is incorrect: Crosstying ECCS busses provides power from an offsite line, but won’t supply the RHRSW pump associated with that loop. Plausible because having an offsite line from the opposite unit to a dash bus is a tech spec requirement.

Reference: QCOA 6100-03 Rev 38, QCOP 1000-05 Rev 49, QOA 6500-06 Rev 22, QOA 6500-04 Rev 20
Reference provided during examination: None

Cognitive level: High

Level (RO/SRO): RO
Tier: 2 **Group:** 1

K/A: 205000 K2.01
Shutdown Cooling System (RHR Shutdown Cooling Mode) Knowledge of electrical power supplies to the following: Pump motors
(CFR: 41.7)
IMPORTANCE RO 3.1 SRO 3.1

SRO Justification: N/A

Question Source: New
Question History:

Comments:

Associated objective(s):

205000.K2.01 Pump motors (RO=3.1 / SRO=3.1)

SRN-6500-K24 (Freq: LIC=B NF=B) Given a 4KV / 480 VAC Distribution Systems operating mode and various plant conditions, PREDICT how each supported system will be impacted by the following 4KV / 480 VAC Distribution Systems failures:

a. Loss of T11 and/or T12 (T21/22)
b. Loss of a 4KV bus
c. Loss of a 480 VAC bus
d. Loss of a 480 VAC MCC
e. T12/22 regulator fails HIGH or LOW

30	ID: 30	Points: 1.00

Which of the following conditions will cause the HPCI Pump Suction source to automatically transfer to the other source?

(Consider each condition separately)

HPCI Pump Suction will transfer to the _(1)_ when _(2)_ .

A. (1) CCST
(2) Torus water level LOWERS to 11 ft

B. (1) CCST
(2) CCST water level RISES to 22.5 ft

C. (1) Torus
(2) CCST water level LOWERS to 10.5 ft

D. (1) Torus
(2) Torus water level RISES to +5 inches

Answer: D

Answer Explanation

HPCI suction source transfers automatically to the torus at +5 inches or on lowering CCST level at 1 ft.

Distractor 1 is incorrect: Plausible because there is an automatic transfer of the suction source based on high Torus level. Also, HPCI operation must be stopped at 11 ft in the Torus, however there is no automatic transfer of the suction source based on low Torus level.
Distractor 2 is incorrect: Plausible because there is an automatic transfer of the suction source based on high Torus level. There is no automatic transfer of the suction source based on high CCST level. 22.5 ft corresponds to the high level alarm in the CCST.
Distractor 3 is incorrect: Plausible since 10.5 feet is the low level alarm setpoint and corresponds to the amount of water by design the CCSTs have in reserve to support HPCI or RCIC (UFSAR 6.3.2.3.2).

Reference: QCAN 901-3 B-12 Rev 5, QCAN 901-3 A-12 Rev 6, UFSAR 6.3.2.3.2 Rev 5, QCAN 912-1 C-4 Rev 4
Reference provided during examination: None

Cognitive level: Memory

Level (RO/SRO): RO
Tier: 2 **Group:** 1

K/A: 206000 K1.06
Knowledge of the physical connections and/or cause effect relationships between HIGH PRESSURE COOLANT INJECTION SYSTEM and the following: Suppression chamber
(CFR: 41.2 to 41.9 / 45.7 to 45.8)
IMPORTANCE RO 3.7 / SRO 3.7

SRO Justification: N/A

Question Source: New
Question History: N/A

Comments:

Associated objective(s):

206000.K1 06 Suppression chamber: BWR-2,3,4 (RO=3.7 / SRO=3.7)

SR-2300-K13 (Freq: LIC=I)
DESCRIBE the following HPCI System interlocks, including purpose, setpoints, and when/how they are bypassed.

a. Torus/CCST suction automatic transfer
b. Turning gear engage
c. HPCI 10 and HPCI 35/36
d. HPCI 15 and HPCI 35/36

31	ID: 31	Points: 1.00

Unit 1 is in MODE 2 with a startup in progress:

- Reactor power is 1%
- Reactor pressure is 300 psig
- RBCCW Pumps 1A and 1B are running
- Annunciator 901-3 C-5, CORE SPRAY SYS 1 BUS/LOGIC PWR FAILURE is in ALARM due to a blown fuse in the power supply to the Core Spray Initiation logic circuit

If a valid High Drywell pressure condition were to occur, which one of the following describes how the Core Spray (CS) and RBCCW pumps respond?

A. ONLY the A CS Pump will START and ONLY the 1A RBCCW Pump will TRIP

B. ONLY the B CS Pump will START and ONLY the 1B RBCCW Pump will TRIP

C. BOTH CS Pumps will START and ONLY the 1A RBCCW Pump will TRIP

D. BOTH CS Pumps will START and ONLY the 1B RBCCW Pump will TRIP

Answer: B

Answer Explanation

Core Spray auto initiation logic is used to start the CS pumps, as well as trip the RBCCW pumps.

The given annunciator indicates a loss of 125 VDC power to the A channel of CS logic (TB 125 VDC BUS 1A-1).

IF loss of 125 VDC Core Spray Subsystem 1A THEN: Core Spray Subsystem 1A automatic initiation logic is inoperative and Core Spray Subsystem 1A will NOT auto actuate regardless of the condition of Core Spray Subsystem 1B initiation logic.

Only the B channel of CS logic will initiate on the High Drywell Pressure condition, causing only the B CS pump to start and the 1B RBCCW Pump to trip.

Distractor 1 is incorrect: Plausible if division 2 is mistaken for division 1.
Distractor 2 is incorrect: Plausible because Core Spray logic can initiate from either division.
Distractor 3 is incorrect: Combination of distractors 1 and 2.

Reference: QCAN 901-3 C-5 Rev 6, QCOA 1400-02 Rev 10
Reference provided during examination: None

Cognitive level: High

Level (RO/SRO): RO
Tier: 2 Group: 1

K/A: 209001 K6.04
Knowledge of the effect that a loss or malfunction of the following will have on the LOW PRESSURE CORE SPRAY SYSTEM: D.C. Power
(CFR: 41.7 / 45.7)
IMPORTANCE RO 2.8 SRO 2.9

SRO Justification: N/A

Question Source: New
Question History: N/A

Comments:

Associated objective(s):

SR-1400-K20 (Freq: LIC=B) Given a system operating mode and various plant conditions, EVALUATE the following system indications and DETERMINE if the indications are expected and normal:

a. Core Spray
   (1) Pump run/trip status
   (2) Valve position
   (3) Pump suction and discharge pressures
   (4) Pump flowrate
   (5) Pump seal flowrate
   (6) Sparger differential pressure
   (7) Pump motor current

b. ECCS Keep Fill pump discharge pressure

209001.K6.04 D.C. power (RO=2.8 / SRO=2.9)

32	ID: 32	Points: 1.00

Unit 1 was operating at full power when Bus 18 tripped due to a fault in the normal feed breaker.

The fault has been repaired and Bus 18 is ready to be re-energized from its normal source.

Which of the following conditions describe how the Core Spray System was impacted, and what actions are required to mitigate these effects?

A. ECCS keep fill was lost; Re-energize Bus 18, and manually restart the keep fill (jockey) pump.

B. ECCS keep fill was lost; Re-energize Bus 18, and verify the keep fill (jockey) pump auto starts.

C. Power was lost to the DGCWP that provides flow to the 1A Core Spray room cooler. Re-energize Bus 18 to restore the DGCWP.

D. MO 1-1402-38A, CS PMP MIN FLOW VLV, will NOT CLOSE on an initiation signal. Re-energize Bus 18 to restore this capability.

Answer: A

Answer Explanation

ECCS keep fill (jockey) pump is powered from MCC 18-1A (QOM 6700-T21) which is fed from Bus 18. The keep fill pump can only be operated locally using a rocker switch (QCOP 1400-10). QCAN 901-3 B-15 Core Spray/RHR Fill system failure directs verifying ECCS fill system is in operation and steps in QCOP 1400-10 will direct starting the keep fill pump.

Distractor 1 is incorrect: The keep fill pump can only be operated locally. There is no auto start feature. Plausible since many loads have auto start features.
Distractor 2 is incorrect: The Unit 1 DGCWP is lined up to provide cooling flow to all ECCS room coolers. The Unit 1 DGCWP is powered from Bus 19. Plausible because the 1/2 DGCWP can be lined up to provide cooling flow.
Distractor 3 is incorrect: MO 1-1402-38A is normally closed. Plausible because RHR's minimum flow valve is normally open in a standby line-up.

Reference: QOA 6700-04 Rev 28, 4E-1675C Rev BA, QCOP 1400-10 Rev 1, QOA 6800-03 Rev 44,
Reference provided during examination: None

Cognitive level: Memory

Level (RO/SRO): RO
Tier: 2 **Group:** 1

K/A: 209001 A2.03
Ability to (a) predict the impacts of the following on the LOW PRESSURE CORE SPRAY SYSTEM ; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations: A.C. failures
(CFR: 41.5 / 45.6)
IMPORTANCE RO 3.4 / SRO 3.6

SRO Justification: N/A

Question Source: New
Question History: N/A

Comments:

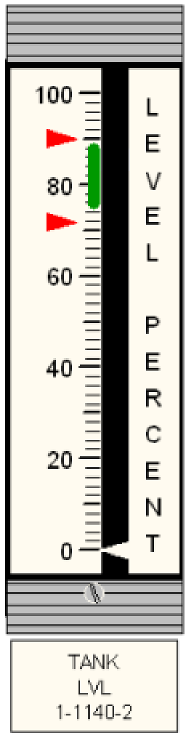
Associated objective(s):

209001.A2.03 A.C. failures (RO=3.4 / SRO=3.6)

SR-1400-K23 (Freq: LIC=B)
Given a Core Spray System operating mode and various plant conditions, PREDICT how the Core Spray System will respond to the following support system failures:
a. Loss of 125vdc
b. Loss of 4160vac
c. Loss of 480vac
d. ECCS suction strainer clogging

33 **ID: 33** **Points: 1.00**

Unit 1 was at rated power when Annunciator 901-5 F-6, STANDBY LIQ CONTROL TANK HI/LO LEVEL, ALARMS. SBLC Storage Tank level on the 901-5 panel indicates as shown below:



Equipment Operators in the field have reported that the sight-glass shows actual tank level to be 85% full, and that the setpoint for FIC 1-1158, SBLC Tank Air FLow, at the 2201-31 panel, is set at 1 scfh.

SBLC Storage Tank temperature controller TIC 1-1154 is set at 95 degrees, and current SBLC Tank temperature is 96 degrees.

Based on the above conditions, what is the status of the SBLC Tank Heaters, and what actions, if any, are required to ensure the Sodium Pentaborate Decahydrate stays in solution?

A. The SBLC Tank Heaters are ENERGIZED.
NO action is required.

B. The SBLC Tank Heaters are DE-ENERGIZED but will automatically re-energize at the setpoint.
NO action is required.

C. The SBLC Tank Heaters are DE-ENERGIZED and will NOT automatically re-energize at the setpoint.
Isolate and restore the air supply to FIC 1-1158, and then re-adjust the FIC to 1 scfh.

D. The SBLC Tank Heaters are DE-ENERGIZED and will NOT automatically re-energize at the setpoint.
PLACE the 'TANK HTR CONTROL' switch at Panel 2201-31 to ON to MANUALLY control storage tank heaters.

Answer: C

Answer Explanation

The SBLC tank heaters have an interlock that will cause them to de-energize when tank level falls below 20%, in order to protect the heating element. Since the tank heaters get their signal from the same level transmitter that drives the level indicator in the control room, the heaters are de-energized.

The local sight-glass shows that actual tank level is normal, but the level indicator in the control room is incorrect due to a problem with the Instrument Air supply to the level transmitter that supplies the control room indicator.

Because the alarm is not valid and the FIC setpoint is set correctly, the required actions are to isolate the air supply to FIC for 2 hours, then un-isolate and re-adjust the FIC.

This will restore the heaters to proper operation and ensure the Sodium Pentaborate stays in solution.

Distractor 1 is incorrect: Plausible if the interlock is not remembered, or if believed the interlock is with the local level indicator, or that the interlock is not tied to the same level indication in the control room.
Distractor 2 is incorrect: Plausible if the interlock is not remembered, or if believed the interlock is with the local level indicator, or that the interlock is not tied to the same level indication in the control room.
Distractor 3 is incorrect: Plausible because this would be a correct action if SBLC tank temperature was low, or if believed that action must be taken at this point to put heaters in manual control, which would be correct if the problem was with the heaters.

Reference: QCAN 901-5 F-6 Rev 7
Reference provided during examination: None

Cognitive level: High

Level (RO/SRO): RO
Tier: 2 **Group:** 1

K/A: 211000 K4.03
Knowledge of STANDBY LIQUID CONTROL SYSTEM design feature(s) and/or interlocks which provide for the following: Keeping sodium pentaborate in solution
(CFR: 41.7)
IMPORTANCE RO 3.8 / SRO 3.9

SRO Justification: N/A

Question Source: New
Question History: N/A

Comments: per NRC: changed the correct answer from "isolate the air supply to FIC 1-1158 for 2 hours" to "isolate and restore the air supply to FIC 1-1158."

Associated objective(s):

211000.K4.03 Keeping sodium pentaborate in solution (RO=3.8 / SRO=3.9)

SR-1100-K20 (Freq: LIC=B)
Given a SBLC operating mode and various plant conditions, EVALUATE the following SBLC indications/responses and DETERMINE if the indication/response is expected and normal.
a. Storage Tank Temperature
b. Squib Continuity Ammeters
c. Storage Tank Level
d. Flow Light
e. Pump Discharge Pressure
f. Local Flow Meter
g. Heat trace (pipe) temperature

34 **ID: 34** **Points: 1.00**

Unit 2 was operating at 100% power when a loss of Bus 28 occurred. The Bus 28 trip was determined to be inadvertent and Bus 28 was restored five minutes later.

With respect to RPS, ONLY the following actions have been taken:

- The feed breaker to the MG set at MCC 28-2 has been CLOSED
- The 2A RPS Motor Generator Set has been started and output voltage verified in band
- The POWER IN indication for the 2A-1 EPA has been verified LIT

What indications are expected when the circuit breaker at the 2A-1 EPA is CLOSED?

RPS 'A' BUS voltage will...

A. REMAIN at 0 VAC.

B. REMAIN at 120 VAC.

C. RISE to 120 VAC.

D. RISE to 480 VAC.

Answer: A

Answer Explanation

RPS electrical distribution is as follows:

- 480 VAC MCC 28-2 feeds the motor side of the RPS MG set
- The output of the generator side of the MG set is 120 VAC
- The MG Set feeds two EPA's in series, 2A-1 then 2A-2
- Each EPA has an output breaker only
- The output of the 2A-2 EPA feeds the Normal Supply breaker to the RPS 'A' Bus

RPS 'A' Bus voltage will remain at zero until the 2A-2 EPA and Normal Supply breakers are closed.

Distractor 1 is incorrect: RPS 'A' Bus is de-energized. Plausible if assumed that RPS A was energized from reserve power.
Distractor 2 is incorrect: Plausible if assumed that the Normal Supply breaker is already closed (it tripped on undervoltage and must be manually reset), and either the 2A-2 EPA breaker is already shut or the 2A-2 EPA is not recalled.
Distractor 3 is incorrect: Plausible if assumed that the Normal Supply breaker is already closed (it tripped on undervoltage and must be manually reset), and either the 2A-2 EPA breaker is already shut or the 2A-2 EPA is not recalled, and that the output of the EPA is the same as the input to the MG Set.

Reference: QOP 7000-01 Rev 50, 4E-1592 Sheet 2 Rev H
Reference provided during examination: None

Cognitive level: High

Level (RO/SRO): RO
Tier: 2 **Group:** 1

K/A: 212000 A1.04

Ability to predict and/or monitor changes in parameters associated with operating the REACTOR PROTECTION SYSTEM controls including: RPS bus voltage: Plant-Specific
(CFR: 41.5 / 45.5)
IMPORTANCE RO 2.8 SRO 3.0

SRO Justification: N/A

Question Source: New
Question History: N/A

Comments:

Associated objective(s):

SR-0500-K21 (Freq: LIC=B)
Given a Reactor Protection System operating mode and various plant conditions, PREDICT how RPS/plant parameters will respond to manipulation of the following Reactor Protection System local/remote controls:

a. Panel 901(2)-15/17
   (1) RPS trip channel test keylock switches
   (2) RPS breakers
b. Panel 901(2)-16
   (1) Individual scram switches
c. Panel 901(2)-5
   (1) Reactor Mode Switch
   (2) Manual scram pushbuttons
   (3) Scram Reset Switch
   (4) Discharge Volume High Water Level Bypass Switch
   (5) Discharge Volume Isolation test Switch
d. RPS Power Distribution
   (1) MG control switch
   (2) Voltmeter Transfer Switch
   (3) Voltage Adjust rheostat
   (4) Auxiliary Reset pushbutton
   (5) RPS supply breakers to 901(2)-15/17
   (6) RPS Normal/Reserve power breakers

212000.A1.04 RPS bus voltage: Plant-Specific (RO=2.8 / SRO=3.0)

35 **ID: 35** **Points: 1.00**

A reactor startup is in progress.

All IRMs are on range 2 with the following readings:

IRM	Reading
11	10
12	12
13	115
14	100

Which of the following responses would be expected?

A. Rod block from IRM 13 ONLY.

B. Rod block from IRM 13 AND 14 ONLY.

C. Rod block from IRM 13 AND 14. ½ scram from IRM 13 ONLY.

D. Rod block from IRM 13 AND 14. ½ scram from IRM 13 AND 14.

Answer: A

Answer Explanation

Analytical readings for IRMs are: 5 (downscale), 112 (Hi), 125 (Hi-Hi). Setpoints for IRMs are 8 (downscale), 105 (Hi), 117 (Hi-Hi).
Downscale and Hi readings will cause a rod block. Hi-Hi readings will cause a scram signal. For the readings provided, only IRM 13 (Hi) will cause a protective function (rod block).

Distractor 1 is incorrect: IRM 14 is too low in value to cause a rod block. Plausible if the Hi setpoint is not remembered.
Distractor 2 is incorrect: IRM 14 is too low in value to cause a rod block. IRM 13 is too low to cause a 1/2 scram. Plausible if the Hi setpoint is not remembered and the Hi-Hi setpoint is not remembered.
Distractor 3 is incorrect: IRM 14 is too low in value to cause a rod block or 1/2 scram. IRM 13 is too low to cause a 1/2 scram. Plausible if the Hi setpoint is not remembered and the Hi-Hi setpoint is not remembered.

Reference: QCAN 901(2)-5 C-5 Rev 5, 901(2)-5 A-5 Rev 6, 901-5 C-10 Rev 6
Reference provided during examination: None

Cognitive level: Memory

Level (RO/SRO): RO
Tier: 2 **Group:** 1

K/A: 215003 A3.04
Ability to monitor automatic operations of the INTERMEDIATE RANGE MONITOR (IRM) SYSTEM including: Control rod block status
(CFR: 41.7 / 45.7)
IMPORTANCE RO 3.5 / SRO 3.5

SRO Justification: N/A

Question Source: New
Question History: N/A

Comments:

Associated objective(s):

215003.A3.04 Control rod block status (RO=3.5 / SRO=3.5)

SR-0702-K09 (Freq: LIC=I)
LIST the signals which cause the following Intermediate Range Monitor System trips including purpose and setpoints. DESCRIBE how they are bypassed AND how they are reset.

a. Inop
b. Downscale
c. High
d. High-high
e. Wrong position

36 **ID: 36** **Points: 1.00**

Unit 1 was performing a normal reactor startup when Annunciator 901-5 C-3, ROD OUT BLOCK, ALARMS.

The following neutron monitoring conditions exist:

- SRMs 21 and 22 Fully inserted, reading $8X10^4$ cps
- SRMs 23 and 24 Partially withdrawn, reading 60 cps
- Reactor Period +200 seconds
- IRMs Fully inserted, reading 4 on Range 1

Which of the following actions will clear the ROD OUT BLOCK condition and permit continued rod withdrawal?

The ROD OUT BLOCK will clear if...

