EXAMINATION ANSWER KEY

2013 NRC SRO EXAM

1 **ID: RS20001-N02** **Points: 1.00**

Given:

- Unit 1 is at 250 Mwe (normal plant lineup) following a recent refueling outage.
- The crew is preparing to raise load to 300 Mwe per 1BwGP 100-3, POWER ASCENSION.
- Rod control is in automatic with control bank D at 145 steps.

The following occur simultaneously:

- The Tref programmer fails to 100%.
- A malfunction of the Ovation Control System causes main generator load to drop to 160 Mwe.
- The following bypass permissives lights are LIT:

  1-BP-5.7 TURBINE LO POWER INTLK C5
  1-BP-3.7 LOW POWER TRIP BLOCKED P8
  1-BP-5.8 AMS PERMISSIVE C-20

With NO operator action, control rods will …

A. continuously withdraw until annunciator 1-10-D5, BANK D ROD STOP C-11, alarms.

B. continuously withdraw until annunciator 1-10-C5, OTΔT HIGH ROD STOP C-3, alarms.

C. remain stationary.

D. insert continuously.

Answer: C

Answer Explanation

New Question (2013 NRC exam question 1)
RO level
System 001 Control Rod Drive System
High Cog

K4 Knowledge of CRDS design feature(s) and/or interlock(s) which provide for the following:
K4.08 Prevention of excessive rod movement
RO 3.2 SRO 3.4

Meets K/A, requires examinee to assess the indications present on the MCB to determine interlock state, effect of a component failure on rod control unit, and which rod control interlock will prevent motion.
10CFR55.41(b)(7) Design, components, and functions of control and safety systems, including instrumentation, signals, interlocks, failure modes, and automatic and manual features.
Answer: C. Remain stationary. With the C5 interlock lit, outward rod motion is stopped (in automatic only, and rods are in automatic). With the Tref programmer failed high, there is a demand for rods to move outward, however the C5 interlock prevents this movement.

Continuously withdraw is a credible distractor in both cases because there will be a demand for outward rod motion due to the Tref programmer failure. Both rod stops (C-11 and OTΔT HIGH ROD STOP) would have potential to stop outward rod motion, except there is already a rod stop (C5) preventing it. Insert continuously is credible because the drop in turbine load will cause actual Tave to rise above the normal progam Tref and thus with no malfuctions, rods would normally drive inward.

Objective: S.RD1-14 (Rod Control LP I1-RD-XL-01)

Technical References: Rod Control LP I1-RD-XL-01 lesson plan rev. 4a. page 30.

LOD 3

2 **ID: RS20002-N02** **Points: 1.00**

Given:

- Unit 1 just completed main generator synchronization following a refueling outage.
- Main Generator load is 150 Mwe.
- Steam Dumps are in the STEAM PRESSURE MODE in AUTOMATIC.
- Tave = 562°F.
- 1UI-500 STM DMP DEMAND meter indicates 10%.

The crew is about to start a turbine load ramp toward full power at 0.65 Mw/min to begin at 01:00 AM. Neglecting Xenon effects from the previous ramp, at what time must the effects of the FIRST reactivity addition to the core occur in order to maintain Tave with NO rod motion?

A. 01:00

B. 02:18

C. 04:15

D. 09:26

Answer: B

Answer Explanation

New Question (2013 NRC exam question 2)
RO level
System 002 Reactor Coolant
High Cog

K5 Knowledge of the operational implications of the following concepts as they apply to the RCS:
K5.11 Relationship between effects of the primary coolant system and the secondary coolant system
RO 4.0 SRO 4.2

Meets K/A, requires examinee to evaluate current operational context, determine effect on RCS temperature (including a delay in the effect), and the operational action that must be initiated, as well as determination of the time frame.
10CFR55.41(b)(7) Design, components, and functions of control and safety systems, including instrumentation, signals, interlocks, failure modes, and automatic and manual features.
Answer: B. 02:24 (after 84 minutes). With the steam dumps in the steam pressure mode in automatic, they will gradually throttle down to maintain steam pressure constant thus preventing Tave from lowering as turbine load rises, until the steam dumps are completely closed. During this time (until the steam dumps are closed) total steam demand does not change, rather steam demand shifts from the steam dumps to the main turbine. Once the steam dumps are closed, total steam demand begins to rise, creating a drop in Tc (and therefore Tave) and start a reactivity effect on the core. The 10% demand on 1UI-500 represents a 4% (10% of the total 40% RTP of the steam dumps) rated thermal power demand. Unit 1 thermal power to Mwe is about 12.65 Mwe/%. The total steam dump demand therefore equates to: 4% times 12.65Mwe/% = 50.6 Mwe change in load. At 0.65 Mwe/min, it will take: 50.6 Mwe/0.65Mwe/min = 78 minutes for the turbine ramp to reach the point that the steam dumps close. This is the time at which the reactor operator must have his/her reactivity addition beginning to affect the core. At this time turbine load will be 200.6 Mwe (150 Mwe + 50.6 Mwe). Tref for this load is: (200.6/1250) x 30 °F + 557 °F = 562 °F.

Distractors: 0 minutes (time 01:00) is plausible as candidates may not consider the response of the steam dumps affecting the otherwise normal rise in steam demand that would occur on ramp initiation. Time 195 minutes (time 04:15) is based on using 10% rated steam flow as the basis for the calculation. Likewise 506 minutes (time 09:26) is based on a student using 40% as the basis for the calculation. Both are common mistakes.

Objective: T.GP03-10 (1BWGP 100-3 Lesson Plan I1-GP-XL-03)

Technical Reference: Steam Dump Lesson Plan I1-DU-XL-01 rev. 6a page 3. Big Note MS-4, MAIN STEAM DUMPS, rev. 15.

LOD 3

3 **ID: RS20011-N03** **Points: 1.00**

Given:

- Unit 2 experienced a Loss of Offsite Power following a reactor trip from full power.
- All equipment responded as designed.
- The Pressurizer Variable heater control switch was broken (inoperable) prior to the reactor trip.
- Pressurizer level is 35%.
- Pressurizer pressure is 2235 psig.
- All Pressurizer backup heater breakers and contactors are closed.

After restoring power to bus 243, the Pressurizer heater groups that automatically re-energize (if any) are…

A. none.

B. A and B.

C. B and D.

D. A and D.

Answer: D

Answer Explanation

New Question (2013 NRC exam question 3)
RO level
System 011 Pressurizer Level Control
High Cog

K2 Knowledge of bus power supplies to the following:
K2.02 PZR heaters
RO 3.1 SRO 3.2

Meets K/A, requires examinee knowledge of the demand for PZR heater operations due to PZR level being ≥ 5% above program, and specific power supplies to specific PZR heater groups.
10CFR55.41(b)(3) Mechanical components and design features of the reactor primary system.

Answer: D. A and D. Bus 243 energizes Backup heater groups A and D. The variable heaters (group C) and Backup heater group B are powered from bus 244.

Distractors all plausible as they all provide power to some Pressurizer heaters.

Objective: S.RY1-07-E (Pressurizer Lesson Plan I1-RY-XL-01)

Technical Reference: Pressurizer Lesson Plan I1-RY-XL-01 rev. 6.b. page 8

LOD: 2

4 **ID: RS20017-N02** **Points: 1.00**

Given:

Case 1: Unit 1 at 100% power steady-state.
Average CETCs (10 highest): 631°F (TRN A); 626°F (TRN B).
T_H (each RCS loop): 617°F.
PZR pressure: 2235 psig (all channels).

Case 2: Unit 1 Tripped from 100% power.
A loss of offsite power occurred (1 hour ago).
The crew is performing 1BwEP ES-0.2 Natural Circulation Cooldown.
Average CETCs (10 highest): 505°F (both Trains) RISING.
RCS WR pressure: 680 psig STABLE.

In regard to the cases above...

A. In Case 1 the CETCs are indicating abnormally high.
In Case 2 indications are consistent with natural circulation occurring.

B. In Case 1 the CETCs are normal.
In Case 2 indications are consistent with natural circulation occurring.

C. In Case 1 the CETCs are normal.
In Case 2 indications are NOT consistent with natural circulation occurring.

D. In Case 1 the CETCs are indicating abnormally high.
In Case 2 indications are NOT consistent with natural circulation occurring.

Answer: C

Answer Explanation

New Question (2013 NRC exam question 4)
RO level
System 017 In-Core Temperature Monitor
High Cog

A3 Ability to monitor automatic operation of the ITM system including:
A3.01 Indications of normal, natural, and interrupted circulation of RCS
RO 3.6 SRO 3.6

Meets K/A, requires examinee to determine subcooling margin using CETCs and compare with criteria for determining natural circulation, as well as evaluating the normal CETC indications at full power.
10CFR55.41(b)(2) General design features of the core, including core structure, fuel elements, control rods, core instrumentation, and coolant flow.

Answer: C. Case 1: A picture of Unit 1 at 100% power shows the exact CETC indications given. The CETCs are showing an average of the 10 highest for each train, not an overall average. Enthalpy rise HCF is a value near 1.5. Given that delta-T (Thot minus Tcold) the enthalpy rise in a channel, the average for 100% power is 60oF. A CETC value of 631oF is a 74oF rise (74/60 = 1.23 which is well below 1.5). Case 2: indications used to verify natural circulation include adequate subcooling with CETCs stable or dropping. In this case Tsat for 680 psig (695 psia) is 502oF. Distractors are plausible as students easily confuse the concept of the average of the TEN HIGHEST CETCs with an overall average. Determination of subcooling margin as part of the natural circulation verification includes a calculation and use of steam tables with opportunity for error, whether forgetting to use the given WR pressure (thus using NOP value) or mis-calculating absolute pressure to determine Tsat.

Objective: T.EP01-06-D (LP I1-EP-XL-01)

Technical References: Photograph of Unit 1 CETCs at 100% power. Steam Tables. 1BwEP ES-0.1 (rev. 203) Attachment B, indications of natural circulation flow.

LOD: 3

5 **ID: RG20033-N01** **Points: 1.00**

Given:

- Unit 1 is in a refueling outage.
- Spent fuel is being unloaded from the core and moved into the spent fuel pool.
- The following indications just occurred:
  - Annunciator 1-1-A1 SPENT FUEL PIT PUMP TRIP is in alarm.
  - Annunciator 1-1-B1 SPENT FUEL PIT TEMP HIGH is in alarm.
  - Local reports include a rise in humidity in the Fuel Handling Building.

Which of the following will the crew implement?

A. ONLY 1BwOA Refuel-1, FUEL HANDLING EMERGENCY.

B. BOTH 1BwOA Refuel-1, FUEL HANDLING EMERGENCY and 0BwOA Refuel-3, LOSS OF SPENT FUEL PIT COOLING.

C. NEITHER 1BwOA Refuel-1, FUEL HANDLING EMERGENCY NOR 0BwOA Refuel-3, LOSS OF SPENT FUEL PIT COOLING.

D. ONLY 0BwOA Refuel-3, LOSS OF SPENT FUEL PIT COOLING.

Answer: D

Answer Explanation

Modified Question (2013 NRC exam question 5)
RO level
System 033 Spent Fuel Pool Cooling
Low Cog

2.4.4 Ability to recognize abnormal indications for system operating parameters that are entry-level conditions for emergency and abnormal operating procedures.
RO 4.5 SRO 4.7

Meets K/A, requires examinee knowledge of the entry conditions for Loss of Spent Fuel Pit Cooling abnormal operating procedure.
10CFR55.41(b)(10) Administrative, normal, abnormal, and emergency operating procedures for the facility.
Answer: D. There are only three entry conditions for 0BwOA Refuel-3, Loss of Spent Fuel Pit Cooling: uncontrolled rise in spent fuel pit temperature, spent fuel pit pump trip alarm, and spent fuel pit temperature high alarm. Distractors are plausible as spent fuel pit level dropping and the low alarm are checked in the body of the procedure (and transition to another procedure as a potential causal factor, but not an entry condition), CC HX temperature could induce a cooling issue with the system, and rising trends in FHB radiation would accompany a much longer loss of spent fuel pit cooling, but is not an entry condition.

Objective: T.OA31-02 (0BwOA Refuel-3 Lesson Plan I1-OA-XL-31)

Technical References: 0BwOA Refuel-3 (rev. 100). 1BwOA Refuel-1 (rev. 102).

LOD: 2

ORIGINAL QUESTION:

VISION ID: BWLI-REF3001

Which of the following is an entry condition for 0BwOA Refuel-3, Loss of Spent Fuel Pit Cooling – Unit 0?

A. RISING trend in Fuel Handling building airborne radiation levels.

B. Spent Fuel Pit Low Level alarm.

C. CC Heat Exchanger outlet Temp High alarm.

D. Spent Fuel Pit Pump Trip alarm.

ANSWER: D

Original Question Use: ILT NOPS phase NOPS 2 exam.

6 **ID: RS20035-N03** **Points: 1.00**

Given:

- Unit 2 was at 100% power.
- Subsequently the 2B SG faulted outside containment.
- Currently
    - 2B SG pressure: 900 psig DROPPING at 70 psig/min.
    - RCS pressure: 2000 psig DROPPING at 5 psig/min.
- Assuming the RCS and SG pressures continue to change at the current rates, which design limit will be reached FIRST and when?

A. SG to RCS in 0-10 minutes.

B. SG to RCS in >10 minutes

C. RCS to SG in 0-10 minutes.

D. RCS to SG in > 10 minutes.

Answer: C

Answer Explanation

New Question (2013 NRC exam question 6)
RO level
System 035 Steam Generator
High Cog

A1 Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating the S/GS controls including:
A1.02 S/G pressure
RO 3.5 SRO 3.8

Meets K/A, requires examinee to predict the time at which the design limit for SG tube D/P is reached, thus the time frame available for mitigation.
10CFR55.41(b)(10) Administrative, normal, abnormal, and emergency operating procedures for the facility.

Answer: B. (actual time is 7.7 minutes). The design limit for primary to secondary differential pressure across the SG tubes is 1600 psig. The time at which the differential pressure reaches 1600 psig is found by setting up an equation for the pressure difference as a function of time and setting it equal to 1600 psig, then solving for the time. The initial pressures (given) are 2000 psig for the RCS and 900 psig for the SG. The RCS pressure will be 2000-5t as a function of time (in minutes). The 2B SG pressure will be 900-70t as a function of time. The pressure difference between the two is: (2000-5t) – (900-70t). Setting this equal to 1600 yields: 1600 = (2000-5t) – (900-70t). Solving for t yields 7.7 minutes.
Distractors: > 10 minutes based on based on dividing 1600 psi by 70 psi/min (yields 22.9 minutes). Other combinations include dividing 670 psig (the secondary to primary limit) by 5 psig/min yielding greater than 10 minutes, also 670 psig divided by 70 psig/min yielding less than 10 minutes.

Objective: S.SG1-01-A (SG Lesson Plan I1-SG-XL-01)

Technical References: Steam Generator LP (I1-SG-XL-01) rev. 3b page 6. Big Note S/G-2 Rev. 9.

LOD: 2-3

7 **ID: RS20056-N01** **Points: 1.00**

Given:

- Unit 1 at 100% power.

In accordance with 1BwGP 100-3, POWER ASCENSION, Unit One Main Condenser Hotwell level control, at this power level, is selected to the _____(1)_____ side where the CB pump recirculation and FW High Pressure cleanup physical connections are located.

This method of control uses the _____(2)_____.

A. (1) West
(2) highest controlling side to prevent damage the LP Turbines.

B. (1) East
(2) lowest controlling side to prevent cavitation of the CD pumps.

C. (1) West
(2) lowest controlling side to prevent cavitation of the CD pumps.

D. (1) East
(2) highest controlling side to prevent damage the LP Turbines.

Answer: B

Answer Explanation

New Question (2013 NRC exam question 7)
RO level
System 056 Condensate
Low Cog

K1 Knowledge of the physical connections and/or cause-effect relationships between the Condensate System and the following systems:
K1.03 MFW
RO 2.6 SRO 2.6

Meets K/A, requires examinee knowledge of the physical connections between CD and FW system and operational effect on hotwell level control, including potential consequence of improper control selection.
10CFR55.41(b)(4) Secondary coolant and auxiliary systems that affect the facility.
Answer: B. The FW HP cleanup return and CB/FW recirculations connect on the West side of the hotwell, whereas the FW heater returns connect on the East side. At low power levels, the CB & FW recirculation valves are often open, and the FW HP cleanup is used. This results in a higher hotwell level on the West side, thus if the overall hotwell level control was selected to the West side, the level in portions of the hotwell would potentially be controlled too low to provide adequate NPSH for the CD pumps. For this reason, the hotwell level control is selected to the West (lowest controlling) side at low power.

Objective: S.CD2-02.

Technical References: CD/FW Lesson Plan (I1-CD-XL-01 rev. 5a) page 9. Secondary Makeup Lesson Plan (I1-CD-XL-02 rev. 2a) page 5. 1BwGP 100-3 Rev. 59 page 7 Precaution D. 4.

LOD: 3

8 **ID: RS20068-N02** **Points: 1.00**

Given:

- Unit One is at 100% power.
- Blowdown is established on ALL SGs with blowdown sampling in progress.
- The RM-11 just alarmed and the NSO notes the following on Grid 1:

1PR08J SG BLDN: DARK BLUE

Based on this indication, the crew will verify the automatic closure of…

A. ONLY the 1PS179A-D, Steam Generator Blowdown sample isolation valves.

B. ONLY the 1SD005A-D, Steam Generator Blowdown sample isolation valves.

C. 1SD002A-H, Steam Generator Blowdown isolation valves.

D. 1PS179A-D and 1SD005A-D, Steam Generator Blowdown sample isolation valves.

Answer: A

Answer Explanation

New Question (2013 NRC exam question 8)
RO level
System 068 Liquid Radwaste
Low Cog

K6 Knowledge of the effect of a loss or malfunction on the following will have on the Liquid Radwaste system:
K6.10 Radiation monitors
RO 2.5 SRO 2.9

Meets K/A, requires examinee to determine the effect of 1PR08J failure on liquid radwaste. 10CFR55.41(b)(13) Procedures and equipment available for handling and disposal of radioactive materials and effluents.

Answer: A. The Dark Blue indication on the RM-11 for 1PS108 indicates an OPERATE failure. On an OPERATE failure of 1PR08J ONLY the 1PS179A-D automatically close. Other answers are plausible based on their related functions within the same blowdown system.

Objective: S.AR1-04-B-03

Technical References: Liquid Radwaste Lesson Plan (I1-WX-XL-01 rev. 4a) page 7. BwAR 1-1PR08J rev. 4. Radiation Monitor Lesson Plan I1-AR-XL-01 rev. 5a. page 18.

LOD: 2

9 **ID: RS20071-N02** **Points: 1.00**

Given:

- Unit One is at 100% power.
- The 0B Gas Decay Tank reached its maximum Curie limitation and was isolated.
- Subsequently, the 0B Gas Decay Tank relief valve inadvertently lifted and is stuck open.

Based on this indication…

A. ONLY 0PR02J, Gas Decay Tank Effluent will provide monitoring indication for the release, and if the HIGH alarm is reached, an interlock will isolate the release.

B. ONLY 0PR02J, Gas Decay Tank Effluent will provide monitoring indication for the release, and if the HIGH alarm is reached, NO automatic interlock will isolate the release.

C. 0PR02J, Gas Decay Tank Effluent and 1/2PR28J Vent Stack Effluent will provide monitoring indication for the release. If a HIGH alarm occurs on ANY of these radiation monitors, an interlock will isolate the release.

D. 0PR02J, Gas Decay Tank Effluent and 1/2PR28J Vent Stack Effluent will provide monitoring indication for the release. A HIGH alarm on any of these radiation monitors will NOT actuate an interlock to isolate the release.

Answer: D

Answer Explanation

New Question (2013 NRC exam question 9)
RO level
System 071 Waste Gas Disposal
Low Cog

K3 Knowledge of the effect that a loss or malfunction of the Waste Gas Disposal System will have on the following:
K3.05 ARM and PRM systems
RO 3.2 SRO 3.2

Meets K/A, requires examinee to know the result of a failed GDT relief valve on the PRM system and subsequent result.
10CFR55.41(b)(13) Procedures and equipment available for handling and disposal of radioactive materials and effluents.
Answer: D. 0PR02J, Gas Decay Tank Effluent and 1/2PR28J Vent Stack Effluent will provide monitoring indication for the release. A HIGH alarm on any of these monitors will NOT actuate an interlock to isolate the release. The relief lifting bypasses the 0GWRCV014 Gas Decay Tank Discharge Release Control valve (which DOES automatically close on high rad alarm of 0PR02J).

Objective: S.AR1-04-B-07 (Radiation Monitors LP I1-AR-XL-01)

Technical References: Gaseous Radwaste System Lesson Plan (I1-GW-XL-01 rev. 4a) page 15. BwAR 3-0PR02J rev. 5. Big Note RW-1, Gaseous Radwaste rev. 4. Big Note AR-2, Rad Monitor Notes, rev. 5.

LOD: 2

10 **ID: RS20072-N01** **Points: 1.00**

The sample pump on the 0PR035J, MCR Turbine Building Intake radiation monitor, can be operated (started or stopped) LOCALLY …

A. ONLY.

B. and from its RM-23 ONLY.

C. and from either RM-11 ONLY.

D. and from BOTH RM-11 units and its RM-23.

Answer: B

Answer Explanation

Modified Question (2013 NRC exam question 10 modified from BWLI-AR1-070-M)
RO level
System 072 Area Radiation Monitoring
Low Cog

A4 Ability to manually operate and/or monitor in the control room:
A4.02 Major components
RO 2.5 SRO 2.5

Meets K/A, requires examinee knowledge of controls for safety related radiation skid sample pump. The RM-23 for the skid is located in the MCR.
10CFR55.41(b)(13) Procedures and equipment available for handling and disposal of radioactive materials and effluents.
Answer: B. and from its RM-23 ONLY. Safety related skids can only be controlled from their RM-23 or locally. Other answers are plausible as they are common locations from which the skids can be operated.

Objective: S.AR1-13

Technical References: Radiation Monitors Lesson Plan (I1-AR-XL-01 rev 5a) pages 8 and 9.

LOD: 2

Original Question:

Vision ID: BWLI-AR1-070-M

The sample pump on the 0PR031J, Main Control Room Outside Air – Trn A, can be operated (started or stopped) LOCALLY …

A. ONLY.

B. or from the RM-11.

C. or from the RM-23.

D. and from BOTH the RM-11 and RM-23.

History: ILT 11-1 Systems final exam.

11 **ID: RS10003-N04** **Points: 1.00**

Given:

- Unit 1 at 100% power steady-state.

Case 1: 1CC9414, CC FROM RC PUMPS ISOL VLV, inadvertently closed and will NOT reopen.

Case 2: 1CC9438, CC FROM RC PUMPS THERM BARR ISOL VLV, inadvertently closed and will NOT reopen.

Comparing the two cases…

A. motor bearing temperatures will NOT CHANGE in either case. RCP seal outlet temperatures will RISE in BOTH cases.

B. motor bearing temperatures will RISE ONLY in Case 1. RCP seal outlet temperatures will RISE ONLY in Case 1.

C. motor bearing temperatures will RISE ONLY in Case 1. RCP seal outlet temperatures will NOT CHANGE in Case 1.

D. motor bearing temperatures will NOT CHANGE in either case. RCP seal outlet temperatures will RISE ONLY in Case 1.

Answer: C

Answer Explanation

Modified Question (2013 NRC exam question 11: The original question on which this modified question was based was on 2011 NRC exam question 20 and Backup Cert Exam 2013-if used---also look at Cert Exam Spare Scenario inadvertent phase B)
RO level
System 003 Reactor Coolant Pump
High Cog

K1 Knowledge of the physical connections and/or cause-effect relationships between the RCPS and the following systems:
K1.12 CCWS
RO 3.0 SRO 3.3

Meets K/A, in that examinee must predict the impact of problem associated with loss of different CCW flowpaths that support the RCPs.
10CFR55.41(b)(4) Secondary coolant and auxiliary systems that affect the facility.
Answer: C.

The Component Cooling Water supply to the RCP motor bearings and thermal barriers has a common supply line and separate return lines. 1CC9414 is a containment isolation valve on the return line from the motor bearings only. Therefore, closing 1CC9414 will isolate cooling water flow from the RCP motor bearings only. 1CC9438 is a containment isolation valve on the return line from the thermal barrier heat exchangers. Although isolating this line stops cooling to the thermal barrier heat exchangers, seal cooling is only provided via the thermal barrier heat exchangers on a loss of seal injection, which is NOT part of the given scenario, therefore this will have NO EFFECT on seal temperatures in the given problem.

Choice A is incorrect (motor bearing temperature will RISE in case 1 due to loss of cooling to the motor oil coolers)
Choice B is incorrect (RCP seal temperatures will NOT change in case 2 as stated)
Choice C is correct (see explanation)
Choice D is incorrect (RCP seal temperature will NOT change in either case)

Objective: 4D.OA-51

Technical References: RCP LP I1-RC-XL-02 rev 5a pages 21, Big Note CC-2 rev 7.

LOD: 2

ORIGINAL QUESTION: VISION ID RS10003-N02

Given:

Unit 1 is at 100% power, normal alignment.

The following then occurs:

- 1CC9416 CC FROM RC PUMPS ISOL VLV, inadvertently CLOSES and will NOT re-open.

With the above conditions, RCP...

A. motor bearing temperatures will rise and RCP temperatures should be monitored for motor bearing trip criteria of 195°F maximum.

B. motor bearing temperatures will rise and RCP temperatures should be monitored for motor bearing trip criteria of 225°F maximum.

C. seal outlet temperatures may rise and RCP temperatures should be monitored for seal outlet trip criteria of 235°F maximum.

D. seal outlet temperatures may rise and CC Surge Tank level should be monitored for adequate make-up.

Answer: A

12 **ID: RS10003-N05** **Points: 1.00**

Given:

- Unit 1 is in MODE 5.
- At time T = 0 seconds, the 1D RCP breaker was closed from the MCR.
- The following 1D RCP observations are made over the next 40 seconds:

Parameter	0.5 sec	1 sec	1.8 sec	30 sec	35 sec	40 sec
Motor Vibration	0.22 in/sec	0.22 in/sec	0.10 in/sec	0.10 in/sec	0.10 in/sec	0.10 in/sec
Motor Current	1200 amps	1200 amps	900 amps	755 amps	720 amps	500 amps
Shaft Rotation	Stationary	Stationary	Rotating	Rotating	Rotating	Rotating

Based on the above data, the crew …

A. should have tripped the 1D RCP at 1 second due to lack of shaft rotation.

B. completed a proper start of the 1D RCP.

C. should have tripped the 1D RCP at 35 seconds due to motor current.

D. should have tripped the 1D RCP at 1 second due to excessive vibration.

Answer: C

Answer Explanation

New Question (2013 NRC exam question 12)
System 003 Reactor Coolant Pump
High Cog

A3 Ability to monitor automatic operation of the RCPS, including:
A3.02 Motor current
RO 2.6 SRO 2.5

Meets K/A, requires examinee to assess key RCP parameters, including motor current, for proper indication on start.
10CFR55.41(b)(10) Administrative, normal, abnormal, and emergency operating procedures for the facility.

Answer: C. RCP trip criteria on a start include motor current > 700 amps for 35 seconds, motor vibration is excess of 0.31 in/sec (notify Sys Engineering if > .15 in/sec) and no shaft rotation within 2 seconds on a start. In this case, the motor current exceeded 700 amps for over 35 seconds and 1D RCP should have been tripped at that point to prevent damage to motor windings.

Choice A is Incorrect. Shaft rotation occurred in less than 2 seconds.
Choice B is Incorrect. The start was not proper as the motor current trip criteria was met and NOT followed.
Choice C is correct. See explanation.
Choice D is Incorrect. Although the vibration exceeded the threshold for more monitoring, did not exceed the threshold requiring a trip.