A. SRMs 23 and 24 are driven IN until they indicate GREATER than 300 cps.

B. a control rod is INSERTED until SRMs 21 and 22 indicate LESS than $1X10^4$ cps.

C. reactor power is allowed to RISE until the IRMs indicate ABOVE 5 on Range 1.

D. SRMs 21 and 22 are driven OUT until they indicate LESS than $1X10^3$ cps.

Answer: A

Answer Explanation

The SRM Retract Permit Rod Block setpoint is less than 100 cps on any SRM not fully inserted. (100 is analytical setpoint / 289 cps is actual).

Driving in the two SRMs that are reading 60 cps until they are above the rod block setpoint will clear the Rod Block.

In this question, the knowledge of the operation of the detector directly impacts the ability of the plant to continue the startup.

This rod block is bypassed by:
- SRM fully inserted
- All IRMs on Range 3 or above
- Mode switch in RUN

Distractor 1 is incorrect: The Rod Out Block on High SRM counts setpoint is $1X10^5$ cps. Plausible if rod block setpoint is not recalled correctly.
Distractor 2 is incorrect: IRM downscale Rod Out Block is bypassed on Range 1. The retract permit rod block is bypassed when IRMs are on range 3 or above. Plausible if rod block setpoints are not recalled correctly.
Distractor 3 is incorrect: The Rod Out Block on High SRM counts setpoint is $1X10^5$ cps. Plausible if rod block setpoint is not recalled correctly.

Reference: QCAN 901(2)-5 C-3 Rev 11
Reference provided during examination: None

Cognitive level: High

Level (RO/SRO): RO
Tier: 2 **Group:** 1

K/A: 215004 K5.01
Knowledge of the operational implications of the following concepts as they apply to SOURCE RANGE MONITOR (SRM) SYSTEM: Detector Operation
(CFR: 41.5 / 45.3)
IMPORTANCE RO 2.6 SRO 2.6

SRO Justification: N/A

Question Source: Bank: Susquehanna 2011 ILT NRC Exam
Question History: N/A

Comments:

Associated objective(s):

215004.K5.01 Detector operation (RO=2.6 / SRO=2.6)

SR-0701-K06 (Freq: LIC=I)
Given a Source Range Monitor System annunciator tile inscription, DESCRIBE the condition causing the alarm and any automatic actions which occur when the alarm actuates. EXPLAIN the consequences of the condition if not corrected.

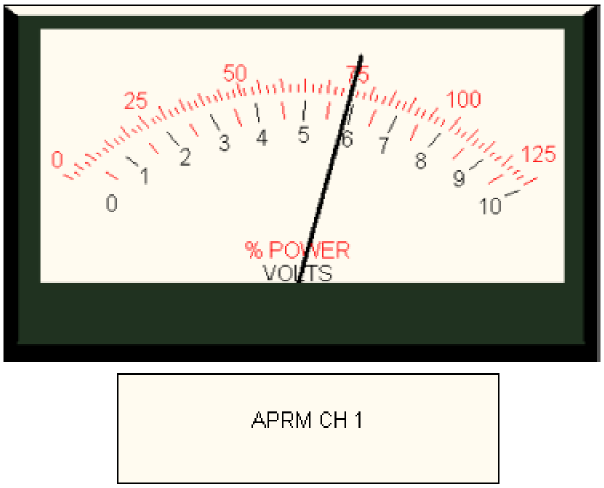
37	ID: 37	Points: 1.00

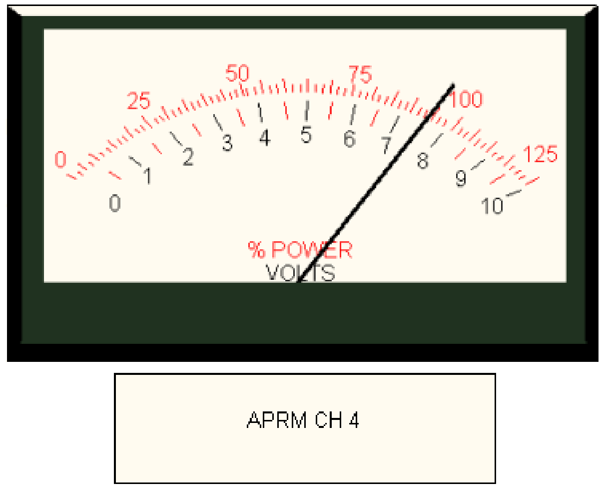
Unit 1 was operating at 100% reactor power when the following Annunciator ALARMS:

- 901-5 D-6, NEUTRON MON FLOW UNIT OFF NORMAL

A review of the Recirc Flow inputs to the following APRMs is shown below:

NOTE: APRM FUNCTION SWITCH IS SELECTED TO THE 'FLOW' POSITION





The RPS scram setpoint for APRM Flow Biased Neutron Flux-High is set at 0.56 W_D + 66.0%.

NO operator actions have been taken.

Which of the following conditions is expected for the given indications?

A. Half scram on RPS A ONLY

B. Rod out block ONLY

C. Half scram on RPS A and a rod out block

D. APRM flow biased scram setpoint on RPS B HIGHER than normal

Answer: B

Answer Explanation

The Flow Converter Reference Off Normal Rod Block setpoint is 10% or greater mismatch between channels.

With reactor power at 100%, recirc flow is 95%.

The graphics show APRM 1 with a recirc flow signal at 75% and APRM 4 at 95%, producing a mismatch of 20%.

The rod block being generated is from the Reactor Manual Control System, and will prevent any rod from being withdrawn only.

The RPS scram setpoint for APRM High-High (flow biased) is 0.56WD + 66.0%, where 'WD' is equal to the flow signal.

With the failed APRM 1 Flow signal at 75%, the RPS A scram setpoint would be 108.0%. Since actual reactor power is at 100% as stated in the stem, a scram setpoint would still not be exceeded.

Distractor 1 is incorrect: Plausible if assumed that the lowered flow signal will be below the scram setpoint, and if the 20% flow mismatch between RPS channels (APRM 1 - RPS A / APRM 4 - RPS B) is not recognized.
Distractor 2 is incorrect: Plausible if assumed that the lowered flow signal will be below the scram setpoint.
Distractor 3 is incorrect: Plausible because this would be the correct answer if assumed that APRM 4 was failed.

Reference: QCAN 901-5 D-6 Rev 6
Reference provided during examination: None

Cognitive level: High

Level (RO/SRO): RO
Tier: 2 **Group:** 1

K/A: 215005 K3.03
Knowledge of the effect that a loss or malfunction of the AVERAGE POWER RANGE MONITOR/LOCAL POWER RANGE MONITOR SYSTEM will have on following: Reactor manual control system: Plant-Specific
(CFR: 41.7 / 45.4)
IMPORTANCE RO 3.3 / SRO 3.3

SRO Justification: N/A

Question Source: New
Question History: N/A

Comments:

Associated objective(s):

215005.K3.03 Reactor manual control system: Plant-Specific (RO=3.3 / SRO=3.3)

SR-0703-K22 (Freq: LIC=B)
Given an LPRM/APRM System operating mode and various plant conditions, PREDICT how the LPRM/APRM System and plant parameters will be impacted by the following failures:
a. Loss of RPS power
b. Flow convertor output fails high/low
c. LPRM output fails high/low
d. APRM output fails high/low

38 ID: 38 Points: 1.00

Unit 1 is operating at rated power with APRM 1 indicating 100% power when Annunciator 901-5 E-7, LPRM DOWNSCALE, ALARMS.

The following conditions are reported:

- LPRM DOWNSCALE alarm is due to a failed LPRM that is reading 1 meter unit
- The failed LPRM is associated with APRM 1
- There are 8 LPRMs already bypassed for APRM 1
- All 8 RPS Scram Solenoid Lights are LIT

What indications are expected AFTER the failed LPRM is placed in BYPASS?

A. ONLY 4 RPS Scram Solenoid Lights REMAIN LIT.
APRM 1 indicates 100% power.

B. All 8 RPS Scram Solenoid Lights REMAIN LIT.
APRM 1 indicates 100% power.

C. ONLY 4 RPS Scram Solenoid Lights REMAIN LIT.
APRM 1 indicates 0% power.

D. All 8 RPS Scram Solenoid Lights REMAIN LIT.
APRM 1 indicates 0% power.

Answer: A

Answer Explanation

APRMs use an averaging circuit after receiving inputs from the LPRMs. APRM 1 has a total of 21 LPRM inputs (with at least 4 on each level) and if <13 total inputs are available the APRM is inop and a ½ scram will be received. When a ninth LPRM is bypassed, the total number of LPRMs that input into APRM 1 will be 12, and an APRM INOP half scram will be generated.

The half scram signal does not affect the indication from the other LPRM inputs; therefore, APRM 1 will continue to indicate the average of the remaining LPRMs.

Distractor 1 is incorrect: Plausible if the APRM INOP half scram is not recalled, or if assumed that there are enough operable LPRMs not to cause the APRM INOP condition.
Distractor 2 is incorrect: Plausible if assumed the inoperable APRM will drive the indication to 0%.
Distractor 3 is incorrect: Plausible because this would be correct if the APRM failed downscale, instead of INOP.

Reference: QCAN 901(2)-5 C-12 Rev 9, QCOP 0700-03 Rev 18
Reference provided during examination: None

Cognitive level: High

Level (RO/SRO): RO
Tier: 2 **Group:** 1

K/A: 215005 A1.01
Ability to predict and/or monitor changes in parameters associated with operating the AVERAGE POWER

RANGE MONITOR/LOCAL POWER RANGE MONITOR SYSTEM controls including: Reactor power indication
(CFR: 41.5 / 45.5)
IMPORTANCE RO 4.0 / SRO 4.0

SRO Justification: N/A

Question Source: New
Question History: N/A

Comments:

Associated objective(s):

215005.A1.01 Reactor power indication (RO=4.0 / SRO=4.0)

SR-0703-K22 (Freq: LIC=B)
Given an LPRM/APRM System operating mode and various plant conditions, PREDICT how the LPRM/APRM System and plant parameters will be impacted by the following failures:
a. Loss of RPS power
b. Flow convertor output fails high/low
c. LPRM output fails high/low
d. APRM output fails high/low

39	ID: 39	Points: 1.00

Unit 1 was operating at full power with QCOS 1300-05, RCIC PUMP OPERABILITY TEST, in progress, when annunciator 901-3 H-2, AREA HI TEMP STEAM LEAK DETECTION, ALARMS.

The ANSO reports that RCIC room temperature is 142ºF and RISING at 1ºF per minute.

A Loss Of Offsite Power then occurs and Reactor Water Level LOWERS to -65 inches.

One minute later, what will be the status of RCIC?

RCIC…

A. is injecting into the reactor at rated flow.

B. has isolated on high room temperature.

C. continues to run in the pump operability test lineup.

D. continues to run deadheaded against MO 1-1301-53, CCST TEST BYP valve.

Answer: A

Answer Explanation

The Loss Of Offsite Power causes a loss of all reactor feed pumps, causing reactor water level to lower to the initiation setpoint for RCIC.

At -59 inches Reactor Water Level, an initiation signal is received and RCIC automatically re-aligns for injection into the RPV.

Distractor 1 is incorrect: RCIC isolation on high room temperature occurs at 170 degrees F (analytical; setpoint is 155 degrees F) and has not been reached. Plausible because the alarm setpoint is 140°F.
Distractor 2 is incorrect: Automatically aligns for injection and pump operability lineup is isolated on the return path to the CCSTs. Plausible if the candidate does not realize an injection signal was received.
Distractor 3 is incorrect: MO 1-1301-53, CCST TEST BYP valve closes automatically and RCIC would be deadheaded except that RCIC injection valves open on the initiation signal. Plausible because RCIC will run deadheaded if a 2.5 psig Drywell pressure signal were received instead, causing HPCI to initiate and realign a test return valve that RCIC is using (MO 1-2301-15).

Reference: QCAN 901-4 D-16 Rev 9, QCOP 1300-02 Rev 30
Reference provided during examination: None

Cognitive level: High

Level (RO/SRO): RO
Tier: 2 **Group:** 1

K/A: 217000 A3.05
Ability to monitor automatic operations of the REACTOR CORE ISOLATION COOLING SYSTEM (RCIC) including: Reactor water level
(CFR: 41.7 / 45.7)
IMPORTANCE RO 3.9 / SRO 3.9

SRO Justification: N/A

Question Source: Bank: Hope Creek 2010 ILT NRC Exam
Question History: N/A

Comments:

Associated objective(s):

217000.A3.05 Reactor water level (RO=3.9 / SRO=3.9)

SR-1300-K08 (Freq: LIC=B)
DESCRIBE how the RCIC System responds to an auto initiation signal.

40	ID: 40	Points: 1.00

Unit 1 was operating at rated power when a transient occurred, resulting in a Loss Of Offsite Power.

Current plant conditions are as follows:

- RPV water level -20 inches
- RPV pressure 97 psig
- Drywell pressure 18.5 psig
- Torus pressure 18 psig
- Torus water level 14.5 ft
- The feed breaker to Bus 18 is tripped on overcurrent

A blowdown is in progress with 4 ADS valves OPEN.

Which of the following systems can be used to supplement the ADS system?

A. Main Steam Line Drains

B. RWCU in blowdown mode

C. HPCI in pressure control mode

D. RCIC in pressure control mode

Answer: D

Answer Explanation

With only 4 ADS valves open, alternate depressurization systems are required to be used to obtain and hold RPV to Torus D/P less than 74 psid (QGA 500-1). RCIC can be operated in pressure control mode until steam supply line pressure is 77 psig actual (QCAN 901-4 B-15) or 50 psig analytical at which time an isolation will occur.

Distractor 1 is incorrect: Main Steam Line drain valves are motor operated and some are powered from MCC 18-1A which is de-energized. Plausible because one steam line drain is DC powered and still operable. However, the AC powered valves are in series with the DC powered valves, so both must be operable.
Distractor 2 is incorrect: One of the isolation valves for RWCU is powered from Bus 18, therefore RWCU cannot be used. Plausible because the other isolation valves are powered from available busses or are DC powered.
Distractor 3 is incorrect: HPCI steam line isolation will occur if pressure is 113 psig actual (QCOA 2300-04) or 100 psig analytical (currently 97 psig) therefore HPCI is not available. Plausible because this is more effective pressure control than RCIC.

Reference: QCAN 901-4 B-15 Rev 12, QCOA 2300-04 Rev 20, QCOP 0250-05 Rev 6, QGA 500-1 Rev 13
Reference provided during examination: None

Cognitive level: High

Level (RO/SRO): RO
Tier: 2 **Group:** 1

K/A: 218000 A2.04

Ability to (a) predict the impacts of the following on the AUTOMATIC DEPRESSURIZATION SYSTEM ; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations: ADS failure to initiate
(CFR: 41.5 / 45.6)
IMPORTANCE RO 4.1 / SRO 4.2

SRO Justification: N/A

Question Source: New
Question History: N/A

Comments: Per NRC: Changed initial conditions in the stem from a complete loss of all AC power to a Loss of Offsite Power, due to making two distractors implausible.
Changed distractor 2 from "Turbine bypass valves" to "RWCU in blowdown mode".

Associated objective(s):

218000.A2.04 ADS failure to initiate (RO=4.1 / SRO=4.2)

SR-0203-K26 (Freq: LIC=B)
EVALUATE given key ADS system parameter indications and/or responses depicting a system specific abnormality/failure and DETERMINE a course of action to correct or mitigate the following abnormal condition(s):

a. Loss of 125 vdc power to electromatic relief valves/ PORVs/ Target Rock safety-relief valves
b. Loss of 125 vdc power to ADS logic (partial/complete)
c. Stuck open relief valve
d. Failure of a relief valve to open

41 **ID: 41** **Points: 1.00**

Unit 1 was at rated power with the following conditions:

- 125 VDC Bus 1A-1 supply breaker is tripped
- RPS A is de-energized

A LOCA results in RPV water level LOWERING to -75 inches.

What is the status of Group 1 Isolation Valves?

A. ALL Group 1 Isolation Valves are CLOSED.

B. The Inboard MSIVs are OPEN. ALL other Group 1 Isolation valves are CLOSED.

C. ALL Group 1 Isolation Valves have remained AS IS.

D. The Inboard MSIVs are CLOSED. ALL other Group 1 Isolation valves have remained AS IS.

Answer: A

Answer Explanation

With the loss of 125 VDC bus 1A-1, channel A half PCIS Group 1 is met (QOA 6900-02). Bus 1A-1 also provides power to the DC solenoids for the inboard MSIVs. RPS A provides power to the AC solenoids for the inboard MSIVs. The inboard MSIVs will close with no power to the solenoids. When -59 inches is reached during the LOCA, channel B PCIS Group I will be received and a full Group I isolation occurs and all valves not previously closed will close.

Distractor 1 is incorrect: Inboard MSIVs will close with the loss of power to the valve solenoids. Plausible if it is believed that the valves fail as-is on a loss of solenoid power.
Distractor 2 is incorrect: Group I logic was met. All Group I valves will close. Plausible if the Group I setpoint is not known or the candidate believes the loss of DC power prevents getting a logic signal (fails safe therefore with loss of power, receives ½ Group I).
Distractor 3 is incorrect: Group I logic was met. All Group I valves will close. Plausible if the Group I setpoint is not known.

Reference: QOA 6900-02 Rev 38, QCAP 0200-10 Rev 48
Reference provided during examination: None

Cognitive level: High

Level (RO/SRO): RO
Tier: 2 **Group:** 1

K/A: 223002 A4.06
Primary Containment Isolation System/Nuclear Steam Supply Shut-Off
Ability to manually operate and/or monitor in the control room: Confirm initiation to completion
(CFR: 41.7 / 45.5 to 45.8)
IMPORTANCE RO 3.6 / SRO 3.7

SRO Justification: N/A

Question Source: New
Question History: N/A

Comments: Per NRC: reworded all distractors to positively identify positions of all Group 1 Isolation valves in each choice.

Associated objective(s):

223002.A4.06   Confirm initiation to completion (RO=3.6 / SRO=3.7)

SR-1603-K22   (Freq: LIC=B)
Given various plant conditions, PREDICT how Primary Containment Isolation (PCI) Systems and key plant parameters will respond to the following failures:

a. Loss of RPS A and/or B power
b. Loss of Essential Service bus
c. Loss of 125vdc
d. Loss of air/drywell pneumatics
e. Loss of Instrument Bus

42 **ID: 42** **Points: 1.00**

Unit 2 was at rated power when a Loss Of Coolant Accident occurred.

Given:

- 2 control rods are at position 48, All other rods are FULL IN
- Reactor pressure is 800 psig and lowering slowly
- Reactor water level is at -100 inches and lowering slowly
- SBLC is injecting
- Preferred Injection Systems are in service and injecting
- Drywell pressure is 3 psig and steady
- Drywell sprays have been started on both loops
- Both Core Spray pumps are in Pull-To-Lock
- The AUTO BLOWDOWN INHIBIT keylock switch is in 'NORMAL'
- Annunciator 901-3 B-13, AUTO BLOWDN TIMER START, has been in ALARM for 3 minutes

Which of the following describes the status of the ADS Valves?

A. ADS Valves are OPEN. The AUTO BLOWDOWN INHIBIT keylock switch must be placed in INHIBIT to prevent a rapid and uncontrolled RPV blowdown.

B. ADS Valves are OPEN. All ADS Valve switches must be placed in OFF to prevent a rapid and uncontrolled RPV blowdown.

C. ADS Valves are CLOSED. NO ADS actuation setpoint has been exceeded.

D. ADS Valves are CLOSED. The ADS timer is running but has NOT yet timed out.

Answer: A

Answer Explanation

When RPV level reaches -59 inches, concurrent with Drywell pressure greater than 2.5 psig, a 110 second timer starts. At the end of the time period, all ADS valves will automatically open, provided there is a Core Spray or RHR pump running.

The conditions state that Drywell sprays are in service on both loops, indicating that a RHR pump is running.
Annunciator 901-3 B-13, Auto Blowdown Timer Start, alerts the operators that both conditions required to start the 110 second timer are present. The stem states that the annunciator has been in alarm for 3 minutes, indicating that the 110 second timer has timed out.