Objective: S.RC2-09-E.

Technical References: RCP LP I1-RC-XL-02 rev 5a page 38, Big Note RCP-1 rev 13. BwOP RC-1 rev. 25 pages 7 and 18.

LOD: 2-3

13 **ID: RS10004-N01** **Points: 1.00**

Given:

- Unit 1 is 100% power.
- Pressurizer Pressure control is selected to 1PT-455.
- Pressurizer Level control is selected to 1LT-459.
- The 1A Regen Heat Exchanger is in service.
- Instrument Bus 111 just de-energized due to a ground fault.

As a result…

A. the crew must select a different controlling Pressurizer Pressure channel.

B. the crew must select a different controlling Pressurizer Level channel.

C. 1CV8324A CHG TO REGEN HX 1A ISOL VLV will fail closed and can NOT be reopened from the MCR due to loss of solenoid power.

D. 1CV112A LTDWN TO VCT OR HUT DIVERT VLV will NOT full divert to the HUT based on VCT level channel 185.

Answer: D

Answer Explanation

New Question (2013 NRC exam question 13)
System 004 Chemical and Volume Control
Low Cog

K2 Knowledge of bus power supplies to the following:
K2.06 Control instrumentation
RO 2.6 SRO 2.7

Meets K/A, requires knowledge of the power supplies to the CVCS and PZR control components in order to determine the effect.
10CFR55.41(b)(7) Design, components, and functions of control and safety systems, including instrumentation, signals, interlocks, failure modes, and automatic and manual features.
Answer: D. 1CV112A will NOT full diver to the HUT based on level channel 185. Per 1BwOA ELEC-2 Table A 1CV112A will not divert based on level channel 185. Memory level because the listing on table A is a memory item expected of students. 1CV8324A would fail closed on a loss of DC bus 111, not AC bus 111. Pressurizer Pressure and level control channels 455 and 459 respectively are both from division 11, however they have backup power supplied by Control Cabinets from MCC power, thus even though instrument bus 111 DOES provide them power, they have backup power supplies.

Objective: S.CV1-16-C

Technical References: 1BwOA ELEC-2 rev 106 Table A (page 10 of 21), I1-RP-XL-01 rev 5a SSPS lesson plan page 5.

LOD: 3

14 **ID: RS10004-N03** **Points: 1.00**

Given:

- Unit 1 at 100% power.
- 120 gpm letdown is in service.
- RCS boron concentration is 540 ppm.
- The current B_{10} Ratio Fraction is 0.185.
- Unit 1 BAT boron concentration is 7200 ppm.

The boric acid flow controller, 1FK-110, potentiometer setting required to ensure that automatic VCT makeup maintains RCS T_{ave} stable is…

A. 0.90.

B. 2.09.

C. 2.25.

D. 2.42.

Answer: B

Answer Explanation

Modified Question (2013 NRC exam question 14 modified from BWLC3CCV1009 used in LORT)
System 004 Chemical and Volume Control
High Cog

A4 Ability to manually operate and/or monitor in the control room:
A4.15 Boron concentration
RO 3.6 SRO 3.7

Meets K/A, requires examinee to determine the manual setting for the boric acid potentiometer for proper maintenance of RCS boron concentration.
10CFR55.41(b)(7) Design, components, and functions of control and safety systems, including instrumentation, signals, interlocks, failure modes, and automatic and manual features.
Answer: B. 2.09. Without accounting for the B10 concentration being less than 19.9% (due to B10 depletion over core life) the boric acid flowrate needed would be (540/7200) x 120 gpm = 9 gpm. The BA pot is 4 gpm/turn, so 9 gpm/4 gpm/turn = 2.25 which is distractor C. Accounting for B10 depletion, multiply the number by (0.185)/(0.199). This is necessary because B10 from the BAT is made with fresh (natural) boron which has a B10 concentration of 19.9%. If the pot was actually set for 2.25 the automatic makeup would result in a negative reactivity addition. Multiplying the 2.25 by (0.185)/(0.199) yields 2.09. The distractor 2.42 is plausible (it represents the answer if the examinee inverts the correction factors in the calculation, a common mistake). The plausible distractor 0.90 is attained if student uses 10 gpm/turn as the basis for BA pot setting (a common mistake) and otherwise performs the calculation correctly.

Objective: S.CV2-04

Technical References: RMCS lesson plan I1-CV-XL-02 rev 8 page 10-13, Reactor Theory Chapter 5 LP I1-RT-XL-05 rev 7b pages 4-5.

LOD: 3

ORIGINAL QUESTION: VISION QUESTION # BWLC3CCV1009

Given the following plant conditions on Unit 1:

- The reactor is at full power.
- RCS boron concentration is 779 ppm
- The current B_{10} Ratio Fraction is 0.189
- Unit 1 BAT boron concentration is 7250 ppm.

The boric acid flow controller, 1FK-110, potentiometer setting required to ensure that automatic VCT makeup maintains RCS T_{ave} stable is…

A. 3.06.

B. 3.17.

C. 3.23.

D. 3.34

Answer: A. 3.06 is CORRECT due to 779 ppm (RCS Cb)*0.189 (B10 correction factor)/0.199(B10 correction factor)/7250 ppm (BAST Cb)* 120 gpm (Auto makeup flow)/4 gpm/turn = 3.06.

15 **ID: RS20005-N01** **Points: 1.00**

Given the following sequence of events:

- Unit 1 was at 100% power, normal alignment.
- An RCS LOCA and auto SI occur.
- 1A RH pump tripped and will NOT re-start.
- All other equipment functioned as designed.

The crew has just completed ALL steps of 1BwEP ES-1.3, TRANSFER TO COLD LEG RECIRCULATION.

With the 1A RH pump unavailable, the cold leg recirc alignment status of the U1 CV pumps will be...

A. ONLY the 1B CV pump running with supply from SI Pumps suction cross-tie header via 1SI8924, SI AND CV PMPS SUCT HDR XTIE VLV.

B. BOTH CV pumps running with supply from 1B RH Pump discharge via 1CV8804A, RH HX 1A TO CV PMP SUCT ISOL VLV.

C. BOTH CV pumps running with supply via 1CV112D/E, RWST TO CHG PMPS SUCT VLV.

D. BOTH CV pumps running with supply from 1B RH Pump discharge via 1SI8804B, RH HX 1B TO SI PMP SUCT ISOL VLV.

Answer: D

Answer Explanation

Bank Question (2013 NRC exam question 14 Bank Question used on 2009 NRC exam Question #3)
System 005 Residual Heat Removal
High Cog

K3 Knowledge of the effect that a loss or malfunction of the RHRS will have on the following:
K3.05 ECCS
RO 3.7 SRO 3.8

Question meets K/A - requires examinee knowledge of how 1A RH pump malfunction will effect ECCS system (CV pps).

10CFR55.41(b)(7) Design, components, and functions of control and safety systems, including instrumentation, signals, interlocks, failure modes, and automatic and manual features.
Answer: D. Per 1BwEP ES 1.3, if 1A RH pp not running, step for opening 1CV8804A is skipped. Therefore CV pp suction is supplied by crosstie to SI pumps only. The 1SI8924 is normally open and 1SI8804B would be opened by the procedure. Both CV pumps remain running.
Choice A is incorrect, both CV pumps will be running. Would be plausible answer if a single RH pump did not have capacity to supply both SI and CV pumps.
Choice B is incorrect, 1CV8804A will be closed and 1RH8716A/B will be closed (flowpath will be isolated)
Choice C is incorrect, RWST suction path will be isolated.
Choice D is correct, see explanation above

Objective: 3D.EP-14-B

Technical References: LP I1-EC-XL-01 rev. 5a, 1BwEP ES-1.3 rev. 201, ECCS-1 big note rev. 11

LOD: 3

16 **ID: RS10006-N03** **Points: 1.00**

Given:

- Unit 1 experienced a LOCA in each of the following cases.
- In BOTH cases the crew has entered 1BwEP ES-1.3, TRANSFER TO COLD LEG RECIRCULATION.

Case 1: Containment Pressure is 6 psig and rising.

Case 2: Containment Pressure is 3 psig and stable.

The difference in the two cases is that…

A. Case 1 requires a higher indicated containment floor water level to implement cold leg recirculation due to the higher water temperature reducing the NPSH available for ECCS recirculation.

B. Case 1 requires a higher indicated containment floor water level to implement cold leg recirculation due to the higher environmental temperature effects on containment floor water level instrumentation accuracy.

C. Case 2 requires a higher indicated containment floor water level to implement cold leg recirculation due to the lower overpressure reducing the NPSH available for ECCS recirculation.

D. BOTH cases require the same indicated containment floor water level to implement cold leg recirculation due to minimal change in instrumentation accuracy between the two cases.

Answer: B

Answer Explanation

New Question (2013 NRC exam question 16)
System 006 Emergency Core Cooling
Low Cog

K5 Knowledge of the operational implications of the following concepts as they apply to ECCS:
K5.01 Effects of temperatures on water level indications
RO 2.8 SRO 3.3

Meets K/A, requires examinees to determine the effect of the adverse containment conditions on the key parameter (containment floor water level) that determines the ability to use ECCS cold leg recirculation as the mitigation strategy.

10CFR55.41(b)(5) Facility operating characteristics during steady state and transient conditions, including coolant chemistry, causes and effects of temperature, pressure and reactivity changes, effects of load changes, and operating limitations and reasons for these operating characteristics.

Answer: B. Requires a higher indicated containment floor water level to implement cold leg recirculation due to the higher environmental temperature effects on containment floor water level instrumentation accuracy. The specific numbers used in the EOPS are based on determination of the instrument inaccuracies induced by the adverse environmental effects.

A: wrong because the rational is focused on the effect of water temperature on the NPSH requirement. The basic water level needed to provide the NPSHA is assumed for a worst case condition at even higher temperatures of containment. The water level threshold used is based on picking a threshold where the temperature effects cause significant instrument inaccuracy.
B: correct. See explanation.
C: Wrong because in Case 2 the containment is still “normal” and the water level indication required is actually lower.
D: Wrong because the adverse condition in case 1 is sufficient per analysis to affect the instrumentation accuracy to the extent that case 1 does require use of a higher threshold number.

Objective: T.MI04-19-B.

Technical References: Critical Parameters LP (I1-MI-XL-04 rev 4a) Pages 9-13.

LOD: 2

17 **ID: RS10007-C03** **Points: 1.00**

Given:

- Unit 1 initially at 100% power

Each of the following causes actual PRT level to rise, EXCEPT a(an)…

A. Inadvertent SI.

B. SMALL Break LOCA (RCS stabilizes at 500 psig).

C. LARGE break LOCA (RCS pressure equalizes with the Containment).

D. Inadvertent Phase A.

Answer: C

Answer Explanation

New Question (2013 NRC exam question 17)
System 007 Pressurizer Relief/Quench Tank
Low Cog

A1 Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating the PRTS controls including:
A1.01 Maintaining quench tank water level within limits
RO 2.9 SRO 3.1

Meets K/A, requires examinee to place him/herself in the position of monitoring PRT level and predicting the response that would challenge the level limit for different plant situations.

10CFR55.41(b)(3) Mechanical components and design features of the reactor primary system.

Answer: C. LARGE break LOCA (RCS pressure completely equalizes with the Containment). Each of the situations given as a choice includes a resulting phase A actuation (whether stated directly, or inferred from the safety injection which in turn causes a phase A). A phase A isolates the normal seal return line (closing _CV8100 and _CV8112). This results in the line being blocked closed unless pressure exceeds 150 psig, causing the relief to lift and resulting in flow to the PRT. In each case EXCEPT the LBLOCA with RCS equalizing with containment pressure, the RCS remains above 150 psig, resulting in the lifting of the seal return relief, causing continuous flow into the PRT.

A: Incorrect. See explanation above.
B: Incorrect. See explanation above.
C: Correct. See explanation above.
D: Incorrect. See explanation above.

Objective: S.CV1-07.

Technical References: I1-CV-XL-01 rev 8 page 39. Big Note CV-1, CVCS rev. 15.

LOD: 2

18 **ID: RS10008-N02** **Points: 1.00**

Given:

- Unit 1 is in mode 4.
- 1A RH train is aligned for shutdown cooling with RH letdown in service.
- 1A CC pump is RUNNING.
- 1B CC pump is in standby.
- 1D RCP is running.
- U-0 CC pump is mechanically AND electrically aligned to Bus 142.
- The crew is maintaining RCS temperature stable (1RH606 at 50% demand) at 300°F.
- PZR level is 26%.

The following timeline then occurs:

0 sec: 1A CC pump TRIPS on overcurrent.
2 sec: A crew member places the 1B CC pump control switch to START but the pump breaker closes and immediately trips open.
4 sec: 1B CC pump is placed in pull-out.
5 sec: 1PI-CC107 CC PUMP DSCH PRESS indicates 85 psig dropping.

Assume the U-0 CC pump functions as designed.

Based on the above conditions, the U-0 CC pump ...

A. did NOT start.

B. started at 4 sec.

C. started at 5 sec.

D. started at 9 sec.

Answer: D

Answer Explanation

New Question (for 2013 NRC exam question 18)
System 008 Component Cooling Water
High Cog

A2 Ability to (a) predict the impacts of the following malfunctions or operations on the CCWS, and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations:
A2.01 Loss of CCW pump
RO 3.3 SRO 3.6

Meets K/A, the question requires examinee to predict the response of CCW equipment to a loss of CCW pump and to determine which procedure to enter. Per NUREG 1021 ES-401 page 6 of 33, the scope of a question may be limited to the aspect of the K/A that meets the higher cognitive level. In this case, the lower cognitive level is selecting the procedure (it is a memory item that on a CC pump trip in mode four, EITHER 1BwOA PRI-10 or 1BwOA PRI-6 apply and no other procedure. However, to predict the system response, the examinee must recall and apply the starting logic of the relationship between the 0 CC pump and the 1B CC pump, AND the low pressure start logic (which includes a time delay).

10CFR55.41(b)(4) Secondary coolant and auxiliary systems that affect the facility.

Answer: D. (1) at time 00:09. The U-0 CC pump functionally replaces the 1B CC pump when the U-0 CC pump is aligned electrically to bus 142 and the 1B CC pump is placed in pull-out. The low discharge pressure auto-start feature has a 4 second delay so the pump will start at 00:09.

A: incorrect. See above explanation.
B: incorrect. See above explanation.
C: incorrect. See above explanation.
D: Correct. See above explanation.

Objective: T.OA17-03.

Technical References: Big Note CC-1 rev 14, CC system. 1BwOA PRI-6 rev 105, COMPONENT COOLING MALFUNCTION (see step 2 RNO).

LOD: 3

19 **ID: RS10010-N02** **Points: 1.00**

Given:

- DC power to Inverter 113 was lost 2 hours ago.
- Unit 1 at 100% power.
- 1PT-455 failed low 2 minutes ago.
- The crew just entered 1BwOA INST-2, OPERATION WITH A FAILED INSTRUMENT CHANNEL.
- A loss of offsite power occurs.

The crew's NEXT actions will address…

A. verification of a reactor trip with NO safety injection.

B. verification of a reactor trip with a safety injection.

C. verification that all safe shutdown loads started and the unit is stable at 100% power.

D. stabilization of the unit from an OTΔT runback.

Answer: B

Answer Explanation

New Question (2013 NRC exam question 19)
RO level
System 010 Pressurizer Pressure Control
High Cog

K3 Knowledge of the effect that a loss or malfunction of the PZR PCS will have on the following:
K3.03 ESFAS
RO 4.0 SRO 4.2

Meets K/A, examinees must evaluate the effects of the PZR pressure channel failure (pressure control input), a loss of DC input to inverter, and response due to LOOP on RPS and ESFAS.
10CFR55.41(b)(7) Design, components, and functions of control and safety systems, including instrumentation, signals, interlocks, failure modes, and automatic and manual features.

Answer: B. Verification of reactor trip with safety injection. With a loss of DC input to inverter 113, the inverter relies on AC power input from bus 141 to maintain the inverter energized (and in turn, to keep instrument bus 113 energized). When offsite power is lost, bus 141 is de-energized until the 1A EDG re-energizes the bus (about 10 seconds). During this time, inverter 113, and thus instrument bus 113 is de-energized. This in turn de-energized the associated PZR pressure channel (1PT-457 due to loss of both the instrument bus and the MCC 120 VAC feed to Protection Cabinet #3: Primary power input is 1IP03J, Ckt. 3; backup power supply is MCC 131x1) and associated bistables (meeting 2/4 logic for low PZR pressure reactor trip, and 2/4 logic for low PZR pressure SI). When the bus re-energizes, the bistables are re-energized, but the reactor trip and SI have already actuated.

Objective: S.RY1-21-A

Technical References: Big Note AC-7, AC One Line Diagram rev. 7. Big Note EF-1 rev 14, ESF Setpoints. Big Note I&C-2 rev 5, AC Bus 112 & 113. Plant drawing 20E-1-4031PA13 rev. B.

LOD: 3

20 **ID: RS10012-N01** **Points: 1.00**

Given:

- Unit 1 is preparing to conduct a reactor startup per 1BwGP 100-2, PLANT STARTUP.
- Both reactor trip breakers are CLOSED.
- Due to a concern with SRNI N31, the startup has been suspended.
- Control Bank A is at 113 steps.
- SRNI N32 indicates 55 cps.
- IMD has placed the LEVEL TRIP BYPASS switch for N31 in BYPASS per a troubleshooting plan.

In this alignment, each of the following will cause a reactor trip EXCEPT…

A. removing N31 instrument power fuses.

B. removing N31 control power fuses.

C. de-energizing instrument bus 111.

D. de-energizing instrument bus 112.

Answer: A

Answer Explanation

New Question (2013 NRC exam question 20)
RO level
System 012 Reactor Protection
High Cog

K4 Knowledge of RPS design feature(s) and/or interlock(s) which provide for the following:
K4.01 Trip logic when one channel OOC or in test
RO 3.7 SRO 4.0

Meets K/A, examinee must determine RPS response to various conditions, with one SRNI channel in bypass.
10CFR55.41(b)(7) Design, components, and functions of control and safety systems, including instrumentation, signals, interlocks, failure modes, and automatic and manual features.
Answer: A. removing N31 instrument power fuses. When in BYPASS, control power (which is powered in turn from the associated instrument bus, in this case bus 111) maintains power to one of two relays that must de-energize to cause a 2/2 reactor trip input logic. Removing the instrument power fuse de-energizes the other relay, but does not result in the 2/2 logic being met. De-energizing bus 111 will result in BOTH relays being de-energized, meeting the 2/2 logic. Removing the control power fuses will similarly cause both relays to de-energize. De-energizing instrument bus 112 causes a reactor trip signal on SRNI N32 to occur because both relays on N32 will be de-energized.

A. correct. See explanation above.
B. Incorrect. See explanation above.
C. Incorrect. See explanation above.
D. Incorrect. See explanation above.

Objective: S.NI1-13.

Technical References: Big Note NI-4 rev 11, Source Range Detector. SRNI Lesson Plan I1-NI-XL-01 rev. 4.

LOD: 3

21 **ID: RS10013-N03** **Points: 1.00**

During a loss of offsite power (LOOP), a loss of which of the following would prevent 1B CC and 1B SX pumps from sequencing on to perform their safety function?

A. Bus 132X.

B. DC bus 114.

C. Instrument bus 112.

D. Instrument bus 114.

Answer: D

Answer Explanation

New Question (2013 NRC exam question 21)
RO level
System 013 Engineered Safety Features Actuation
Low Cog

K2 Knowledge of bus power supplies to the following:
K2.01 ESFAS/safeguards equipment control
RO 3.6 SRO 3.8

Meets K/A, requires examinee to identify the bus power supply (to the appropriate portion of the ESFAS/safeguards equpment control circuitry) that would prevent the B train of ESF equipment from sequencing.

10CFR55.41(b)(7) Design, components, and functions of control and safety systems, including instrumentation, signals, interlocks, failure modes, and automatic and manual features.

Answer: D. Instrument bus 114. A loss of instrument bus 114 de-energizes the slave relays in SSPS that would normally energize during an ESF actuation to start the B train ESF equipment. Loss of 132X would prevent other train B ESF equipment from actuating due to loss of power to some valves (e.g. CS). Instrument bus 112 does not provide power to the subject relays, although it is a common misconception that it does. DC bus 114, likewise, is commonly mistaken as a power source for Train B ESF equipment (DC control power for train B equipment is DC 112).

A is Incorrect. See explanation above.
B is Incorrect. See explanation above.
C is Incorrect. See explanation above.
D is Correct. See explanation above.

Objective: S.EF1-08. I1-EF-XL-01 Lesson Plan objective.

Technical References: Big Note I&C-3, AC Bus 114 rev. 6. I1-EF-XL-01 Lesson Plan.

LOD: 2

22 **ID: RS10022-N01** **Points: 1.00**

Given:

- Unit 1 at 100% power.
- CNMT CHILLER 1A is running.
- 1WO01PA, CHILLED WATER Pump 1A, just tripped due to an internal ground.

As a result of the chilled water pump trip, CNMT CHILLER 1A will…

A. remain running. 1WO01PB, CHILLED WATER Pump 1B will automatically start to support CNMT CHILLER 1B.

B. trip. The crew will start 1WO01PB, CHILLED WATER Pump 1B and then restart CNMT CHILLER 1A.

C. trip. The crew will start 1WO01PB, CHILLED WATER Pump 1B and then start CNMT CHILLER 1B.

D. remain running. The crew will start 1WO01PB, CHILLED WATER Pump 1B to support continued operation of CNMT CHILLER 1A.

Answer: C

Answer Explanation

New Question (2013 NRC exam question 22)
RO level
System 022 Containment Cooling
High Cog

A2 Ability to (a) predict the impacts of the following malfunctions or operations on the CCS; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations:
A2.06 Loss of CCS pump
RO 2.8 SRO 3.2

Meets K/A, examinee is posed with the trip of chill water pump, must identify the system response, and then identify the correct procedure based operator action.

10CFR55.41(b)(4) Secondary coolant and auxiliary systems that affect the facility.

Answer: C. The chiller will trip on loss of the chill water pump. Each chill water pump supplies the train specific chiller, so the 1B chill water pump cannot supply the other train chiller, although the piping is cross-connected, it is not cross-connected in a geometry that facilitate cross-train operation (see Big Note WO-2). The crew must therefore manually start the 1B chill water pump, then the 1B chiller.

Answer A is Incorrect. See explanation above.
Answer B is Incorrect. See explanation above.
Answer C is Correct. See explanation above.
Answer D is Incorrect. See explanation above.

Objective: S.W01-02-B.

Technical References: BwAR 0-33-D3, CNMT CHLR UNIT TROUBLE rev 7. BwOP VP-1, RCFC REFREGERATION UNIT AND HILLED WATER SYSTEM STARTUP rev. 45a. Big Note WO-2 rev. 5. Big Note WO-1, Generic Chiller.

LOD: 2

23 **ID: RS10026-N02** **Points: 1.00**

Given:

- Unit 1 at 100% power, all systems normally aligned.
- During a board walkdown the Unit 1 NSO discovers BOTH the OPEN and CLOSED indicating lights for 1CS019B, Containment Spray Eductor 1B Spray Add Valve, are DE-energized (NOT LIT).
- Local investigation has determined the breaker for 1CS019B is TRIPPED and will NOT reclose.
- 1CS019B has been locally verified to be in its normal position at full power.

With the above conditions, if a U1 CS Signal is actuated, the 1B CS pump will:

A. NOT automatically start, and CANNOT be manually started from the MCR.

B. automatically start and provide spray flow WITHOUT NaOH.

C. automatically start and provide spray flow WITH NaOH.

D. NOT automatically start, but CAN be manually started from the MCR and provide spray flow.

Answer: A

Answer Explanation

Bank Question (2013 NRC exam question 23)
RO level
System 026 Containment Spray
High Cog

KA3 Ability to monitor automatic operation of the CSS, including:
A3.01 Pump starts and correct MOV positioning
RO 4.3 SRO 4.5

Meets K/A, requires examinee to interpret the indications, determine current status of system and predict how the system will respond to an automatic actuation in this condition. In order to properly monitor system operation, the examinee must in turn be able to predict/anticipate the system response as required in this problem. High Cog because the examinee must know the normal at power position, effect of the loss of power on the valve (which in turn depends on valve type i.e. AOV vs MOV, and whether action can be taken to manually open from MCR.)

10CFR55.41(b)(7) Design, components, and functions of control and safety systems, including instrumentation, signals, interlocks, failure modes, and automatic and manual features.

Answer: A. 1CS019B valve must be on it's open limit switch for the 1B CS pp to auto start. The normal standby position of 1CS019B is Closed. Without power the valve would not reposition to open on a CS actuation.

A. Correct. See explanation.
B. Incorrect. Will not auto-start. See Explanation above.
C. Incorrect. Will not auto-start. See Explanation above.
D. Incorrect. See explanation.

Objective: S.CS1-16.

Technical References: Lesson Plan for CS I1-CS-XL-01 rev. 5. Big Note CS-1, rev. 15 Containment Spray.

LOD: 3

Question Use: ILT Systems Exam #5 (ILT Bank Question BWLI-CS1-052-C)

24 **ID: RS10026-N03** **Points: 1.00**

Given:

- Both units were at 100% power.
- A fire in the MCR has occurred.
- The crew is implementing 1BwOA PRI-5 and 2BwOA PRI-5, CONTROL ROOM INACCESSIBILITY.

LOCAL Equipment Operator/Reactor Operator actions include…

A. aligning local Containment Spray control switch control from each unit-specific Remote Shutdown Panel. Automatic Containment Spray actuation for ALL Containment Spray trains is inhibited by this action.

B. aligning local Containment Spray control switch control from each unit-specific Remote Shutdown Panel. Automatic Containment Spray actuation for ALL Containment Spray trains remains available.

C. pulling control power fuses for ONE Containment Spray pump on each unit. If the automatic Containment Spray actuation setpoint and coincidence are reached, ONE Containment Spray train will actuate on the affected unit.

D. pulling control power fuses for ALL Containment Spray pumps. If the automatic Containment Spray actuation setpoint and coincidence are reached, NO Containment Spray trains will actuate on either unit.

Answer: D

Answer Explanation

New Question (2013 NRC exam question 24)
RO level
System 026 Containment Spray
Low Cog

2.4.35 Knowledge of local auxiliary operator tasks during an emergency and the resultant operational effects.
RO 3.8 SRO 4.0

Meets K/A, examinee must identify the correct local operator action and the effect of this action on the ability of the CS system to respond to an actuation signal.

10CFR55.41(b)(10) Administrative, normal, abnormal, and emergency operating procedures for the facility.

Answer: D. Per 1 and 2BwOA PRI-5, CONTROL ROOM INACCESSIBILITY steps 7 and 8 of Attachment B LOCAL OPERATOR ACTIONS, the control power fuses are pulled for ALL CS pumps to prevent automatic start of any CS pump. There are no controls for the CS pumps at the RSDP. Question is RO level because a knowledge of the overall mitigating strategy (to prevent spurious actuation of any containment spray train) and systems (there are not CS pump switches at the RSDP) are RO knowledge sufficient to answer the question.

A. Incorrect. See explanation.

B. Incorrect. See explanation.
C. Incorrect. See explanation.
D. Correct.

Objective: T.OA16-09.

Technical References: 1BwOA PRI-5 rev. 106 and 2 BwOA PRI-5 rev. 105.

LOD: 2

25 **ID: RS10039-N03** **Points: 1.00**

Given:

- At 14:45 Unit 1 experienced a SGTR on 1D SG from full power.
- The crew implemented appropriate emergency procedures and is now conducting a plant cooldown per 1BwEP ES-3.1, POST-SGTR COOLDOWN USING BACKFILL.
- The following data has been recorded on 1BwOSR 3.4.3.1, RCS PRESSURE/TEMPERATURE LIMIT SURVEILLANCE and 1BwOS TRM 3.4.c.1 PRESSURIZER TEMPERATURE LIMIT SURVEILLANCE.

	1BwOSR 3.4.3.1				1BwOS TRM 3.4.c.1		
Time	Loop A Cold Leg Temp	Temp (°F) Change	Rate (°F/hr)	Temp Change in 1 hr Period	PZR Water Temp	Rate (°F/hr)	Temp Change in 1 hr Period
1500	557°F	0	0	0	650	0	0
1515	485°F	72	288	72	581	276	69
1530	480°F	5	20	77	540	164	110
1545	479°F	1	4	78	535	20	115
1600	450°F	29	116	107	530	20	120
1615	430°F	20	80	55	524	24	57
1630	425°F	5	20	55	520	16	20
1645	420°F	5	20	59	518	8	17
1700	418°F	2	4	32	516	8	14

The FIRST time a Tech Spec or TRM cooldown limit was exceeded was ___(1)____ on the ____(2)_____.

A. (1) 1515
(2) PZR and RCS.

B. (1) 1530
(2) PZR ONLY.

C. (1) 1515
(2) RCS ONLY.

D. (1) 1600
(2) RCS ONLY.

Answer: D

Answer Explanation

Modified Question (2013 NRC exam question 25 modified from RS20039-N01) Same K/A was on 2009 Braidwood NRC exam (question #16)
RO level
System 039 Main and Reheat Steam
High Cog

K5 Knowledge of the operational implications of the following concepts as the apply to the MRSS:
K5.05 Bases for RCS cooldown limits
RO 2.7 SRO 3.1

Meets K/A, requires examinee to know how cooldown rates are calculated (operational implication). 10CFR55.41(b)(10) Administrative, normal, abnormal, and emergency operating procedures for the facility.

Answer: D. 1600. affecting ONLY the RCS. The maximum cooldown rate as defined in the PTLR is 100°F in any 1 hr period. 1BwOSR 3.4.3.1 directs that rate to be calculated at 30 min intervals even though data can be taken more often for trending. At 1515 the rate exceeded 100°F, but it was not in a 1 hr. period. The 1600 calculation was the first 1 hr. period in which the 100°F limit was violated. The bases for the cooldown rate is to establish limits to provide a margin to brittle failure of the RCS and vessel. The PZR limit is 200°F in any 1 hr period, which was never exceeded (short time frame rates exceeded 200°F/hr but not for an entire 1 hour interval). PZR does have a limiting temperature criteria for thermal stress on the spray nozzle, but this is the basis for the 320°F delta-T limit between PZR Vapor space and cold leg temperature, not the PZR cooldown rate.

A is Incorrect. See explanation.
B is Incorrect. See explanation.
C is Incorrect. See explanation.
D is Correct.

Objective: 3C.MS-06-A.

Technical References: 1BwOSR 3.4.3.1, RCS PRESSURE/TEMPERATURE LIMIT SURVEILLANCE rev. 4. 1BwOS TRM 3.4.c.1 PRESSURIZER TEMPERATURE LIMIT SURVEILLANCE rev. 2. TS 3.4.3 and bases.

LOD: 2

ORIGINAL QUESTION:

RS20039-N01

Given:

- Unit 1 is in Mode 3 following a normal reactor shutdown.
- A cooldown commenced at 1500 following 2 hours of stable RCS temperature.

The following data has been recorded on 1BwOSR 3.4.3.1, RCS PRESSURE/TEMPERATURE LIMIT SURVEILLANCE.

Time	Loop A Cold Leg Temp	Temp (°F) Change	Rate (°F/hr)	Temp Change in 1 hr Period
1500	557°F	0	0	0
1515	525°F	32	128	32
1530	499°F	26	104	58
1545	479°F	20	80	78
1600	460°F	19	76	97
1615	430°F	30	120	95
1630	395°F	35	140	104
1645	380°F	15	60	99
1700	374°F	16	64	86

The RCS cooldown FIRST exceeded the limits of Tech Spec. 3.4.3, RCS P/T LIMITS, at _____, which may have exceeded the assumed _____ .

A. 1515, margin to RCS brittle failure.

B. 1630, shutdown margin.

C. 1515, shutdown margin.

D. 1630, margin to RCS brittle failure.

Answer: D

Answer Explanation

The question meets the K/A, requires examinee to know how cooldown rates are calculated (operational implication) and what the consequence is when exceeded.
The maximum cooldown rate as defined in the PTLR is 100°F in any 1 hr period. 1BwOSR 3.4.3.1 directs that rate to be calculated at 30 min intervals even though data can be taken more often for trending. At 1515 the rate exceeded 100°F , but it was not in a 1 hr. period. The 1630 calculation was the first 1 hr. period in which the 100°F limit was violated. The bases for the cooldown rate is to establish limits to provide a margin to brittle failure of the RCS and vessel.
Choice A is incorrect, wrong time.
Choice B is incorrect, due to wrong reason.Shutdown margin is valid distractor because the bases for adequate SDM assumes a severe RCS temperature drop during a MSLB event and positive reactivity due to MTC. This can easily be confused with rate of temperature drop.
Choice C is incorrect, wrong time and reason.
Choice D is correct, see explanation above.

Braidwood NRC Exam 2009 Question # 16
039 Main and Reheat Steam System (MRSS)
Knowledge of the operational implications of the following concepts as the apply to the MRSS: Bases for RCS cooldown limits

TIER:	2
GROUP:	1
Cog Level:	High
Task No:	R-MS-002
Obj No:	3C.MS-06-A
Cross Ref:	10CFR55.41(b) (5)

26 **ID: RS10059-N04** **Points: 1.00**

Given:

- Unit 1 is at 62% power (780 Mwe) ramping toward 100% power.
- The 1A Motor Driven FW pump is out of service.
- The 1C TDFWP just tripped.
- Annunciator 1-16-E1, FW PUMP NPSH LOW, is in ALARM.
- The BOP confirms that an NPSH actuation has occurred.

Expected plant response includes…

A. rising GS condenser pressure. The crew must reduce turbine load at least 80 Mwe.

B. lowering GS condenser pressure. The crew must reduce turbine load at least 80 Mwe.

C. rising GS condenser pressure. The crew is NOT required to reduce turbine load.

D. lowering GS condenser pressure. The crew is NOT required to reduce turbine load.

Answer: A

Answer Explanation

New Question (2013 NRC exam question 26)
RO level
System 059 Main Feedwater
High Cog

A1 Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating the MFW controls including:
A1.03 Power level restrictions for operation of MFW pumps and valves
RO 2.7 SRO 2.9

Meets K/A, examinee must predict the GS condenser pressure change driven by the loss of the FW pump and NPSH actuation and to determine if the remaining pump is within its design operating limit for power. 10CFR55.41(b)(4) Secondary coolant and auxiliary systems that affect the facility.

Answer: A. The NPSH actuation causes cooling flow (condensate) to bypass the GS condensers, thus the pressure will rise. The initial power level of 780 Mwe is above the 700 Mwe limit for operating a single FW pump, therefore the crew must reduce load 80 Mwe (per 1BwOA SEC-1).

A is Correct. See explanation.
B is Incorrect. See explanation.
C is Incorrect. See explanation.
D is Incorrect. See explanation.

Objective: T.OA36-03.

Technical References: Big Note FW-1, Feedwater rev. 14. 1BwOA SEC-1, SECONDARY PUMP TRIP, rev. 104.

LOD: 2

27 **ID: RS10061-N02** **Points: 1.00**

Given:

- Case 1
  - Unit 1 is at 100% power.
  - The potentiometer at 1PM06J for 1AF005A failed to a value of 50%.
- Case 2
  - A fire required MCR evacuation.
  - The potentiometer at 1PL04J for 1AF005A failed to a value of 50%.
  - The Local-Remote switch at 1PL04J is placed in "local".

The 1AF005A …

A. response in Case 1 and 2 are identical, BEFORE AND AFTER a 1A AF pump start.

B. remains FULL OPEN in Case 1, until the 1A AF pump starts, then THROTTLES flow to maintain a constant flowrate.
In Case 2, the 1AF005A THROTTLES to 50% open and remains in that position.

C. response in Case 1 and 2 are identical BEFORE a start of the 1A AF pump.
In Case 1, 1AF005A THROTTLES flow to a constant flowrate AFTER a 1A AF pump start.

D. CLOSES fully in Case 1, until the 1A AF pump starts, then THROTTLES flow to a constant flowrate.
In Case 2, the 1AF005A THROTTLES to 50% open and remains in that position.

Answer: B

Answer Explanation

New Question (2013 NRC exam question 27)
RO level
System 061 Auxiliary/Emergency Feedwater
High Cog

K6 Knowledge of the effect of a loss or malfunction of the following will have on the AFW components:
K6.01 Controllers and positioners
RO 2.5 SRO 2.8

Meets K/A, is presented two different controller failures for the same valve from different locations and must determine the operational effect on the valve in each case.
10CFR55.41(b)(4) Secondary coolant and auxiliary systems that affect the facility.
Answer: B. The 1AF005A opens fully in case 1. The potentiometer at 1PM06J sets a demanded flow signal. With the pump secured, there is no flow and the valve remains 100% open. When the 1A AF pump starts, flow will exceed the demanded value and the valve will throttle down until actual flow matches demanded flow. At 1PL04J the potentiometer directly sends an air signal to position the valve with no feedback based on actual flow. This potentiometer simply positions the valve to a percent open, so the valve will open to 50% open (even with no flow present) and stay in that position after the pump start.

A is Incorrect. See explanation.

B is Correct. See explanation.
C is Incorrect. See explanation.
D is Incorrect. See explanation.

Objective: S.AF1-15.

Technical References: AF lesson plan I1-AF-XL-01 rev. 5.b. pages 20 and 21.

LOD: 2

28 **ID: RS10062-N03** **Points: 1.00**

Given:

- The Unit 1 reactor is at full power.
- A grid problem has JUST lowered ESF bus 141 & 142 voltage to 3700 volts (at time = 0 seconds).

With NO operator action and ESF bus 141 & 142 voltages remaining at 3700 volts until the plant responds to this condition, what is the SEQUENCE of events that will occur before the ESF bus loads are sequenced on?

A. The D/Gs start ~ 310 seconds LATER (at time = 310 seconds), then the ESF buses are deenergized followed by the D/Gs energizing the ESF buses.

B. The D/Gs start IMMEDIATELY (at time = 0 seconds), then the ESF buses are deenergized followed by the D/Gs energizing the ESF buses.

C. The ESF buses are deenergized IMMEDIATELY (at time = 0 seconds), then the D/Gs start and energize the ESF buses.

D. The ESF buses are deenergized ~ 310 seconds LATER (at time = 310 seconds), then the D/Gs start and energize the ESF buses.

Answer: D

Answer Explanation

Bank Question (LORT question Vision ID: BWLC3CAP1004)
RO Level
System 062 AC Electrical Distribution
Low Cog

K3 Knowledge of the effect that a loss or malfunction of the ac distribution system will have on the following:
K3.02 ED/G
RO 4.1 SRO 4.4

Meets K/A, requires examinee to determine the response of the ED/Gs due to a degraded voltage condition on the ac distribution system.

10CFR55.41(b)(7) Design, components, and functions of control and safety systems, including instrumentation, signals, interlocks, failure modes, and automatic and manual features.

Answer: D. The ESF buses are deenergized ~ 310 seconds LATER (at time = 310 seconds), then the D/Gs start and energize the ESF buses. is CORRECT due to 3700V is > the 70% nominal voltage setpoint required for a loss of bus voltage, and is < the 95.8% nominal to consider it degraded voltage there by energizing the degraded bus voltage timer of 310 seconds then tripping ACB 1412 which will cause a loss of voltage on busses 141 and 142 tripping all 4KV loads and DG 1A and 1B will start and energize busses 141 and 142. reference BwAR's 1-21-C7 and 1-22-C7.

The D/Gs start ~ 310 seconds LATER (at time = 310 seconds), then the ESF buses are deenergized followed by the D/Gs energizing the ESF buses. is INCORRECT due to the DG start signal is a loss of bus voltage which will not occur until BKR's 1412 and 1422 open after ~ 310 seconds.

The D/Gs start IMMEDIATELY (at time = 0 seconds), then the ESF buses are deenergized followed by the D/Gs energizing the ESF buses. is INCORRECT due to the DG start signal is a loss of bus voltage which will not occur until BKR's 1412 and 1422 open after ~ 310 seconds.

The ESF buses are deenergized IMMEDIATELY (at time = 0 seconds), then the D/Gs start and energize the ESF buses. is INCORRECT due to the 310 second timer needs to time out to cause BKR's 1412 and 1422 to open which will then cause a loss of bus voltage and start the 1A and 1B DG's.

A: Incorrect. See explanation above.
B: Incorrect. See explanation above.
C: Incorrect. See explanation above.
D: Correct. See explanation above.

Objective: S.AP1-10-A.

Technical References: Ref: 4030 AP30 rev T, BwAR 1-21-C7(rev 12), 1- 22-C7 (rev 11)

LOD: 2

Question Use: LORT

29 **ID: RS10063-N02** **Points: 1.00**

Given the following conditions (consider each independently):

1 - Battery charger 111 DC output breaker CB-2 TRIPPED
2 - Battery to bus feed breaker AF-2 TRIPPED
3 - Bus 131X Voltage Low alarm

The condition(s) that indicate that 125VDC Battery Charger 111 AC input breaker CB-1 has opened is/are…

A. 1 ONLY.

B. 1 and 2 ONLY.

C. 2 ONLY.

D. 1, 2 and 3.

Answer: A

Answer Explanation

New Question (2013 NRC exam question 29)
RO level
System 063 DC Electrical Distribution
Low Cog

K4 Knowledge of DC electrical system design feature(s) and/or interlock(s) which provide for the following:
K4.02 Breaker interlocks, permissives, bypasses and cross-ties
RO 2.9 SRO 3.2

Meets K/A, requires examinee knowledge of the interlock for the ESF battery charger.
10CFR55.41(b)(7) Design, components, and functions of control and safety systems, including instrumentation, signals, interlocks, failure modes, and automatic and manual features.

Answer: A. 1 ONLY. Any DC output breaker trip on the Battery Charger causes the AC input breaker to trip open. No other interlocks are involved. Alarm listed is a valid distractor as low AC bus voltage would suggest rising DC current drawn. AF-2 is a DC breaker downstream of CB-2 and has no interlocks.

A is Correct. See explanation.
B is Incorrect. See explanation.
C is Incorrect. See explanation.
D is Incorrect. See explanation.

Objective: S.DC1-04-A.

Technical References: Lesson Plan I1-DC-XL-01 rev. 4. 125 VDC Power Systems page 7. Big Note DC –1, rev. 9 125 DC System.

LOD: 2

30 **ID: RS10063-N03** **Points: 1.00**

Given:

- Unit 1 at 100% power.

Consider each event separately:

- Event 1: Loss of DC bus 111.
- Event 2: Loss of Inverter 111.
- Event 3: SAT 142-1 fault.

Of the events listed, ONLY event(s) _____ result(s) in a Mode change within 1 hour.

A. 1

B. 2 and 3

C. 3

D. 1 and 2

Answer: A

Answer Explanation

New Question (2013 NRC exam question 30)
RO level
System 063 DC Electrical Distribution
High Cog

2.4.30 Knowledge of events related to system operation/status that must be reported to internal organizations or external agencies, such as the State, the NRC, or the transmission system operator.
RO 2.7 SRO 4.1

NOTE: ALTERING THE QUESTION TO SPECIFICALLY REQUIRE REPORTABILITY INFORMATION IS SRO ONLY AT BRAIDWOOD (SEE REPORTABILTY MANUAL OBJECTIVES)

Meets K/A, in that examinee must analyze that the loss of DC bus 111 will cause a reactor trip (reportable) in less than 1 hour.

10CFR55.41(b)(7) Design, components, and functions of control and safety systems, including instrumentation, signals, interlocks, failure modes, and automatic and manual features.

Answer: A. 1. Loss of DC bus 111 causes all feedwater regulating valves to fail closed resulting in loss of SG water levels and reactor trip on low-2 SG water level within minutes (mode change). Loss of inverter 111 results in loss of instrument bus 111 and need to enter technical specification action requirements, none of which require 1 hour to a lower mode. SAT 142-1 fault results in a loss of offsite power, which will not result in a reactor trip or otherwise cause a mode change. Similarly, it will cause need to enter Technical Specification action requirements that are not 1 hour or less.

A is Incorrect. See explanation.
B is Incorrect. See explanation.
C is Correct. See explanation.

D is Incorrect. See explanation.

Objective: S.DC1-09.

Technical References: Big Note DC-1, 125VDC SYSTEM rev. 9.

LOD: 2

31 **ID: RS10064-N01** **Points: 1.00**

Given:

- Unit 1 is at 100% power.
- Major external corrosion and leakage have been discovered on the 1A and 1C EDG Fuel Oil Storage Tanks.
- Both tanks are isolated and drained.

As a result _____ meet the Technical Specification requirements for Diesel Fuel Oil.

A. NEITHER the 1A nor the 1B EDG

B. ONLY the 1A EDG does NOT

C. ONLY the 1B EDG does NOT

D. BOTH the 1A and 1B EDGs still

Answer: B

Answer Explanation

New Question (2013 NRC exam question 31)
RO level
System 064 Emergency Diesel Generator
Low Cog

K6 Knowledge of the effect of a loss or malfunction of the following will have on the ED/G system:
K6.08 Fuel oil storage tanks
RO 3.2 SRO 3.3

Meets K/A, requires examinee to determine the operational impact of the loss of two of four diesel fuel oil storage tanks on the Unit 1 EDGs. There are four diesel oil storage tanks that support the unit 1 EDGs. 10CFR55.41(b)(7) Design, components, and functions of control and safety systems, including instrumentation, signals, interlocks, failure modes, and automatic and manual features.

Answer: B. The 1A and 1C support 1A EDG. The 1B and 1D support the 1B EDG. Each tank is 25,000 gallons. The LCO requires 44,000 gallons to support each EDG. There are multiple examples of redundant cross-train support. For example, the TDFW pumps each have an A and B auxiliary oil pump supporting them.

A is Incorrect. See explanation.
B is Correct. See explanation.
C is Incorrect. See explanation.
D is Incorrect. See explanation.

Objective: S.DG1-10-A.

Technical References: I1-DG-XL-01 rev.6a Diesel Generator & Auxiliaries Lesson Plan. LCO 3.8.3. Big Note DG-9, rev.9, Diesel Generator F.O. & L.O.

LOD: 2.

EXAMINATION ANSWER KEY

2013 NRC SRO EXAM

32 **ID: RS10064-N04** **Points: 1.00**

Given:

- Both Units were at 100% power.
- A tornado swept through the switchyard causing a loss of offsite power (LOOP).
- BOTH reactors tripped.
- Unit 2 experienced a loss of all AC power.
- Bus 141 is now supplying bus 241.

The following indications are present:

1JI-DG002 DIESEL GEN 1A OUTPUT WATTS:	6100 KW
1II-DG001 DIESEL GEN 1A OUTPUT CURRENT:	1010 AMPS
1II-AP053 BUS 241 FEED TO BUS 141 CURRENT:	930 AMPS

Based on the readings provided…

A. NO limits are exceeded.

B. the limits on EDG current AND bus cross-tie current are exceeded.

C. the limits on EDG Watts AND bus cross-tie current are exceeded.

D. the limits on EDG Watts AND EDG output current are exceeded.

Answer: C

Answer Explanation

New Question (2013 NRC exam question 32)
RO level
System 064 Emergency Diesel Generator
Low Cog

2.1.25 Ability to interpret reference materials, such as graphs, curves, tables, etc.
RO 3.9 SRO 4.2

Meets K/A, requires examinee to interpret data recorded in the EDG operating log using the cautions in BwOP DG-11T2.
10CFR55.41(b)(7) Design, components, and functions of control and safety systems, including instrumentation, signals, interlocks, failure modes, and automatic and manual features.
Answer: Limitations are (step 8 of 1BwCA-0.3, RESPONSE TO OPPOSITE UNIT LOSS OF ALL AC POWER) 5935 KW AND 1030 AMPS on the DG. Unit 2 reserve feed cable limit is 925 AMPS.

A: Incorrect. See explanation.
B: Incorrect. See explanation.
C: Correct. See explanation.
D: Incorrect. See explanation.

Objective: 4C.DG-06.

Technical References: 1BwCA-0.3, rev. 200 RESPONSE TO OPPOSITE UNIT LOSS OF ALL AC POWER step 8.

LOD: 2

33 **ID: RS10073-N02** **Points: 1.00**

Given:

- You are in the process of performing a Gaseous Release of 0A GDT.
- Concurrently, a High Rad bag of material must be moved past 0PR02J GAS DECAY TANK EFFLUENT RADIATION MONITOR.

Given:

- ONLY one of the below cases will result in automatically terminating the release due to moving the Hi-Rad bag past the monitor.
  - Case 1: walking 1 meter away from 0PR02J with a 5 second transit time.
  - Case 2: walking 2 meters away from 0PR02J with a 20 second transit time.
  - Case 3: walking 3 meters away from 0PR02J with a 1 minute transit time.
  - Case 4: walking 5 meters away from 0PR02J with a 5 minute transit time

Consider the bag a point source.

The release will automatically be terminated during Case…

A. 1.

B. 2.

C. 3.

D. 4.

Answer: A

Answer Explanation

Bank Question (Byron)
RO level
System 073 Process Radiation Monitoring
High Cog

K5 Knowledge of the operational implications as they apply to concepts as they apply to the PRM system:
K5.02 Radiation intensity changes with source distance
RO 2.5 SRO 3.1

Meets K/A, Requires examinee to assess that radiation dose rate changes as distance changes and tests if the examinee knows what the rad monior is really looking at. This has applicability to the Licensed Operator. As an example, when changing out Hi Rad. CV filters such as the Seal Injection or Reactor Coolant, the control room will receive a call prior to the “filter pull” alerting them to the possibility that radiation alarms may occur.

10CFR55.41(b)(7) Design, components, and functions of control and safety systems, including instrumentation, signals, interlocks, failure modes, and automatic and manual features.

Answer: A. 1. The correct answer is only dependent on distance, not time. The closest distance for a given source strength will yield the greatest dose rate. All distractors are plausible if the examinee confuses dose with dose rate.

A is Correct. See explanation.
B is Incorrect. See explanation.
C is Incorrect. See explanation.
D is Incorrect. See explanation.

Objective: T.OA02-09.

Technical References: NanTel Nuclear General Employee Study Guide rev. 2 page 95 dose and dose rate, pg 104 reducing dose-distance.

LOD: 2-3

34 **ID: RS10073-N03** **Points: 1.00**

Given:

- Unit 1 at 100% power.
- The NSO selects Grid 1 on the RM-11 and notes the following:
  - 1PR08J SG BLDN radiation monitor indicates White.
  - 1PR27J SJAE GS EXH radiation monitor indicates Magenta.
  - All OTHER process radiation monitors indicate Green.

Grid one indicates that the 1PR08J status is ____(1)____ and 1PR27J is ____(2)____.

A. (1) Communications Failure
(2) Monitor Poll Status

B. (1) Equipment Failure
(2) Control Function

C. (1) Control Function
(2) Equipment Failure

D. (1) Monitor Poll Status
(2) Communications Failure

Answer: D

Answer Explanation

New Question (2013 NRC exam question 34)
RO level
System 073 Process Radiation Monitoring
Low Cog

A4 Ability to manually operate and/or monitor in the control room:
A4.02 Radiation monitoring system control panel
RO 3.7 SRO 3.7

Meets K/A, examinee must identify the correct meaning of the cursor colors as displayed by the RM-11 radiation monitor control panel.

10CFR55.41(b)(7) Design, components, and functions of control and safety systems, including instrumentation, signals, interlocks, failure modes, and automatic and manual features.

Answer: D. White: Monitor Poll Status, and Magenta: Communications Failure. The color meanings are as follows:

White: Monitor Poll Status
Magenta: Communications Failure
Blue: Operate Failure
Red: High Alarm
Yellow: Alert/Interlock
Cyan: Equipment Failure
Half-Cyan: Control Function

Green: Normal Operations

A is Incorrect. See explanation.
B is Incorrect. See explanation.
C is Incorrect. See explanation.
D is Correct. See explanation.

Objective: S.AR1-11.

Technical References: Radiation Monitors Lesson Plan I1-AR-XL-01 rev. 5a page 26.

LOD: 2-3

35 **ID: RS10076-N02** **Points: 1.00**

Given:

- BOTH units are at 100% power.
- The 0B MCR Ventilation train is in service.
- The 2A Containment Chiller is in service.
- Unit 0 CC Hx is aligned to Unit 1.
- 1SX005, CC HX 0 Inlet Valve, is OPEN.
- 2SX005, CC HX 0 Inlet Valve, is CLOSED.
- 2A SX pump is OOS for bearing replacement.
- 1A SX pump is running.
- 2B SX pump recently tripped.

In response…

A. the 2A Containment Chiller will trip. The crew will start the 1B SX pump, shutdown ONE RCFC train on EACH unit, isolate SX to the shutdown RCFCs, then OPEN 2SX005, CC HX 0 Inlet Valve.

B. the 2A Containment Chiller will trip. The crew will start the 1B SX pump and then OPEN 2SX005, CC HX 0 Inlet Valve.

C. OB VC chiller will trip. The crew will start the 1B SX pump, shutdown ONE RCFC train on EACH unit, isolate SX to the shutdown RCFCs, then OPEN 2SX005, CC HX 0 Inlet Valve.

D. OB VC chiller will trip. The crew will start the 1B SX pump and then OPEN 2SX005, CC HX 0 Inlet Valve.

Answer: B

Answer Explanation

New Question
RO level
System 076 Service Water
High Cog

A2 Ability to (a) predict the impacts of the following malfunctions or operations on the SWS; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations:
A2.01 Loss of SWS
RO 3.5 SRO 3.7

Meets K/A, examinee must determine the effect of the loss of SX to supported systems and the result, then identify the correct procedural based strategy to restore SX cooling.
10CFR55.41(b)(7) Design, components, and functions of control and safety systems, including instrumentation, signals, interlocks, failure modes, and automatic and manual features.

Answer: B. the 2A Containment Chiller will trip. The crew will start the 1B SX pump and then OPEN 2SX005, CC HX 0 Inlet Valve. The loss of all SX on Unit 2 results in loss of cooling to the 2A Chiller which will trip on high condenser pressure due to the loss of cooling. The OB VC chiller is not affected as is receives SX cooling from the Unit 1 side even though it it's the OB train. 2BwOA PRI-8 ESSENTIAL SERVICE WATER MALFUNCTION, directs cross-tying the Unit 1 SX to Unit 2 after first starting the 1B SX pump. The procedure only directs shutting down and isolating one RCFC train on each unit if the second SX pump (in this case 1B) will NOT start.

A is Incorrect. See explanation.
B is Correct. See explanation.
C is Incorrect. See explanation.
D is Incorrect. See explanation.

Objective: T.OA49-03.

Technical References: 2BwOA PRI-8, rev. 105, ESSENTIAL SERVICE WATER MALFUNCTION. Big Note SX-1, rev. 16, Essential Service Water.

LOD: 3

36 **ID: RS10078-N01** **Points: 1.00**

Given the following plant conditions on Units 1 & 2:

- BOTH reactors were manually tripped from full power due to a large IA leak.
- Normal post trip plant response has occurred.
- Temporary repairs to the IA leak have been completed.
- The U-1 SAC has just been made available (clearance order recently cleared).
- The crew is preparing to start the U-1 SAC.
- The U-0 and the U-2 SACs are NOT available for a start.
- IA pressure is currently 35 psig.

Under these conditions, a Nitrogen bottle ____(1)____ be required to be used for the U-1 SAC startup, and the U-1 SAC ____(2)____ .