The conditions also state that the Auto Blowdown Inhibit switch is in 'Normal', indicating that the switch will not prevent the ADS valves from automatically opening.

With all the conditions necessary for the ADS valves to automatically open, the ADS valves are now open.

However, with two control rods still at position 48, the plant also in an ATWS condition.

The overall mitigation strategy of QGA 101, RPV Control (ATWS), is to shut down the reactor and maintain adequate core cooling, then cool down the RPV to cold shutdown conditions.

ADS valves must be prevented from opening automatically by placing the Auto Blowdown Inhibit switch in INHIBIT, for the following reasons:

- Rapid, uncontrolled injection of relatively cold, unborated water could occur as RPV pressure decreases, leading to a power excursion.
- ADS actuation can impose a severe thermal transient on the RPV and may complicate efforts to control RPV water level.
- The operator has more information available than is sensed by the ADS logic and can better judge when and how to depressurize the RPV.

Distractor 1 is incorrect: Plausible because the first part is correct, and while placing the ADS valve switches in OFF will prevent the valves from opening on high pressure, but will not close the valves which have an open signal from ADS logic.
Distractor 2 is incorrect: Plausible if it is not recognized that there is an RHR pump running.
Distractor 3 is incorrect: Plausible if it is not recognized that there is an RHR pump running or if confused with the 8.5 minute timer (starts at -59" RPV water level) starting.

Reference: QCAN 901(2)-3 B-13 Rev 7, UFSAR 6.3.2.4.2 Rev 11
Reference provided during examination: None

Cognitive level: High

Level (RO/SRO): RO
Tier: 2 **Group:** 1

K/A: 239002 Safety/Relief Valves
2.4.06
Knowledge of EOP mitigation strategies.
(CFR: 41.10 / 43.5 / 45.13)
IMPORTANCE RO 3.7 SRO 4.7

SRO Justification: N/A

Question Source: New
Question History: N/A

Comments: Per NRC: modified 'A' and 'B' choices to positively state that an action must be taken.

Associated objective(s):

239002.2.4.06 Knowledge of EOP mitigation strategies. RO 3.7 SRO 4.7

SR-0001-K61 (Freq: LIC=B)
Given QGA 101, 'RPV Control (ATWS)', EXPLAIN the reasons for the actions.

43	ID: 43	Points: 1.00

Unit 1 is operating at rated power when a loss of Bus 15 occurs.

What is the status of the 1B FRV and how will RPV water level be controlled?
(Assume NO operator action)

The 1B FRV is __(1)__ , and RPV water level will be automatically controlled by the __(2)__ .

	(1)	(2)
A.	locked up	1A FRV ONLY
B.	locked up	LFFRV ONLY
C.	drifting OPEN	1A FRV ONLY
D.	drifting CLOSED	1A FRV AND the LFFRV

Answer: A

Answer Explanation

1B FRV actuator power supply is MCC 15-2-1. Loss of this power causes the 1B FRV to lockup, position indication is lost, and the DFWLC system shifts the 1B FRV controller to Manual. The 1A FRV controller remains in auto and controls RPV water level (QCAN 901-5 H-8)**.**

Distractor 1 is incorrect: LFFRV will remain closed. Plausible if candidate believes both FRVs transfer to Manual control which would transfer the LFFRV to local single element control allowing it to open.
Distractor 2 is incorrect: 1B FRV is locked in place and will not drift open. Plausible since drifting does occur on the LFFRV on loss of Instrument air pressure.
Distractor 3 is incorrect: 1B FRV is locked in place and will not drift closed. Plausible since drifting does occur on the LFFRV on loss of Instrument air pressure. LFFRV will remain closed. Plausible if candidate believes both FRVs transfer to Manual control which would transfer the LFFRV to local single element control allowing it to open.

Reference: QCOA 0600-01 Rev 12, QCAN 901-5 H-8 Rev 7, QOM 1-6700-T07 Rev 9
Reference provided during examination: None

Cognitive level: Memory

Level (RO/SRO): RO
Tier: 2 **Group:** 1

K/A: 259002 K4.13
Knowledge of REACTOR WATER LEVEL CONTROL SYSTEM design feature(s) and/or interlocks which provide for the following: FWRV lockup
(CFR: 41.7)
IMPORTANCE RO 3.5 / SRO 3.6

SRO Justification: N/A

Question Source: New
Question History: N/A

Comments:

Associated objective(s):

259002.K4 13 FWRV lockup (RO=3.5 / SRO=3.6)

SR-0600-K22 (Freq: LIC=B)
Given a Feedwater Level Control System operating mode and various plant conditions, PREDICT how feedwater level control/plant parameters will respond to the following failures:

a. Feedflow sensor fails high/low
b. Steam flow sensor fails high/low
c. RPV level sensor fails high/low
d. Reactor level SMS value error
e. RFP suction pressure SMS value error
f. Steam flow SMS value error
g. Feedflow error with calculated feedwater flow activated
h. Loss of 480vac
i. Loss of Essential Service or Instrument Bus power
j. Loss of instrument air
k. FWLC Hydraulic Skid failures:
    (1) Pump trip
    (2) Loss of FWLC position feedback
    (3) Oil leak
    (4) Tracking error

44	ID: 44	Points: 1.00

It is required to vent the Primary Containment following a DBA LOCA due to Hydrogen Generation.

Which one of the following paths is the preferred Primary Containment Vent and Purge strategy for these conditions?

A. Vent the Torus through ONE Standby Gas Treatment Train ONLY and purge the Drywell.

B. Vent the Drywell through ONE Standby Gas Treatment Train ONLY and purge the Torus.

C. Vent the Torus through BOTH Standby Gas Treatment Trains and purge the Drywell.

D. Vent the Drywell through BOTH Standby Gas Treatment Trains and purge the Torus.

Answer: A

Answer Explanation

The preferred method for venting the Primary Containment is through the Torus. Studies performed by General Electric indicate a decontamination factor of up to four is provided when vented gases are required to bubble through water first. This will also help in preventing the Torus to Drywell Vacuum Breakers from cycling.

Only one train of SBGTS is allowed to be run at a time in the event of a DBA LOCA.

Distractor 1 is incorrect: Plausible if forgotten that the preferred path is to vent the Drywell through the Torus to reduce release rates.
Distractor 2 is incorrect: Plausible if assumed that two SBGTS trains will reduce pressure in the containment faster or if the precaution for not running two trains at once is forgotten/ignored.
Distractor 3 is incorrect: Combination of distractors 1 and 2.

Reference: QCOP 1600-13 Rev 25, QCOP 7500-01 Rev 19
Reference provided during examination: None

Cognitive level: Memory

Level (RO/SRO): RO
Tier: 2 **Group:** 1

K/A: 261000 A1.02
Knowledge of the physical connections and/or cause-effect relationships between STANDBY GAS TREATMENT SYSTEM and the following: Drywell
(CFR: 41.2 to 41.9 / 45.7 to 45.8)
IMPORTANCE RO 3.2 SRO 3.4

SRO Justification: N/A

Question Source: Bank: Filtzpatrick 2010 ILT NRC Exam
Question History: N/A

Comments:

Associated objective(s):

261000.K1.02 Drywell (RO=3.2 / SRO=3.4)

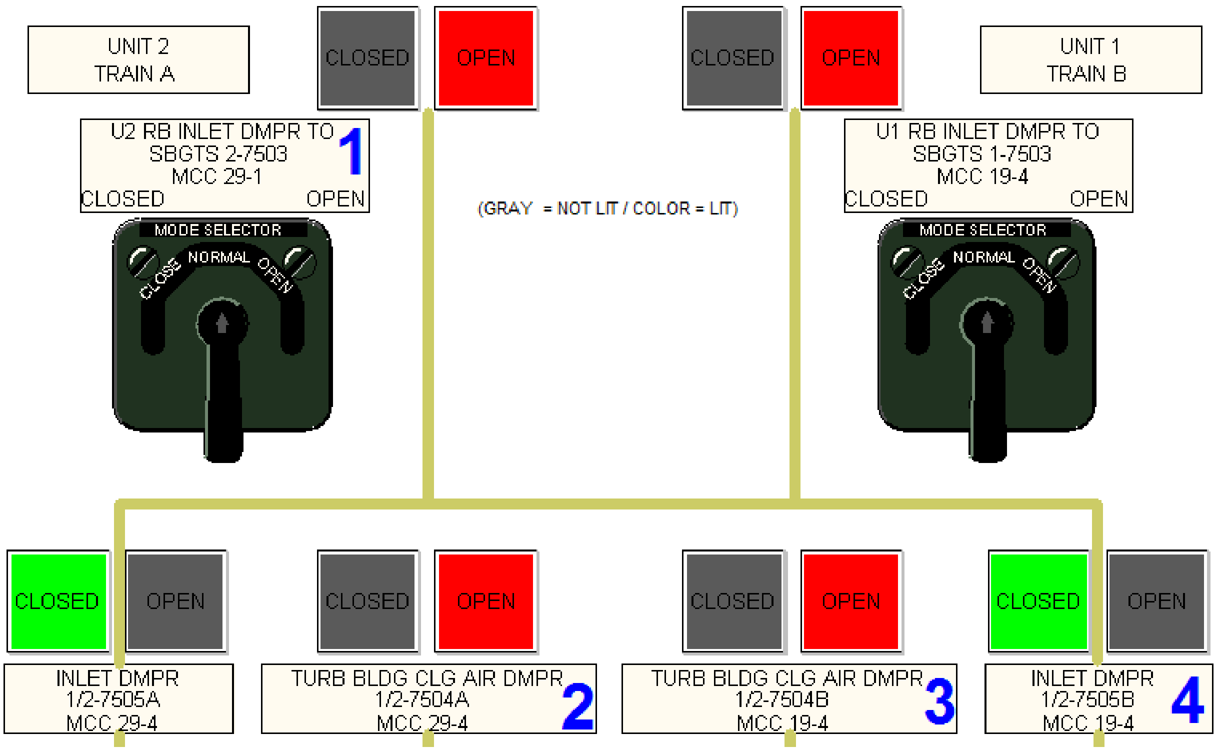
SR-7500-K02 (Freq: LIC=B)
DESCRIBE the flowpaths/valve lineup for each mode of SBGTS operation.

a. Standby
b. System operating with suction from reactor building, torus, or drywell
c. Cooldown

45	ID: 45	Points: 1.00

Given:

- Unit 1 is at 100% power
- Reactor Building to Atmosphere D/P as read on the 1-5740-22, RX BLDG TO ATMOS DP, indicates -0.1 inches of water.
- The current indications for the Standby Gas Treatment System (SBGT) are shown below



Both Units' Reactor Building Ventilation Isolation dampers are then manually shut and the 'B' SBGT Train is manually started.

What are the expected indications 5 minutes after taking the above described actions?

Valves ______ have repositioned from their original state.

RX BLDG TO ATMOS DP indicates ______ inches of water.

A. 1, 2, 3 and 4
-0.1

B. 1, 2, 3 and 4
-0.25

C. 3 and 4 only
-0.1

D. 3 and 4 only
-0.25

Answer: D

Answer Explanation

When the B train of SBGT starts, it will take a suction on the RB and internal pressure will lower, causing RB to Atmosphere D/P to become more negative.
SBGT is required and periodically verified to to maintain the secondary containment at 0.25 inches of vacuum water gauge for 1 hour at a flow rate of less than or equal to 4000 cfm (SR 3.6.4.1.3).
The running train's Turbine Building Cooling Air Damper will close and the standby train's will remain open.
Both Reactor Building Inlet Dampers will remain open regardless of which train is started.

Distractor 1 is incorrect: Plausible if assumed that the standby train isolates when the opposite train is running and that SBGTS has no effect on RB D/P.
Distractor 2 is incorrect: Plausible if assumed that the standby train isolates when the opposite train is running.
Distractor 3 is incorrect: Plausible if assumed that SBGTS has no effect on RB D/P.

Reference: QCOP 7500-01 Rev 19
Reference provided during examination: N/A

Cognitive level: High

Level (RO/SRO): RO
Tier: 2 **Group:** 1

K/A: 261000 A1.04
Ability to predict and/or monitor changes in parameters associated with operating the STANDBY GAS TREATMENT SYSTEM controls including: Secondary containment differential pressure
(CFR: 41.5 / 45.5)
IMPORTANCE RO 3.0 SRO 3.3

SRO Justification: N/A

Question Source: New
Question History: N/A

Comments: None

Associated objective(s):

261000.A1.04 Secondary containment differential pressure (RO=3.0 / SRO=3.3)

SR-7500-K20 (Freq: LIC=B)
Given a SBGTS operating mode and various plant conditions, EVALUATE the following SBGTS indications/responses and DETERMINE if the indication/ response is expected and normal.

a. System flow
b. Fan and heater indicating lights
c. MOV position
d. Air-operated outlet valve 1/2-7510A/B position
e. Heater inlet and outlet temperatures
f. Heater differential temperature
g. Run-time
h. Train component differential pressures
i. Charcoal adsorber temperature

46 **ID: 46** **Points: 1.00**

Unit 1 is at full power.

Which of the following conditions will require the MANUAL transfer of auxiliary power TO the Reserve Aux Transformer (T-12)?

(Consider each condition separately)

Condition 1 - Trip of all Unit Aux Transformer (T-11) fans with transformer oil temperature of 111°C.

Condition 2 - Trip of the 1A Bus Duct Blower with Bus Conductor temperature of 92°C.

Condition 3 - Trip of the 1A Stator Cooling Water (SCW) Pump with SCW temperature of 82°C.

A. Condition 1 only

B. Conditions 1 and 2 only

C. Conditions 2 and 3 only

D. Condition 3 only

Answer: A

Answer Explanation

IAW QCOA 6100-16, Unit Auxiliary Transformer 11 Loss Of Cooling, a trip of all cooling fans with a corresponding oil temperature > 110°C will require immediate removal of the UAT from operation per QOP 6500-09, Energizing 4kV Switchgear and Transferring Auxiliary Power.

Distractor 1 is incorrect: Plausible because Condition 1 is true. However, Condition 2 is not. A loss of Bus Duct Cooling will not require transferring T-11 load to T-12. Plausible because a there is no auto start of the other Bus Duct cooler. Another Bus Duct Blower can be started or load can be lowered to maintain temperature.
Distractor 2 is incorrect: Plausible because a there is no auto start of the other Bus Duct cooler. Transferring aux power to T-12 is plausible if not recognized that QCOA action is to verify that the standby pump auto-starts. Also, although Condition 3 will result in a Turbine runback, transferring Aux power is not required/desired as the manual scram will result in automatic transfer.
Distractor 3 is incorrect: Plausible because SCW outlet temperature greater than 80°C will result in a Turbine Runback, transferring Aux power is not required/desired as the manual scram will result in automatic transfer.

Reference: QCOA 6100-16 Rev 13, QOP 6500-09 Rev 17
Reference provided during examination: N/A

Cognitive level: Memory

Level (RO/SRO): RO
Tier: 2 **Group:** 1

K/A: 262001 A2.04

Ability to (a) predict the impacts of the following on the A.C. ELECTRICAL DISTRIBUTION ; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations: Types of loads that, if deenergized, would degrade or hinder plant operation
(CFR: 41.5 / 45.6)
IMPORTANCE RO 3.8 SRO 4.2

SRO Justification: N/A

Question Source: New
Question History: N/A

Comments:

Associated objective(s):

SRN-6100-K22 (Freq: LIC=B NF=B)
Given a 345 KV Switchyard/ Main Transformer System operating mode and various plant conditions, PREDICT how 345 KV Switchyard/ Main Transformer System/ plant parameters will respond to the following component or controller failures:
a. Main transformer partial/total loss of cooling
b. Microwave failure
c. Unit transformer/generator trip
d. 345 KV breaker fails to trip on fault

262001.A2.04 Types of loads that, if deenergized, would degrade or hinder plant operation (RO=3.8 / SRO=4.2)

47	ID: 47	Points: 1.00

Unit 2 is at 100% reactor power. Electrical Maintenance is preparing to perform an inspection of the ESS UPS INVERTER.

Which of the following indications/responses would be expected when the input to the ESS UPS STATIC SWITCH is transferred FROM the INVERTER TO the REGULATOR?

A. Annunciator 902-8 E-9, ESS SERV BUS ON EMERG SPLY, alarms.

B. The SJAE Suction Valves CLOSE.

C. Annunciator 902-8 E-8, ESS SERV UPS ON DC OR ALT AC, alarms.

D. The 2B Feedwater Regulator Valve locks up.

Answer: C

Answer Explanation

The evolution being performed will automatically transfer the ESS power source from the UPS normal AC (Bus 28) to the UPS alternate AC (Bus 26) supply.

The operators will be able monitor that the transfer has occurred by verifying that the 902-8 E-8 annunciator alarms in the control room.

The transfer of power is through the Static Switch and is a "make before break" type circuit, with no temporary loss of power.

Distractor 1 is incorrect: This is an indication that the ESS ASCO ABT transferred to reserve (28-2) power.
Distractor 2 is incorrect: The SJAE suction valves close on a loss of ESS but with the make-before-break static switch, no power loss occurs.
Distractor 3 is incorrect: Plausible because this would be the indication for a transfer of the Instrument Bus ABT.

Reference: QOP 6800-03 Rev 32, QOA 900-8 E-8 Rev 3
Reference provided during examination: None

Cognitive level: Memory

Level (RO/SRO): RO
Tier: 2 **Group:** 1

K/A: 262002 Uninterruptable Power Supply (A.C./D.C.)
2.4.31 Knowledge of annunciator alarms, indications, or response procedures.
(CFR: 41.10 / 45.3)
IMPORTANCE RO 4.2 SRO 4.1

SRO Justification: N/A

Question Source: New
Question History: N/A

Comments:

Associated objective(s):

SR-6800-K15 (Freq: LIC=I)
DESCRIBE the operation of the following principal Essential Service/Instrument Bus Systems components:
a. ESS Uninterruptable Power Supply (UPS)
b. ESS reserve AC ASCO ABT
c. Instrument bus ABT

262002.2.4.31 Knowledge of annunciator alarms, indications, or response procedures. RO 4.2 SRO 4.1

48	ID: 48	Points: 1.00

Unit 2 is at 100% power when the following annunciator ALARMS on the 902-8 panel:

- 902-8 G-9, 120V AC INSTR BUS TRANSFER TO EMERG SPLY

Based on this annunciator, an operator must verify at panel 902-50 that the auto-transfer switch (ABT) is CLOSED onto __(1)__.

When NORMAL power is restored, the operating crew must __(2)__ to its normal power supply.

A. (1) MCC 25-2
(2) verify that the Instrument Bus AUTOMATICALLY transfers

B. (1) MCC 25-2
(2) MANUALLY transfer the Instrument Bus

C. (1) MCC 28-2
(2) verify that the Instrument Bus AUTOMATICALLY transfers

D. (1) MCC 28-2
(2) MANUALLY transfer the Instrument Bus

Answer: A

Answer Explanation

MCC 28-2 is the normal supply through the Instrument Bus ABT. The ABT automatically swaps power to MCC 25-2 on loss of the normal supply.

There are no controls that are operated in response to this alarm. The ABT is "normal-seeking" and will transfer back to MCC 28-2 when normal power is restored.

Distractor 1 is incorrect: Plausible because the Essential Service Bus ABT is "power-seeking".
Distractor 2 is incorrect: Plausible because MCC 28-2 is the normal supply through the Instrument Bus ABT.
Distractor 3 is incorrect: Combination of distractors 1 and 2.

Reference: QOA 900-8 G-9 Rev 4, QCOP 6800-07 Rev 1
Reference provided during examination: None

Cognitive level: Memory

Level (RO/SRO): RO
Tier: 2 **Group:** 1

KA: 262002 A3.01
Ability to monitor automatic operations of the UNINTERRUPTABLE POWER SUPPLY (A.C./D.C.) including: Transfer from preferred to alternate source
(CFR: 41.7 / 45.7)
IMPORTANCE RO 2.8 SRO 3.1

SRO Justification: N/A

Question Source: Quad Cities ILT Exam Bank

Question History: N/A

Comments: None

Associated objective(s):

SR-6800-K06 (Freq: LIC=I)
Given an Essential Service/Instrument Bus Systems remote annunciator tile inscription or ESS UPS local alarm light, DESCRIBE the condition causing the alarm and any automatic actions which occur when the alarm actuates. EXPLAIN the consequences of the condition if not corrected.