A. (1) will
(2) can be started locally or in the MCR.

B. (1) will
(2) can ONLY be started in the MCR.

C. (1) will NOT
(2) can be started locally or in the MCR.

D. (1) will NOT
(2) can ONLY be started in the MCR.

Answer: A

Answer Explanation

Bank Question (2013 NRC exam question 36) used in LORT
RO level
System 078 Instrument Air
Low Cog

K4 Knowledge of IAS design feature(s) and/or interlock(s) which provide for the following:
K4.01 Manual/automatic transfers of control
RO 2.7 SRO 2.9

Meets K/A, requires examinee knowledge of the design aspects allowing for local or remote operation of the station air compressors.

10CFR55.41(b)(7) Design, components, and functions of control and safety systems, including instrumentation, signals, interlocks, failure modes, and automatic and manual features.

Answer: A. Per 0BwOA SEC-4 (step 2) the threshold for availability of control air for SAC operation is 50 psig. The procedure directs operators to utilize BwOP SA-1 to align a nigtrogen bottle to supply SAC control air pressure. The procedure allows for either local or remote start in this condition (the SAC are designed for operation from either location. There is no remote/local transfer switch, however putting the control switch in PTL would prevent a local start). The determination for use of a nitrogen bottle is a memory item (based solely on remembering the procedure dictated threshold of 50 psig). Determination of where the switches are located and that there is no transfer switch are memory items.

A is Correct. See explanation.
B is Incorrect. See explanation.
C is Incorrect. See explanation.
D is Incorrect. See explanation.

Objective: S.SA1-02-A.

Technical References: 0BwOA SEC-4 rev. 101. BwOP SA-1 rev. 40. 20E-1-4030SA01 rev. K.

LOD: 3

37 **ID: RS10078-N03** **Points: 1.00**

Given:

- Unit 1 was at 25% power, in a normal alignment for this power level.
- A large plant transient has just occurred.

With the above conditions, which of the following MCR indications would procedurally require an immediate reactor trip?

A. 1PI-GS001, GS SUP HDR PRESS at 1PM02J indicates 40 psig.

B. 0PI-IA007, INST AIR HDR PRESS at 0PM01J indicates 50 psig

C. 1PI-HY005A, MAIN GEN H2 PRESS at 1PM02J indicates 60 psig.

D. 0PI-SA006, SERV AIR HDR PRESS at 0PM01J indicates 70 psig.

Answer: B

Answer Explanation

Bank Question (2013 NRC exam question 37; previously on 2009 NRC exam question #27)
RO level
System 078 Instrument Air
Low Cog

A4 Ability to manually operate and/or monitor in the control room:
A4.01 Pressure gauges
RO 3.1 SRO 3.1

Meets K/A, requires examinee ability to monitor pressure meters in the MCR.

10CFR55.41(b)(7) Design, components, and functions of control and safety systems, including instrumentation, signals, interlocks, failure modes, and automatic and manual features.

Answer:

Choice A is incorrect, 1BwOA SEC-4 checks GS supply pressure at step 9, but no reactor trip criteria is mentioned.
Choice B is correct 1BwOA SEC-4, step 3 checks IA press at 0PI-IA007 (checking for adequate IA supply to operate FW valves) < 60 psig, if yes, next step is to trip reactor.
Choice C is incorrect, 1BwOA TG-7 checks H2 pressure <75 psig, and lowering is turbine trip criteria, but at <30% power reactor trip is not required.
Choice D is incorrect, pressure transmitter for 0PI-SA006 is on the main turb. bldg SA header. The IA supply taps off the compressor discharges upstream of the SA header. depending on the location and size of the leak, the 0PI-SA006 may be less than 0PI-IA007.

Objective: 4C.IA-01.

Technical References: 1BwOA SEC-4 rev. 103.

LOD: 2-3

38 **ID: RS10103-N03** **Points: 1.00**

Given:

- Unit 2 is in MODE 3 preparing for a reactor startup.
- All Shutdown banks are withdrawn.
- Redundant Steam Pressure instrumentation failures resulted in an inadvertent safety injection.
- Both malfunctioning Steam Pressure channels are failed LOW.

Subsequently:

- Five minutes later the crew has depressed BOTH SI RESET pushbuttons.

Regarding restoration of the normal containment cooling alignment (RCFCs and Containment Chillers)…

A. Phase A must be reset.

B. no additional ESF actuations are required to be reset.

C. operators must place the STM LIME SI RESET/BLOCK switches (A and B train) to BLOCK. BOTH SI RESET pushbuttons must be depressed a second time. Resetting Phase A is NOT required.

D. operators must place the STM LIME SI RESET/BLOCK switches (A and B train) to BLOCK. BOTH SI RESET pushbuttons must be depressed a second time. Resetting Phase A is then required.

Answer: A

Answer Explanation

New Question (2013 NRC exam question 38)
RO level
System 103 Containment
High Cog

K1 Knowledge of the physical connections and/or cause effect relationships between the containment system and the following systems:
K1.08 SIS, including action of safety injection reset
RO 3.6 SRO 3.8

Meets K/A, requires examinee to determine the effect of the active safety injection signal (due to the two failed low pressurizer pressure channels) on the ability to reset the SI signal and phase A, in order to restore normal containment cooling.

10CFR55.41(b)(7) Design, components, and functions of control and safety systems, including instrumentation, signals, interlocks, failure modes, and automatic and manual features.

Answer: A. Phase A must be reset. In order to restore normal containment cooling (RCFCs to fast or desired speed and containment chiller operation) phase A and SI must be reset. Phase A can be reset even if SI has NOT been reset, even though the safety injection signal actuates a slave relay that then actuates phase A. SI will reset even though the two steam pressure channels are failed low, so depressing the SI RESET pushbuttons DID work to reset SI. Because a reactor trip occurred (P-4 met there is no statement indicating any reactor trip breakers failed) auto-SI is blocked (blocking the SI input from the failed pressuizer channels). As such, it is not necessary to remove the failed channel inputs by resetting a failed channel bistable. Blocking steamline SI via switches is plausible for distraction as these are used during normal shutdown (and during 1BwEP-3) to prevent SI/MS isolation.

A is Correct. See explanation.
B is Incorrect. See explanation.
C is Incorrect. See explanation.
D is Incorrect. See explanation.

Objective: S.EF1-06.

Technical References: Big Note EF-4, rev. 5, ESF Actuations. Big Note VP-3, rev. 6, Containment Cooling.

LOD: 3

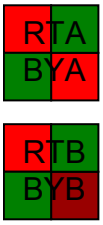
39 **ID: RE10007-N02** **Points: 1.00**

Given:

- Unit One at 100% power.
- 1BwOSR 3.3.1.4-1, SSPS, REACTOR TRIP BREAKER, AND REACTOR TRIP BYPASS BREAKER SURVEILLANCE (TRAIN A) testing is in progress.
- The last manipulation results in the following reactor trip/bypass breaker indications at 1PM05J:

Note: Color Indications:

= RED LIT = GREEN NOT LIT = RED NOT LIT



- Bypass Permissive Status Light P4 RX TRIP is fast flashing after acknowledgment.
- PRNIs N41-N44 ALL indicate 4% dropping.
- ALL rod bottom lights are lit.
- IRNI SUR is negative.

Based on these indications the NEXT action is to…

A. check SI status.

B. go to 1BwFR-S.1, RESPONSE TO NUCLEAR POWER GENERATION/ATWS.

C. verify ALL turbine throttle and governor valves CLOSED.

D. manually trip the reactor.

Answer: D

Answer Explanation

New Question (2013 NRC exam question 39) **NOTE: print in color for exam use.**
RO level
E/APE 007 Reactor Trip-Stabilization-Recovery
High Cog

EK2 Knowledge of the interrelations between a reactor trip and the following:
EK2.03 Reactor trip status panel
RO 3.5 SRO 3.6

Meets K/A, examinee must determine the status of the A reactor trip and bypass breakers, and the B bypass breaker.

10CFR55.41(b)(7) Design, components, and functions of control and safety systems, including instrumentation, signals, interlocks, failure modes, and automatic and manual features.
Answer: D. manually trip the reactor at 1PM05J and 1PM06J. Step 1 of 1BwEP-0 requires that ALL conditions (rod bottom lights lit, reactor trip AND bypass breakers are OPEN, and neutron flux dropping). Although indications are that the reactor is tripped, the bypass breaker A indicates open and the correct procedural action is to manually trip the reactor from BOTH 1PM05J and 1PM06J.

A is Incorrect. See explanation.
B is Incorrect. See explanation.
C is Incorrect. See explanation.
D is Correct. See explanation.

Objective: T.EP01-06A.

Technical References: 1BwOSR 3.3.1.4-1, SSPS, REACTOR TRIP BREAKER, AND REACTOR TRIP BYPASS BREAKER SURVEILLANCE (TRAIN A) rev 32 (see step F.4.3 page 26 and F.15.8.g.1 page 56).

LOD: 2-3

40 **ID: RE10008-N02** **Points: 1.00**

Given the following plant conditions on Unit 1:

- The crew is responding to a reactor trip and SI.
- 1BwEP-1 "LOSS OF REACTOR OR SECONDARY COOLANT" is in progress at step 2.
- PZR level has risen continuously.
- RCS pressure has dropped continuously.

Based on these conditions, the failure is a leak through the

A. PZR liquid space sample valve.

B. charging header connection to the RCS loop.

C. PZR connection to a safety valve.

D. 1B RCS hot leg valve body.

Answer: C

Answer Explanation

Bank Question (2013 NRC exam question 40) from LORT Bank Vision ID BWLC3DEP2003
RO level
E/APE 008 Pressurizer Vapor Space Accident
High Cog

AK2. Knowledge of the interrelations between the Pressurizer Vapor Space Accident and the following:
AK2.01 Valves
RO 2.7 SRO 2.7

Meets K/A, requires examinee to evaluate the indications of a vapor space accident and determine that the only answer that meets this is related to a PZR safety valve.
10CFR55.41(b)(7) Design, components, and functions of control and safety systems, including instrumentation, signals, interlocks, failure modes, and automatic and manual features.
Answer: C. Since PZR level is rising during a leak (loss of inventory), that indicates the leak is in the PZR vapor space. The PZR connection to a safety valve is the only answer in the PZR vapor space. Distractors are all potential leakage paths, but not via PZR vapor space.

A is Incorrect. See explanation.
B is Incorrect. See explanation.
C is Correct. See explanation.
D is Incorrect. See explanation.

Objective: T.EP02-09.

Technical References: I1-EP-XL-02 rev. 16a.

LOD: 2

41 **ID: RE10009-C03** **Points: 1.00**

Given:

- Unit One initially at 100% power.
- The 1A CV pump was OOS.
- A LOCA occurred 10 minutes ago.
- Bus 142 is faulted.
- Containment pressure just peaked at 21 psig.
- RCS pressure is 520 psig and STABLE.
- RWST level is 75% and dropping at 0.3% per minute.
- Assume all equipment responds as designed, with the aforementioned exceptions.

Of the following, the parameter that is expected to RISE over the next five minutes is…

A. RCP 1A Seal Outlet Temperature.

B. VCT Temperature.

C. Unit 1 CC HX Outlet Temperature.

D. Containment Chilled Water Expansion tank level.

Answer: A

Answer Explanation

New Question (2013 NRC exam question 41)
RO level
E/APE 009 Small Break LOCA
High Cog

EA2 Ability to determine or interpret the following as they apply to a small break LOCA:
EA2.24 RCP temperature setpoints
RO 2.6 SRO 2.9

Meets K/A, requires examinee to determine that RCP seal outlet temperature will trend toward its temperature limit during the SBLOCA conditions described.

10CFR55.41(b)(5) Facility operating characteristics during steady state and transient conditions, including coolant chemistry, causes and effects of temperature, pressure and reactivity changes, effects of load changes, and operating limitations and reasons for these operating characteristics.

Answer: A. RCP 1A Seal Outlet Temperature. With the 1A CV pump OOS and bus 142 faulted, there are no charging pumps available for seal injection. When containment pressure exceeded 20 psig, a Phase B actuation isolated all CCW to the RCPs and the phase A isolated seal return. Seal return will now divert to the PRT with hot RCS water leaking through the RCP seals into the seal packages and out the seal return line to the PRT. This will cause the RCP 1A Seal Outlet Temperature to rise. The containment chillers are isolated and trip on the SI so no heat load will be added to the system and chiller expansion tank level will remain the same with no heat load. The VCT has been isolated on the SI (letdown isolated on Phase A and no charging pump is putting any water into it, so VCT temperature will not change). Unit 1 CC HX outlet temperature will likely drop as the largest heat load for CCW (the letdown heat exchanger) and additional heat loads (RCPs) have been isolated, with no significant new heat loads added to the system (this will change once the ECCS is aligned for cold leg recirculation).

A: Correct. See explanation.
B: Incorrect. See explanation.
C: Incorrect. See explanation.
D: Incorrect. See explanation.

Objective: S.RC2-04-D.

Technical References: Big Note CV-1, rev. 15, CVCS. Big Note WO-2, rev 5, Control Room/CNMT Chilled Water. I1-RC-XL-02, rev. 5a, RCP lesson plan.

LOD: 2-3

42 **ID: RE10015-N03** **Points: 1.00**

Given:

- Unit 1 at 100% power.
- 1B RCP #1 Seal Leakoff reads 6.8 gpm.
- 1B RCP #2 Seal Leakoff has been reported at 1.4 gpm.
- Other RCP parameters are initially normal.

Based on the above conditions, which ONE of the following correctly describes the required operator actions?

A. Immediately trip the reactor AND then trip the 1B reactor coolant pump.

B. Immediately trip the reactor, and trip the 1B RCP if the #2 seal Leakoff DROPS to < 0.2 gpm.

C. Initiate a plant shutdown, and trip the affected RCP within 8 hours.

D. Operation may continue however operators will have to trip the reactor and 1B RCP if #1 Seal Leakoff RISES to > 8 gpm.

Answer: A

Answer Explanation

Bank Question (2013 NRC exam question 42) Question is from ILT bank Vision ID BWLI-RCP1006. Not used for ILT 11-1. Used in COPS quizzes for ILT 10-1 and prior ILT class.
RO level
E/APE 015/017 RCP Malfunctions
High Cog

AA1. Ability to operate and / or monitor the following as they apply to the Reactor Coolant Pump Malfunctions (Loss of RC Flow):
AA1.22 RCP seal failure/malfunction
RO 4.0 SRO 4.2

Meets K/A, examinee must assess RCP seal (failure) indications monitored and make a decision regarding continued operation of the RCPs.

10CFR55.41(b)(10) Administrative, normal, abnormal, and emergency operating procedures for the facility.

Answer: A. 1BwOA RCP-1 states that if combined leakoff of #1 and #2 seals > 8 gpm, then trip the reactor and affected RCP (Step 9d RNO & 10). Per BwOP RC-1 RCP is tripped during initial start if #1 seal leakoff drops to less than 0.2 gpm, otherwise specific troubleshooting guidance is provided for seal leakoff less than 0.2 gpm. A controlled plant shutdown over an 8 hour period is directed if #1 seal leakoff is above 6 gpm but total seal leakoff less than 8 gpm.

A is Correct. See explanation.
B is Incorrect. See explanation.
C is Incorrect. See explanation.
D is Incorrect. See explanation.

Objective: T.OA27-08.

Technical References: 1BwOA RCP-1 rev. 107.

LOD: 2-3

43 **ID: RE10022-N03** **Points: 1.00**

Given:

- Unit 1 is in MODE 3.
- 1BwGP 100-1, Plant Heatup, is in progress.
- 1SI8808A-D, SI Accumulator Isolation Valves, are being restored to their normal at power alignment.
- 1A CV pump is RUNNING.

- The following then occurs:

  - 1A CV pump TRIPs.
  - The crew has implemented 1BwOA PRI-15, Loss of Normal Charging.
  - NO abnormal charging system indications were observed prior to the 1A CV pump trip.

The crew will …

A. vent the 1B CV pump BEFORE starting it to prevent gas binding.

B. throttle 1CV121 in manual to 5% demand BEFORE starting the 1B CV pump to provide adequate line resistance.

C. send a NSO to start the Auxiliary Oil Pump BEFORE starting the 1B CV pump to ensure proper lubrication.

D. start the 1B CV pump with 1CV121 FULL OPEN to minimize the time period with no charging flow.

Answer: B

Answer Explanation

Modified Question (2013 NRC exam question 43)
RO level
E/APE 022 Loss of Rx Coolant Makeup
Low Cog

AK3. Knowledge of the reasons for the following responses as they apply to the Loss of Reactor Coolant Makeup:
AK3.02 Actions contained in SOPs and EOPs for RCPs, loss of makeup, loss of charging, and abnormal charging.
RO 3.5 SRO 3.8

Meets K/A, examinee must identify the correct action and reason for the action to address a loss of Rx Coolant makeup, per 1BwOA PRI-15, Loss of Normal Charging.

10CFR55.41(b)(10) Administrative, normal, abnormal, and emergency operating procedures for the facility.

Answer: B. throttle 1CV121 in manual to 5% demand BEFORE starting the 1B CV pump to provide adequate line resistance. The plant is between 800 and 1000 psig (preparing to place 1SI8808s in service) and the cause of the trip is known (based on direct observation) not to be gas binding. The note at the front of the procedure allows the reader to proceed directly to step 6 where the mini-flow path for the associated standby pump is verified and then 1CV121 placed in manual at 5% demand because the plant is not at NOP. For radial flow pumps, such as the CV pumps, discharge flow resistance is necessary to minimize starting current, and forms the basis for throttling 1CV121 to 5% open. For some procedural situations, a NSO is sent to the RSDP to start the Auxiliary Oil pump prior to starting the charging pump (but not in this procedure). Starting the standby pump with 1CV121 full open would be performed with the plant at normal operating pressure (the RCS pressure providing sufficient backpressure even with 1CV121 full open to prevent excessive starting current).

A is Incorrect. See explanation.
B is Correct. See explanation.
C is Incorrect. See explanation.
D is Incorrect. See explanation.

Objective: T.OA23A-04.

Technical References: 1BwOA PRI-15, rev. 1. I1-OA-XL-23A rev.1, BwOA PRI-15, Loss of Normal Charging lesson plan. I1-FF-XL-02, rev. 6b,, Lesson Plan on Pumps page 34.

LOD: 2-3

Original Question:

BWLI-PRI5024

Given:
Unit 1 is in MODE 3.
1BwGP 100-1, Plant Heatup, is in progress.
1SI8808A-D, SI Accumulator Isolation Valves, are being restored to their normal at power alignment.
1A CV pump is RUNNING.

The following then occurs:
1A CV pump TRIPs.
The crew has implemented 1BwOA PRI-15, Loss of Normal Charging.
NO abnormal charging system indications were observed prior to the 1A CV pump trip.

Based on the above conditions AND in accordance with 1BwOA PRI-15, which ONE of the following describes ALL actions that must be performed to restore charging flow?

Vent 1B CV Pump.
Verify 1CV8110 AND 1CV8116, 1B CV pump Mini-flow valves, are OPEN.
Place 1CV121, CV Pumps Discharge Flow Control Valve, in MANUAL at 5% demand.
Place 1B CV pump control switch to START.

A. ONLY 2, 3, AND 4

B. ONLY 3 AND 4

C. ONLY 4.

D. 1, 2, 3, AND 4

Answer: A

Answer Explanation

Explanation:
1BwOA Pri-15 is written for all modes of operation (per background document), therefore it applies. The plant is between 800 and 1000 psig (preparing to place 1SI8808s in service) and the cause of the trip is known (based on direct observation) not to be gas binding. The note at the front of the procedure allows the reader to proceed directly to step 6 where the mini-flow path for the associated standby pump is verified and then 1CV121 placed in manual at 5% demand because the plant is not at NOP.

44 **ID: RG10025-N02** **Points: 1.00**

Given:

- Unit 1 PZR is solid.
- RCS temperature is 120°F.
- RCS pressure is 100 psig.
- The 1A RH train is operating in the shutdown cooling mode.
- All Narrow Range SG levels are 20%.
- 1RY8000A and B PORV ISOL VLVs are closed and de-energized.

In this situation…

A. the 1B RH train is aligned for shutdown cooling to allow the 450 psig suction relief to meet RCS overpressure protection requirements of LCO 3.4.12, Low Temperature Overpressure Protection.

B. the 1B RH train is aligned for shutdown cooling to meet LCO 3.4.7, RCS Loops MODE 5 (Loops Filled) requirements for OPERABLE loops.

C. normal letdown is aligned to allow the 600 psig relief to meet RCS overpressure protection requirements of LCO 3.4.12, Low Temperature Overpressure Protection.

D. at least one SG NR level must be raised to meet LCO 3.4.7, RCS Loops MODE 5 (Loops Filled) requirements for OPERABLE loops.

Answer: A

Answer Explanation

New Question (2013 NRC exam question 44)
RO level
E/APE 025 Loss of RHR System
Low Cog

2.1.28 Knowledge of the purpose and function of major system components and controls.
RO 4.1 SRO 4.1

Meets K/A, examinee must identify the specific component and functional requirement (in this case, per Tech Specs).

10CFR55.41(b)(7) Design, components, and functions of control and safety systems, including instrumentation, signals, interlocks, failure modes, and automatic and manual features.

Answer: A. the 1B RH train is aligned for shutdown cooling to allow the 450 psig suction relief to meet RCS overpressure protection requirements of LCO 3.4.12, Low Temperature Overpressure Protection. C is valid distractor as normal letdown IS aligned to allow the 600 psig relief to provide ADDITIONAL protection from overpressure events, however that relief does NOT meet the LCO requirements (due to limited capacity). B is valid distractor as LCO 3.4.7 for Mode 5 (Loops Filled) requires either two RH loops OPERABLE or the secondary SG side of 2 SGs of at least 18% NR. In this case, the second RH loop is not required to be operable because the SG requirement is met. Students easily confuse the requirements of LCO 3.4.7 (Loops Filled) and LCO 3.4.8 (Loops Not Filled), both applicable to Mode 5.

A Correct. See explanation.

B Incorrect. See explanation.
C Incorrect. See explanation.
D Incorrect. See explanation.

Objective: S.RH1-12-A.

Technical References: LCO 3.4.12. LCO 3.4.7. SR 3.4.7.2.

LOD: 2

45 **ID: RE10026-N03** **Points: 1.00**

Given:

- Both units at 100% power.
- The 0 CC HX and pump are aligned to Unit 2.

Subsequently:

- A CC system malfunction has resulted in placing ALL CC pumps aligned to Unit 2 in PTL.

The current situation has resulted in…

A. no effect on Unit 1.

B. a loss of CC flow capability to the Unit 1 RCPs.

C. a loss of CC flow capability to the 1A RH train.

D. a loss of ALL CC flow capability to spent fuel pool cooling.

Answer: C

Answer Explanation

New Question (2013 NRC exam question 45)
RO level
E/APE 026 loss of Component Cooling Water
High Cog

AK3. Knowledge of the reasons for the following responses as they apply to the Loss of Component Cooling Water:
AK3.04 Effect on the CCW flow header of a loss of CCW
RO 3.5 SRO 3.7

Meets K/A, examinee must determine the effect of loss of Unit 2 CCW (with the 0 CC HX and pump aligned) on the various CCW flow headers. In order to determine this, examinee must understand how the system is aligned (thus establishing the reason for which CC support is lost).

10CFR55.41(b)(7) Design, components, and functions of control and safety systems, including instrumentation, signals, interlocks, failure modes, and automatic and manual features.

Answer: C. Loss of CC support to the 1A RH train. With unit 0 CC HX and pump aligned to Unit 2, the Unit 2 side supports BOTH units' A train safety loops (A RH trains). Unit 1 RCPs are supplied by the non-safety portion of the unit 1 CCW system. SFP cooling has separate unit 1 and unit 2 side HXs supplied by their non-safety flow loops. Support has been lost from the unit 2 side SFP HX but not the unit 1 side SFP HX. Because the SFP is a common system between units, and the 0 CC HX and pump are aligned to unit 2, an examinee may well assume that all cooling is lost to SFP cooling.

A is Incorrect. See explanation.
B is Incorrect. See explanation.
C is Correct. See explanation.
D is Incorrect. See explanation.

Objective: S.CC1-02-A.

Technical References: Big Note CC-1, rev. 14, CC system. Lesson Plan I1-CC-XL-01 rev. 4b.

LOD: 2

46 **ID: RE10027-N03** **Points: 1.00**

Given:

- Unit 1 is at 100% power.
- 1PK-455A, Master PZR Pressure Controller output failed as is.
- 1PK-455A will NOT transfer to Manual control.

- A grid loss results in a rapid runback to 70% power.
- The US directs the RO to manually operate Pressurizer Pressure controls during the runback.
- Current parameters are as follows:

  - PZR Level 66%
  - PZR Pressure 2280 psig

The RO will…

A. turn OFF all heaters, and initiate spray flow to compensate for the initial insurge.

B. turn ON all backup heaters and initiate spray flow to compensate for the initial insurge.

C. turn ON all backup heaters and CLOSE both Pressurizer spray valves to compensate for the initial outsurge.

D. turn OFF ONLY the backup heaters, and fully OPEN both Pressurizer spray valves to compensate for the initial outsurge.

Answer: B

Answer Explanation

New Question (2013 NRC exam question 46)
RO level
E/APE 027 Pressurizer Pressure Control System Malfunction
High Cog

AK1. Knowledge of the operational implications of the following concepts as they apply to Pressurizer Pressure Control Malfunctions:
AK1.02 Expansion of liquids as temperature increases
RO 2.8 SRO 3.1

Meets K/A, examinee must determine the effect of the runback (rapid turbine load reduction results in the RCS heating up and causing an insurge into the Pressurizer) on RCS fluid temperature, then determine the appropriate operational response to manually control Pressurizer pressure consistent with the automatic design function.

10CFR55.41(b)(7) Design, components, and functions of control and safety systems, including instrumentation, signals, interlocks, failure modes, and automatic and manual features.

Answer: B. Turn on all backup heaters and initiate spray flow to compensate for initial insurge. The rapid turbine runback results in RCS heatup, causing an insurge into the Pressurizer. The automatic design is such that all backup heaters turn on (at a setting of 5 % above program) to heat up the cool water that surges into the bottom of the pressurizer to maintain saturation conditions. At the same time, the insurge compresses the steam space causing Pressurizer pressure to rise, necessitating opening pressurizer sprays.

A is Incorrect. See explanation.
B is Correct. See explanation.
C is Incorrect. See explanation.
D is Incorrect. See explanation.

Objective: A.TH3-08.

Technical References: Lesson Plan I1-TH-XL-03, rev. 8c, First Law Applications. Lesson Plan I1-RY-XL-01 rev. 6b.

LOD: 2-3

47 **ID: RE10038-N02** **Points: 1.00**

Given:

- Unit 1 has experienced a SGTR on the 1A SG.
- Failures of BOTH SI and CV pumps occurred during the event.
- The initial RCS cooldown has been completed.
- The TSC has expressed concern that the RCS is experiencing reflux boiling.

NOTE:

- 1BwCA-3.1: SGTR WITH LOSS OF REACTOR COOLANT-SUBCOOLED RECOVERY DESIRED
- 1BwCA-3.2: SGTR WITH LOSS OF REACTOR COOLANT-SATURATED RECOVERY DESIRED
- 1BwEP-3: STEAM GENERATOR TUBE RUPTURE

If the TSC is correct, the RCS is/has …

A. lost natural circulation. The mitigating strategies in 1BwCA-3.1, and/or 1BwCA-3.2, apply.

B. continuing natural circulation. ONLY the mitigating strategies in 1BwEP-3, apply.

C. continuing natural circulation. The mitigating strategies in 1BwCA-3.1 and/or 1BwCA-3.2 apply.

D. lost natural circulation. ONLY the mitigating strategies in 1BwEP-3 apply.

Answer: A

Answer Explanation

New Question (2013 NRC exam question 47)
RO level
E/APE 038 Steam Generator Tube Rupture
Low Cog

EK1 Knowledge of the operational implications of the following concepts as they apply to the SGTR:
EK1.04 Reflux boiling
RO 3.1 SRO 3.3

Meets K/A, examinee must assess the operational mitigating strategies that apply to a SGTR with reflux boiling occurring.

10CFR55.41(b)(10) Administrative, normal, abnormal, and emergency operating procedures for the facility.

Answer: A. Reflux boiling is generally associated with SBLOCA theory, however it could conceivably occur during a SGTR wherein the RCS loses sufficient inventory via the SGTR or in combination with a LOCA. Reflux boiling occurs when the RCS is saturated and the SG U-tubes are predominantly steam on BOTH hot and cold leg sides of the the SG. This is the point at which natural circulation is lost due to the small difference in water density between hot and cold leg sides of the RCS. Following the initial cooldown of the RCS in 1BwEP-3, the RCS subcooling is checked. With no subcooling present, the mitigating strategies of 1BwCA-3.1 SGTR with Loss of Reactor Coolant-Subcooled Recovery Desired and potentially 1BwCA-3.2 SGTR with Loss of Reactor Coolant-Saturated Recovery Desired .

A is Incorrect. See explanation.
B is Incorrect. See explanation.
C is Correct. See explanation.
D is Incorrect. See explanation.

Objective: T.CA4-04-A.

Technical References: Lesson Plan I1-EP-XL-02B Small Break LOCA rev. 6. 1BwEP-3 SGTR rev. 207. Lesson Plan I1-CA-XL-04 CA-3.1, 3.2, 3.3 Contingency Action Procedures rev. 10b.

LOD: 2-3

48 **ID: RE1WE12-C02** **Points: 1.00**

Given:

- Unit 2 at 100% power.

Subsequently:

- A fault occurred on the 2B SG inside containment.
- ALL MSIVs failed to close.

- Currently:

  - AFW flow is 45-50 gpm per SG.
  - ALL NR SG levels are 0%.
  - ALL WR SG levels are 30-40%.
  - Containment pressure is 18 psig dropping.
  - ONLY the 2A Train CS train actuated and is running.
  - The crew is implementing 2BwCA-2.1, UNCONTROLLED DEPRESSURIZATION OF ALL STEAM GENERATORS, Step 4, Check Pzr PORVs and Isolation Valves.
  - 2BwFR-H.1 RESPONSE TO LOSS OF SECONDARY HEAT SINK, was previously entered and exited.

  - 2MS001B Loop 2B MSIV just closed.
  - 2MS001A, 2MS001C and 2MS001D MSIVs remain OPEN.
  - 2A, 2C and 2D SG pressures are 70 psig and rising.

In response to this event, the crew will…

A. IMMEDIATELY transition to 2BwFR-H.1 and initiate bleed and feed.

B. complete letdown restoration, then transition to 2BwFR-H.1 and initiate bleed and feed.

C. IMMEDIATELY transition to 2BwEP-2, FAULTED STEAM GENERATOR ISOLATION.

D. complete letdown restoration, then transition to 2BwEP-2, FAULTED STEAM GENERATOR ISOLATION.

Answer: C

Answer Explanation

New Question (2013 NRC exam question 48)
RO level
E/APE WE12 Uncontrolled Depressurization of all Steam Generators
High Cog

EA2. Ability to determine and interpret the following as they apply to the (Uncontrolled Depressurization of all Steam Generators)
EA2.1 Facility conditions and selection of appropriate procedures during abnormal and emergency operations.
RO 3.2 SRO 4.0

Meets K/A, examinee must assess plant conditions and determine the correct procedural implementation. 10CFR55.41(b)(10) Administrative, normal, abnormal, and emergency operating procedures for the facility.

Answer: C. Per OAS in 2BwCA-2.1, go to 2BwEP-2 if any SG indicates pressure rises at any time, except while performing SI termination in steps 11 to 21. Although red path exists on Heat Sink, the procedure was already entered and exited (per note in BwFR-H.1) and does not require re-entry.

A is Incorrect. See explanation.
B is Incorrect. See explanation.
C is Correct. See explanation.
D is Incorrect. See explanation.

Objective: T.CA3-05.

Technical References: 2BwCA-2.1, rev. 204, UNCONTROLLED DEPRESSURIZATION OF ALL STEAM GENERATORS.

LOD: 2-3

49 **ID: RE10054-C02** **Points: 1.00**

Given:

- Unit 2 at 100% power.
- The crew is implementing 2BwOA SEC-1, SECONDARY PUMP TRIP, in response to a loss of the 2B FW pump.
- A turbine runback was initiated.

In response to this event, a reactor trip is most likely to occur as a result of …

A. Lo-2 SG level. This is prevented by starting the standby CD/CB pump.

B. high Pressurizer water level. This is prevented by initiating a boration concurrent with initiating the runback.

C. high Pressurizer water level. This is prevented by ensuring rod control is in automatic.

D. Lo-2 SG level. This is prevented by matching FW flow and steam flow on each SG.

Answer: D

Answer Explanation

New Question (2013 NRC exam question 49)
RO level
E/APE 054 Loss of Main Feedwater
High Cog

AK3. Knowledge of the reasons for the following responses as they apply to the Loss of Main Feedwater (MFW):
AK3.02 Matching of feedwater and steam flows
RO 3.4 SRO 3.7

Meets K/A, examinee must evaluate operator actions during a of the loss of Main FW and determine the reason for the action.

10CFR55.41(b)(5) Facility operating characteristics during steady state and transient conditions, including coolant chemistry, causes and effects of temperature, pressure and reactivity changes, effects of load changes, and operating limitations and reasons for these operating characteristics.

Answer: D. Lo-2 SG level. This is prevented by matching FW flow and steam flow on each SG. The loss of 2B FW pump results in FW flow < steam flow driving SG levels down. The runback is in response to a failure (or unavailability) of the 2A FW pump. EACH SG level will only stop dropping once FW flow matches steam flow, thereby preventing the reactor trip. Presssurizer water level will initially rise somewhat due to an insurge, however it will subsequently lower as rods drive in lowering Tave. Similarly, an operator action during the event is to borate, which adds negative reactivity, limiting the total rod motion necessary to drive Tave to the lower program Tave value at the end of the ramp. The plant is designed (per UFSAR) for a 50% load reject without the insurge causing a high Pressurizer level reactor trip (this was a design criteria for sizing the Pressurizer-see Big Note RY-1). Starting a fourth CD/CB pump is a procedural action, making it plausible, however this alone will not prevent the low-2 SG level reactor trip.

A is Incorrect. See explanation.

B is Incorrect. See explanation.
C is incorrect. See explanation.
D is Correct. See explanation.

Objective: T.OA36-04.

Technical References: I1-OA-XL-36 rev. 13. Big Note RY-1, Pressurizer rev. 11.

LOD: 2-3

50 **ID: RG102418-C01** **Points: 1.00**

Given:

- Unit 1 has experienced a Loss of All AC Power.
- The crew is performing the immediate actions of 1BwCA-0.0, LOSS OF ALL AC POWER.

The basis for verifying ALL MSIVs and MSIV bypass valves closed at step 2 is to …

A. protect personnel in the turbine building.

B. limit the potential for high differential pressure across the SG tubes.

C. prevent an uncontrolled cooldown of the RCS.

D. protect the Main Condenser from overpressure.

Answer: C

Answer Explanation

New Question (2013 NRC exam question 50)
RO level
E/APE 055 Station Blackout
Low Cog

2.4.18 Knowledge of the specific bases for EOPs.
RO 3.3 SRO 4.0

Meets K/A, examinee must identify the basis for the specific EOP action for a Station Blackout.
10CFR55.41(b)(10) Administrative, normal, abnormal, and emergency operating procedures for the facility.

Answer: C. prevent an uncontrolled cooldown of the RCS due to steam flow to the main turbine. Per the ERG bases for step 2 of 1BwCA-0.0, LOSS OF ALL AC POWER isolating the MS lines is performed to ensure the main turbine is isolated and does not cause an uncontrolled RCS cooldown. Distractors are plausible as power is lost to station air compressors (if Unit 2 is available, one SAC will have power), thus it is reasonable for various gland steam regulators to fail. Also, the loss of all AC removes power to various secondary pumps that provide gland water cooling to prevent high temperature feedwater from leaking into the turbine building. With MSIVs left open and MS lines depressurizing, the differential pressure across the SG tubes would rise tending to raise any pre-existing primary to secondary leakage. Protecting the Main Condenser from overpressure is a valid distractor as CW pumps are lost for condenser cooling and potential steam into the Condenser would be an overpressure concern.

A is Incorrect. See explanation.
B is Incorrect. See explanation.
C is Correct. See explanation.
D is Incorrect. See explanation.

Objective: T.CA1-07.

Technical References: ERG background document (BD-CA-0.0) rev. 203, for BwCA-0.0 step 2..

LOD: 2

EXAMINATION ANSWER KEY

2013 NRC SRO EXAM

51 **ID: RE10056-C02** **Points: 1.00**

Given:

- Unit 1 experienced a reactor trip from full power.
- One minute later a loss of offsite power occurred.

Currently (90 minutes after the loss of offsite power):

- The crew is implementing 1BwEP ES-0.2, NATURAL CIRCULATION COOLDOWN.
- RCS pressure is 885 psig.
- SG pressures are ALL 785 psig.

- SATURATED conditions in the plenum are indicated by ___(1)___ .
- In response, operators will ____(2)____.

A. (1) CETCs reading 532°F.
(2) actuate safety injection.

B. (1) RCS cold leg temperatures at 518.2°F.
(2) repressurize the RCS to collapse the void.

C. (1) CETCs reading 532°F.
(2) repressurize the RCS to collapse the void.

D. (1) RCS cold leg temperatures at at 518.2°F.
(2) actuate safety injection.

Answer: A

Answer Explanation

New Question (2013 NRC exam question 51)
RO level
E/APE 056 Loss of Off-site Power
Low Cog

AK1. Knowledge of the operational implications of the following concepts as they apply to Loss of Offsite Power:
AK1.04 Definition of saturation conditions, implication for the systems
RO 3.1 SRO 3.2

Meets K/A, examinee must determine the correct indication for saturation in the plenum and determine the correct operational response.
10CFR55.41(b)(5) Facility operating characteristics during steady state and transient conditions, including coolant chemistry, causes and effects of temperature, pressure and reactivity changes, effects of load changes, and operating limitations and reasons for these operating characteristics.

Answer: A. 532°F. Actuate safety injection. Saturation temperature for 885 psig (900 psia) is 532°F. CETCs measure fluid temperature of the plenum, therefore the CETCs at 532°F is a direct indication of plenum saturation. A cold leg temerature of at 518.2°F means the cold leg is at the saturation temperature for the SGs (532°F is the saturation temperature for 785 psig or 800 psia) and this is an indication that natural circulation is occuring (per Attachment B of 1BwEP ES-0.1, REACTOR TRIP RESPONSE). This is a logical error for an examinee who just looks up a saturation temperature without thinking through the specific location of interest for the question.. 1BwEP ES-0.2 OAS directs operators to actuate SI and go to 1BwEP-0, REACTOR TRIP OR SAFETY INJECTION, if RCS subcooling is unacceptable. With the plenum at saturated conditions, there is no subcooling (i.e. unacceptable) so this criteria is met. Distractors are plausible as Pressurizer level rising suddenly is a concern/diagnostic for voiding in the reactor vessel head with an operator response to raise RCS pressure to collapse the void.

A is Correct. See explanation.
B is Incorrect. See explanation.
C is Incorrect. See explanation.
D is Incorrect. See explanation.

Objective: T.EP01-06-D.

Technical References: Steam tables. 1BwEP ES-0.2, NATURAL CIRCULATION COOLDOWN, rev. 202.

LOD: 3

52 **ID: RE10057-C02** **Points: 1.00**

Given:

- Unit 1 at 100% power.
- Pressurizer Level control is selected to 459/460.
- A simultaneous loss of Instrument Bus 111 and the redundant power supply for 1PA01J occurs.

In response to this event Pressurizer Level controller 1LK-459 will …

A. NOT control PZR level in automatic. The crew MUST place the controller in MANUAL and restore letdown to control Pressurizer level.

B. NOT control PZR level in ANY mode. The crew MUST place 1CV121 in MANUAL and restore letdown to control Pressurizer level.

C. control PZR level in automatic after an operable Pressurizer level channel is selected AND letdown is restored.

D. function in automatic after an operable Pressurizer level channel is selected. Letdown was NOT isolated during the event.

Answer: C

Answer Explanation

New Question (2013 NRC exam question 52)
RO level
E/APE 057 Loss of Vital AC Inst Bus
High Cog

AA1. Ability to operate and / or monitor the following as they apply to the Loss of Vital AC Instrument Bus:
AA1.02 Manual control of PZR level
RO 3.8 SRO 3.7

Meets K/A, examinee must assess the effects of a loss of vital instrument bus and 1PA01J power supply on the Pressurizer level control system and determine the manual control mechanisms available to restore/control Pressurizer level.

10CFR55.41(b)(7) Design, components, and functions of control and safety systems, including instrumentation, signals, interlocks, failure modes, and automatic and manual features.

Answer: C. control PZR level in automatic after an operable Pressurizer level channel is selected AND letdown is restored. The crew must restore letdown to control Pressurizer level. The loss of instrument bus 111 combined with internal power supply result in loss of channel LT-459 and de-energizing of all associated bistables. This causes an isolation of letdown, therefore letdown must be restored to control Pressurizer level. Controllers are not powered by protection cabinets so the loss of the protection cabinet does not affect 1LK-459 (which is powered by 1PA06J – see 20E-1-4031RY30). Various controllers are/may be lost depending on the instrument bus. Once an operable channel is selected (460 or 461) 1LK-459 will function normally in automatic.

A is Incorrect. See explanation.
B is Incorrect. See explanation.

C is Correct. See explanation.
D is Incorrect. See explanation.

Objective: T.OA02-06.
Technical References: 20E-1-4031RY05 rev. H. 20E-1-4031RY30 rev. G. Big Note IC-1, AC Bus 111, rev. 5.
LOD: 3

53 **ID: RG10058-C01** **Points: 1.00**

Given:

- Diagnostic monitoring is in progress to locate a suspected 0.5 gpm primary leak.
- Normal charging and letdown are aligned, with the 1A Regenerative Heat Exchanger in service.
- You are monitoring computer points for:
  - Letdown flow
  - RCP Seal injection flow

Subsequently:

- A loss of DC bus 111 occurs.

Which of the following indications will you observe on the two computer points?

A. Letdown flow dropping to 0 gpm and RCP seal injection flows rising.

B. No change in letdown flow and RCP seal injection flows rising.

C. Letdown flow dropping to 0 gpm and RCP seal injection flows dropping, but NOT to 0 gpm.

D. No change in letdown flow and RCP seal injection flows dropping, but NOT to 0 gpm.

Answer: A

Answer Explanation

New Question (2013 NRC exam question 53)
RO level
E/APE 058 Loss of DC Power
High Cog

2.1.19 Ability to use plant computers to evaluate system or component status.
RO 3.9 SRO 3.8

Meets K/A, examinee must determine the expected computer indications for selected parameters as a result of a loss of DC power.

10CFR55.41(b)(7) Design, components, and functions of control and safety systems, including instrumentation, signals, interlocks, failure modes, and automatic and manual features.

Answer: A. Letdown flow dropping to 0 gpm and RCP seal injection flows rising. The loss of DC bus 111 will result in multiple valve failures in various directions. Most notable, letdown flow will isolate due to closure of 1CV8152 and subsequent closure of Letdown orifice isolation valves (due to 1-IA065 failing closed, isolating instrument air to containment). Charging will be isolated by the closure of 1CV8324A. In addition, the loss of instrument air to containment would eventually cause 1CV8324A (or B) to fail closed, isolating the normal charging line and causing all charging flow to be routed to the RCP seals. Depending on the DC bus that fails, different results occur.

A is Correct. See explanation.

B is Incorrect. See explanation.
C is Incorrect. See explanation.
D is Incorrect. See explanation.

Objective: T.OA01-09.

Technical References: Lesson plan I1-OA-XL-01, BwOA ELEC-1, rev. 9a. Big Note DC-1, rev. 9, 125 VDC SYSTEM.

LOD: 3

54 **ID: RE10062-C02** **Points: 1.00**

Given:

- Both Units at 100% power.
- Unit 0 CC HX and Pump are aligned to Unit 2.
- 1A SX pump is OOS for bearing replacement.
- 1B SX pump is running.
- 2A SX pump is running.

The following sequence of events then occurs:

- 2A SX pump TRIPs on overcurrent.
- 2B SX pump CANNOT be started.
- The crew has implemented 2BwOA PRI-8, Essential Service Water Malfunction.

Based on the above conditions, in accordance with 2BwOA PRI-8, prior to OPENING 1SX005, Unit 0 CC HEAT EXCHANGER INLET VLV, the crew MUST...

A. ISOLATE SX flow to ONE train of RCFCs on EACH unit.

B. ISOLATE SX flow to BOTH containment chillers on Unit 2.

C. ISOLATE SX flow to ONE AF pump on EACH unit, and place the affected AF pumps in PTL.

D. THROTTLE SX flow to BOTH unit specific CC Heat Exchangers.

Answer: A

Answer Explanation

Bank Question (2013 NRC exam question 54)
RO level
E/APE 062 Loss of Nuclear Svc Water
Low Cog

AA1. Ability to operate and / or monitor the following as they apply to the Loss of Nuclear Service Water (SWS):
AA1.06 Control of flow rates to components cooled by the SWS
RO 2.9 SRO 2.9

Meets K/A, examinee must determine the correct SX load adjustment based on the loss of three of four SX pumps.
10CFR55.41(b)(10) Administrative, normal, abnormal, and emergency operating procedures for the facility.
Answer: A. ISOLATE SX flow to ONE train of RCFCs on EACH unit. This is a basic mitigating strategy, as one SX pump (the situation) is incapable of supporting all eight RCFCs of both units, so the basic mitigating strategy is to reduce the demand to within the flow capacity of the single remaining SX pump.

A is Correct. See explanation.
B is Incorrect. See explanation.
C is Incorrect. See explanation.
D is Incorrect. See explanation.

Objective: T.OA18-03.

Technical References: 2BwOA PRI-8, ESSENTIAL SERVICE WATER MALFUNCTION (ATTACHMENT B steps 1 and 2) rev. 105.

LOD: 2-3

ORIGINAL QUESTION:

BWLI-PRI8-001

Given:
BOTH units are at 100% power.
2A SX pump is out of service for motor replacement.
1A SX pump is RUNNING.
2B SX pump is RUNNING.
0 CC Heat Exchanger is aligned to Unit 1.

The following sequence of events then occurs:
1A SX pump TRIPs on overcurrent.
1B SX pump CANNOT be started.
The crew has implemented 1BwOA PRI-8, Essential Service Water Malfunction.

Based on the above conditions, in accordance with 1BwOA PRI-8, prior to OPENING 2SX005, Unit 0 CC HEAT EXCHANGER INLET VLV, the crew MUST ISOLATE SX flow to...

A. ONE train of RCFCs on EACH unit.

B. BOTH unit specific CC Heat Exchangers.

C. ALL Containment chillers on BOTH units.

D. ALL RCFCs on ONE unit.

Answer: A

Answer Explanation

Refer to 1BwOA PRI-8, Attachment B, Step 1.b, RNO.

PAST USE: 11-1 EOPS 4; 11-1 NOPS 4

55 **ID: RE10065-C02** **Points: 1.00**

Given:

- Unit 1 at 100% power.
- Normal charging aligned to 1B RC loop.
- 1A Regenerative HX is aligned.
- A malfunction results in isolation of Instrument Air to Unit 1 Containment.

Annunciator 1-7-A2, RCP SEAL WTR INJ FLTR ΔP HIGH is in alarm due to the position of…

A. 1CV182, CHG HDR BACK PRESS CONT VLV.

B. 1CV8324A, CHG TO REGEN HX ISOL VLV.

C. 1CV8146, CHG TO RC LOOP 1B ISOL VLV.

D. 1CV8141A-D, RCP 1A-1D SEAL LEAKOFF ISOL VLVs.

Answer: B

Answer Explanation

Bank Question (2013 NRC exam question 55)
RO level
E/APE 065 Loss of Instrument Air
High Cog

AA2. Ability to determine and interpret the following as they apply to the Loss of Instrument Air:
AA2.08 Failure modes of air-operated equipment
RO 2.9 SRO 3.3

Meets K/A, examinee must determine the failure mode of associated valves and determine if that failure mode would result in the subject annunciator.

10CFR55.41(b)(7) Design, components, and functions of control and safety systems, including instrumentation, signals, interlocks, failure modes, and automatic and manual features.

Answer: B. 1CV8324A, CHG TO REGEN HX ISOL VLV. 1CV8324A fails closed on loss of instrument air to containment. This directs all charging flow through the seal injection flowpath causing Annunciator 1-7-A2 to alarm. 1CV182 is outside Containment so it would not lose air. Also, 1CV182 fails open and would not result in this condition if it did lose air. 1CV8146 will lose air but will fail open and is not the cause of normal charging flowpath isolation. 1CV8141A-D fail open which is their normal position.

A is Incorrect. See explanation.
B is Correct. See explanation.
C is Incorrect. See explanation.
D is Incorrect. See explanation.

Objective: S.SA1-09.

Technical References: Big Note CV-1 rev. 15.

LOD: 2-3

56 **ID: RE10077-C03** **Points: 1.00**

Given:

- Unit 1 at 100% power in a normal alignment.
- 1VI-MP006 MAIN GENERATOR 1 OUTPUT VARS indicates 200 MVAR out.

Subsequently:

- A grid disturbance results in grid voltage rising.
- Power Team reports NO lines were lost and total grid reactive load did NOT change.

In response to this event Unit 1 MVAR out …

A. rose. To return MVAR load to a STABLE 200 MVAR the crew will take the voltage regulator control switch to LOWER.

B. lowered. To return MVAR load to a STABLE 200 MVAR the crew will take the voltage regulator control switch to RAISE.

C. did NOT change with the voltage regulator in Automatic. NO adjustment will be necessary.

D. lowered. To return MVAR load to a STABLE 200 MVAR the crew will take the base adjustor control switch to RAISE.

Answer: B

Answer Explanation

New Question (2013 NRC exam question 56)
RO level
E/APE 077 Generator Voltage and Electric Grid Disturbances
High Cog

AK2. Knowledge of the interrelations between Generator Voltage and Electric Grid Disturbances and the following:
AK2.04 Controllers, positioners
RO 3.0 SRO 3.0

Meets K/A, examinee must assess the effect of rising grid voltage on main generator reactive load and determine the appropriate voltage controller adjustment.

10CFR55.41(b)(5) Facility operating characteristics during steady state and transient conditions, including coolant chemistry, causes and effects of temperature, pressure and reactivity changes, effects of load changes, and operating limitations and reasons for these operating characteristics.

Answer: B. A rise in grid voltage with no change in total reactive load causes a reduction in reactive load output of the main generator, therefore MVAR out will lower. To restore reactive load to the original value, the operator must go to RAISE on the voltage regulator control switch.

A is Incorrect. See explanation.
B is Correct. See explanation.
C is Incorrect. See explanation.

D is Incorrect. See explanation.

Objective: S.MP2-05-A.

Technical References: I1-MP-XL-02 rev. 6a. BwOP MP-23 rev. 15.

LOD: 2-3

57 **ID: RE20001-N01** **Points: 1.00**

Given:

- Unit 2 at 90% power.
- Control Bank D is at 210 steps with rods in AUTOMATIC control.

Which of the following will INITIALLY cause the ROD OUT light to light at 2PM05J?

A. Tref programmer output fails high.

B. Power range N-44 fails low.

C. A loop 2A narrow range cold leg RTD fails high.

D. 2FK-110 BA potentiometer for is set 0.5 turns low followed by auto-makeup.

Answer: A

Answer Explanation

New Question (2013 NRC exam question 57)
RO level
E/APE 001 Continuous Rod Withdrawal
High Cog

AK2. Knowledge of the interrelations between the Continuous Rod Withdrawal and the following:
AK2.05 Rod motion lights
RO 2.9 SRO 3.1

Meets K/A, examinee must determine which situation that will cause continuous outward rod motion and light the ROD OUT light.

10CFR55.41(b)(5) Facility operating characteristics during steady state and transient conditions, including coolant chemistry, causes and effects of temperature, pressure and reactivity changes, effects of load changes, and operating limitations and reasons for these operating characteristics.

Answer: A. Tref programmer output fails high. 100% program Tave for Unit 2 is 581°F. Rod control will cause rod motion out when the difference between Tave and Tref exceeds 1.5 °F. When Tref programmer output fails high rod control will sense greater than 1.5°F difference with Tave low and initiate outward rod motion (lighting the ROD OUT light). PRNI N-44 failing low will cause NO rod motion due to the input of the power mismatch circuit in rod control being based on the auctioneered HIGH channel. A narrow range cold leg RTD failing high will cause inward rod motion due to auctioneered high Tave exceeding Tref by more than 1.5 °F. Setting the BA pot too low will cause an inadvertent dilution on auto-makeup resulting in actual Tave rising and inward rod motion.

A is Correct. See explanation.
B is Incorrect. See explanation.
C is Incorrect. See explanation.
D is Incorrect. See explanation.

Objective: S.RD1-12.

Technical References: Big Note RD-2 rev. 6. I1-RD-XL-01 Rod Control lesson plan rev. 4a.

EXAMINATION ANSWER KEY

2013 NRC SRO EXAM

LOD: 2-3

58 **ID: RE20058-N01** **Points: 1.00**

Given:

- Unit 1 at 75%.
- PDMS is operable.
- During the ramp to 100% power, rod H8 in CBD stopped moving at 162 steps (determined NOT mechanically bound-misalignment was determined to exist starting two hours ago).
- CBD rods (other than H8) are at 180 steps.
- Appropriate Tech Spec actions are in progress.
- It is estimated that the CRDM for rod H-8 will be functional in three hours.

Per 1BwOA ROD-3, DROPPED OR MISALIGNED ROD, to recover the misaligned rod:

(1) What will be moved?
(2) What is the maximum power level that will allow the recovery to begin?

A. (1) Rod H8
(2) 49%

B. (1) The other rods in CBD
(2) 49%

C. (1) Rod H8
(2) 69%

D. (1) The other rods in CBD
(2) 69%

Answer: A

Answer Explanation

New Question (2013 NRC exam question 58)
RO level
E/APE 058 Inoperable/Stuck Control Rod
High Cog

AK1. Knowledge of the operational implications of the following concepts as they apply to Inoperable / Stuck Control Rod:
AK1.03 Xenon transient
RO 3.2 SRO 3.6

Meets K/A, examinee must determine the appropriate recovery strategy for recovering a control rod that was stuck (due to a rod control issue) for several days. The basis for the approach is the effects of Xenon on the region/channel of the misaligned rod.

10CFR55.41(b)(1) Fundamentals of reactor theory, including fission process, neutron multiplication, source effects, control rod effects, criticality indications, reactivity coefficients, and poison effects.

Answer: A. (1) Rod H8 (2) 49%. 1BwOA ROD-3, DROPPED OR MISALIGNED ROD applies to the situation. Step 11 requires a reactor power level below 50% IF the misalignment lasts greater than 4 hours. Bases for step 19 specifically discusses the effects of Xenon transient as the basis for this strategy in rod recovery. 70% is the other power level based limit for restoring alignment (if accomplished within 4 hours). A common error, due to the belief that regardless of the situation, it is more conservative to move rods in than out, students mistake the procedure to discern moving the bank in toward the misaligned rod. Level of detail is basic mitigating strategy and not detailed method of restoration.

A is Correct. See explanation.
B is Incorrect. See explanation.
C is Incorrect. See explanation.
D is Incorrect. See explanation.