262002.A3.01 Transfer from preferred to alternate source (RO=2.8 / SRO=3.1)

49	ID: 49	Points: 1.00

Unit 1 is at full power with the Unit 1 SBO DG in a normal standby lineup.

Which of the following is supplying power to the 125 VDC SBO Distribution Panel 6A-1?

A. Turbine Building 125 VDC Bus 1B-1

B. MCC 75-1 through the 150A Maintenance Battery Charger

C. Reactor Building Distribution Panel 1

D. MCC 65-1 through the 300A Stationary Battery Charger 6A

Answer: D

Answer Explanation

During normal operating conditions, the (SBO) 125 VDC bus will be powered from the stationary battery charger. The SBO battery is normally on a float charge.

Distractor 1 is incorrect: Plausible because SBO Dist Panel 6A-1 can supply control power to the same bus as TB Res Bus 1B-1, but they do not power each other.
Distractor 2 is incorrect: Plausible because SBO Dist Panel 6A-1 can be powered from MCC 75-1 through the maintenance charger, but it is not the normal lineup.
Distractor 3 is incorrect: Plausible because SBO Dist Panel 6A-1 can supply control power to the same bus as Reactor Building Distribution Panel 1, but they do not power each other.

Reference: QCOP 6900-22 Rev 16
Reference provided during examination: N/A

Cognitive level: Memory

Level (RO/SRO): RO
Tier: 2 **Group:** 1

K/A: 263000 K1.02
Knowledge of the physical connections and/or cause effect relationships between D.C. ELECTRICAL DISTRIBUTION and the following: Battery charger and battery
(CFR: 41.2 to 41.9 / 45.7 to 45.8)
IMPORTANCE RO 3.2 SRO 3.3

SRO Justification: N/A

Question Source: Bank
Question History: N/A

Comments:

Associated objective(s):

SRN-6620-K19 (Freq: LIC=I NF=I)
LIST the plant systems which support Station Blackout Diesel Generators and DESCRIBE the nature of support. (Includes power supplies)

263000.K1.02 Battery charger and battery (RO=3.2 / SRO=3.3)

50	ID: 50	Points: 1.00

Unit 1 was at full power when a complete loss of offsite power resulted in a Station Blackout. The following conditions are now present:

- Drywell pressure is 2.6 psig and rising slowly
- The Unit 1 SBO Diesel Generator is powering Bus 13-1
- The UNSO is manually starting the Unit 1 EDG
- The 1A Core Spray (CS) Pump Control Switch is in 'Pull-To-Lock'

Which of the following describes how the CS Pumps will start?

The 1A CS Pump will start _(1)_ after its control switch is placed in 'Normal-After-Trip'.

The 1B CS Pump will start _(2)_ after the Unit 1 EDG energizes Bus 14-1.

A. (1) immediately
(2) 5 seconds

B. (1) immediately
(2) 10 seconds

C. (1) 10 seconds
(2) 5 seconds

D. (1) 10 seconds
(2) 10 seconds

Answer: B

Answer Explanation

Drywell pressure greater than 2.5 psig is an autostart signal for the EDGs.
The SBO Diesel Generator does not have pump start sequence loading protection. The 1A CS Pump will start immediately if Bus 13-1 is being powered from the SBO.
If the EDG is supplying power to the Core Spray pumps, a 10 second time delay (from the time the output breaker is closed) is imposed in the pump start sequence to prevent overloading the diesel.

Distractor 1 is incorrect: (1) Immediately is correct. (2) Plausible because a RHR pump starts after 5 seconds on each division when powered from an EDG.
Distractor 2 is incorrect: (1) Plausible because a CS pump starts after 10 seconds on each division when powered from an EDG. (2) Plausible because a RHR pump starts after 5 seconds on each division when powered from an EDG.
Distractor 3 is incorrect: (1) Plausible because a CS pump starts after 10 seconds on each division when powered from an EDG. (2) 10 Seconds is correct.

Reference: UFSAR section 6.3.2.1.3 (Page 6.3-7 Rev 6; Page 6.3-8 Rev 11), Tech Spec Table 3.3.5.1-1 section 1 Amendment 204/200
Reference provided during examination: None

Cognitive level: High

Level (RO/SRO): RO
Tier: 2 **Group:** 1

K/A: 264000 K5.06
Knowledge of the operational implications of the following concepts as they apply to EMERGENCY GENERATORS (DIESEL/JET): Load Sequencing
(CFR: 41.5 / 45.3)
IMPORTANCE RO 3.4 SRO 3.5

SRO Justification: N/A

Question Source: New
Question History: N/A

Comments: None

Associated objective(s):

264000.K5.06 Load sequencing (RO=3.4 / SRO=3.5)

SRN-6600-K08 (Freq: LIC=I NF=I)
DESCRIBE how the Emergency Diesel Generators responds to an auto initiation signal.

51	ID: 51	Points: 1.00

Unit 1 is operating at rated power.

If a Total Loss of Instrument Air were to occur, which of the following would be expected?

A. Containment pumpback (Joy) capabilities will be lost.

B. SBGTS flow will be 5000 SCFM.

C. RPV water level will be controlled using the LFFRV.

D. RPV pressure will be controlled using RWCU in blowdown mode.

Answer: A

Answer Explanation

With a loss of Instrument Air, the instrument air-operated valves will fail in specific positions.
For the containment pumpback (joy) air system, valves such as the AO 1-1601-56 and -59 will close, preventing a flowpath for the pumpback system. Torus air is taken through AO 1-1601-56 for the compressors and returned to the drywell via AO 1-1601-59.

Distractor 1 is incorrect: A loss of instrument air will result in a reactor scram and SBGTS initiation. The SBGTS flow control valve fails open; however a flow restricting orifice restricts flow to 4400 SCFM. Plausible since SBGTS will start and flow rate is affected.
Distractor 2 is incorrect: RPV water level will be controlled using FRVs. The LFFRV locks up on lowering IA pressure and then will drift open over time. Plausible since the reactor will scram and following a scram, RPV water level is normally controlled using the LFFRV.
Distractor 3 is incorrect: Will not be able to use RWCU in blowdown mode because FCV 1-1239, CU REJECT valve must be opened to complete the flow path and it is an Instrument air operated valve. Plausible since the reactor will scram and the normal decay heat removal pathway of steam removal via the bypass valves will be lost due to closure of the outboard MSIVs.

Reference: QCAP 0200-10 Rev 48, QOA 4700-06 Rev 24
Reference provided during examination: None

Cognitive level: High

Level (RO/SRO): RO
Tier: 2 **Group:** 1

K/A: 300000 K3.02
Knowledge of the effect that a loss or malfunction of the (INSTRUMENT AIR SYSTEM) will have on the following: Systems having pneumatic valves and controls
(CFR: 41.7 / 45.6)
IMPORTANCE RO 3.3 SRO 3.4

SRO Justification: N/A

Question Source: New
Question History: N/A

Comments:

Associated objective(s):

300000.K3.02 Systems having pneumatic valves and controls (RO=3.3 / SRO=3.4)

SR-1602-K19 (Freq: LIC=I)
LIST the plant systems which support Primary Containment Atmosphere Control Systems and DESCRIBE the nature of support. (Includes power supplies)

52	ID: 52	Points: 1.00

Unit 1 is operating at rated power.

Which one of the following describes how the RBCCW System will be affected by an overcurrent trip of Bus 14-1?

A. The 1B RBCCW Pump must be manually restarted after bus 19 is manually re-energized from Bus 18.

B. The 1B RBCCW Pump must be manually restarted after bus 19 is automatically re-energized from the U1 EDG.

C. RBCCW Supply and Outboard Return Isolation Valves can NOT be operated from the control room until Bus 19 is manually re-energized from Bus 18.

D. RBCCW Supply and Outboard Return Isolation Valves can NOT be operated from the control room until Bus 19 is automatically re-energized from the U1 EDG.

Answer: C

Answer Explanation

A loss of Bus 14-1 on overcurrent will lock out the bus preventing any other 4KV safety-related source from supplying it. Bus 14-1 powers Bus 19, therefore Bus 19 is de-energized. RBCCW Isolation valves to loads in the DW are powered from MCC 19-1-1 (RBCCW Supply and outboard return valves for the DW) and MCC 18-1A-1 (RBCCW inboard return valve for the DW), therefore you can't isolate RBCCW loads in the DW from the control room without crosstying buses 18 and 19 to restore power to MCC 19-1-1.

Distractor 1 is incorrect: Plausible because Bus 19 must be manually re-energized. The 1B RBCCW pump will automatically restart when power is restored to the Bus. This answer would be correct if Bus 19 had tripped due to a LOCA signal and not a loss of power.
Distractor 2 is incorrect: Plausible because this would be the correct answer had the loss of Bus 14-1 been due to a LOCA signal and not an overcurrent trip. However, the U1 EDG output breaker is prevented from closing onto Bus 14-1 due to the overcurrent causing a lockout on Bus 14-1.
Distractor 3 is incorrect: Plausible since the first part of the distractor is true, however, the U1 EDG output breaker is prevented from closing onto Bus 14-1 due to the overcurrent causing a lockout on Bus 14-1.

Reference: M-33 sheet 1 Rev AS, QCOA 3700-06 Rev 7, QOA 900-8 F-3 Rev 6, QOA 6700-05 Rev 22
Reference provided during examination: None

Cognitive level: High

Level (RO/SRO): RO
Tier: 2 **Group:** 1

K/A: 400000 K2.02
Knowledge of electrical power supplies to the following: CCW valves
(CFR: 41.7)
IMPORTANCE RO 2.9 SRO 2.9

SRO Justification: N/A

Question Source: New

Question History: N/A

Comments:

Associated objective(s):

400000.K2.02 CCW valves (RO=2.9 / SRO=2.9)

SR-3700-K21 (Freq: LIC=B)
Given a RBCCW operating mode and various plant conditions, PREDICT how RBCCW/plant parameters will respond to manipulation of the following RBCCW controls:

a. MO 3701 control switch
b. MO 3702, 3703, 3706 control switch
c. Pump control switches
d. DIV I/II DW CLR / RBCCW / FPC TRIP BYPASS switch

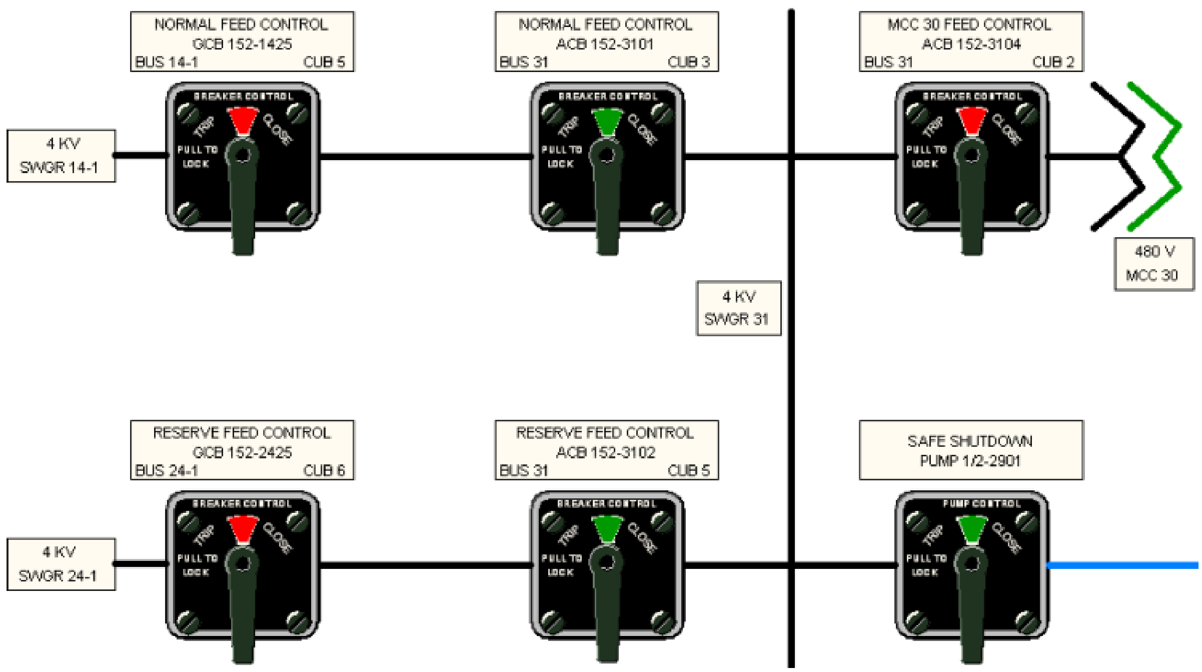
53 | **ID: 53** | **Points: 1.00**

Both Units are at full power, preparing for a scheduled cubicle inspection of GCB 152-1425, NORMAL FEED CONTROL.

The ANSO is manually switching the SSMP power supply from Bus 14-1 feed to Bus 24-1 feed.

Shortly after opening ACB 152-3101, NORMAL FEED CONTROL, the feed breaker to 125VDC Bus 1B-1 TRIPS.

What are the MINIMUM actions that must be completed in order to power the SSMP from Bus 24-1?



A. Close ACB 152-3102, RESERVE FEED CONTROL, ONLY.

B. Open GCB 152-1425, NORMAL FEED CONTROL, AND THEN close ACB 152-3102, RESERVE FEED CONTROL.

C. Place 4KV SWGR 31 DC TRANSFER CONTROL switch to the '**UNIT 1**' position, AND THEN close ACB 152-3102, RESERVE FEED CONTROL.

D. Place 4KV SWGR 31 DC TRANSFER CONTROL switch to the '**UNIT 2**' position, AND THEN close ACB 152-3102, RESERVE FEED CONTROL.

Answer: D

Answer Explanation

4E-1346A shows the DC control power sources to Bus 31 as selected by the 4KV SWGR 31 DC TRANSFER CONTROL switch are from Unit 1 (1B-1) and Unit 2 (2B-1).

The drawing shows the normal line-up is Unit 1 (1B-1).

A loss of 125 VDC Bus 1B-1 will result in the loss of the normal control power feed to Bus 31.

Placing the switch to U2 transfers control power to 2B-1 (which is actually fed from U-1).

The 4KV SWGR 31 DC TRANSFER CONTROL switch must be placed in the 'Unit 2' position, or the reserve feed breaker, ACB 152-3102, will not close.

Distractor 1 is incorrect: Plausible if assumed the loss of BUS 1B-1 has no effect on Bus 31, or if assumed that the normal position of the DC transfer switch is 'UNIT 2'.
Distractor 2 is incorrect: Plausible because the other Normal Feed Control breaker, ACB 152-3101, must be opened in order to close the Reserve Feed Breaker. However, that interlock is already met by ACB-3101 being open. No SSMP breakers will operate without 125 VDC control power.
Distractor 3 is incorrect: Plausible because DC control power must be powered from Unit 1, however, the DC transfer switch must be placed in 'UNIT 2' in order to provide control power from Unit 1.

Reference: QCOP 2900-02 Rev 25, 4E-1346A Rev H
Reference provided during examination: None

Cognitive level: High

Level (RO/SRO): RO
Tier: 2 **Group:** 1

K/A: (SSMP) 217000 A4.04
Ability to manually operate and/or monitor in the control room:
Manually initiated controls
(CFR: 41.7 / 45.5 to 45.8)
IMPORTANCE RO 3.6 SRO 3.6

SRO Justification: N/A

Question Source: New
Question History: N/A

Comments: Replaced question due to overlap with a systems JPM.

Associated objective(s):

217000.A4.04 Manually initiated controls (RO=3.6 / SRO=3.6)

SR-2900-K13 (Freq: LIC=B)
DESCRIBE the interlocks associated with the following SSMP components, including purpose and setpoints:
a. 4kv supply breakers
b. SSMP (start interlocks)
c. SSMP injection valves

54 **ID: 54** **Points: 1.00**

Given the following:

- Reactor power is 80%
- "Full Power Blocks" are DISABLED on the Rod Worth Minimizer (RWM)

If the Total Steam Flow signal as read by the RWM indicates 8% rated steam flow, how is control rod motion affected?

The RWM will...

A. apply insert and withdraw blocks to ALL rods.

B. apply rod blocks in accordance with the loaded rod sequence.

C. allow ALL rod motion independent of the loaded rod sequence.

D. allow continued control rod motion only by single notch increments.

Answer: B

Answer Explanation

If power is greater than the LPSP (10% RTP) and either the steam flow or feed flow signals fail low, the RWM considers power to be below 10% and all applicable blocks are automatically enforced in accordance with the loaded rod sequence.

The given conditions indicate that the RWM is interpreting the Total Steam Flow signal incorrectly and will therefore enforce all rod blocks in accordance with the loaded sequence.

Distractor 1 is incorrect: This would be the correct answer if the RWM power supply failed and was subsequently returned with the RWM switch in Normal.
Distractor 2 is incorrect: This would be correct if the steam flow signal did not fail below the LPSP.
Distractor 3 is incorrect: Single notch restrictions are only enforced in the Rod Exercise Mode of the RWM.

Reference: QCOP 0207-01 Rev 21
Reference provided during examination: None

Cognitive level: High

Level (RO/SRO): RO
Tier: 2 **Group:** 2

K/A: 201006 K3.01
Knowledge of the effect that a loss or malfunction of the ROD WORTH MINIMIZER SYSTEM (RWM) (PLANT SPECIFIC) will have on following: Reactor manual control system: P-Spec(Not-BWR6)
(CFR: 41.7 / 45.4)
IMPORTANCE RO 3.2 SRO 3.5

SRO Justification: N/A

Question Source: Quad Cities ILT Exam Bank
Question History: N/A

Comments:

Associated objective(s):

SR-0207-K23 (Freq: LIC=B)
Given a Rod Worth Minimizer operating mode and various plant conditions, PREDICT how the Rod Worth Minimizer and supported systems will be impacted by the following failures:
a. Loss of single RPIS input signal
b. Loss of multiple RPIS input signals
c. Loss of FWLV inputs (steam/feed flow)
d. Loss of computer UPS
e. Rod drift
f. Mispositioned control rod

201006.K3.01 Reactor manual control system: P-Spec(Not-BWR6) (RO=3.2 / SRO=3.5)

55	ID: 55	Points: 1.00

REFER TO THE INDICATIONS ON THE FOLLOWING PAGE

Unit 1 was at rated power when a Loss Of Coolant Accident occurred on the "B" recirc loop, causing RPV level to reach the LPCI Loop Select Logic initiation setpoint.

Which of the following indications for the Recirc Pumps are expected 5 seconds after the LPCI Loop Select Logic initiation setpoint is reached?

A. 1

B. 2

C. 3

D. 4

Answer: B

Answer Explanation

LPCI Loop Select occurs when either of the following conditions exists: Drywell pressure 2.5 psig or RPV water level -59".

LPCI loop select trips BOTH recirc pumps 1A and 1B.

The recirc pumps also have a direct trip at -59" RPV water level.

The included graphics show four pictures of the RECIRC ASD BKR LIGHTS ('TRIP' OR 'ON' LIT):

1 - 1A TRIP / 1B ON
2 - 1A TRIP / 1B TRIP
3 - 1A ON / 1B TRIP
4 - 1A ON / 1B ON

Distractor 1 is incorrect: Both recirc pumps trip. Plausible if thought that only the intact loop pump will be tripped.
Distractor 2 is incorrect: Both recirc pumps trip. Plausible if thought that only the broken loop pump will be tripped.
Distractor 3 is incorrect: Both recirc pumps trip. Plausible since ATWS circuitry has a 9 second delay before tripping both recirc pumps.