Objective: T.OA34-03.

Technical References: 1BwOA ROD-3, DROPPED OR MISALIGNED ROD rev. 105. I1-OA-XL-34 rev. 10.
LOD: 3

59 **ID: RE20033-N01** **Points: 1.00**

Given:

- Unit 2 is performing a plant startup.
- At 15% power a rod control malfunction resulted in the crew tripping the unit.
- The crew has just manually re-energized the SRNIs.

Currently:

- BOTH SRNIs indicate 1.5×10^{4} cps.
- IRNI N35 indicates 5×10^{-11} amps.
- IRNI N36 indicates 5×10^{-10} amps.

Based on these indications…

A. N35 indicates consistent with the SRNIs. The crew responded correctly because N36 indication is consistent with compensating voltage failing high.

B. N35 indicates consistent with the SRNIs. The crew responded correctly because N36 indication is consistent with compensating voltage failing low.

C. N36 indicates consistent with the SRNIs. The crew responded incorrectly because N35 indication is consistent with compensating voltage failing high.

D. N36 indicates consistent with the SRNIs. The crew responded incorrectly because N35 indication is consistent with compensating voltage failing low.

Answer: B

Answer Explanation

New Question (2013 NRC exam question 59)
RO level
E/APE 033 Loss of Intermediate Range NI
High Cog

AA2. Ability to determine and interpret the following as they apply to the Loss of Intermediate Range Nuclear Instrumentation:
AA2.01 Equivalency between source-range, intermediate-range, and power-range channel readings
RO 3.0 SRO 3.5

Meets K/A, examinee must determine which IRNI is functioning properly based on knowledge of the equivalent SRNI scale readings, and must determine whether the operational response of the crew is correct.

10CFR55.41(b)(7) Design, components, and functions of control and safety systems, including instrumentation, signals, interlocks, failure modes, and automatic and manual features.

Answer: B. N35 indicates consistent with the SRNIs. The crew responded correctly because N36 indication is consistent with compensating voltage failing low. At 15,000 cps IRNIs should indicate about 5×10^{-11} amps. N36 indicating high is a symptom of a failure (low) of compensating voltage. Other answers plausible based on lack of knowledge of SRNI to IRNI overlap values and compensating voltage effects.

A is Incorrect. See explanation.
B is Correct. See explanation.
C is Incorrect. See explanation.
D is Incorrect. See explanation.

Objective: S.NI2-08-B.

Technical References: Big Note NI-2, POWER RANGE DETECTOR, rev. 9. Big Note NI-3, INTERMEDIATE RANGE, rev. 9.

LOD: 3

60 **ID: RE20036-C03** **Points: 1.00**

Given:

- Unit 1 is in a refueling outage.

Which of the following would be the FIRST indication of a malfunction of the portable RCCA change tool dropping an RCCA onto a fuel assembly and causing a loss of cladding integrity?

A. Annunciator 0-34-D8, FH BLDG FLTR PLEN ΔP HIGH.

B. Rising ΔP across running Containment Building Charcoal filter units.

C. RM-11 1AR11J Ctmt Fuel Handling Incident in ALARM.

D. RM-11 0AR56J FHB Handling Incident in ALARM.

Answer: D

Answer Explanation

New Question (2013 NRC exam question 60)
RO level
E/APE 036 Fuel Handling Accident
High Cog

AK2. Knowledge of the interrelations between the Fuel Handling Incidents and the following:
AK2.01 Fuel handling equipment
RO 2.9 SRO 3.5

Meets K/A, examinee must determine which indication would be associated with a fuel handling incident involving changeout of an RCCA.

10CFR55.41(b)(7) Design, components, and functions of control and safety systems, including instrumentation, signals, interlocks, failure modes, and automatic and manual features.
Answer: D. RM-11 3AS156 FHB Handling Incident in ALARM. This is the alarm that would actuate based on AR056 detecting rising radiation levels in the fuel handling building. Annunciator 0-34-C8 FH BLDG FLTR PEN ΔP HIGH alarms on high differential pressure across the filter, and should not occur unless the filters are clogged. Students potentially consider this an expected alarm on auto-start of FH ventilation. RCCAs are ONLY changed out in the fuel handling building, NOT in the Containment, so the containment-based answers are incorrect, although it is physically possible to use the tool in containment.

A is Incorrect. See explanation.
B is Incorrect. See explanation.
C is Incorrect. See explanation.
D is Correct. See explanation.

Objective: F.FH1-01-F.

Technical References: BwAR 0-34-D8 rev. 6E1, FH BLDG FLT PLEN ΔP HIGH. Lesson plan I1-FH-XL-01 rev. 5, Fuel Handling page 12. BwAR 0-34-C8 rev. 10.

LOD: 3

61 **ID: RE20059-N01** **Points: 1.00**

Given:

- A liquid release is in progress.
- A faulty valve disc to stem interface results in CW blowdown flowrate dropping to 5200 gpm.

In response to this event Monitor 0PR01J as indicated on the RM-11 display OPS101 LIQ RADWASTE 0WX01T will be…

A. yellow.

B. grey blue (half cyan)

C. dark blue.

D. light blue (cyan).

Answer: C

Answer Explanation

New Question (2013 NRC exam question 61)
RO level
A/EPE 059 Accidental Liquid Radwaste Release
High Cog

AA1. Ability to operate and / or monitor the following as they apply to the Accidental Liquid Radwaste Release:
AA1.01 Radioactive-liquid monitor
RO 3.5 SRO 3.5

Meets K/A, examinee must determine the expected display that will result from the change in status of the liquid release.

10CFR55.41(b)(7) Design, components, and functions of control and safety systems, including instrumentation, signals, interlocks, failure modes, and automatic and manual features.

Answer: C. dark blue. The drop in CW blowdown flow below 7000 gpm results in automatic isolation of the release. This cause loss of flow to the rad monitor which results in an operate failure (dark blue). The distractors are all actual colors used for the RM-11 display for other failures/status.

A is Incorrect. See explanation.
B is Incorrect. See explanation.
C is Correct. See explanation.
D is Incorrect. See explanation.

Objective: S.WX1-11.

Technical References: BwAR 1-0PR01J rev. 4. Lesson Plan I1-WX-XL-01 Liquid Radwaste system rev. 4a page 13. Big Note AR-1, Rad Monitors rev. 9. Big Note RW-5, Liquid Radwaste PT II rev. 6.

LOD: 2-3

62 **ID: RE20061-N01** **Points: 1.00**

Given:

- Unit 2 is in a refueling outage.
- Spent fuel is being moved in the spent fuel pool.
- A fuel assembly is dropped and damaged.
- General radiation levels are rising in the Fuel Handling Building.

The following timeline applies: (Time annotated in HR:MIN)

00:00 0AR55J Fuel Handling Building Incident went into ALERT.
00:30 0AR56J Fuel Handling Building Incident went into ALERT.
00:40 0AR55J Fuel Handling Building Incident went into ALARM.
00:50 0AR56J Fuel Handling Building Incident went into ALARM.

In response to this event…

- 0VA04CA FHB Booster Fan 0A started and the Train A Charcoal Absorber automatically aligned at ____(1)____.
- 0VA04CB FHB Booster Fan 0B ____(2)____.

A. (1) 00:00.
(2) started and the Train B Charcoal Absorber automatically aligned at 00:30.

B. (1) 00:00.
(2) did NOT start.

C. (1) 00:40.
(2) started and the Train B Charcoal Absorber automatically aligned at 00:50.

D. (1) 00:40.
(2) did NOT start.

Answer: D

Answer Explanation

New Question (2013 NRC exam question 62)
RO level
E/APE 061 ARM System Alarms
High Cog

Generic KA 2.1.28
2.1.28 Knowledge of the purpose and function of major system components and controls.
RO 4.1 SRO 4.1

Meets K/A, examinee must identify the correct system response to the ARM system reaching ALERT and then ALARM setpoints.

10CFR55.41(b)(7) Design, components, and functions of control and safety systems, including instrumentation, signals, interlocks, failure modes, and automatic and manual features.

Answer: D. 00:40. Did NOT start. The FHB charcoal booster system radiation automatic start interlocks are driven by the ALARM setpoints rather than the ALERT setpoints being reached. The trains are also independent (i.e. 0AR55J ONLY provides auto start to Train A and 0AR56J ONLY provides auto start to Train B. There is also an interlock preventing the start of a given train's FHB booster fan if the parallel fan's damper is open (i.e. when the parallel fan is operating) to prevent dual fan operation.

A is Incorrect. See explanation.
B is Incorrect. See explanation.
C is Incorrect. See explanation.
D is Correct. See explanation.

Objective: S.VA1-03-D.

Technical References: Big Note VA-1, Aux BLDG Vent, rev. 10. Big Note VA-2 Aux BLDG Vent, rev. 6. Lesson Plan I1-VA-XL-01, Auxiliary Building HVAC, rev. 3a. BwAR 4-OAR056J, Rev 003. BwAR 4-OAR055J, Rev 003.

LOD: 2-3

63 **ID: RE2WE14-C01** **Points: 1.00**

Given the following plant conditions on Unit 1:

- CS actuated during a RCS LOCA.
- 1CS007A, Pump 1A Hdr Isol Valve, remained CLOSED with the 1A CS pump running.
- The 1A CS pump control switch (C/S) was JUST placed in PULL OUT.

The SEQUENCE of the MINIMUM Control Room actions that are required to initiate 1A CS train flow to the containment are to ...

A. immediately place the 1A CS test switch in "test", open 1CS007A, then place the 1A CS pump C/S in after-trip.

B. immediately open 1CS007A, then place the 1A CS pump C/S in after-trip.

C. wait 30 seconds, place the 1A CS test switch in "test", open 1CS007A, then place the 1A CS pump C/S in after-trip.

D. wait 30 seconds, open 1CS007A, then place the 1A CS pump C/S in after-trip.

Answer: D

Answer Explanation

Bank Question (2013 NRC exam question 63) from LORT Bank
RO level
W/E 14 High Containment Pressure
Low Cog

EA1. Ability to operate and / or monitor the following as they apply to the (High Containment Pressure)
EA1.3 Desired operating results during abnormal and emergency situations.
RO 3.3 SRO 3.8

Meets K/A, examinee must identify the minimum actions necessary to align the 1A CS train to function during a LOCA.

10CFR55.41(b)(7) Design, components, and functions of control and safety systems, including instrumentation, signals, interlocks, failure modes, and automatic and manual features.

Answer: D. wait 30 seconds, open 1CS007A, then place the 1A CS pump C/S in after-trip. 1CS007A is interlocked with the pump breaker, preventing opening until 30 seconds after the pump breaker opens. The TEST switch is interlocked with the 1CS019A not 1CS007A.

A is Incorrect. See explanation.
B is Incorrect. See explanation.
C is Incorrect. See explanation.
D is Correct. See explanation.

Objective: S.CS1-12.

Technical References: Big Note CS-1, Containment Spray rev. 15. Lesson Plan I1-CS-XL-01 rev. 5.

LOD: 2-3

Question use: LORT (this question is USERID BWLC3DCS1001 in LORT bank)

64 **ID: RE2WE10-C01** **Points: 1.00**

Given:

- Unit 1 initially at 100% power.

Subsequently:

- A reactor trip and loss of offsite power occurred.
- The reactor trip occurred 3 hours ago.
- Bus 143 and 144 have been re-energized.
- The crew is implementing 1BwEP ES-0.4, NATURAL CIRCULATION COOLDOWN WITH STEAM VOID IN VESSEL (WITHOUT RVLIS).
- Pressurizer level is 94%.
- RCS temperature is 370°F.
- 1A CV pump is running.
- 1B CV pump is in standby.
- Both SI pumps are in standby.
- Normal letdown is established.
- BOTH Pressurizer PORV control switches are selected to AUTO.

The crew action(s), as directed by 1BwEP ES-0.4, that will restore compliance with a Technical Specification license condition that is NOT CURRENTLY MET is/are to…

A. place BOTH SI pumps and ONE CV pump in PULL OUT and administratively control them.

B. reduce pressurizer level.

C. align one RH train to the shutdown cooling mode.

D. place RCS Cold Overpressure Protection in service.

Answer: B

Answer Explanation

New Question (2013 NRC exam question 64)
RO level
W/E 10 Natural Circulation with Steam Voids in Vessel with/without RVLIS
High Cog

EK3. Knowledge of the reasons for the following responses as they apply to the (Natural Circulation with Steam Void in Vessel with/without RVLIS):

EK3.4 RO or SRO function within the control room team as appropriate to the assigned position, in such a way that procedures are adhered to and the limitations in the facilities license and amendments are not violated.
RO 3.4 SRO 3.7

Meets K/A, examinee must determine the license condition that is not currently met and identify the action that will restore compliance.

10CFR55.41(b)(7) Design, components, and functions of control and safety systems, including instrumentation, signals, interlocks, failure modes, and automatic and manual features.
Answer: B. Reduce Pressurizer level. In mode 3 (the current mode of the RCS) LCO 3.4.9 Pressurizer requires Pressurizer level to be < 92% to maintain the Pressurizer OPERABLE. Due to the conditions present during a natural circulation cooldown and depressurization per 1BwEP ES-0.4, NATURAL CIRCLULATION COOLDOWN WITH STEAM VOID IN VESSEL (WITHOUT RVLIS) the procedure incorporates action to repressurize and reduce pressurizer level to less than 90% following each depressurization. Although RCS Cold Overpressure Protection is placed in service at this temperature per the procedure, the subject LCO (3.4.12) is not applicable until mode 4 (i.e. not currently applicable, therefore not a compliance issue at this time). Similarly, both SI pumps and one CV pump will be placed in PTL but not to RESTORE compliance with the LCO. LCO 3.4.5 RCS loops-mode 3 is currently not met, however the only action that will restore compliance is to start one RCP (not available with loss of offsite power).

A is Incorrect. See explanation.
B is Correct. See explanation.
C is Incorrect. See explanation.
D is Incorrect. See explanation.

Objective: T.EP01-06-F

Technical References: LCO 3.4.9 Amendment 98. LCO 3.4.5 Amendment 98. LCO 3.4.12 Amendment 167. 1BwEP ES-0.4 rev. 201.

LOD: 3

65 **ID: RE2WE08-C03** **Points: 1.00**

The parameter and criteria that is FIRST evaluated to determine if a RED PATH exists on the INTEGRITY status tree is:

	Parameter	Criteria
A.	RCS Hot Leg	ANY drop > 100°F in LAST 60 Minutes
B.	RCS Hot Leg	ALL dropped > 100°F in LAST 60 Minutes
C.	RCS Cold Leg	ANY drop > 100°F in LAST 60 Minutes
D.	RCS Cold Leg	ALL dropped > 100°F in LAST 60 Minutes

Answer: C

Answer Explanation

New Question (2013 NRC exam question 65)
RO level
E/APE W/E 08 RCS Overcooling-PTS
Low Cog

EA2.1 Ability to determine and interpret the following as they apply to the (Pressurized Thermal Shock) Facility conditions and selection of appropriate procedures during abnormal and emergency operations.
RO 3.4 SRO 4.2

Meets K/A, examinee must evaluate plant conditions and determine that there is an imminent PTS condition that merits transition to 2BwFR P.1.

10CFR55.41(b)(10) Administrative, normal, abnormal, and emergency operating procedures for the facility.

Answer: C. RCS Cold Leg. ANY drop > 100°F in LAST 60 Minutes. The status tree wording states "Temp drop in all RCS cold legs less than 100°F in LAST 60 Minutes" to avoid the PTS red path. The correct wording to MEET the red path logically is then any RCS cold leg drop > 100°F in LAST 60 Minutes. Th or Tc use for heatup/cooldown depends on the particular concern and for some surveillances both are recorded and evaluated. For this specific tool (status tree) only the Tc is evaluated.

A is Incorrect. See explanation.
B is Incorrect. See explanation.
C is Correct. See explanation.
D is Incorrect. See explanation.

Objective: T.FR04-04-A.

Technical References: 2BWST-4, INTEGRITY REV 200.

LOD: 2-3

66 **ID: RG32113-N01** **Points: 1.00**

Given:

- A new ILT student assigned to Operations is performing his six month familiarization time.
- The new student intends to come into the Main Control Room to observe shift operations.
- He intends to walk down the Unit One main control boards, including walking on the colored carpeting (Zone of Control) immediately adjacent to the control panels.

The student …

A. has unlimited access to the control room as an operations employee.

B. must gain Shift Manager permission prior to entering the MCR. The Unit One Unit Supervisor OR Unit One Reactor Operator may authorize the control board walkdown in the Zone of Control.

C. must gain permission from the WEC Supervisor prior to entering the MCR. The Unit One Unit Supervisor AND Unit One Reactor Operator may authorize the control board walkdown in the Zone of Control.

D. must gain permission from the WEC Supervisor prior to entering the MCR. ONLY the Unit One Reactor Operator may authorize the control board walkdown in the Zone of Control.

Answer: D

Answer Explanation

New Question (2013 NRC exam question 66)
RO level
TIER 3
Low Cog

2.1.13 Knowledge of facility requirements for controlling vital/controlled access.
RO 2.5 SRO 3.2

Meets K/A, examinee must determine the permission requirements for a walkdown of a vital area (the MCR) by an operations department employee who is an ILT student.

10CFR55.41(b)(10) Administrative, normal, abnormal, and emergency operating procedures for the facility.

Answer: D. must gain permission from the WEC Supervisor prior to entering the MCR. ONLY the Unit One Reactor Operator may authorize the control board walkdown in the Zone of Control. Per OP-AA-103-101 only specific operations personnel and others are granted unlimited access to the MCR (within the operations department, those On-Shift personnel assigned to a control room position and On-Shift personnel conducting control room related business). Specific permission is required from the WEC supervisor prior to entry.

A is Incorrect. See explanation.
B is Incorrect. See explanation.
C is Correct. See explanation.
D is Incorrect. See explanation.

Objective: T.AM31-02.

Technical References: OP-AA-103-101 rev. 1.

LOD: 2

67 **ID: RG30215-N01** **Points: 1.00**

During the 1st quarter of the year, an NSO took the shift as the Unit NSO as indicated below:

Jan. 03, 2012 - 8 hours plus turnovers.
Jan. 13, 2012 - 12 hours plus turnovers.
Feb. 01, 2012 - 8 hours plus turnovers.
Mar. 25, 2012 - 12 hours plus turnovers
Mar. 31, 2012 - 8 hours plus turnovers.

This NSO's license became INACTIVE on _____ because _____ more 8 hour shift(s) was/were required to maintain an active license.

A. April 1, 2012, one

B. April 1, 2012, two

C. July 1, 2012, one

D. July 1, 2012, two

Answer: B

Answer Explanation

Bank Question (2013 NRC exam question 67) from LORT (Vision ID BWLC3EAM1001)
RO level
Tier 3
High Cog

2.1.5 Ability to use procedures related to shift staffing, such as minimum crew complement, overtime limitations, etc.
RO 2.9 SRO 3.9

Meets K/A, examinee must determine when an individual could no longer be used as an active license holder for shift staffing, per license maintenance procedure.

10CFR55.41(b)(10) Administrative, normal, abnormal, and emergency operating procedures for the facility.

Answer: B. April 1, 2012, two. OP-AA-105-102 Section 4.1.1 requires seven 8-hour shifts or five 12-hour shifts per calendar quarter Five 8-hour shifts were completed thus 2 additional shifts were needed The license becomes inactive after the end of the quarter

A is Incorrect. See explanation.
B is Correct. See explanation.
C is Incorrect. See explanation.
D is Incorrect. See explanation.

Objective: 3E.AM-031-F.

Technical References: OP-AA-105-102 Rev 9.

LOD: 2-3

EXAMINATION ANSWER KEY

2013 NRC SRO EXAM

Previous Use: LORT

68 **ID: RG32128-N01** **Points: 1.00**

Given:

- Unit 1 at 26% power.
- The crew is performing a plant startup following a forced outage near the end of a fuel cycle.
- Steam dumps are in the Tave mode.

Subsequently:

- The main turbine trips.

Assuming NO operator action and that all equipment operates as designed, …

A. Unit 1 reactor trips. Steam Dumps maintain Tave at 557°F.

B. control banks A-D drive inward and eventually fully insert, making the reactor subcritical. Steam dumps open and then close at 550 °F and remain closed.

C. control banks A-D drive inward until Tave is within 1°F of Tref and then stop. Steam dumps open but then close when Tave is 560 °F. The reactor remains critical between the POAH and 1% power.

D. control banks A-D drive inward and eventually fully insert, making the reactor subcritical. Steam dumps open intermittently and maintain Tave at approximately 560 °F.

Answer: D

Answer Explanation

New Question (2013 NRC exam question 68)
RO level
Tier 3
High Cog

2.1.28 Knowledge of the purpose and function of major system components and controls.
RO 4.1 SRO 4.1

Meets K/A, examinee must determine the response of control rods and steam dumps, both with major control functions, to the turbine trip. To do this requires knowledge of the function of both controls. 10CFR55.41(b)(7) Design, components, and functions of control and safety systems, including instrumentation, signals, interlocks, failure modes, and automatic and manual features.

Answer: D. control banks A-D drive inward and eventually fully insert, making the reactor subcritical. Steam dumps open intermittently and maintain Tave at approximately 560 °F. The plant is below P-8, so the turbine trip does NOT cause the reactor to trip, and therefore steam dumps remain in the Tave mode on the load reject controller which does not cause steam dumps to open until Tave is 3 °F above Tref. With the turbine tripped, Tref goes to 557 °F. With the turbine trip, C-7 Loss of Turbine Load actuates arming the steam dumps on the load reject controller. At the same time, Tave rises and control rods begin stepping in as Tave is more than 1.5 °F above Tref. Steam dumps open when Tave reaches 560°F. Heat from decay heat and RCPs operating continue to be added into the RCS continuously. With rods in automatic, they continue to drive inward and eventually have no effect on Tave as the reactor goes subcritical but RCS heat input continues from decay heat and RCPs (the same heat sources used to heat up a plant to N.O.T prior to a reactor startup). With steam dumps in Tave mode instead of Steam Pressure mode, Tave will be maintained at 560 °F rather than the normal 557 °F that would be maintained if in Steam Pressure mode. Eventually all control banks have inserted, the reactor is subcritical, and Tave is being maintained at 560 °F by steam dumps. 550°F is the P-12 setpoint, which would cause all steam dumps to close if reached. Some candidates will mis-interpret the reactor Tave response to control rod insertion an assume that Tave will be driven this low.

A is Incorrect. See explanation.
B is Incorrect. See explanation.
C is Incorrect. See explanation.
D is Correct. See explanation.

Objective: T.OA51-03.

Technical References: Big Note MS-4, Steam Dumps, rev. 15. Big Note RD-2, Reactor Control Unit, rev. 6. I1-OA-XL-51, rev. 1a, 1BwOA TG-8, Turbine Trip Below P-8 LP.

LOD: 3

69 **ID: RG32225-N01** **Points: 1.00**

- The Reactor Core Safety Limits in section 2.0 of Technical Specifications include limits on ____(1)_____.
- The functioning of the ____(2)_____ are credited to AUTOMATICALLY preserve the Reactor Core Safety Limits.

A. (1) Highest Loop Tave.
(2) Main Steam Safety Valves AND RPS

B. (1) Maximum boron concentration.
(2) ONLY the Main Steam Safety Valves

C. (1) Highest Loop Tave.
(2) ONLY the Main Steam Safety Valves

D. (1) Maximum boron concentration.
(2) Main Steam Safety Valves AND RPS

Answer: A

Answer Explanation

New Question (2013 NRC exam question 69)
RO level
Tier 3
Low Cog

2.2.25 Knowledge of the bases in Technical Specifications for limiting conditions for operations and safety limits.
RO 3.2 SRO 4.2

Meets K/A, examinee must identify the specific parameter included in the core safety limit and the operational system component(s) that prevent exceeding that limit per the bases.

10CFR55.41(b)(10) Administrative, normal, abnormal, and emergency operating procedures for the facility.

Answer: A. (1) Highest Loop Tave. (2) Main Steam Safety Valves AND RPS. Reactor core safety limit 2.1.1. includes a combination of thermal power, RCS highest loop Tave, and Pressurizer pressure. Per bases the RPS (via OTΔT and OPΔT setpoints) and SG safeties are credited to function and prevent exceeding the safety limit. Boron concentration affects the temperature coefficient which does have a limit per Technical Specifications.

A is Correct. See explanation.
B is Incorrect. See explanation.
C is Incorrect. See explanation.
D is Incorrect. See explanation.

Objective: S.TS1-03-D.

Technical References: Safety Limit 2.1.1 and bases.

LOD: 2-3

70 **ID: RG32239-N01** **Points: 1.00**

Given:

- Unit 1 is at 10% power
- A plant transient occurs resulting in the following:

- Loop 1A Tave = 550 °F.
- Loop 1B Tave = 551 °F.
- Loop 1C Tave = 549 °F.
- Loop 1D Tave = 550 °F.

Under these conditions, Technical Specifications require the crew to…

A. immediately open the reactor trip breakers.

B. take no specific action.

C. restore RCS Tave within 30 minutes.

D. verify shutdown margin is within the limits of the COLR within 1 hour.

Answer: C

Answer Explanation

Modified Question (2013 NRC exam question 70)
RO level
Tier 3
Low Cog

2.2.39 Knowledge of less than or equal to one hour Technical Specification action statements for systems.
RO 3.9 SRO 4.5

Meets K/A, examinee must assess the current plant conditions as applicable to LCO 3.1.8, Physics Test Exceptions and apply the appropriate action requirement.
10CFR55.41(b)(10) Administrative, normal, abnormal, and emergency operating procedures for the facility.
Answer: C. restore RCS Tave within 30 minutes. LCO 3.4.2 requires EACH loop Tave to be at least 550°F therefore LCO 3.4.2 condition A applies which specifies that the crew either be in mode 2 in 30 minutes or restore compliance with the LCO. Distractors are plausible as each is an actual action requirement (when applicable).

A is Incorrect. See explanation.
B is Incorrect. See explanation.
C is Correct. See explanation.
D is Incorrect. See explanation.

Objective: S.RC1-12-B.

Technical References: LCO 3.4.2 Amendment 165. I1-RC-XL-01 Reactor Coolant System page 71 (Tech Spec summary table) rev. 5b.

LOD: 3

ORIGINAL QUESTON (from LORT bank):

BWLC3CRC1006

Given the following plant conditions on Unit 1:

- Physics Testing is in progress with a work package indicating that all Physics Testing Technical Specifications are applicable.
- Loop 1A Tave = 531 ^{o}F.
- Loop 1B Tave = 530 ^{o}F.
- Loop 1C Tave = 529 ^{o}F.
- Loop 1D Tave = 531 ^{o}F.
- Reactor power is 3% and stable.

Under these conditions, the crew …

A. must immediately open the reactor trip breakers.
B. May continue Physics Testing with no limitations.
C. Must initiate a boration within 15 minutes.
D. Must restore RCS Tave within 15 minutes.

71 **ID: RG30235-N01** **Points: 1.00**

Given:

- Both units are at full power, normal alignment.
- The 0A VC train is in normal operation.
- The 0B VC train is in standby.

The following occurs:

- An event that has the potential for an accidental radioactive release in the Unit 2 Auxiliary Building is reported to the MCR.
- The MCR SRO directs an RO to monitor control room intake air for elevated radiation trends.
- The RO notes all MCR rad monitor icons on the RM-11 GRID 2, PROCESS AIR MONITORS, are currently GREEN.

With the above conditions, to monitor control room intake air on the RM-11, the RO will trend the...

A. 0PR31J or 0PR32J, OUT AIR IN 0A.

B. 0PR33J or 0PR34J, OUT AIR IN 0B.

C. 0PR35J or 0PR36J, TURB AIR IN 0A.

D. 0PR37J or 0PR38J, TURB AIR IN 0B.

Answer: A

Answer Explanation

Bank Question (2013 NRC exam. Previous use: 2012 Byron NRC Exam Question 72)
RO level
Tier 3
Low Cog

2.3.5 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

Meets K/A, examinee must demonstrate knowledge of how to use fixed radiation monitoring system.
10CFR55.41(b)(11) Purpose and operation of radiation monitoring systems, including alarms and survey equipment.
Answer: A.