Reference: QCOA 1000-04 Rev 17, 4E-6857 Rev AA, 4E-1503A Rev AU, 4E-1503B Rev BC, 4E-1422 Rev G, 4E-1426 Rev J
Reference provided during examination: None

Cognitive level: High

Level (RO/SRO): RO
Tier: 2 **Group:** 2

K/A: 202001 A3.07
Ability to monitor automatic operations of the RECIRCULATION SYSTEM including: Pump trips
(CFR: 41.7 / 45.7)

IMPORTANCE RO 3.3 SRO 3.3

SRO Justification: N/A

Question Source: New
Question History: N/A

Comments:

Associated objective(s):

SR-0202-K20 (Freq: LIC=B) Given a Reactor Recirculation System operating mode and various plant conditions, EVALUATE the following Reactor Recirculation System indications/responses and DETERMINE if the indication/response is expected and normal.

a. ASD
- (1) ASD Pre-Charge Status (Ready/In Progress/Complete)
- (2) ASD Run Status (Ready/On)

b. RRCS
- (1) Master controller speed demand indicator
- (2) Individual speed controller speed / speed demand indicators
- (3) Operator Work Station (OWS)
  - (a) RRCS Overview Display indications
  - (b) Jet Pump Instrumentation Display indications
  - (c) RRCS Control Algorithm Display indications
  - (d) RRCS Interlocks Display indications
  - (e) Jet Pump Surveillance Display indications
  - (f) RRCS Measuring Points Display indications
  - (g) ASD Functionality Display indications
  - (h) ASD Cooling System Display indications
  - (i) Trend Display indications
  - (j) Alarm/Event/System List indications

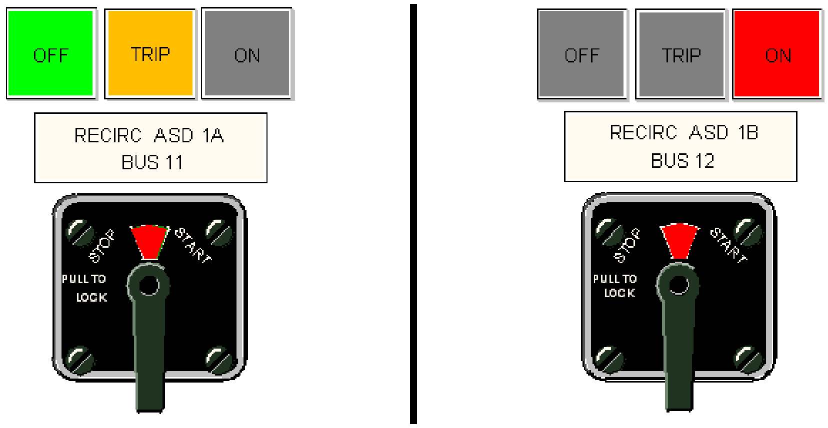
c. Reactor recirc pump
- (1) Motor voltage, current and power
- (2) Differential pressure
- (3) Motor winding temperatures
- (4) Seal cooling water temperatures
- (5) Motor bearing temperatures

d. Reactor recirc system
- (1) MOV/AOV positions
- (2) Reactor recirc loop temperatures
- (3) Pump flow
- (4) Jet Pump Loop flow
- (5) A/B jet pump riser differential pressure
- (6) Total core flow
- (7) Core plate DP and noise

202001.A3.07 Pump trips: Plant-Specific (RO=3.3 / SRO=3.3)

(GRAY = NOT LIT / COLOR = LIT)

1



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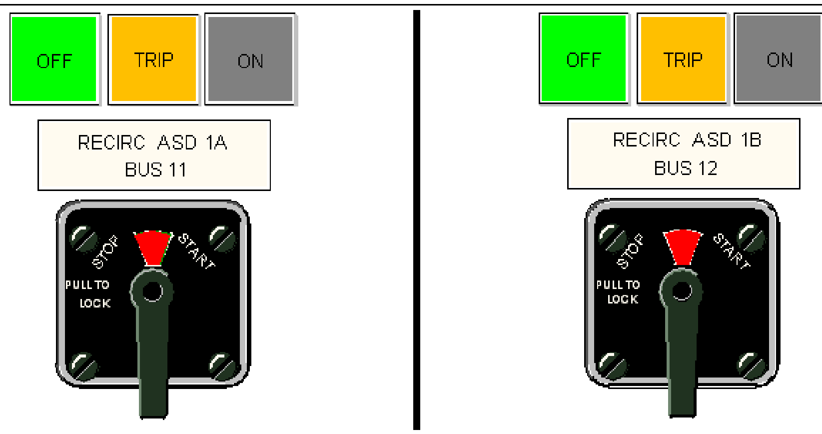

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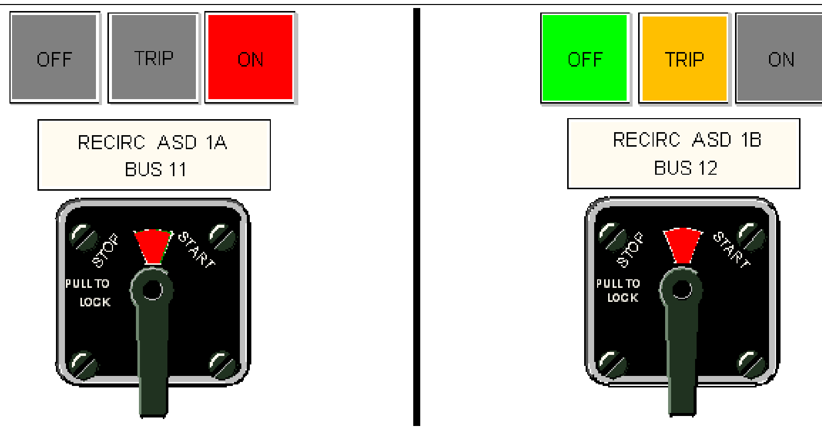

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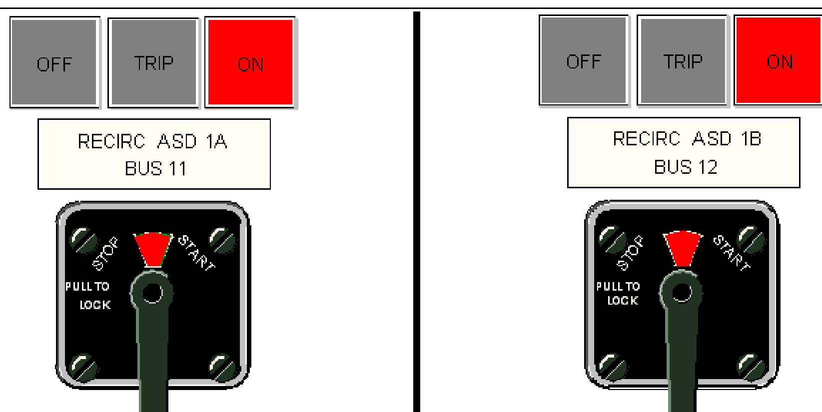
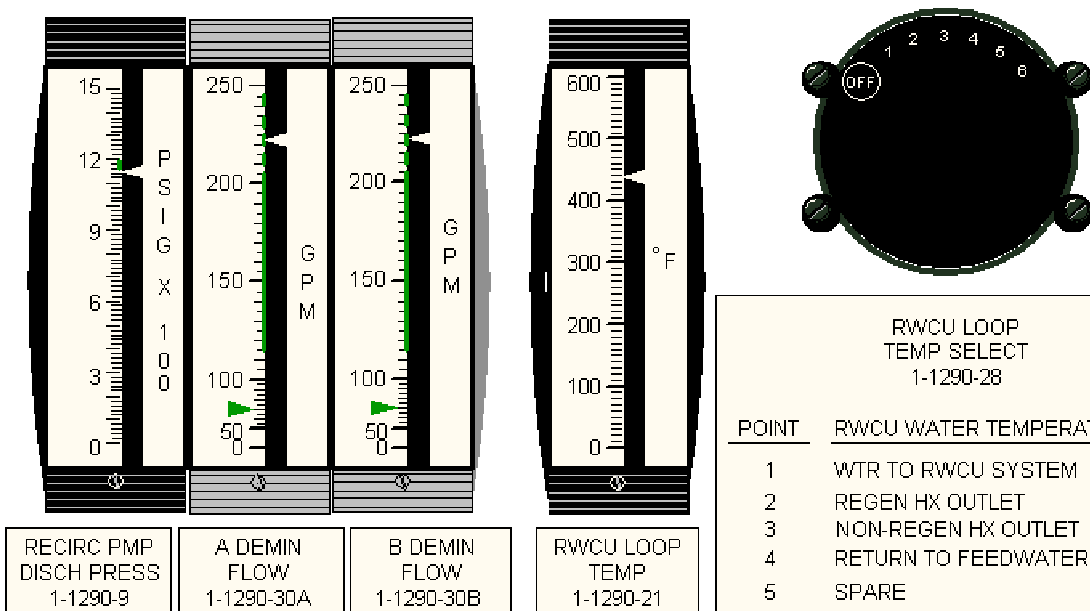


56 **ID: 56** **Points: 1.00**

The Reactor Water Cleanup System (RWCU) is in normal operation at full power. Panel 901-4 indications are provided below.

(Note: The 1-1290-28, RWCU LOOP TEMP SELECT switch has been partially obscured in the picture.)

Based on the indications provided, which point is the 1-1290-28, RWCU LOOP TEMP SELECT switch measuring?



POINT	RWCU WATER TEMPERATURES
1	WTR TO RWCU SYSTEM
2	REGEN HX OUTLET
3	NON-REGEN HX OUTLET
4	RETURN TO FEEDWATER LINE
5	SPARE
6	SPARE

A. 1

B. 2

C. 3

D. 4

Answer: D

Answer Explanation

The provided picture is with the switch in position 4. Meter 1-1290-21 is reading approximately 440ºF, which is cooler than saturation temperature of the reactor water at ~520ºF (Pt 1), but warmer than the outlet of the Regenerative Heat Exchanger or Non-regenerative Heat Exchanger .

The RWCU RHX cools the reactor water from ~520ºF to ~200ºF (Pt 2).

The RWCU NRHX further cools the reactor water from ~200ºF to ~100ºF (Pt 3).

Therefore, meter 1-1290-21 is indicating RETURN TO FEEDWATER LINE, Point 4.

Distractor 1 is incorrect: Normal Pt 1 value is 510-530 ºF.
Distractor 2 is incorrect: Normal Pt 2 value is 200-210 ºF.
Distractor 3 is incorrect: Normal Pt 3 value is 90-110 ºF.

Reference: UFSAR 5.4.8.2 Rev 5, M-47 sheet 1 Rev AF
Reference provided during examination: None

Cognitive level: High

Level (RO/SRO): RO
Tier: 2 **Group:** 2

K/A: 204000 K5.08
Knowledge of the operational implications of the following concepts as they apply to REACTOR WATER CLEANUP SYSTEM: Temperature measurement
(CFR: 41.5 / 45.3)
IMPORTANCE RO 2.6 SRO 2.6

SRO Justification: N/A

Question Source: Modified from Quad Cities 2011 ILT NRC Exam
Question History: N/A

Comments:

Associated objective(s):

SR-1200-K20 (Freq: LIC=B) Given a Reactor Water Cleanup System operating mode and various plant conditions, EVALUATE the following Reactor Water Cleanup System indications/responses and DETERMINE if the indication/ response is expected and normal:

a. Control Room
   (1) RWCU recirc pump discharge pressure
   (2) Filter-demin flow
   (3) System temperatures
   (4) Reject flowrate
   (5) RWCU conductivities and dissolved O2
   (6) RWCU recirc pump status
   (7) MOV and AOV positions

204000.K5.08 Temperature measurement (RO=2.6 / SRO=2.6)

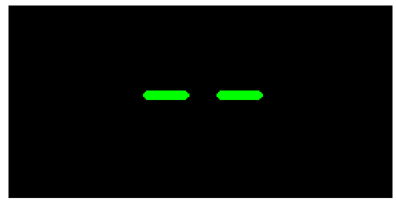
57	**ID: 57**	**Points: 1.00**

Which one of the following shows the rod position indication on the full core display immediately following a scram, and then after the operator resets the scram?

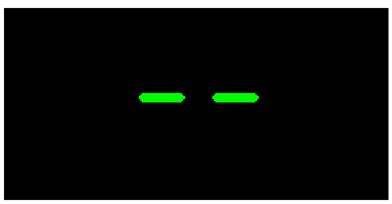
Immediately following the scram, control rods will show __(1)__.

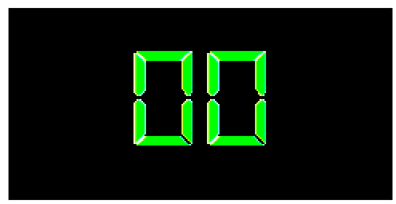
After the scram is reset, control rods will show __(2)__.

A. (1) (2)

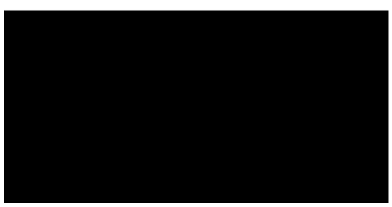


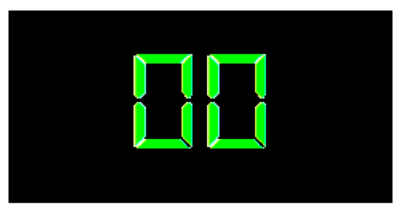
B. (1) (2)



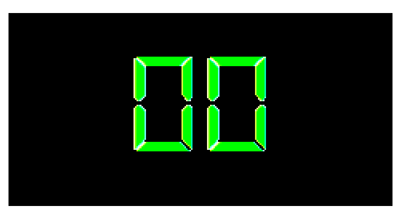


C. (1) (2)





D. (1) (2)



Answer: B

Answer Explanation

The position of every rod in the core is continuously sensed by an associated position indicator probe. The basic position sensing device is a magnetically actuated reed switch. As a CRD moves, it moves a magnet mounted in the drive piston axially with respect to the probe, thereby actuating the reed switches.

With the scram signal active, the scram valves are open and the control rods are being held in the overtravel in position.
The overtravel in reed switches are picked up and designated by a double dash illuminated in green.

After the scram is reset, the scram valves close and the control rod will settle at position 00, illuminated in green.

Rod position will display amber when not full in or full out and when not in latched position (between notches).

The rod position display will be blank if the rod travels past the overtravel out position.

Distractor 1 is incorrect: Plausible because the display will be blank if a rod is withdrawn past overtravel out. Although there is no notch for the rod to stop at when the rod is at overtravel in, the full in reed switch is picked up and will show the dashes in green.
After the scram is reset, the rods will settle at position 00, not at the overtravel in position.
Distractor 2 is incorrect: Plausible because the display will be blank if a rod is withdrawn past overtravel out. Although there is no notch for the rod to stop at when the rod is at overtravel in, the full in reed switch is picked up and will show the dashes in green.
Distractor 3 is incorrect: Plausible because rods that are not in a latched position will be displayed in amber, however, the rod will display in green due to it being full in. Although not in a notched position, the full in reed switch is picked up and will show the dashes in green.

Reference: 4E-1410 Rev I, LIC-0280 Rev 13, QCOA 0280-01 Rev 15
Reference provided during examination: None

Cognitive level: Memory

Level (RO/SRO): RO
Tier: 2 **Group:** 2

K/A: 214000 A4.02
Ability to manually operate and/or monitor in the control room: Control rod position
(CFR: 41.7 / 45.5 to 45.8)
IMPORTANCE RO 3.8 SRO 3.8

SRO Justification: N/A

Question Source: New
Question History: N/A

Comments:

Associated objective(s):

214000.A4.02 Control rod position (RO=3.8 / SRO=3.8)

SR-0280-K15 (Freq: LIC=B)
DESCRIBE the operation of the Reactor Manual Control System (RMCS)/ Rod Position Information System (RPIS) during the following evolutions:
a. Rod selection
b. Notch In cycle
c. Continuous In operation
d. Notch Out cycle
e. Rod out notch override operation
f. Rod is full in or full out (RPIS reed switches)
g. Double Clutching

58	ID: 58	Points: 1.00

Unit 1 was operating at rated power when a steam leak in the drywell occurred.

The 'A' Loop of Torus Sprays and Torus Cooling have been initiated.

Current plant conditions are as follows:

- RPV Water Level -70 inches
- RPV Pressure 275 psig
- Torus Pressure 0.5 psig
- Drywell Pressure 0.9 psig

Based on current plant conditions, which of the following valves will have a CLOSE signal?

1. MO 1-1001-34A, TORUS TEST OR SPRAY VLV
2. MO 1-1001-36A, TORUS H2O TEST VLV
3. MO 1-1001-37A, TORUS SPRAY SHUTOFF VLV

A. 1 ONLY

B. 3 ONLY

C. 2 and 3 ONLY

D. 1, 2, and 3

Answer: B

Answer Explanation

A LPCI initiation signal is present and if Drywell pressure drops below 1 psig, the following valves are interlocked closed: MO 1-1001-23A/B, 26A/B, 37A/B (QCAN 901-3 A-13) to prevent drawing a vacuum in the containment relative to RB pressure. Of the listed valves, only number 3, MO 1-1001-37A, is interlocked closed.

Distractor 1 is incorrect: MO 1-1001-34A is upstream of MO 1-1001-37A. Plausible since closing this valve alone also secures torus spray flow.
Distractor 2 is incorrect: MO 1-1001-36A is in parallel with the MO 1-1001-37A. Plausible since closing both valves secures all flow to the torus.
Distractor 3 is incorrect: All three valves provide a flowpath away from LPCI. These valves are interlocked closed if RPV water level drops to 2/3 core height (-191 inches). Plausible because a LPCI injection signal is present.

Reference: QCAN 901-3 A-13 Rev 7
Reference provided during examination: None

Cognitive level: HIGH

Level (RO/SRO): RO
Tier: 2 **Group:** 2

K/A 230000 K1.01
Knowledge of the physical connections and/or cause effect relationships between RHR/LPCI: TORUS/SUPPRESSION POOL SPRAY MODE and the following: Suppression pool

(CFR: 41.2 to 41.9 / 45.7 to 45.8)
IMPORTANCE RO 3.6 / SRO 3.7

SRO Justification: N/A

Question Source: New
Question History: N/A

Comments:

Associated objective(s):

SR-1000-K12 (Freq: LIC=I)
DESCRIBE how the RHR system responds to an isolation signal.

230000.K1.01 Suppression pool (RO=3.6 / SRO=3.7)

59 **ID: 59** **Points: 1.00**

Given the following:

- Unit 2 is operating at 100% reactor power
- Reactor pressure is 1000 psig
- Turbine Control Valves are approximately 55% OPEN

A transient occurred that caused Reactor power to RISE to 101%.

Which of the following describes how the DEHC System responds?

A. DEHC will OPEN the Turbine Control Valves AND the Turbine Bypass Valves to control reactor pressure.

B. DEHC will OPEN the Turbine Control Valves to control reactor pressure.

The Turbine Bypass Valves will NOT change position.

C. DEHC will OPEN the Turbine Bypass Valves to control reactor pressure.

The Turbine Control Valves will NOT change position.

D. Max Combined Flow will prevent the Turbine Control Valves AND the Turbine Bypass Valves from OPENING further.

The Reactor will scram on high flux OR high pressure.

Answer: B

Answer Explanation

Initially, with Load Set greater than Turbine Load (Load Set procedurally maintained at 10% > reactor power), the TCVs are receiving an open demand signal from the load control function.
However, because reactor pressure is being maintained at the current Pressure Set demand, the TCVs do not open any further, as any further opening would cause reactor pressure to lower.
The RISE in reactor power will cause a RISE in reactor pressure, creating a positive error signal between reactor pressure and pressure set, which then outputs an open demand to the TCVs and BPVs to lower reactor pressure.
The TCVs now have an open demand signal from Load Set and Pressure Set, so the TCVs will open to both lower reactor pressure and raise Turbine Load.
The BPVs do not open if the pressure control demand signal is met with the TCVs. In this case, the rise in reactor power is within the capacity of the TCVs and not limited by Load Set (110% > 101%), so the BPVs will not open.

Distractor 1 is incorrect: Plausible if assumed that the rise in pressure is not within the capacity of the BPVs.
Distractor 2 is incorrect: Plausible if assumed that either Load Set or Load Limit is limiting the TCVs.
Distractor 3 is incorrect: Plausible if assumed that the capacity of the TCVs and BPVs has been met or if MCFL is set to 100%, because then neither the TCVs nor BPVs would open and reactor pressure would rise until a trip setpoint was reached.

Reference: QCOA 0201-03 rev 28, QCGP 1-1 Rev 95
Reference provided during examination: None

Cognitive level: High

Level (RO/SRO): RO
Tier: 2 **Group:** 2

K/A: 241000 K6.08
Knowledge of the effect that a loss or malfunction of the following will have on the REACTOR/TURBINE PRESSURE REGULATING SYSTEM : Reactor power
(CFR: 41.7 / 45.7)
IMPORTANCE RO 3.6 SRO 3.7

SRO Justification: N/A

Question Source: New
Question History: N/A

Comments:

Associated objective(s):

SR-5652a-K15 (Freq: LIC=I) DESCRIBE the operation of the following principal Main Turbine Control - EHC Logic System components:
a. Pressure control unit
  (1) Pressure regulators
  (2) Pressure/load gate
  (3) Load limit gate
b. Bypass control unit
  (1) Bypass jack
  (2) Max combined flow limit
c. Load control unit
  (1) Load set
  (2) Load set runback
d. Speed and acceleration control unit
  (1) Speed control section
  (2) Acceleration control section
e. Valve flow control unit
f. Main turbine valves during turbine startup/runback/overspeed
  (1) Main stop valves
  (2) Control valves
  (3) Combined intermediate valves
  (4) Bypass valves
  (5) Extraction non-return valve

241000.K6 08 Reactor power (RO=3.6 / SRO=3.7)

60	ID: 60	Points: 1.00

When testing the control valves per QOS 5600-01, Turbine Control Valve Fast Closure Scram Instrumentation Channel Functional Test, why are Turbine Control Valve positions verified prior to commencing the test?

```
Verify Turbine Control Valves are at the
following positions

 .   Control Valve #1:  ≤ 45% open.
 .   Control Valve #2:  ≤ 47% open.
 .   Control Valve #3:  ≤ 42% open.
 .   Control Valve #4:  ≤ 45% open.
```

A. To prevent Turbine Bypass Valve actuation during testing.

B. To prevent a power-to-flow (high power) rod block.

C. To prevent a T.S. entry due to high reactor pressure.

D. To ensure adequate valve travel to test the scram signal.

Answer: A

Answer Explanation

QOS 5600-01 step C.4 states “Verify Turbine Control Valves are at the following positions to prevent Turbine Bypass Valve actuation during testing:"

Distractor 1 is incorrect: There are no power prerequisites for performance of the test. Reactor pressure will rise slightly, causing a slight power change. Plausible since power will change slightly.
Distractor 2 is incorrect: Reactor pressure is lowered to allow for a slight pressure rise when conducting the test. Plausible since other actions are taken in the procedure to account for the pressure rise.
Distractor 3 is incorrect: The valves are verified to be at a maximum position; no minimum is specified. Plausible because the response of the valves as they near their closed position is being evaluated.

Reference: QOS 5600-01 Rev 52
Reference provided during examination: None

Cognitive level: Memory

Level (RO/SRO): RO
Tier: 2 **Group:** 2

K/A: 245000 2.2.12
Knowledge of surveillance procedures.
(CFR: 41.10 / 45.13)
IMPORTANCE RO 3.7 SRO 4.1

SRO Justification: N/A

Question Source: New
Question History: N/A

Comments: Per NRC: added specific values of valve positions to stem.

Associated objective(s):

245000.2.2.12 Knowledge of surveillance procedures. RO 3.7 SRO 4.1

SR-5652a-K21 (Freq: LIC=B) Given a Main Turbine Control - EHC Logic System operating mode and various plant conditions, PREDICT how Main Turbine/EHC systems and plant parameters will respond to manipulation of the following Main Turbine Control - EHC Logic System local/remote controls:

a. Status
  - (1) Turbine Reset
  - (2) Pressure Reset
  - (3) TB Diag Reset
  - (4) PP Diag Reset

b. Control
  - (1) Valve Limiters
    - (a) Load Limit
    - (b) Max Combined Flow Limit
  - (2) Pressure Control
    - (a) Pressure Control Mode – Throttle/Dome
    - (b) Pressure Set
  - (3) Pre-Warming
    - (a) MSV #2 adjustment
    - (b) Chest Warming
    - (c) Shell Warming
  - (4) Speed-Load
    - (a) Speed Control
      - 1) Acceleration
      - 2) Speed Cmd
    - (b) Load Set
  - (5) Rx Cooldown
    - (a) OFF/ON
    - (b) Setpoint/Rate
  - (6) BPV Jack

c. Aux
  - (1) Trip Status
    - (a) 1st Hits
    - (b) Disable/Enable Hi Vibe Trip
  - (2) Mark VI Panel
    - (a) Comm Status
    - (b) Power Supplies
  - (3) Transmitter Reset

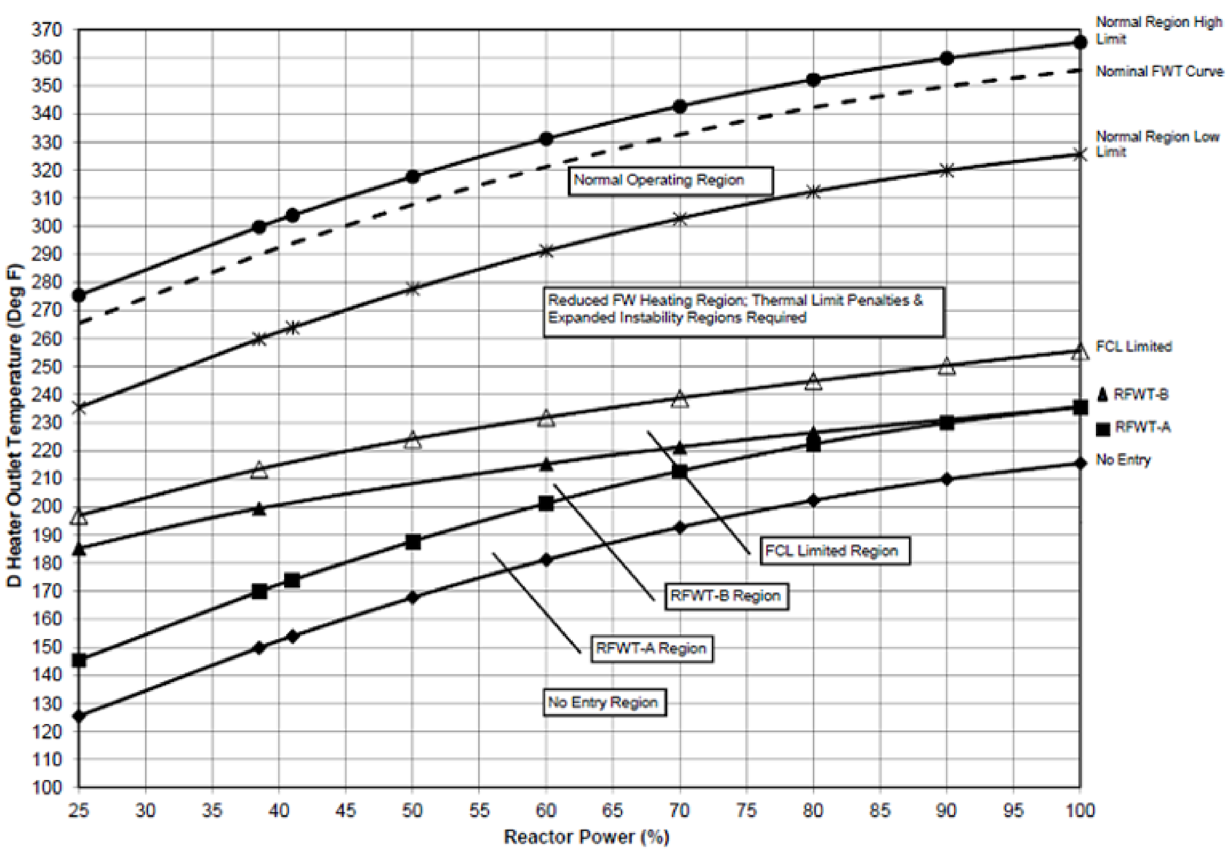
d. Tests
  - (1) PCU
  - (2) MSV-CV
  - (3) BPV
  - (4) CIV
  - (5) 2/3 Trip System
  - (6) Offline Vlv Test
  - (7) Offline O/S
  - (8) Online O/S

e. Trubine trip pushbuttons

61	ID: 61	Points: 1.00

Unit 1 was operating initially at 95% power with an initial "D" Heater outlet temperature of 360°F, when a transient occurred. The following conditions are now present:

- Annunciator 901-6 G-3, HEATER 1D3 HIGH LEVEL, is in ALARM
- MO 1-3401C, LINE 3 HTR INLT ISOL VLV, is CLOSED
- MO 1-3402C, LINE 3 HTR OUTLT ISOL VLV, is CLOSED
- MO 1-3403, LP HTR STRING BYP VLV, is OPEN
- D Heater outlet temperature is at 300°F and LOWERING
- Reactor power is 100% and RISING



Based on the current conditions, what minimum action is required?

A. Insert a Manual Reactor Scram

B. Close MO 1-3403, LP HTR STRING BYP VLV

C. Initiate an Emergency Power Reduction beginning with Control Rods

D. Initiate an Emergency Power Reduction beginning with Reactor Recirc Pumps

Answer: D

Answer Explanation

When a high level in the A heater occurs, the Low Pressure heater bypass valve opens, causing a third of the water traveling through the condensate system to bypass the feedwater heaters. This results in colder water being fed to the reactor through the feedwater system.

A loss of Feedwater Heating will cause Reactor Power to rise. It is necessary that a compensatory power reduction be initiated immediately to avoid an APRM High Neutron Flux Reactor Scram.

Power reduction should begin with Recirc Flow, and then continue with Control Rods to suppress the power rise further.

This action sequence is based on:
a. Leaving Recirc Flow alone at high values and just inserting Control Rods may result in LHGR violations and possible fuel failures.
b. The difference between APRM Flow Bias Line Slope and the 100% FCL Slope allows more margin to avoid a scram as flow is reduced.

Distractor 1 is incorrect: A scram is only required if power cannot be maintained less than 105%, or if feedwater temperature falls below the "No Entry" curve on the shown graph. Plausible if the graph is incorrectly interpreted or if the scram power limit is not recalled correctly.
Distractor 2 is incorrect: Plausible because shutting the bypass valve will be required later in the procedure, but doing so now would cause a scram due to low feedwater flow. Reactor power must be reduced first to lower the feedwater flow requirements to be within the capacity of remaining feedwater heater flow.
Distractor 3 is incorrect: Plausible because initiating an emergency power reduction is required, but will be started with recircs, not rods.

Reference: QCOA 3500-01 Rev 36, QCAN 901(2)-6 G-3 Rev 4
Reference provided during examination: None

Cognitive level: Memory

Level (RO/SRO): RO
Tier: 2 **Group:** 2

K/A: 256000 A2.03
Ability to (a) predict the impacts of the following on the REACTOR CONDENSATE SYSTEM; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations: Valve openings
(CFR: 41.5 / 45.6)
IMPORTANCE RO 2.8 / SRO 2.9

SRO Justification: N/A

Question Source: New
Question History: N/A

Comments: Per NRC: changed initial power level from 103% to 100% to make the use of the graph more plausible.

Associated objective(s):

256000.A2.03 Valve openings (RO=2.8 / SRO=2.9)

SR-3500-K26 (Freq: LIC=B)
EVALUATE given key Feedwater Heating System parameter indications and/or responses depicting a system specific abnormality/failure and DETERMINE a course of action to correct or mitigate the following abnormal condition(s):

a. LP heater A high level
b. Heater high level
c. Unbalanced MSDT to D heater flows

62 **ID: 62** **Points: 1.00**

A Unit 1 plant startup is being performed with the 1B Reactor Feed Pump out of service.

In accordance with QOP 3200-02, START UP OF THE FIRST REACTOR FEED PUMP, which electrical busses will the NSO select to supply the 1A and 1C Reactor Feed Pumps under these conditions?

RFP 1A _(1)_

RFP 1C _(2)_

A. (1) Bus 11
(2) Bus 11

B. (1) Bus 11
(2) Bus 12

C. (1) Bus 12
(2) Bus 11

D. (1) Bus 12
(2) Bus 12

Answer: B

Answer Explanation

The C RFP has two possible power supplies, Bus 11 or Bus 12. QOP 3200-02 Precaution #4 states "When selecting a second RFP or Condensate/Condensate Booster pump for startup, then the one that is fed from the opposite electrical bus as the one already running should be chosen." Since A RFP is powered from Bus 11 and both A and C RFPs will be required to be started, C RFP will be powered from Bus 12.

Distractor 1 is incorrect: QOP 3200-02 directs the C RFP started from Bus 12 in this situation.
Distractor 2 is incorrect: This would be correct for RFP 1B and 1C.
Distractor 3 is incorrect: Only the 1C RFP can be fed from either Bus 11 or 12.

Reference: QOP 3200-02 Rev 39
Reference provided during examination: None

Cognitive level: Memory

Level (RO/SRO): RO
Tier: 2 **Group:** 2

K/A: 259001 K2.01
Knowledge of electrical power supplies to the following: Reactor feedwater pump(s): Motor-Driven-Only (CFR: 41.7)
IMPORTANCE RO 3.3 SRO 3.3

SRO Justification: N/A

Question Source: New
Question History: N/A

Comments:

Associated objective(s):

SR-3200-K19 (Freq: LIC=I)
LIST the plant systems which support Condensate/Feedwater System and DESCRIBE the nature of support. (Includes power supplies)

259001.K2.01 Reactor feedwater pump(s): Motor-Driven-Only (RO=3.3 / SRO=3.3)

63 **ID: 63** **Points: 1.00**

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

- Both the Drywell Floor Drain Sump (DWFDS) and the Drywell Equipment Drain Sump (DWEDS) REQUIRE pumping to the Waste Collector Tank (WCT)
- Both IDENTIFIED and UNIDENTIFIED LEAKAGE determination is required
- Individual pump flow rates for each pump were determined last shift

Before pumping could begin, the digital display on the 1-2003-3, DW FLR DRN SUMP FLOW RECORDER, changes from numbers to stars (*******).

After a full reset is performed, the DWFDS Flow Recorder is determined to be INOPERABLE.

Given the above conditions, which of the following describes the required actions?

A. Enter LCO 3.0.3 immediately.

B. Pump the Drywell **FLOOR** Drain Sump with the Drywell **EQUIPMENT** Drain Sump Pump, and quantify ALL the volume pumped as IDENTIFIED leakage, with NO UNIDENTIFIED leakage.

C. Pump the Drywell **FLOOR** Drain Sump with the Drywell **EQUIPMENT** Drain Sump Pump, and quantify ALL the volume pumped as UNIDENTIFIED leakage, with NO IDENTIFIED leakage.

D. Pump the Drywell **FLOOR** Drain Sump with the Drywell **FLOOR** Drain Sump Pump, and use the previously calculated pump flow rate to determine UNIDENTIFIED LEAKAGE. Pump the Drywell **EQUIPMENT** Drain Sump with the Drywell **EQUIPMENT** Drain Sump Pump to determine IDENTIFIED LEAKAGE.

Answer: D

Answer Explanation

Two drywell floor drain sump pumps and two drywell equipment drain sump pumps take suction from their respective sumps and discharge to the Liquid Radioactive Waste System. When a high level is reached in the sumps, a level switch actuates to start a sump pump when the pump discharge valves are open. A flow monitor in the discharge line of the sump pumps provides a flow input to a flow integrator in the control room. The flow integrator is used to quantify the amount of sump input.

The volume pumped from the DWFDS determines UNIDENTIFIED Leakage.
The volume pumped from the DWEDS determines IDENTIFIED Leakage.

An alternate to the drywell floor drain sump monitoring system for quantifying unidentified LEAKAGE is the drywell equipment drain sump monitoring system, if the drywell floor drain sump is overflowing to the drywell equipment drain sump. In this configuration, the drywell equipment drain sump collects all LEAKAGE into the drywell equipment drain sump and the overflow from the drywell floor drain sump. Therefore, if the drywell floor drain sump is overflowing to the drywell equipment drain sump, the drywell equipment drain sump monitoring system can be used to quantify unidentified LEAKAGE. In this condition, all LEAKAGE measured by the drywell equipment drain sump monitoring system is assumed to be unidentified LEAKAGE.

With the DWFDS flow recorder inoperable, it is permissible within the procedure (QCOS 1600-07) to determine the volume pumped by using the previously recorded flowrate and a stopwatch.

The required instrumentation to quantify unidentified LEAKAGE from the RCS consists of either the drywell floor drain sump monitoring system or the drywell equipment drain sump monitoring system, with the drywell floor drain sump overflowing to the drywell equipment drain sump. Thus, for either system to be considered OPERABLE, the flow monitoring portion of the system must be OPERABLE.

Distractor 1 is incorrect: Plausible if assumed that both sump instrumentation is required to be operable in order to meet the LCO.
Distractor 2 is incorrect: Plausible because normally the volume pumped from the DWEDS is declared as IDENTIFIED leakage. Also, there is another procedure that can be used to pump the DWFDS with the DWEDS sump pump, however, all water pumped would have to be declared UNIDENTIFIED Leakage.
Distractor 3 is incorrect: Plausible because there is another procedure that can be used to pump the DWFDS with the DWEDS sump pump; however, all water pumped would have to be declared UNIDENTIFIED Leakage. Also, the question states that both IDENTIFIED AND UNIDENTIFIED leakage is required to be determined.

Reference: QCOS 1600-07 Rev 33, LCO 3.4.5 Amendment No. 247/242
Reference provided during examination: None

Cognitive level: Memory

Level (RO/SRO): RO
Tier: 2 **Group:** 2

K/A: 268000 Radwaste
2.1.23
Ability to perform specific system and integrated plant procedures during all modes of plant operation.
(CFR: 41.10 / 43.5 / 45.2 / 45.6)
IMPORTANCE RO 4.3 SRO 4.4

SRO Justification: N/A

Question Source: New
Question History: N/A

Comments: Per NRC: positively identified both types of leakage for choices 'B', 'C', and 'D'.

Associated objective(s):

268000.2.1.23 Ability to perform specific system and integrated plant procedures during all modes of plant operation. RO 4.3 SRO 4.4

SR-2000-K26 (Freq: LIC=Q)
EVALUATE given key Radwaste Liquid Processing System parameter indications and/or responses depicting a system specific abnormality/ failure and DETERMINE a course of action to correct or mitigate the following abnormal condition(s):
a. Oil spill into a sump
b. DWEDT or DWFDS isolation valve failure
c. Reactor Building Floor Drain Sump check valve failure
d. Loss of DWEDS/DWFDS flow integrators

64	ID: 64	Points: 1.00

Unit 1 was at full power when Annunciator 901-54 C-7, NORMAL PROCESS FLOW HI/LO, ALARMS.

An Equipment Operator has been dispatched to the Steam Jet Air Ejector (SJAE) Rooms and is attempting to maintain SJAE Steam Supply pressure manually.

The Operator reports that 1-3099-1, 1A SJAE STM PCV BYP VLV, has been throttled OPEN and 1-3003A, MAIN STM TO 1A SJAE PCV SV, has been CLOSED.

Offgas system parameters are now as follows:

- Steam supply to Primary SJAE's 89 psig and RISING
- Steam supply to Booster/Dilution 125 psig and STEADY
- Recombiner temperature 600°F and LOWERING

Based on the above indications, how will Offgas system flow be affected?

Offgas flow to the Main Chimney will...

A. RISE due to opening the SJAE Steam Bypass valve

B. RISE due to lowering Recombiner temperature

C. LOWER due to the SJAE Suction Valves closing

D. LOWER due to the Offgas System to Main Chimney Isolation Valve closing

Answer: C

Answer Explanation

The SJAE Suction Valves close at a SJAE Steam Supply pressure of $\leq$90 psig, resulting in a loss of Offgas system flow.