MCR rad monitor icons are green even when their sampled plenums are not online because the sample pumps will continuously sample plenums that have stagnant air flow. With the 0A VC system in normal alignment (outside air intake) the only rad monitors that would have MCR intake air flow through their respective intake plenum is the 0PR31J and 32J.

Choice A is correct, see explanation above.
Choice B is incorrect, 0PR33J and 34J sample the outside air intake from Unit 2 (0B train). Although the radiation spill was in the Aux. Bldg, because 0B VC train was not running, this plenum would not experience intake air flow.

Choice C is incorrect, 0PR35J and 36J sample the turbine bldg intake from Unit 1 (0A train). Although the radiation spill was in the Aux. Bldg, this plenum would not experience intake air flow unless the 0A VC system was manually or automatically swapped to emergency mode.
Choice D is incorrect, 0PR37J and 38J sample the turbine bldg intake from Unit 2 (0B train). Although the radiation spill was in the Aux. Bldg this plenum would not experience intake air flow unless the 0B VC system was manually started in emergency mode.

Objective: S.AR1-12.

Technical References: Big Note VC-1, Control Room Ventilation rev. 10. BwOP VC-1 rev. 10. Prerequisites.

LOD: 3

Previous use: Byron 2013 Certification Exam Question 71. 2012 Byron NRC Exam Question 72

72 **ID: RG32314-N01** **Points: 1.00**

Given:

- A RCS LOCA resulted in core damage on Unit 1.

Which ONE of the following correctly describes the evolution that constitutes the LEAST potential for RAISING radiation levels in the Auxiliary Building?

A. placing one train of Unit 1 RH in service per BwOP RH-6, PLACING THE RH SYSTEM IN SHUTDOWN COOLING.

B. restarting one reactor coolant pump per 1BwOA ESP-1, REACTOR COOLANT PUMP STARTUP DURING ABNORMAL CONDITIONS, without unisolating seal return.

C. implementing 1BwOA ESP-2, REESTABLISHING CV LETDOWN DURING ABNORMAL CONDITIONS.

D. implementing 1BwEP ES-1.3, TRANSFER TO COLD LEG RECIRCULATION.

Answer: B

Answer Explanation

Modified Question (2013 NRC exam question 72. Modified from BWLI-MCD-169 which was used: EOPS 4 exam ILT 11-1)
RO level
Tier 3
Low Cog

2.3.14 Knowledge of radiation or contamination hazards that may arise during normal, abnormal, or emergency conditions or activities.
RO 3.4 SRO 3.8

Meets K/A, examinee must discern evolutions that will significantly raise radiation levels in areas that are NOT normally high radiation areas, during a core damaging event.
10CFR55.41(b)(10) Administrative, normal, abnormal, and emergency operating procedures for the facility.
Answer: B. restarting one reactor coolant pump per 1BwOA ESP-1, REACTOR COOLANT PUMP STARTUP DURING ABNORMAL CONDITIONS, without re-aligning seal return. Following a core damage event, any evolution that restores a system alignment in communication with the RCS or Containment atmosphere and routes that flow outside containment will have significant potential to increase radiation levels in areas of the plant that are not normally high radiation areas. 1BwOA ESP-2 re-establishes normal letdown (through the Aux Building), cold leg recirc establishes RCS flow through the ECCS system (Aux Building) as does placing a train of RH in normal shutdown cooling per BwOP RH-6. While implementing 1BwOA ESP-1 (without re-establishing normal seal return, which is an option in the procedure) does re-establish component cooling flow from inside containment to outside containment, it is a closed loop system and does not communicate directly with the RCS or Containment atmosphere. Question is memory level because each choice states the lineup of the system(s) and the only information needed to answer the question is whether that lineup passes RCS fluid through the Auxiliary Building.

A is Incorrect. See explanation.
B is Correct. See explanation.

C is Incorrect. See explanation.
D is Incorrect. See explanation.

Objective: T.MI13-03.

Technical References: I1-MI-XL-13 rev.3a.

LOD: 3

ORIGINAL QUESTION:

BWLI-MCD-169 use: EOPS 4 exam ILT 11-1

During recovery from a core damaging event on Unit 1, which ONE of the following correctly describes the evolution that constitutes the LEAST potential for RAISING Radiation levels in areas that are NOT normally High Radiation areas?

A. restoring normal Containment cooling per BwOP VP-1, RCFC Refrigeration unit and Chilled Water System Startup.

B. implementing 1BwEP ES-1.1, SI Termination.

C. implementing 1BwEP ES-1.3, Transfer to Cold Leg Recirculation.

D. placing one train of Unit 1 RH in service per BwOP RH-6, Placing the RH System in Shutdown Cooling.

Answer: A

Question_Use: INITIAL
KA_System: 2.3
KA_Number: 2.3.14
Low_KA_Justification: N/A
Technical_Ref_w_Rev:
Supplied_Ref:
SRO_Justification: N/A
Question_Source: Historical
Source_Text: N/A
Question_History:
LORT_Question_Section: N/A
PRA: None

Solution: Following a core damage event, any evolution that restores a system alignment in communication with the RCS or Containment atmosphere and routes that flow outside containment will have significant potential to increase rad levels in areas of the plant that are not normally high rad areas. ES 1.1 re-establishes normal charging and letdown (through the Aux Building), cold leg recirc establishes RCS flow through the ECCS system (Aux Building) as does placing a train of RH in normal shutdown cooling per BwOP RH-6. While implementing BwOP VP-1 does re-establish chill water flow from inside containment to outside containment, it is a closed loop system and does not communicate directly with the RCS or Containment atmosphere.

73 **ID: RG32428-N01** **Points: 1.00**

Given:

- BOTH Units are at 100% power, all systems are normally aligned.
- The Unit 1 Unit Supervisor receives a report from the NRC via the red ENS phone that an airborne threat is PROBABLE.
- The crew has implemented 0BwOA SECURITY-1, Security Threat.

Based on the EXISTING threat status AND assuming it is safe to send personnel into the plant, which ONE of the following correctly describes an action the crew will perform as directed by 0BwOA SECURITY-1?

A. Immediately trip BOTH units.

B. Start the in-service VC Train Makeup Filter unit.

C. Expedite any releases in progress.

D. Initiate a rapid downpower of BOTH units.

Answer: D

Answer Explanation

Modified Question (2013 NRC exam question 73)
RO level
Tier 3
Low Cog

2.4.28 Knowledge of procedures relating to a security event (non-safeguards information).
RO 3.2 SRO 4.1

Meets K/A, examinee must identify the operator action that is performed in response to an airborne security threat in accordance with 0BwOA SECURITY-1.
10CFR55.41(b)(10) Administrative, normal, abnormal, and emergency operating procedures for the facility.

Answer: D. Initiate a rapid downpower of BOTH units.
This is a basic mitigating strategy per step 1C RNO of 0BwOA SECURITY-1 Attachment A has the crew perform this action. The procedure essentially directs three different overall strategies, depending on whether the threat is classified as "Informational", "Probable", or "Imminent". The entry conditions of the procedure define the terminology as follows: "Imminent" as within 5 minutes; "Probable" within 30 minutes; and "Informational" greater than 30 minutes. In this case, the strategy for "Probable" applies. Starting the in-service VC Train Makeup Filter unit would place the ventilation system in the mode of operation following a safety injection, but would be pulling in outside air, which the procedure intends to avoid (in case the airborne threat includes chemical or biological airborne hazard). The procedure directs termination of in-progress releases rather than expediting them.

A is Incorrect. See explanation.
B is Incorrect. See explanation.
C is Incorrect. See explanation.
D is Correct. See explanation.

Objective: T.OA43A-01.

Technical References: 0BwOA SECURITY-1, rev. 013.

LOD: 3

ORIGINAL QUESTION:

BWLI-SECURITY1-01 (used on ILT 11-1 NOPS 5 exam)

Given:
BOTH Units are at 100% power, all systems are normally aligned.
The Unit 1 Unit Supervisor receives a report from the Security Supervisor of armed intruders in the Unit 2 Turbine Building elevation 401'.
The crew has implemented 0BwOA SECURITY-1, Security Threat.
BOTH Units' reactors have just been manually tripped.

Based on the above conditions AND assuming it is safe to send personnel into the plant, which ONE of the following correctly describes the NEXT action the crew will perform?

A. Commence a plant cooldown using 1/2BwGP 100-5.

B. Start the in-service VC Train Makeup Filter unit.

C. Proceed to the U1 Remote Shutdown Panel.

D. Dispatch an operator to START the Security Diesel Generator.

Answer: A

Answer Explanation
Explanation:

commence a plant cooldown using 1/2BwGP 100-5 is correct answer per 0BwOA SECURITY-1, Attach B step 3.

"proceed to the U1 RSDP" and "dispatch an operator to start the security DG" are incorrect because you do not want to unnecessarily send personnel into the plant when armed intruder are present and actions are not directed by procedure.

"Start the inservice VC train makeup filter unit" is incorrect because you do not want to makeup to the VC system from outside.

Question_Use: INITIAL
Question_Level: RO
Cognitive_Level: low
Cognitive_Level: High
KA_System: N/A
KA_Number: 2.4.28

74 **ID: RG32416-N01** **Points: 1.00**

Given:

- Unit 1 experienced a loss of all AC power.
- 1BwCA-0.0, LOSS OF ALL AC POWER is in progress at step 10.
- STA informs the US of the following Status Tree results:

Subcriticality:	Green
Core Cooling:	Orange
Heat Sink:	Red
Integrity:	Red
Containment:	Yellow
Inventory:	Yellow

Under these conditions, the crew will...

A. remain in 1BwCA-0.0, LOSS OF ALL AC POWER.

B. IMMEDIATELY transition to 1BwFR-H.1, RESPONSE TO A LOSS OF SECONDARY HEAT SINK.

C. IMMEDIATELY transition to 1BwFR-P.1, RESPONSE TO IMMINENT PTS CONDITION.

D. IMMEDIATELY transition to 1BwEP ES-0.0, REDIAGNOSIS.

Answer: A

Answer Explanation

Bank Question (2013 NRC exam question 74) from BWLC3DCA1003 used in LORT.
RO level
Tier 3
Low Cog

2.4.16 Knowledge of EOP implementation hierarchy and coordination with other support procedures or guidelines such as, operating procedures, abnormal operating procedures, and severe accident management guidelines.
RO 3.5 SRO 4.4

Meets K/A, examinee must determine the procedure hierarchy for multiple procedures that have applicability to current plant conditions.

10CFR55.41(b)(10) Administrative, normal, abnormal, and emergency operating procedures for the facility.

Answer: A. 1BwCA-0.0, LOSS OF ALL AC POWER. During implementation of 1BwCA 0.0 status trees are monitored for information only (per note just prior to step 1). All distractors listed are plausible as the plant has conditions that otherwise would drive entry into them based on status tree usage as described in BwAP 340-1.

A is Correct. See explanation.
B is Incorrect. See explanation.

C is Incorrect. See explanation.
D is Incorrect. See explanation.

Objective: T.FR07-04.

Technical References: BwAP 340-1 rev. 26. 1BwCA 0.0. rev.204.

LOD: 2-3

75 **ID: RG30246-N01** **Points: 1.00**

Given:

- Unit 1 was initially at 100% power.
- A LOCA occurred.

Currently:

- The crew is implementing 1BwEP ES-1.2, POST LOCA COOLDOWN AND DEPRESSURIZATION.
- Step 8, Initiate RCS Cooldown to 200^{o}F has just been initiated.
- RCS WR pressure is 1315 psig
- PZR level is 0%.
- CETCs indicate 512^{o}F.

The NEXT mitigating strategy the crew will implement is…

A. reduce RCS injection flow by securing ECCS pumps.

B. stop all but one RCP.

C. depressurize the RCS.

D. isolate SI accumulators.

Answer: C

Answer Explanation

New Question (2013 NRC exam question 75)
RO level
Tier 3
Low Cog

2.4.6 Knowledge of EOP mitigation strategies.
RO 3.7 SRO 4.7

Meets K/A, examinee must identify the next mitigating strategy of 1BwEP ES-1.2.
10CFR55.41(b)(10) Administrative, normal, abnormal, and emergency operating procedures for the facility.
Answer: C. Depressurize the RCS. The Major action category/mitigating strategies of 1BwEP ES-1.2 are (in order): initiate RCS cooldown, depressurize the RCS (to refill PZR), stop all but one RCP, reduce RCS injection flow, depressurize RCS (to minimize subcooling), perform other long term recovery actions (including isolating SI accumulators). Question is memory level as it only requirese memorization of the Westinghouse major action categories and their order to answer correctly.

A is Incorrect. See explanation.
B is Incorrect. See explanation.
C is Correct. See explanation.
D is Incorrect. See explanation.

Objective: T.EP02-01.h.

Technical References: Lesson Plan I1-EP-XL-02 rev. 16a page 32.

LOD: 2-3

EXAMINATION ANSWER KEY (ANSWERS ONLY)

2013 NRC SRO EXAM

76 **ID: 881623** **Points: 1.00**

Answer: C

Answer Explanation

New Question (2013 NRC exam question 76)
SRO level
System 006 Emergency Core Cooling
High Cog

A2 Ability to (a) predict the impacts of the following malfunctions or operations on the ECCS; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations:
A2.01 High bearing temperature
RO 2.9 SRO 3.1

Meets K/A, examinee must assess the impact of the high bearing temperature trend on the ability of ECCS to perform its safety function, and then determine the procedure directed actions in 1BwOA PRI-8.
10CFR55.43(b)(5) Assessment of facility conditions and selection of appropriate procedures during normal, abnormal, and emergency situations.
SRO level because it requires detailed knowledge of procedure content versus overall mitigating strategy.

Answer: C. (1) ECCS CANNOT be relied upon to perform its UFSAR safety function. (2) aligning fire protection to ONE CV pump and shutting down either CV pump if it EXCEEDS a table A limit. With inadequate SX supply (the Unit 2 header pressure is less than 90 psig and bearing temperatures trending up) the CV pumps are inoperable and thus cannot be guaranteed to perform their safety function. The RCS pressure is currently above the SI pump shutoff head, so with inoperable CV pumps and RCS pressure too high for SI pump injection, ECCS cannot perform its safety function assumed in the UFSAR. 1BwOA PRI-8 (step 3) directs aligning FP to a CV pump and shutting down any vital equipment once it EXCEEDS the limits of table A.

A is Incorrect. Part 2 of answer is incorrect but plausible because a mitigation strategy for low system pressure for any closed loop service system is to raise supply or isolate loads. For this distracter the isolation of an adjacent load served from the same supply header as the CV pumps would be plausible but not directed by the procedure.
B is Incorrect. Part 1 is incorrect, see explanation.
C is Correct. See explanation.
D is Incorrect. Part 1 is incorrect, see explanation. Part 2 is a possible procedure guided option in 1BwOA PRI-8.

Objective: T.OA18-03.

Technical References: 1BwOA PRI-8, rev. 104, ESSENTIAL SERVICE WATER MALFUNCTION.

LOD: 3-4

EXAMINATION ANSWER KEY (ANSWERS ONLY)

2013 NRC SRO EXAM

77 **ID: 883051** **Points: 1.00**

Answer: D

Answer Explanation

New Question (2013 NRC exam question 77)
SRO level
System 022 Containment Cooling
High Cog

Generic 2.2.36 Ability to analyze the effect of maintenance activities, such as degraded power sources, on the status of limiting conditions for operations.
RO 3.1 SRO 4.2

Meets K/A, examinee must evaluate three different maintenance situations and determine the LCO implications for containment cooling.

10CFR55.43(b)(2) Facility operating limitations in the technical specifications and their bases.

Answer: D. CASE 3 ONLY. In CASES 1 and 2, LCO 3.0.6 applies, and may be used to justify NOT entering LCO 3.6.6 Condition C. This is because in each case, a support system (In Case 1 AC distribution under LCO 3.8.9; in Case 2 an AC source under LCO 3.8.1) is lost, thus the LCO Condition for the lost support system must be entered. In Case 1, the 1A and 1C RCFCs are actually inoperable, even though LCO 3.6.6 Condition C entry is NOT required. In Case 2, the RCFCs are still operable, as they are still capable of being powered by the emergency power supply. Per definition of OPERABILITY they must be capable of being powered by the normal OR emergency power supply. SRO level because it requires application of the generic LCO requirements.

A: Incorrect. See explanation.
B: Incorrect. See explanation.
C: Incorrect. See explanation.
D: Correct. See explanation.

Objective: S.TS1-12.

Technical References: LCO 3.0.6. LCO 3.6.6. LCO 3.8.1. LCO 3.8.9.

LOD: 3

78 **ID: 881625** **Points: 1.00**

Answer: A

Answer Explanation

New Question (2013 NRC exam question 78)
SRO level
System 008 Component Cooling Water
High Cog

2.2.44 Ability to interpret control room indications to verify the status and operation of a system, and understand how operator actions and directives affect plant and system conditions.
RO 4.2 SRO 4.4

Meets K/A, examinee must determine the CC system status and determine the appropriate operator actions.
10CFR55.43(b)(5) Assessment of facility conditions and selection of appropriate procedures during normal, abnormal, and emergency situations.
SRO level because it requires detailed knowledge of procedure content versus overall mitigating strategy.

Answer: A. stop the 1A RH pump. The RH heat exchanger is a major heat load on the CC system. Stopping the RH system as a heat load on CC is performed to prevent the CC system from flashing. If 1A RH pump discharge temperature exceeds 200^{o}F then the running RH pump is tripped. The 1B RH pump should not be started as there is no CCW support for this train of shutdown cooling.

A is Correct. See explanation.
B is Incorrect. See explanation. This distractor is plausible because a loss of RH cooling exist and the next procedure the crew will enter is 1BwOA PRI-10. SI pump hotleg injection is an option for restoring core cooling in 1BwOA PRI-10, however the RCS must be in an adverse condition for SI pump hotleg injection to be allowed.
C is Incorrect. See explanation. This distractor is plausible because closing the CC isolation to the RH Hx is procedurally directed AFTER the RH pump is secured. Closing the 1CC9412A before shutting down the RH pump would raise the possibility of flashing the CC system inside the RH Hx.
D is Incorrect. See explanation. This distractor is plausible because, depending upon the mechanical configuration of the U-0 CC Hx, the same units RH trains can be cooled by separate unit CC systems. (the unit with the U-0 CC Hx aligned supplies BOTH units "A" train RH safety loops) It is common for candidates to confuse which units CC system is supplying RH Hx cooling and believe that the opposite RH train would be available.

Objective: T.OA17-03.

Technical References: 1BWOA PRI-6, rev. 105, COMPONENT COOLING MALFUNCTION, Attachment C Loss of CC when RH in Shutdown Cooling, step 1.

LOD: 4

EXAMINATION ANSWER KEY (ANSWERS ONLY)

2013 NRC SRO EXAM

79 **ID: 881626** **Points: 1.00**

Answer: C

Answer Explanation

New Question (2013 NRC exam question 79)
SRO level
System 012 Reactor Protection System
High Cog

A2 Ability to (a) predict the impacts of the following malfunctions or operations on the RPS; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations:
A2.05 Faulty or erratic operation of detectors and function generators
RO 3.1 SRO 3.2

Meets K/A, examinee must determine the effects of the PRNI detector failures on the shutdown NIs and RPS (the SRNIs are de-energized and thus SR reactor trip cannot function). In addition, the examinee must use knowledge of Technical Specifications (as procedures) to determine the allowable operations and limitations to avoid operating outside of the safety analysis (otherwise the potential would exist to place the plant in an unanalyzed condition).
10CFR55.43(b)(2) Facility operating limitations in the technical specifications and their bases.
Question is SRO level as it requires application of LCO 3.0.4 and Technical Specification Bases knowledge because the Gamma Metrics NIs are not mentioned in LCO 3.9.3 but are mentioned in the bases documents as an acceptable substitute for the installed SRNIs.

Answer: C. (1) no change in compliance with the LCO requirements of 3.9.3. (2) may enter Mode 3, but may NOT place rods in a condition where they are capable of withdrawal. The two PRNIs failing high makes up the P-10 interlock and causes the SRNIs to de-energize. LCO 3.9.3 is still met however, as per the bases the Gamma Metrics SRNIs are also credited for this LCO. Requirements for subsequent modes are met with the exception of Modes 1 and 2. Per LCO 3.0.4 mode entry is NOT allowed unless a specific risk analysis has been performed or the mode allows continuous operation with the inoperability. Therefore mode 2 entry is prohibited (with two SRNIs inoperable LCO 3.3.1 condition I requires immediately opening reactor trip breakers). Examinees may fail to realize that the Gamma Metrics SRNIs are sufficient to meet the LCO 3.9.3 requirements and therefore LCO 3.9.3 is actually still met.

A is Incorrect. See explanation.
B is Incorrect. See explanation.
C is Correct. See explanation.
D is Incorrect. See explanation.

Objective: S.TS1-05-C.

Technical References: Big Note EF-1, ESF Setpoints rev. 14.LCO 3.9.3 and bases Nuclear Instrumentation Amendment 165. LCO 3.0.4 Amendment 134. LCO 3.3.1 condition I (amendment 148)

LOD: 3-4

EXAMINATION ANSWER KEY (ANSWERS ONLY)

2013 NRC SRO EXAM

80 **ID: 883092** **Points: 1.00**

Answer: B

Answer Explanation

New Question (2013 NRC exam question 80)
SRO level
System 010 Pressurizer Pressure Control System
Low Cog

A2 Ability to (a) predict the impacts of the following malfunctions or operations on the PZR PCS; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations:
A2.02 Spray valve failures
RO 3.9 SRO 3.9

Meets K/A, examinee must assess the plant response to the failed PZR spray valve and recall the specific procedure direction for response following the manual trip of the reactor, for this specific situation.

10CFR55.43(b)(5) Assessment of facility conditions and selection of appropriate procedures during normal, abnormal, and emergency situations.

Answer: B. (1) trip the 1D RCP. (2) implement 1BwEP-0, followed by 1BwEP ES-0.1. 1BwOA INST-2 ATTACHMENT B step 2.b. RNO directs manually tripping the reactor, then stopping the affected RCP (1D), THEN entering 1BwEP-0. In this case, tripping the reactor from 2200 psig will NOT result in sufficient pressure drop to cause an automatic SI (the RCS pressure drop will be normal i.e. less than a 200 psig drop). In MOST situations, the tripping of the reactor requires completion of the immediate actions of 1BwEP-0 PRIOR to any other procedure steps. This situation is an exception to that general philosophy because of the need to promptly secure the RCP. If the examinee determines that the immediate actions of 1BwEP-0 are performed first, then at step 4 of 1BwEP-0, the examinee would determine that the RNO of step 4 would require a manual safety injection due to dropping PZR pressure and step 18 would direct securing the 1D RCP in that situation. Tripping of the 1B RCP vice 1D is a valid distractor as the labeling of the sprays and RCPs is mixed (1C RCP with 1RY455C; 1D RCP with 1RY455B) and easily confused. Question is SRO as it requires specific detailed knowledge of procedure direction, procedure usage rules, and selection of expected transitions.

A: Incorrect. See explanation.
B: Correct. See explanation.
C: Incorrect. See explanation.
D: Incorrect. See explanation.

Objective: T.OA11-21.

Technical References: 1BwOA INST-2, rev. 107, OPERATION WITH A FAILED INSTRUMENT CHANNEL, ATTACHMENT B, PRESSURIZER PRESSURE CHANNEL FAILURE. 1BwEP-0, rev. 204, REACTOR TRIP OR SAFETY INJECTION.

LOD: 2-3

EXAMINATION ANSWER KEY
(ANSWERS ONLY)

2013 NRC SRO EXAM

EXAMINATION ANSWER KEY (ANSWERS ONLY)

2013 NRC SRO EXAM

81 **ID: 884358** **Points: 1.00**

Answer: C

Answer Explanation

MODIFIED QUESTION
SRO LEVEL
045 Main Turbine Generator (MT/G) System
Low Cog

A2 Ability to (a) predict the impacts of the following malfunctions or operation on the MT/G system; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations:
A2.11 Control problems in primary, e.g., axial flux imbalance; need to reduce load on secondary
RO 2.4 SRO 2.9

Meets KA, requires examinee to evaluate current conditions and determine the correct actions between two different applicable procedures in a situation involving excessive axial flux imbalance.

10CFR55.43(b)(5) Assessment of facility conditions and selection of appropriate procedures during normal, abnormal, and emergency situations.

Answer: C. continue the runback until SG levels begin to rise while keeping rod control in automatic. Based on SG and FW and Steam flow conditions given, 1BwOA SEC-1 direction does not direct stopping the runback until SG levels are trending back to normal (i.e. rising) and directs rods to remain in automatic. Placing rods in manual is a plausible distractor based upon the annunciator response procedures for LOW and LO-2 insertion limits. Both AR procedures contain steps to take action to restore rod heights above the alarm setpoints and is a common mis-application of manual rod control during turbine runbacks seen in initial license training simulator training.

A: Incorrect. See explanation.
B: Incorrect. See explanation.
C: Correct. See explanation.
D: Incorrect. See explanation.

Technical References: 1BwOA SEC-1 rev. 104.

The question is SRO level because it requires assessment of facility conditions and decision making of proper detailed procedure actions.

TIER: 2
GROUP: 2
Task No. R-OA-120
Obj No: T.OA54-03

ORIGINAL QUESTION:
VISION ID: SS20045-N01

Given:

- Unit 1 Main Turbine was just runback from 100% power due to a secondary pump trip.

- The crew is performing 1BwOA SEC-1, SECONDARY PUMP TRIP.

- Annunciator 1-10-A6, ROD BANK LO-2 INSERTION LIMIT, is NOT lit.
- Annunciator 1-10-B6, ROD BANK LOW INSERTION LIMIT, is LIT.

Note: procedure names given for reference.

- 1BwOA PRI-2, EMERGENCY BORATION
- BwOP CV-6, OPERATION OF THE REACTOR MAKEUP SYSTEM IN THE BORATE MODE/BATCH BORATION METHOD

With the above conditions, the US will direct the crew to...

A. borate the RCS per BwOP CV-6, because boration is required by 1BwOA SEC-1, and boration is required by Tech Specs.

B. EMERGENCY borate the RCS per 1BwOA PRI-2, because EMERGENCY boration is required by 1BwOA SEC-1, and boration is required by Tech Specs.

C. borate the RCS per BwOP CV-6, because boration is required by 1BwOA SEC-1, but NOT required by Tech Specs.

D. EMERGENCY borate the RCS per 1BwOA PRI-2, because boration is required by 1BwOA SEC-1, but NOT required by Tech Specs.

Answer: C

EXAMINATION ANSWER KEY (ANSWERS ONLY)

2013 NRC SRO EXAM

82 **ID: 881637** **Points: 1.00**

Answer: A

Answer Explanation

New Question (2013 NRC exam question 82)
SRO level
System 079 Station Air
High Cog

A2 Ability to (a) predict the impacts of the following malfunctions or operations on the SAS; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations:
A2.01 Cross-connection with IAS
RO 2.9 SRO 3.2

Meets K/A, examinee must predict the impact of a service air header break with the systems cross-tied (normal) to instrument air.
10CFR55.43(b)(5) Assessment of facility conditions and selection of appropriate procedures during normal, abnormal, and emergency situations.
Question is SRO because examinee must assess plant conditions and determine correct detailed procedural response per step 2 of 2BwOA SEC-4.