Distractor 1 is incorrect: Plausible if assumed that the bypass valve passes more flow than the normal PCV.
Distractor 2 is incorrect: Plausible because lowering Recombiner temperature could indicate a loss of Recombination which leads to a higher flow rate.
Distractor 3 is incorrect: The Main Chimney Isolation Valve closure is based on a HI HI SJAE Radiation Monitor trip.

Reference: QCOA 5400-04, Rev 9
Reference provided during examination: None

Cognitive level: High

Level (RO/SRO): RO
Tier: 2 **Group:** 2

K/A: 271000 A1.15 Ability to predict and/or monitor changes in parameters associated with operating the OFFGAS SYSTEM controls including: Steam supply pressures.
(CFR: 41.5 / 45.5)
IMPORTANCE RO 2.7 SRO 2.8

SRO Justification: N/A

Question Source: New
Question History: N/A

Comments:

Associated objective(s):

SR-5400-K22 (Freq: LIC=B)
Given an Off-Gas System operating mode and various plant conditions, PREDICT how key Off-Gas System/ plant parameters will respond to the following Off-Gas System component or controller failures:

a. Loss of recombination
b. Recombination at a location other than the recombiner
c. Off-gas fire or explosion
d. SJAE pressure regulator failure
e. Preheater steam supply pressure regulator failure
f. Off-gas charcoal adsorber fire
g. Improperly operated SJAE manual suction and steam supply valves
h. Blown loop seals
    (1) SJAE intercondenser drain 35 foot loop seal
    (2) 30 min holdup line drain loop seal
    (3) Final filter drain loop seal
i. Mechanical vacuum pump plugged Cuno filter

271000.A1.15 Steam supply pressures (RO=2.7 / SRO=2.8)

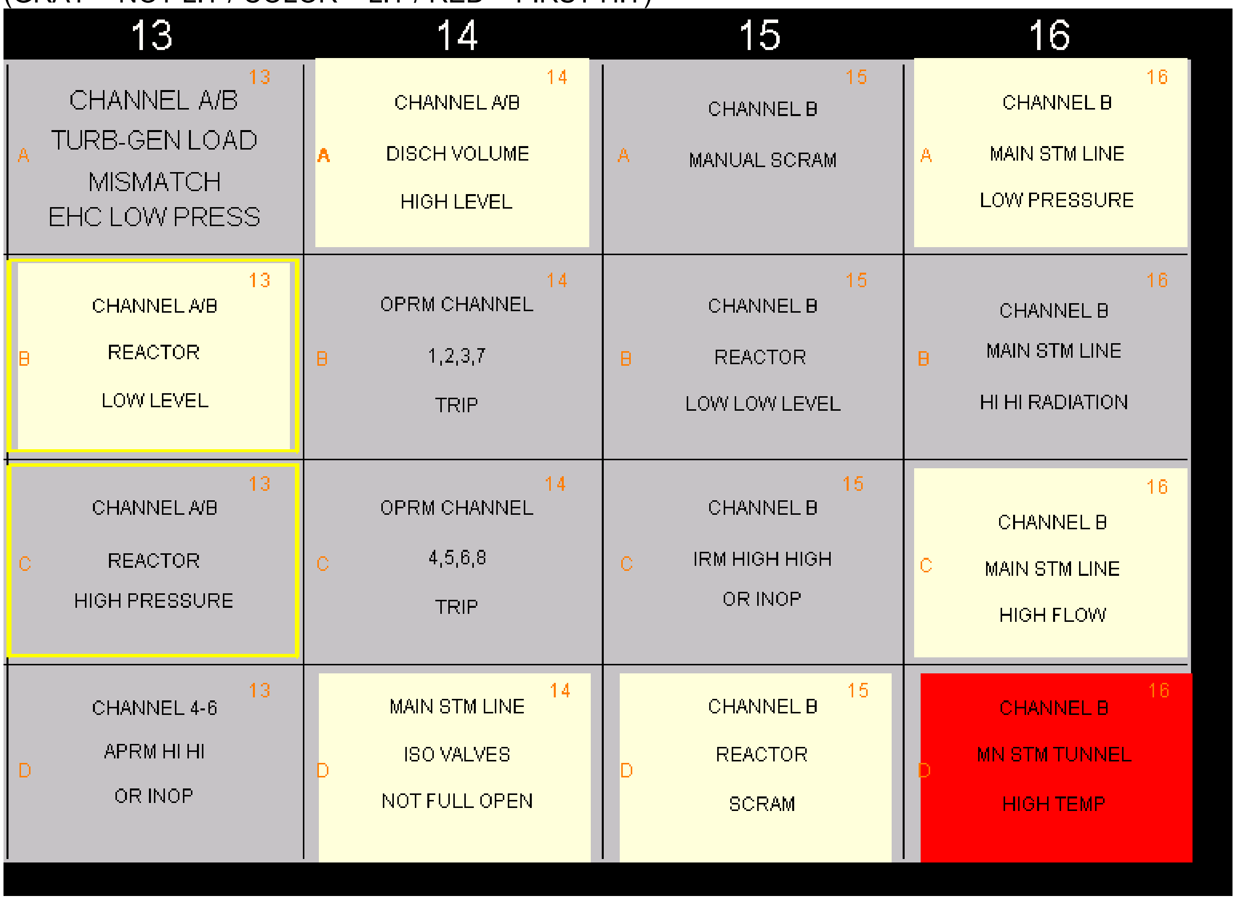
65 **ID: 65** **Points: 1.00**

Unit 1 was initially at rated power.

One minute ago a transient occurred.

The following annunciators are in ALARM on the 901-5 panel:

(GRAY = NOT LIT / COLOR = LIT / RED = FIRST HIT)



Given the above indications, which of the following systems have automatically isolated?

1. Control Room Ventilation
2. Reactor Core Isolation Cooling
3. Reactor Water Cleanup

A. 1 and 2 only

B. 1 and 3 only

C. 2 and 3 only

D. 1, 2 and 3

Answer: B

Answer Explanation

The picture shows, High Main Steam Tunnel Temperature, Main Steam Line High Flow , Reactor Low Level, and Main Steam Isolation Valves Closed annunciators in alarm, indicating a break of the Main Steam Lines into the MSIV room.

The Control Room Ventilation System will isolate AND shift to Recirculation Mode on any of the following conditions:

- Low Reactor Water Level
- High Drywell Pressure
- Reactor Building Ventilation Radiation Monitor Upscale
- Reactor Building Ventilation Radiation Monitor Downscale
- Refueling Floor Radiation Monitor Upscale
- Refueling Floor Radiation Monitor Downscale
- High Drywell Radiation
- High Main Steam Flow
- High Toxic Gas Concentration

Distractor 1 is incorrect: Plausible because RCIC also has a High Steam Line Flow Isolation, but the flow transmitter for the Main Steam High Flow is downstream of the RCIC supply line.
Also, RWCU will isolate on low reactor water level.
Distractor 2 is incorrect: Plausible if assumed that there is no isolation signal to CRHVAC. The Main Steam Tunnel High Temperature alarm is lit in red, indicating it was the first alarm received on the 901-5 panel. However, the condition does not cause CRHVAC to isolate.
Distractor 3 is incorrect: Plausible because RCIC also has a High Steam Line Flow Isolation, but the flow transmitter for the Main Steam High Flow is downstream of the RCIC supply line.

Reference: QCOP 5750-09 Rev 55, QCAP 0200-10 Rev 48
Reference provided during examination: None

Cognitive level: High

Level (RO/SRO): RO
Tier: 2 **Group:** 2

K/A: 290003 K4.01 Knowledge of CONTROL ROOM HVAC design feature(s) and/or interlocks which provide for the following: System initiations/reconfiguration: Plant-Specific
(CFR: 41.7)
IMPORTANCE RO 3.1 SRO 3.2

SRO Justification: N/A

Question Source: New
Question History: N/A

Comments:

Associated objective(s):

SR-5752-K11 (Freq: LIC=I)
LIST the signals which cause a Control Room Ventilation System isolation including purpose and setpoints. DESCRIBE how they are bypassed AND how they are reset.

290003.K4.01 System initiations/reconfiguration: Plant-Specific (RO=3.1 / SRO=3.2)

66	ID: 66	Points: 1.00

Unit 1 is starting up and is in the process of synchronizing the Main Generator to the grid. The FIRST 345kV circuit breaker has just been closed. Two Turbine Bypass Valves remain open.

In accordance with QCGP 1-1, Normal Unit 1 Startup, which of the following methods will be used to close the Bypass Valves?

A. Turn Main Generator GOVERNOR to INCR direction.

B. Select RAISE on DEHC Load LIMIT.

C. Withdraw Control Rods per QCGP 4-1, Control Rod Movements and Control Rod Sequence.

D. Depress the RAISE pushbutton on the MASTER SPEED DEMAND Recirc Pump controller.

Answer: A

Answer Explanation

Quad Cities General Procedure (QCGP) 1-1 contains the steps necessary to bring the reactor and steam plant to full power from a cold shutdown condition. In QCGP 1-1, after the first 345 KV circuit breaker has just been closed, the Main Generator is in parallel with the grid. Real Load (MWe) is raised using either the generator Governor or the DEHC Load SET controls (step F.8.i.(10)).
As real load is raised, the Turbine will draw more steam and the bypass valves will close to maintain reactor pressure.

Distractor 1 is incorrect: Plausible because DEHC Load LIMIT is raised earlier in QCGP 1-1.
Distractor 2 is incorrect: Plausible because control rods are pulled to further raise power later in the procedure, but not yet.
Distractor 3 is incorrect: Plausible because recirc pump speed is raised to further raise power later in the procedure, but not yet.

Reference: QCGP 1-1 Rev 95
Reference provided during examination: None

Cognitive level: Memory

Level (RO/SRO): RO
Tier: 3

K/A: 2.1.20 Ability to interpret and execute procedure steps.
(CFR: 41.10 / 43.5 / 45.12)
IMPORTANCE RO 4.6 SRO 4.6

SRO Justification: N/A

Question Source: Bank - Oyster Creek 2011 ILT NRC Exam
Question History: N/A

Comments: Per NRC: changed stem from "which of the following states how generator load is raised" to "which of the following methods will be used to close the Bypass Valves" due to a K/A mismatch for not meeting the "interpret" part of the K/A.

Associated objective(s):

2.1.20 Ability to interpret and execute procedure steps. (RO=4.6 / SRO=4.6)

SR-6000-P01 (Freq: LIC=I)
Given a reactor plant during a startup, startup and sychronize the main generator in accordance with QCGP 1-1.

67	ID: 67	Points: 1.00

Which of the following sources are authorized for verifying that a Quad Cities Operating Procedure (QCOP) is the most current revision?

1. PassPort
2. Procedures In Progress (PIP) Book
3. Electronic Document Management System (EDMS)

A. 3 only.

B. 1 and 2 only.

C. 2 and 3 only.

D. 1 and 3 only.

Answer: D

Answer Explanation

All QCOPs are Controlled Documents for which the content is revision controlled and distribution is controlled with copyholder receipt verified by Records Management.

The authorized sources for validating the most current and authorized revision of a Controlled Document are EDMS and PassPort.

Distractor 1 is incorrect: Passport is also an authorized source.
Distractor 2 is incorrect: The PIP book is used to keep track of procedures that are in progress but will not be turned over to the next shift. Also, EDMS is also an authorized source.
Distractor 3 is incorrect: The PIP book is used to keep track of procedures that are in progress but will not be turned over to the next shift. Also, PassPort is an authorized source.

Reference: HU-AA-104-101 Rev 4
Reference provided during examination: None

Cognitive level: Memory

Level (RO/SRO): RO
Tier: 3

K/A: 2.1.21 Ability to verify the controlled procedure copy.
(CFR: 41.10 / 45.10 / 45.13)
IMPORTANCE RO 3.5 / SRO 3.6

SRO Justification: N/A

Question Source: New
Question History: N/A

Comments:

Associated objective(s):

2.1.21 Ability to verify the controlled procedure copy. (RO=3.5 / SRO=2.6)

SRNLF-PR-K09 (Freq: LIC=I NF=I)
From memory, DESCRIBE responsibilities for the following items in accordance with HU-AA-104-101:

a. Step performance
b. Referenced items
c. Performance documentation and placekeeping
d. User capability
e. Partial performance
f. Remote performance
g. Transient conditions
h. Work in progress

68	**ID: 68**	**Points: 1.00**

Unit 1 was operating at rated power, when the following sequence of events occurred:

<u>TIME</u>

1040 Bus 19 supply breaker trips
1100 Bus 19 is re-energized
1110 ANSO discovers the indication lights are OFF for MO-1-1001-26B, INBD SPRAY ISOL VLV
1215 EO and EMD reports that the wires connecting the 'CLOSED' indication light for MO-1-1001-26B are damaged, and the insulation has burn marks

LCO 3.3.3.1, Post Accident Monitoring Instrumentation, Condition A, is entered for the loss of 'Penetration Flow Path PCIV Position' indication.

Based on the above conditions, the Tech Spec Required Action completion time clock for LCO 3.3.3.1 Condition A started at...

A. 1040

B. 1100

C. 1110

D. 1215

Answer: C

Answer Explanation

The completion time is the amount of time allowed for completing a required action. It is referenced to the time of discovery of a situation, in this case when it was discovered the indication lights were not functioning.
The ANSO found the light out for the valve on a walkdown of the panels which constitutes time of discovery.
At 10:40 AM the light was out because of loss of power to the MCC that powers the valve but entry into TS 3.3.3.1 is not required here since the support equipment was inoperable and is tracked under TS 3.8.7. LCO 3.0.2 states Upon discovery of a failure to meet an LCO, the required actions and times shall be met except as provided in LCO 3.0.5 (N/A here) and LCO 3.0.6 which states when a supported system LCO is not met solely due to a support system LCO not being met, the required actions are not entered.

Reactor Operators are required to be able to determine if and when Tech Spec LCOs are not being met, including the ability to determine when the LCO was first not being met.

Distractor 1 is incorrect: At 10:40 AM the light was out because of loss of power to the MCC that powers the valve but entry into TS 3.3.3.1 is not required here since the support equipment was inoperable and is tracked under TS 3.8.7. Plausible since this is when the indication light first went out.
Distractor 2 is incorrect: Incorrect since the valve light indication had not been found yet. Plausible since this is when power was restored to the MCC that powers the valve.
Distractor 3 is incorrect: Incorrect, since the light indication should have been restored when power to the MCC was restored. Plausible since this is when the reason for the loss of light indication was identified to be legitimate.

Reference: TS 1.3 completion times, Amendment 199/195
Reference provided during examination: None

Cognitive level: High

Level (RO/SRO): RO
Tier: 3

K/A: 2.2.23
Ability to track technical specification limiting conditions for operations.
IMPORTANCE RO 3.1 / SRO 4.6

SRO Justification: N/A

Question Source: Modified from Prairie Island ILT NRC exam 2012
Question History: N/A

Comments:

Associated objective(s):

2.2.23 Ability to track Technical Specification limiting conditions for operations (RO=3.1 / SRO=4.6)

SR-1603-K29 (Freq: LIC=I)
Given Primary Containment Isolation (PCI) System key parameter indications and various plant conditions, DETERMINE, from memory, if the Primary Containment Isolation (PCI) System Tech Spec LCOs have been met.

69	ID: 69	Points: 1.00

Unit 1 is at full power.

What is the MAXIMUM amount of TOTAL Reactor Coolant System Operational LEAKAGE allowed for continued plant operation?

A. 2 gpm

B. 5 gpm

C. 24 gpm

D. 25 gpm

Answer: D

Answer Explanation

LCO 3.4.4.c. states "RCS operational LEAKAGE shall be limited to less than or equal to 25 gpm total LEAKAGE averaged over the previous 24 hour period."

Distractor 1 is incorrect: 2 gpm is the maximum change in Unidentified Leakage in 24 hours.
Distractor 2 is incorrect: 5 gpm is the maximum Unidentified Leakage.
Distractor 3 is incorrect: This would be correct if the limit was "less than 25 gpm" instead of "less than or equal to 25 gpm".

Reference: LCO 3.4.4 Amendment No. 199/195
Reference provided during examination: None

Cognitive level: Memory

Level (RO/SRO): RO
Tier: 3

K/A: 2.2.38 Knowledge of conditions and limitations in the facility license.
(CFR: 41.7 / 41.10 / 43.1 / 45.13)
IMPORTANCE RO 3.6 SRO 4.5

SRO Justification: N/A

Question Source: Bank: Fermi 2010 ILT NRC Exam
Question History: N/A

Comments:

Associated objective(s):

2.2.38 Knowledge of conditions and limitations in the facility license. (RO=3.6 / SRO=4.5)

SR-0201-K30 (Freq: LIC=I)
Given Reactor Vessel and Internals key parameter indications and various plant conditions, DETERMINE, from memory, if the Reactor Vessel and Internals related Tech Spec Safety Limits or LSSSs have been exceeded.

70 **ID: 70** **Points: 1.00**

Unit 2 is performing a normal reactor shutdown to allow personnel to enter the Drywell.

In accordance with RP-QC-465, DRYWELL AND TORUS ENTRY, which one of the following identifies Containment conditions which would allow the individuals to enter the Drywell?

A. O_2 concentration is 18.5%, Reactor power is 120 MWe

B. O_2 concentration is 19.5%, Reactor power is 240 MWe

C. O_2 concentration is 21%, Reactor power is 200 MWe

D. O_2 concentration is 26%, Reactor power is 120 MWe

Answer: C

Answer Explanation

Primary Containment is considered de-inerted when two consecutive air samples, taken at least 30 minutes apart on Drywell and Torus, meet the following: oxygen concentration between 19.5% AND 23.5%.

Reactor power must be less than or equal to 220 MWe in order to enter the Drywell. Reactor power limitations on entering the Drywell are based on Rad levels at power.

Distractor 1 is incorrect: Oxygen concentration is < 19.5%.
Distractor 2 is incorrect: Reactor power is > 220 MWe.
Distractor 3 is incorrect: Oxygen concentration is > 23.5%.

Reference: RP-QC-465 Rev 8, QCOP 1600-08 Rev 24
Reference provided during examination: None

Cognitive level: Memory

Level (RO/SRO): RO
Tier: 3

K/A: 2.3.13
Knowledge of radiological safety procedures pertaining to licensed operator duties, such as response to radiation monitor alarms, containment entry requirements, fuel handling responsibilities, access to locked high-radiation areas, aligning filters, etc.
(CFR: 41.12 / 43.4 / 45.9 / 45.10)
IMPORTANCE RO 3.4 SRO 3.8

SRO Justification: N/A

Question Source: Bank - Vermont Yankee 2010 ILT NRC Exam
Question History: N/A

Comments: Per NRC: changed all answer choices to include reactor power level due to K/A mismatch for not meeting the "radiological safety" part of the K/A.

Associated objective(s):

2.3.13 Knowledge of radiological safety procedures pertaining to licensed operator duties, such as response to radiation monitor alarms, containment entry requirements, fuel handling responsibilities, access to locked high-radiation areas, aligning filters, etc. (RO=3.4 / SRO=3.8)

SR-1600-P02 (Freq: LIC=I)
Given a reactor plant during a shutdown, de-inert the primary containment through the reactor building ventilation system in accordance with QCOP 1600-08.

71 **ID: 71** **Points: 1.00**

Refer to the weekly surveillance log shown below:

Where does the operator ACCESS the Radwaste Effluent Radiation Monitor reading to determine if it is within weekly surveillance requirements?

OPERATION DEPARTMENT WEEKLY SUMMARY OF DAILY SURVEILLANCE QOS 0005-S01

DAY	SUN			MON			TUES			WED			THURS			FRI			SAT		
SHIFT	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3

37. **RADWASTE EFFLUENT RADIATION MONITOR (Required once per day.)** (Unit One only)
Operable and reading on the E^2-E^5 range

Channel 10-01 (Instrument Check)																					

A. At a recorder on the 901-4 panel

B. At a recorder on the 901-2 panel

C. At a SPING terminal on the 912-4 panel

D. At a radiation monitor on the 901-10 panel

Answer: C

Answer Explanation

The Radwaste Effluent Radiation Monitor is an input into the Eberline SPING terminal on the 912-4 panel.

To determine reading, depress DATA, 10-01, ENTER.

Distractor 1 is incorrect: Plausible because Radwaste pumps are operated from the 901-4 panel.
Distractor 2 is incorrect: Plausible because other process radiation recorders are located on the 901-2 panel.
Distractor 3 is incorrect: Plausible because other process radiation monitors are located on the 901-10 panel.

Reference: QOS 0005-01 Rev 149, QCOP 1700-11 Rev 14, QOS 0005-S01 Rev 177
Reference provided during examination: None

Cognitive level: Memory

Level (RO/SRO): RO
Tier: 3

K/A: 2.3.5 Ability to use radiation monitoring systems, such as fixed radiation monitors and alarms, portable survey instruments, personnel monitoring equipment, etc.
(CFR: 41.11 / 41.12 / 43.4 / 45.9)
IMPORTANCE RO 2.9 SRO 2.9

SRO Justification: N/A

Question Source: Quad Cities ILT Exam Bank

Question History: Quad Cities 2011 ILT NRC Exam

Comments:

Associated objective(s):

2.3.05 Ability to use radiation monitoring systems, such as fixed radiation monitors and alarms, portable survey instruments, personnel monitoring equipment, etc. (RO=2.9 / SRO=2.9)

SR-1701-K05 (Freq: LIC=I)
Given the following Process Radiation Monitoring System key parameters, STATE the physical location of the lights, meters, and recorders and DESCRIBE the radiation detector locations in the system flowpath:

a. Main Steam Line Radiation Monitors
   (1) Radiation levels
   (2) NUMAC chassis trip/status indications
b. SJAE Monitors (Off-Gas Log Scale)
   (1) Radiation levels
   (2) NUMAC chassis trip/status indications
   (3) Interval timer status
c. Off-Gas Flux Tilt (Off-Gas Linear Scale) radiation levels
d. Off-Gas Filter Building Process radiation levels and alarm lights
e. Process Liquid Radiation Monitor System
   (1) Service water radiation levels
   (2) RBCCW radiation levels and alarm lights
   (3) Radwaste effluent radiation levels
f. Reactor Building Vent / Fuel Pool Radiation Monitors
   (1) Indicator/Trip unit radiation levels and Hi/Lo alarm lights
   (2) Power supply voltage and power on light

72	ID: 72	Points: 1.00

Which of the following activities require that a plant area be evacuated to prevent plant personnel from being over-exposed to radiation during the activity?

A. Conducting a set of TIP scans.

B. Flushing Fuel Pool Heat Exchangers.

C. Performing a HPCI Pump Operability Test.

D. Filling and Venting the Shutdown Cooling Suction Header.

Answer: A

Answer Explanation

Extremely high radiation levels may be present in the TIP room due to activation of the TIP cable and detector. Levels are subject to rapid changes during TIP movement.
All personnel are required to be evacuated from the TIP room prior to and during a TIP scan.

Distractor 1 is incorrect: Plausible because flushing the Fuel Pool Heat Exchangers will increase local dose rates in the area and require Radiation Protection personnel to control access to the area, but evacuation is not required.
Distractor 2 is incorrect: Plausible because evacuating the HPCI area during the startup of the HPCI turbine is required, but not for radiological concerns. During a quarterly HPCI surveillance test in 1993, the exhaust line rupture disc burst and released large amounts of steam into the room, which burned several people in the room.
Distractor 3 is incorrect: Plausible because filling and venting the SDC suction header will increase local dose rates in the area and require Radiation Protection personnel to control access to the area, but evacuation is not required.

Reference: RP-AB-460 Rev 2, QCOP 0700-08 Rev 16
Reference provided during examination: None

Cognitive level: Memory

Level (RO/SRO): RO
Tier: 3

K/A: 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.
(CFR: 41.12 / 45.9 / 45.10)
IMPORTANCE RO 3.2 SRO 3.7

SRO Justification: N/A

Question Source: New
Question History: N/A

Comments:

Associated objective(s):

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. (RO=3.2 / SRO=3.7)

SR-0704-K21 (Freq: LIC=B)
Given a Traversing In-Core Probe System operating mode and various plant conditions, PREDICT how key system/ plant parameters will respond to manipulation of the following Traversing In-Core Probe System local/remote controls:
a. Valve control monitor drawer
  (1) Monitor-Fire keylock switch
  (2) Purge On-Off switch
  (3) Group 2 reset
b. Unit 2
  (1) Drive control Unit drawer
    (a) Channel selector switch
    (b) Core limit display selector switch
    (c) Manual valve control switch
    (d) Scan On-Off switch
    (e) Low speed On-Off switch
    (f) Manual drive control switch
    (g) Auto start pushbutton
  (2) X-Y recorder
    (a) Power/Servo On-Off switch
    (b) Pen Up/Down switch
    (c) Chart Hold/release switch
  (3) Flux probing monitor drawer
    (a) Meter selector switch
    (b) Recorder channel selector switch
d. Unit 1
  (1) NUMAC ATCU Oper/Inop Mode Switch
  (2) NUMAC ATCU screens and function controls

73	ID: 73	Points: 1.00

Unit 2 was at 15% power when a transient caused Drywell Pressure to exceed the entry condition value for QGA 100, RPV Control and QGA 200, Primary Containment Control.

Assuming NO OTHER QGA entry conditions were met, which of the following automatic PCIS Group Isolations have occurred?

A. Group 2 only

B. Group 3 only

C. Group 2 and 3 only

D. Group 1, 2, and 3

Answer: A

Answer Explanation

The entry condition into QGA 100 for Drywell Pressure is 2.5 psig. The setpoint for Groups 2 PCIS automatic isolations is also 2.5 psig Drywell Pressure. With no other QGA entry conditions met (notably RPV level), no other isolations will occur.

Distractor 1 is incorrect: The Group 3 isolation parameters do not include Drywell Pressure. (Isolation signals are SBLC initiation, low RPV level, Main Steam Tunnel high temperature, and RWCU area high temperature)
Distractor 2 is incorrect: The Group 3 isolation parameters do not include Drywell Pressure. (Isolation signals are SBLC initiation, low RPV level, Main Steam Tunnel high temperature, and RWCU area high temperature)
Distractor 3 is incorrect: The Group 3 isolation parameters do not include Drywell Pressure. (Isolation signals are low-low RPV level, low main steam line pressure with the mode switch in run, high main steam line flow, and high main steam line temperature)

Reference: QGA 100 Rev 9, QCAP 0200-10 Rev 48
Reference provided during examination: None

Cognitive level: Memory

Level (RO/SRO): RO
Tier: 3

K/A: 2.4.2 Knowledge of system set points, interlocks and automatic actions associated with EOP entry conditions.
(CFR: 41.7 / 45.7 / 45.8)
IMPORTANCE RO 4.5 SRO 4.6

SRO Justification: N/A

Question Source: New
Question History: N/A

Comments:

Associated objective(s):

2.4.02 Knowledge of system set points, interlocks and automatic actions associated with EOP entry conditions. (RO=4.5 / SRO=4.6)

SR-0001-K15 (Freq: LIC=B)
STATE the entry conditions to QGA 100, 'RPV Control'.

74	ID: 74	Points: 1.00

Unit 2 was at full power when a LOCA occurred.

Current plant conditions are as follows:

- RPV Water level is -120 inches and RISING at 1 inch per min
- RPV Pressure is 275 psig and slowly LOWERING

- CS header flow is 3000 GPM both loops

- B loop of LPCI selected for injection
- RHR Pump Disch Press is 120 psig

- RHR 1B loop flow is 19,600 GPM
- Containment spray flow B loop is >12,000 GPM
- MO 2-1001-36B, TORUS WTR TEST VALVE, is full OPEN
- MO 2-1001-18B, RHR MIN FLOW BYP is full CLOSED

- RHR 1A loop flow is 0 GPM
- MO 2-1001-18A, RHR MIN FLOW BYP is full OPEN

Based on the status of makeup water systems and containment parameters, the limit on individual RHR Pump flows is 4800 GPM.

What actions are required to maintain NPSH to the ECCS pumps?

A. CLOSE MO 2-1001-18A, RHR MIN FLOW BYP, to avoid damage to the RHR Pumps by reducing flow.

B. Throttle CLOSED on MO 2-1001-28B, OUTBD LPCI INJ VLV, to avoid damage to the RHR Pumps by reducing flow.

C. Throttle CLOSED on MO 2-1001-36B, TORUS WTR TEST VALVE, to avoid damage to the RHR Pumps by reducing flow.

D. Secure 1 Core Spray pump to raise the allowable flowrate of the RHR pumps.

Answer: C

Answer Explanation

Based on individual pump flow rates allowed and number of RHR pumps running, the total flowrate allowed is 19,200 GPM (Currently at 19,600 GPM). By closing on MO 2-1001-36B, the flowrate going directly to the torus which is at a low pressure is reduced and total RHR flowrate is thus reduced. **Caution in QGA 100 level leg states: Exceeding NPSH/Vortex limits may cause system damage.**

Distractor 1 is incorrect: Closing MO 2-1001-18A would temporarily reduce RHR flow but with no flow through the A loop, an interlock would cause the MO 2-1001-18A to reopen. This minimum flow line occurs before the A loop transmitter and would cause indicated RHR flow to either remain unchanged or increase slightly as more flow is directed to the B torus cooling flowpath. Plausible because closing a flowpath would temporarily reduce overall flow.

Distractor 2 is incorrect: Throttling closed on MO 2-1001-28B will have no effect due to RHR discharge pressure being less than Reactor Pressure. Plausible because if flow were occurring as LPCI, this would reduce RHR flowrate.
Distractor 3 is incorrect: Securing a pump with the same suction source as RHR would increase NPSH, but with RPV water level rising at 1"/min (about 200 gallons/minute), securing a core spray pump would be contrary to maintaining adequate core cooling. In addition, the NPSH curve in QCAP 0200-10 allows for any core spray pump combination. Plausible because securing a pump with a common suction source should increase available NPSH.

Reference: QGA 100 Rev 9, QCAP 0200-10 Rev 48, QCOP 1000-30 Rev 29
Reference provided during examination: None

Cognitive level: High

Level (RO/SRO): RO
Tier: 3

K/A: 2.4.20
Knowledge of the operational implications of EOP warnings, cautions, and notes.
(CFR: 41.10 / 43.5 / 45.13)
IMPORTANCE RO 3.8 / SRO 4.3

SRO Justification: N/A

Question Source: New
Question History: N/A

Comments:

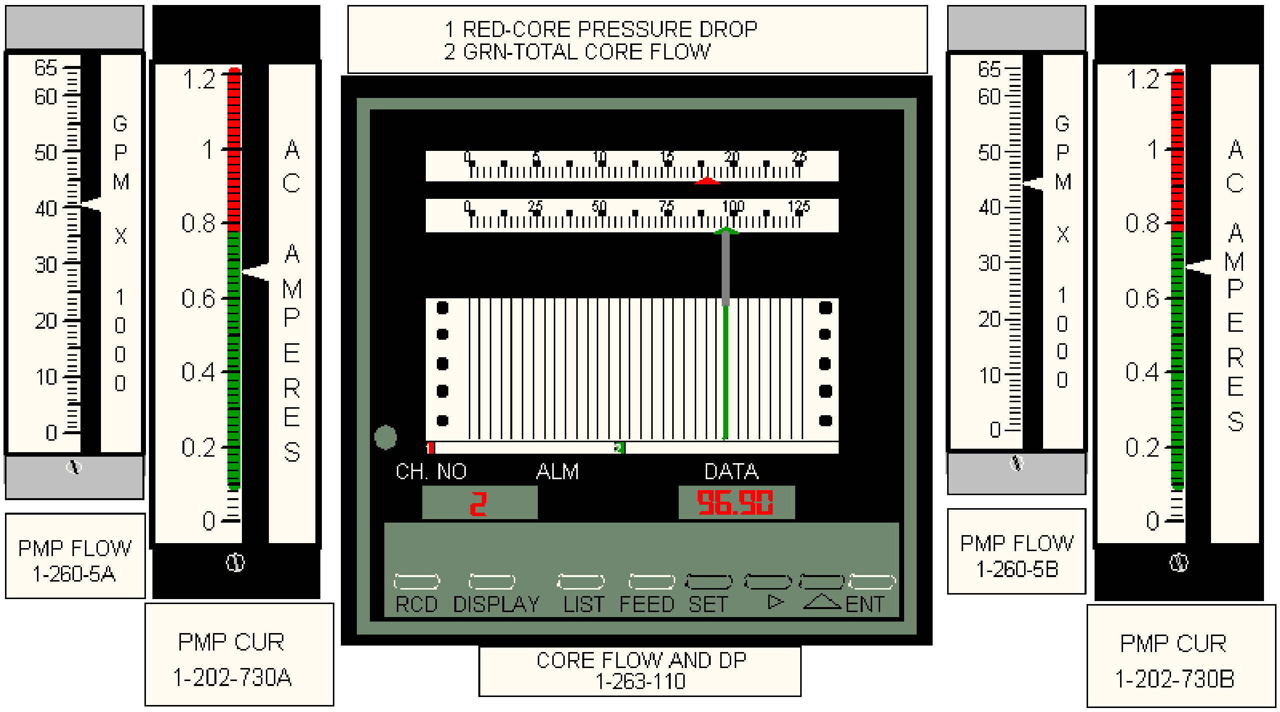
Associated objective(s):

2.4.20 Knowledge of operational implications of EOP warnings, cautions, and notes. (RO=3.8 / SRO=4.3)

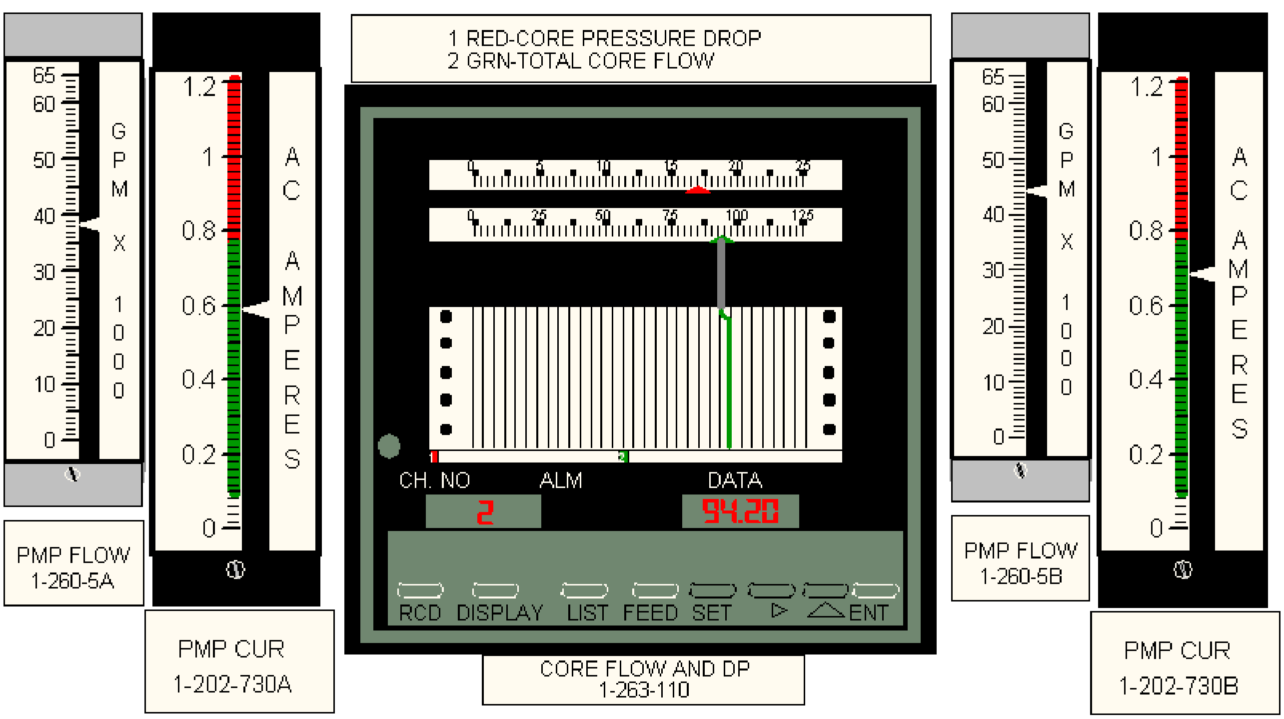
SR-1000-K21 (Freq: LIC=B) Given an RHR system operating mode and various plant conditions, PREDICT how key RHR/RHRSW system and/or plant parameters will respond to manipulation of the following RHR/RHRSW system local/remote controls:
a. RHR/RHRSW MOV control switches
b. RHR/RHRSW pump control switches
c. RHRSW vault sump pump disconnects
d. CONT CLG PERM switch (S-17A/B)
e. CONT CLG 2/3 LEVEL/ECCS INIT BYP switch (S-18A/B)
f. RHRSW START PERM switch (S-19A/B)
g. LPCI INITIATION RESET pushbutton (S-21A/B)
h. LPCI LOOP SELECT LOGIC RESET pushbutton (S-1A/B)
i. FP CLG SUCTION permissive switch (S-22A/B)
j. RESET FOR GRP 2 ISOL VLV 1(2)-1001-29
k. AO-1001-68A/B test switch
l. Head Spray Controller
m. RHR Heat Exchanger SW flow selector switch

75 **ID: 75** **Points: 1.00**

Unit 1 was operating at rated power with the following Recirc Pump indications:



One minute AFTER a transient occurs, the following indications are now present:



Based on the given indications before and after the transient, which of the following faults could have occurred? (Consider each item separately)

1. Shroud Access Cover Hole Failure
2. MO 1-202-4A, PMP SUCT VLV, drifted 15% CLOSED
3. 1A ASD Cell Failure

A. 1 ONLY

B. 1 and 2 ONLY

C. 2 and 3 ONLY

D. 3 ONLY

Answer: D

Answer Explanation

The graphics show before and after indications of the A and B Recirc pump amps, flow and Total Core Flow meters.

A cell failure has occurred on the 1A ASD, this results in a drop in pump flow, amps and Total core flow.

The B ASD parameters remain unchanged.

The ASD Cell failure is automatically bypassed by the ASD and a speed hold occurs.

Distractor 1 is incorrect: Symptoms for Shroud Access Hole Cover Failure are >5% thermal power drop with no core flow change or a rise in total core flow (core flow dropped).
Distractor 2 is incorrect: Symptoms for Shroud Access Hole Cover Failure are >5% thermal power drop with no core flow change or a rise in total core flow (core flow dropped). If MO 1-202-4A, PMP SUCT VLV drifted 15% closed the 1A ASD would have tripped and indications would go to zero. Plausible since a valve drifting closed would reduce Pump flow, D/P, current and loop flow if the pump did not trip.
Distractor 3 is incorrect: If MO 1-202-4A, PMP SUCT VLV drifted 15% closed the 1A ASD would have tripped and indications would go to zero. Plausible since a valve drifting closed would reduce Pump flow, D/P, current and loop flow if the pump did not trip.

Reference: QCOA 0202-01 Rev 12, QCAN 901-4 C-1 Rev 10
Reference provided during examination: None

Cognitive level: High

Level (RO/SRO): RO
Tier: 3

K/A: 2.4.47
Ability to diagnose and recognize trends in an accurate and timely manner utilizing the appropriate control room reference material.
(CFR: 41.10 / 43.5 / 45.12)
Importance 4.2/4.2

SRO Justification: N/A

Question Source: New
Question History: N/A

Comments:

Associated objective(s):

2.4.47 Ability to diagnose and recognize trends in an accurate and timely manner utilizing the appropriate control room reference material. (RO=4.2 / SRO=4.2)

SR-0202-K22 (Freq: LIC=B) Given a Reactor Recirculation System operating mode and various plant conditions, PREDICT how key Reactor Recirculation / plant parameters (including power/flow map shifts) will respond to the following failures:
a. RRCS major failure
b. Reactor recirc pump seal failure (one or both)
c. Reactor recirc pump trip (one or both)
d. Single loop operation with operating pump speed above/below 40%
e. Jet pump or shroud access hole cover failure
f. Recirc flow controller fails high or low
g. ASD Cell failure/bypass
h. Reactivity additions
i. Core instabilities exist