Answer: A. (1) Unit 2 reactor will trip. The crew will enter 2BwEP-0, REACTOR TRIP OR SAFETY INJECTION and concurrently perform 2BWOA SEC-4, LOSS OF INSTRUMENT AIR. (2) stop the 1A CV pump. Although there are isolation check valves between the service air and instrument air headers that will tend to prevent backflow of instrument air to the service air header break, the normal instrument air loads will continue to draw down instrument air header pressure until there is insufficient pressure to support air operated valves and Unit 2 will trip (likely due to Low-2 SG level). Unit 1 is similarly affected except with the unit in Mode 5, the ultimate loss of instrument air results in loss of RH letdown (1RH128 fails closed) causing the RCS pressure rise due to the continued 1A CV pump injection. 1BWOA SEC-4, LOSS OF INSTRUMENT AIR step 2 directs stopping the operating CV pump when RCS pressure is above 400 psig and solid plant (to prevent lifting the 450 psig RH suction reliefs). Securing the RH train is another specific action provided (therefore plausible), but only if the RH pump indicates erractic flows or amps (signs of cavitation). This may happen during reduced inventory conditions, but not with solid plant ops.

A is Correct. See explanation.
B is Incorrect. See explanation.
C is Incorrect. See explanation.
D is Incorrect. See explanation.

Objective: T.OA039-03.

Technical References: 1BWOA SEC-4, LOSS OF INSTRUMENT AIR rev. 103.

LOD: 2-3

EXAMINATION ANSWER KEY (ANSWERS ONLY)

2013 NRC SRO EXAM

83 **ID: 883315** **Points: 1.00**

Answer: B

Answer Explanation

New Question (2013 NRC exam question 83)
SRO level
System 027 Containment Iodine Removal
Low Cog

Generic KA 2.2.25:
Knowledge of the bases in Technical Specifications for limiting conditions for operations and safety limits.
RO 3.2 SRO 4.2

Meets K/A, examinee must determine the state of each unit regarding the applicable technical specification, and determine the effect of that state on the safety analysis as expressed in the bases of technical specification 3.6.7.

10CFR55.43(b)(2) Facility operating limitations in the technical specifications and their bases.

Answer: B. (1) NEITHER unit meets the requirements of ; 2) could result in excessive re-evolution of iodine collected in the containment sump following a design basis accident. LCO 3.6.7 applies in Modes 1-4, therefore BOTH units are in a Mode of applicability. SR 3.6.7.2 requires a spray add tank level of $\geq$ 78.6% and $\leq$ 90.3%. SR 3.6.7.3 requires a NaOH concentration of $\geq$ 30% and $\leq$ 36%. Unit 1 does NOT meet SR 3.6.7.3 and Unit 2 does NOT meet SR 3.6.7.2. The basis for LCO 3.6.7 specifically explains the analysis ONLY credits NaOH for the resulting sump pH to ensure re-evolution of iodine is prevented. The distractor of "invalidates the safety analysis assumption for hydrogen generation" is plausible because it does affect corrosion rates inside the containment (see bases page B.3.6.7-1.) however the total hydrogen generation is a function of specific metals present (in particular, aluminum, which is inventoried and limited within the containment) inside containment that are available to corrode.

A is Incorrect. See explanation.
B is Correct. See explanation.
C is Incorrect. See explanation.
D is Incorrect. See explanation.

Objective: S.CS1-04.

Technical References: LCO 3.6.7 bases. SR 3.6.7.2 and 3.6.7.3.

LOD: 3

EXAMINATION ANSWER KEY (ANSWERS ONLY)

2013 NRC SRO EXAM

84 **ID: 881639** **Points: 1.00**

Answer: A

Answer Explanation

Bank Question (question use in LORT. 2013 NRC exam question 84)
SRO level
E/APE 011 Large Break LOCA
High Cog

EA2 Ability to determine or interpret the following as they apply to a Large Break LOCA:
EA2.08 Conditions necessary for recovery when accident reaches stable phase
RO 3.4 SRO 3.9

Meets K/A, examinee must determine whether conditions were met for transition to the Hot Leg or Cold Leg recirculation and recovery phase for a large break LOCA.
10CFR55.43(b)(5) Assessment of facility conditions and selection of appropriate procedures during normal, abnormal, and emergency situations.
SRO level because is requires assessment of plant conditions and detailed knowledge of procedure transition criteria and plant alignment.
Answer: A. Cold leg recirc procedure will be entered when RWST level drops to 46%. Following completion of ES-1.3, the RH pumps suction will be aligned from the containment sumps, and the crew will transition back to 1BwEP-1. Per step 18 1BwEP-1, at 4 hours 50 minutes preparation is made for hot leg recirc, but the transition to ES-1.4 is not made until 5 hours 50 minutes (per step 20). Therefore, at 1700, 5 hours after the LOCA, ECCS will still be aligned to the RCS cold legs.

A is Correct. See explanation.
B is Incorrect. See explanation.
C is Incorrect. See explanation.
D is Incorrect. See explanation.

Objective: T.EP02A-04.

Technical References: 1BwEP-1, LOSS OF REACTOR OR SECONDARY COOLANT, rev. 204.

LOD: 2-3

EXAMINATION ANSWER KEY (ANSWERS ONLY)

2013 NRC SRO EXAM

85 **ID: 881640** **Points: 1.00**

Answer: A

Answer Explanation

Bank Question (2013 NRC exam question 85)
SRO level
E/APE 029 ATWS
High Cog

2.4.4 Ability to recognize abnormal indications for system operating parameters that are entry-level conditions for emergency and abnormal operating procedures.
RO 4.5 SRO 4.7

Meets K/A, examinee must determine several entry conditions for emergency procedures for a plant situation resulting from an ATWS.

SRO level because candidate must assess plant conditions (including continuing trends) and determine appropriate procedural entries/transitions, including rules of usage for functional restoration guidelines.

10CFR55.43(b)(5) Assessment of facility conditions and selection of appropriate procedures during normal, abnormal, and emergency situations.

Answer: A. 1BwFR H.1 immediately, then transition to 1BwFR C.1. In this situation, the crew transitioned out of 1BwEP-0 to 1BwFR-S.1 so status trees are required to be monitored/implemented. With SG NR levels at 0%, a red path exists on Heat Sink requiring immediate transition to 1BwFR-H.1. With trends continuing as stated, eventually CETCs reach 1200^{o}F requiring transition to 1BwFR-C.1.

A is Correct. See explanation.
B is Incorrect. See explanation.
C is Incorrect. See explanation.
D is Incorrect. See explanation.

Objective: T.FR07-04.

Technical References: BwAP 340-1 USE OF PROCEDURES FOR THE OPERATING DEPARTMENT rev. 26. 1BwST-2 CORE COOLING rev. 200. 1BwST-3 HEAT SINK STATUS TREE rev. 201. 1BwFR C.1 rev. 200.

LOD: 4

Question Use: LORT

EXAMINATION ANSWER KEY (ANSWERS ONLY)

2013 NRC SRO EXAM

86 **ID: 881692** **Points: 1.00**

Answer: C

Answer Explanation

New Question (2013 NRC exam question 86)
SRO level
A/EPE 040 Steam Line Rupture-Excessive Heat Transfer
High Cog

2.4.46 Ability to verify that the alarms are consistent with the plant conditions.
RO 4.2 SRO 4.2

Meets K/A, examinee must assess the order and meaning of annunciator 1-9-E1 and P-11 clearing and determine whether this is consistent with the expected progression of the steam fault event, or not. SRO as it requires assessment of plant conditions and decision at procedural transition step. The decision to stay in the current procedure and NOT make a transition to another procedure is an SRO function at Braidwood.

10CFR55.43(b)(5) Assessment of facility conditions and selection of appropriate procedures during normal, abnormal, and emergency situations.

Answer: C.remain in 1BwEP ES-1.1, SI TERMINATION. Step 5 of 1BwEP ES-1.1 checks for RCS pressure trend and if it is trending up, the procedure directs continuing with SI termination.

A is Incorrect. See explanation. Transition to 1BwEP ES-1.2 is plausible and contained in the RNO column of 1BwEP ES-1.1, step 5, if the examinee misdiagnoses the RCS pressure trend.
B is Incorrect. See explanation. Transition to 1BwEP-2 is plausible and contained in the Operator Action Summary of 1BwEP ES-1.1 if another steam generator has an uncontrolled pressure drop. Given the intact steam generator pressures are well below normal post trip pressures, the examinee may assume one or more faulted steam generators. However, the examinee needs to understand that intact steam generators saturation pressure will drop considerably during the cooldown caused by the faulted generator.
C is Correct. See explanation.
D is Incorrect. See explanation. Transition to 1BwEP ES-0.2 is plausible because all RCPs are tripped in the question stem and will be the eventual procedure destination. However, 1BwEP ES-0.2 does not contain steps to terminate SI and therefore a procedure transition to 1BwEP ES-0.2 at this time would be incorrect.

Objective: T.EP02-01.

Technical References: Step 5, Check RCS Pressure of 1BwEP ES-1.1, rev. 202, SI TERMINATION.

LOD: 3

87 **ID: 881693** **Points: 1.00**

Answer: C

Answer Explanation

New Question (2013 NRC exam question 87)
SRO level
W/E04 LOCA Outside Containment
High Cog

EA2. Ability to determine and interpret the following as they apply to the (LOCA Outside Containment)
EA2.2 Adherence to appropriate procedures and operation within the limitations in the facility's license and amendments.
RO 3.6 SRO 4.2

Meets K/A, examinee must determine operability status of the ECCS trains as a result of actions initiated to mitigate a LOCA outside containment IAW 2BwCA-1.2, LOCA OUTSIDE CONTAINMENT, then determine the ECCS operability status once Mode 4 is entered. In order to adhere to the license/Tech Spec requirements, the examinee must be able to ascertain the operability status of each ECCS train.
10CFR55.43(b)(2) Facility operating limitations in the technical specifications and their bases.
SRO level because the examinee must determine application of LCO 3.0.3 and use knowledge of Technical Specification bases to determine operability of ECCS trains.

Answer: C. Declare BOTH ECCS trains inoperable, causing entry into LCO 3.0.3. Once mode 4 is reached ECCS operability requirements are still NOT met. With the 2SI8809B, 2RH8716B and 2SI8812B closed, the 2B RH train (and therefore 2B ECCS train) is inoperable (2B RH pump is completely isolated). ECCS operability per LCO 3.5.2 bases (page B3.5.2-8) requires the ability to discharge into all four ECCS cold legs, which in this alignment cannot be accomplished by train A. As such, both trains are inoperable, AND there is NOT flow equivalence to a single ECCS train because 2A RH pump cannot discharge into all four RCS cold legs. This results in applicability of LCO 3.0.3. LCO 3.5.3 provides the operability requirements for ECCS in mode 4. This LCO requires 1 charging and 1 RH pump, again capable of discharging into all 4 cold legs, therefore the ECCS requirements for mode 4 are not met even though 1 CV and 1RH pump are capable of operating.

A is Incorrect. See explanation.
B is Incorrect. See explanation.
C is Correct. See explanation.
D is Incorrect. See explanation.

Objective: S.EC1-15-D.

Technical References: LCO 3.5.2 and Bases. LCO 3.5.3 and Bases. 2BwCA-1.2, rev. 200, LOCA OUTSIDE CONTAINMENT.

LOD: 3

EXAMINATION ANSWER KEY (ANSWERS ONLY)

2013 NRC SRO EXAM

88 **ID: 881694** **Points: 1.00**

Answer: B

Answer Explanation

Bank Question (2013 NRC exam question 88) from LORT Bank BWLC3DEP4010
SRO level
W/E11 Loss of Emergency Coolant Recirculation
High Cog

EA2. Ability to determine and interpret the following as they apply to the (Loss of Emergency Coolant Recirculation)
EA2.2 Adherence to appropriate procedures and operation within the limitations in the facility*s license and amendments.
RO 3.4 SRO 4.2

SRO level as examinee must assess plant conditions and select appropriate transition.

Meets K/A, examinee must assess plant conditions for loss of emergency coolant recirculation present, and identify the correct transition for the correct transition criteria.
10CFR55.43(b)(5) Assessment of facility conditions and selection of appropriate procedures during normal, abnormal, and emergency situations.
Answer: B. transition to 1BwCA-1.1, LOSS OF EMERGENCY COOLANT RECIRCULATION due to the status of Cnmt floor water level. Step 2 of 1BwEP ES-1.3, determines if adequate level is in the ECCS RECIRC sump to establish the cold leg recirculation alignment. The criteria is 8 inches (normal containment) or 13 inches (adverse containment). In this case, the adverse containment value applies and transition to 1BwCA-1.1, LOSS OF EMERGENCY COOLANT RECIRCULATION is required. Otherwise if adequate level had been present (which some examinees will determine to be the case, as the value is above the normal containment value), the crew would continue to implement 1BwEP ES-1.3. Implementation of Attachment A would apply if the 1A RH pump were running in that case.

A is Incorrect. See explanation.
B is Correct. See explanation.
C is Incorrect. See explanation.
D is Incorrect. See explanation.

Objective: T.CA2-04.

Technical References: 1BwEP-ES1.3, TRANSFER TO COLD LEG RECIRCULATION rev 201.

LOD: 2-3

Question Use: LORT

89 **ID: 881695** **Points: 1.00**

Answer: B

Answer Explanation

New Question (2013 NRC exam question 89)
SRO level
W/E05 Inadequate Heat Transfer-Loss of Secondary Heat Sink
High Cog

Generic KA 2.2.25 Knowledge of the bases in Technical Specifications for limiting conditions for operations and safety limits.
RO 3.2 SRO 4.2

Meets K/A and SRO level, examinee must determine compliance with LCO 3.4.5 (RCS loops mode 3) which requires information only located in the bases and/or surveillance requirements (information below the double line).
10CFR55.43(b)(2) Facility operating limitations in the technical specifications and their bases.
Answer: B. crew must start ONE RCP AND raise the corresponding SG level. Per LCO 3.4.5 with rod control incapable of rod withdrawal, one OPERABLE RCS loop must be in operation. An RCS loop is only OPERABLE if the NR SG level is at least 18% (per bases page 3.4.5-7 for SR 3.4.5.2). Distractors are plausible based on lack of knowledge of the requirement for 18% NR SG level for an RCS loop to be OPERABLE, and LCO 3.4.5 does have a requirement for two Loops in operation (if rods are capable of withdrawal). Similarly, LCO 3.4.6 (applies to Mode 4) requires two loops in operation.

A is Incorrect. See explanation.
B is Correct. See explanation.
C is Incorrect. See explanation.
D is Incorrect. See explanation.

Objective: S.RC1-12-D.

Technical References: LCO 3.4.5 Amendment 98. LCO 3.4.5 bases page B.3.4.5-7 rev. 85.

LOD: 2-3

EXAMINATION ANSWER KEY (ANSWERS ONLY)

2013 NRC SRO EXAM

90 **ID: 883093** **Points: 1.00**

Answer: D

Answer Explanation

New Question (2013 NRC exam question 90)
SRO level
W/E03 LOCA Cooldown and Depressurization
High Cog

EA2. Ability to determine and interpret the following as they apply to the (LOCA Cooldown and Depressurization)
EA2.1 Facility conditions and selection of appropriate procedures during abnormal and emergency operations.
RO 3.4 SRO 4.2

Meets K/A, examinee must determine that the correct procedural path for the conditions given is to implement the post-LOCA cooldown and depressurization.

10CFR55.43(b)(5) Assessment of facility conditions and selection of appropriate procedures during normal, abnormal, and emergency situations.

Answer: D. transition to 1BwEP ES-1.2, POST LOCA COOLDOWN AND DEPRESSURIZATION. Step 12 of 1BwEP-1 directs a transition to 1BwEP ES-2.1 if RCS pressure is above 325 psig.

A: Incorrect. See explanation. 1BwFR-S.1 is plausible based on the IRNI fluctuating SUR (actual Orange path is a positive SUR, the indications to constitute a Yellow path).
B: Incorrect. See explanation. 1BwFR-C.2 is plausible based on Core cooling is NOT green (no subcooling) and is approaching the defined criteria for degraded core cooling (CETCs at 700^{o}F or greater), but not there yet.
C: Incorrect. See explanation. 1BwEP ES-1.1 is plausible based on an earlier transition step (step 6) in 1BwEP-1 that is also a Continuous Action. However, RCS pressure must be stable or rising as one of the criteria for transition to 1BwEP ES-1.1.
D: Correct. See explanation.

Objective: T.EP02-01.b.

Technical References: 1BwEP-1, rev. 204, step 12. 1BwST-1, rev. 200, SUBCRITICALITY. 1BwST-2, rev. 200, CORE COOLING.

LOD: 2-3

EXAMINATION ANSWER KEY (ANSWERS ONLY)

2013 NRC SRO EXAM

91 **ID: 881697** **Points: 1.00**

Answer: B

Answer Explanation

New Question (2013 NRC exam question 91)
SRO level
APE 067 Plant Fire On-site
Low Cog

AA2. Ability to determine and interpret the following as they apply to the Plant Fire on Site:
AA2.13 Need for emergency plant shutdown
RO 3.3 SRO 4.4

Meets K/A, examinee must determine whether the MCR conditions require an emergency shutdown (reactor trip) due to the presence of a fire in specific plant location.

SRO level as requires assessment of conditions, knowledge of the transition to Unit-specific procedure criteria, and detailed procedure content knowledge.
10CFR55.43(b)(5) Assessment of facility conditions and selection of appropriate procedures during normal, abnormal, and emergency situations.
Answer: B. The Fire Brigade Leader recommends MCR evacuation. The Shift Manager concurs. 0BwOA PRI-5 step 3.e. DETERMINE IF MCR EVACUATION REQUIRED lists 4 conditions for the SM to determine if the MCR must be evacuated. If ONE of the criteria is met AND the SM determines MCR evacuation is necessary, THEN the crew implements 1/2BwOA PRI-5 for BOTH units (directing that each be tripped). The loss of individual equipment control from the MCR is addressed in the RNO of step 3.e. which specifies taking local control at the RSDP of that equipment that is affected and does NOT implement 1/2BwOA PRI-5 for EITHER unit. Distractors are plausible as loss of vital equipment control due to the fire

A is Incorrect. See explanation.
B is Correct. See explanation.
C is Incorrect. See explanation.
D is Incorrect. See explanation.

Objective: T.OA16-03.

Technical References: 0BwOA PR-5, CONTROL ROOM INACCESSIBIILTY, rev. 101. 1/2BwOA PRI-5, CONTROL ROOM INACCESSIBIILTY, rev.106/105.
LOD: 2-3

EXAMINATION ANSWER KEY (ANSWERS ONLY)

2013 NRC SRO EXAM

92 **ID: 881698** **Points: 1.00**

Answer: D

Answer Explanation

Bank Question (2013 NRC exam question 92. Previous use ILT NOPS exam)
SRO level
APE 068 Control Room Evacuation
Low Cog

Generic KA 2.1.20
2.1.20 Ability to interpret and execute procedure steps.
RO 4.6 SRO 4.6

Meets K/A, examinee must determine those procedural actions required to be completed PRIOR to implementation of the 1BwOA PRI-5 Attachments (which are implemented after evacuating the MCR).

SRO level because the examinee must discern between those actions required prior to evacuation (main body of procedure) versus those that can be performed in the attachments (subsequent).
10CFR55.43(b)(5) Assessment of facility conditions and selection of appropriate procedures during normal, abnormal, and emergency situations.
Answer: D. TRIPPING ALL RCPS. Per 1BwOA PRI-5 steps 1-8, step 1 requires verification of reactor trip and bypass breakers open, step 3 verifies turbine governor and throttle valves closed, and step 6.f verifies RCS loop sample CIVs open in the MCR. Tripping RCPs is a plausible distractor because it is a mitigation strategy in multiple other abnormal and emergency procedures. Also, at the remote shut down panel, RCPs have emergency stop pushbuttons but no method to start an RCP, which an examinee could mistakenly consider running RCPs is not desirable when the MCR is evacuated.

A is Incorrect. See explanation.
B is Incorrect. See explanation.
C is Incorrect. See explanation.
D is Correct. See explanation.

Objective: T.OA16-03.

Technical References: 1BwOA PRI-5, CONTROL ROOM INACCESSIBILITY, rev. 106.

LOD: 2-3.

Bank question from ILT bank (Used in NOPS phase exam) BWLI-PRI5021

EXAMINATION ANSWER KEY (ANSWERS ONLY)

2013 NRC SRO EXAM

93 **ID: 881699** **Points: 1.00**

Answer: D

Answer Explanation

New Question (2013 NRC exam question 93)
SRO level
EPE W/E13 Steam Generator Over-pressure
High Cog

Generic KA 2.1.32 Ability to explain and apply system limits and precautions.
RO 3.8 SRO 4.0

Meets K/A, examinee must determine the action required when the technical specification limits for SG safeties are not met. Question is SRO level as it requires knowledge of technical specification actions required beyond 1 hour or information in the TS bases.

10CFR55.43(b)(2) Facility operating limitations in the technical specifications and their bases.

Answer: D. (3) and (4) ONLY. Per LCO 3.7.1 condition A, with one or more steam generators with one or more MSSVs inoperable, thermal power must be reduced and the Power Range neutron flux high reactor trip setpoint must be reduced. These actions statements are greater than one hr. and would not normally be considered for application from memory however, the requirements are extensively discussed in the 3.7.1 bases and therfore SRO required knowledge (the question does not ask the candidate to apply the tech specs in any time frame). OTΔT and OPΔT are plausible distractors because they are also power limiting trip setpoints that can be adjusted by changing calculation constants.

A is Incorrect. See explanation.
B is Incorrect. See explanation.
C is Incorrect. See explanation.
D is Correct. See explanation.

Objective: S.MS1-08-D.

Technical References: B.3.7.1 Revision 42.

LOD: 2-3

EXAMINATION ANSWER KEY (ANSWERS ONLY)

2013 NRC SRO EXAM

94 **ID: 881700** **Points: 1.00**

Answer: C

Answer Explanation

New Question (2013 NRC exam question 94)
SRO level
Tier 3
Low Cog

2.1.36 Knowledge of procedures and limitations involved in core alterations.
RO 3.0 SRO 4.1

Meets K/A, examinee must determine which actions are acceptable in order to meet the requirement to suspend core alterations as is required in this situation. It is the FH SRO job to direct the specific manner in which core alterations will be suspended.
10CFR55.43(b)(7) fuel handling facilities and procedures.
Answer: C. the fuel assembly MUST be placed in a designated core location. Of the options given, this is the only one procedurally allowed. Per 1BwGP 100-6, REFUELING OUTAGE, Section E. Limitations and Actions item 5, an UNEXPECTED change in boron concentration of 20 ppm or greater based on two successive samples requires suspension of core alterations. OU-AP-200 section 4.5 defines the acceptable means to meet suspension of core alterations. In this case, item 4.5.2 applies as the fuel assembly has been lowered below the plane of the Reactor Vessel flange, requiring that either the assembly be placed in the designated core location, or in a designated set down location per move sheet cover page emergency set down location notes. Emergency boration is not required as boron concentration is NOT outside the limitations of the COLR (COLR specifies 1714 ppm). Actuating phase A containment ventilation isolation is not required. LCO 3.9.4 requires that the actuation instrumentation for containment ventilation isolation be operable during movement of recently irradiated fuel (containment vent isolation is actuated by phase A also).

A is Incorrect. See explanation.
B is Incorrect. See explanation.
C is Correct. See explanation.
D is Incorrect. See explanation.

Objective: T.AM12-02.

Technical References: 1BwGP 100-6, REFUELING OUTAGE, rev. 24. OU-AP-200, ADMINISTRATIVE CONTROLS DURING FUEL HANDLING ACTIVITIES FOR BYRON AND BRAIDWOOD, rev. 14.

LOD: 3

EXAMINATION ANSWER KEY (ANSWERS ONLY)

2013 NRC SRO EXAM

95 **ID: 881701** **Points: 1.00**

Answer: D

Answer Explanation

New Question (2013 NRC exam question 95)
SRO level
Tier 3
Low Cog

2.1.42 Knowledge of new and spent fuel movement procedures:
RO 2.5 SRO 3.4

Meets K/A, examinee must discern the unique SRO fuel handling responsibilities from the QNE responsibilities per OU-AP-200 (fuel handling administrative procedure).
10CFR55.43(b)(7) fuel handling facilities and procedures.
Answer: D. perform an Inverse Count Rate Ratio plot for each fuel assembly placed in the core. Per OU-AP-200 section 4.8.5 this is the responsibility of the QNE. OU-AP-200 section 3.2.4 designates SRO responsibility for visual core alignment inspection. OU-AP-200 section 3.2.3 designates the SRO responsibility for maintaining direct communication with the MCR. Item 15 under Reactor Services Supervisor designates responsibility for access control to the refueling areas (and item 3.2.5 assigns the SRO the same responsibilities as the Reactor Services Supervisor when supervising fuel related activity). An ICRR plot is plausible because it is in OU-AP-200 and performance of an ICRR plot is taught to ILT candidates during fundamentals and Normal Ops phase of the ILT program.

A is Incorrect. See explanation.
B is Incorrect. See explanation.
C is Incorrect. See explanation.
D is Correct. See explanation.

Objective: T.AM12-16.

Technical References: OU-AP-200 ADMINISTRATIVE CONTROLS DURING FUEL HANDLING ACTIVITIES FOR BYRON AND BRAIDWOOD rev. 14.

LOD: 2-3

EXAMINATION ANSWER KEY (ANSWERS ONLY)

2013 NRC SRO EXAM

96 **ID: 881702** **Points: 1.00**

Answer: A

Answer Explanation

New Question (2013 NRC exam question 96)
SRO level
Tier 3
Low Cog

2.2.19 Knowledge of maintenance work order requirements.:
RO 2.3 SRO 3.4

Meets K/A, examinee must identify the specific SRO responsibility associated with maintenance work orders (for safety related equipement).
10CFR55.43(b)(1) Conditions and limitations in the facility license.
Answer: A. Section 2.21 of WC-AA-106, WORK SCREENING AND PROCESSING specifically requires an SRO for the Screening Committee review of equipment issues that affect the plant operating license. During maintenance activities, Maintenance is responsible for configuration control (see section 3.5 of WC-AA-106). Personnel may individually/independently check out keys from the WEC (see BwAP 330-5 which allows the SM to designate other than licensed individuals for authorizing key checkout). IV of component positioning for safety related clearance orders may be performed by other qualified operators (i.e. does not require SRO). SRO level as it requires SRO specific knowledge driven by plant operating license basis commitments.

A is Correct. See explanation.
B is Incorrect. See explanation.
C is Incorrect. See explanation.
D is Incorrect. See explanation.

Objective: S-AM-134.

Technical References: WC-AA-106, rev. 13, WORK SCREENING AND PROCESSING.

LOD: 3

EXAMINATION ANSWER KEY (ANSWERS ONLY)

2013 NRC SRO EXAM

97 **ID: 881703** **Points: 1.00**

Answer: C

Answer Explanation

New Question (2013 NRC exam question 97)
SRO level
Tier 3
Low Cog

2.2.42 Ability to recognize system parameters that are entry-level conditions for Technical Specifications.
RO 3.9 SRO 4.6

Meets K/A, examinee must determine which parameter change will result in failure to meet a specific LCO and the operational effect, according to technical specification bases (SRO level).
10CFR55.43(b)(2) Facility operating limitations in the technical specifications and their bases.
Answer: C. (1) NEGATIVE 0.2 psig in Containment Pressure (2) exceed the design NEGATIVE Containment pressure if Containment Spray inadvertently actuates. LCO 3.6.4 bases state that the initial containment pressure assumed in the safety analysis was -0.1 psig (the lower limit for the LCO) and that the design basis event is an inadvertent CS actuation. Although 1 gpm or greater water flowing into the Containment Floor Drain sump will actuate annunciator 2-1-A2 CNMT DRAIN LEAK DETECT FLOW HIGH, the bases allows for use of PC002 and PC003 via trending to monitor for leakage to meet the requirement to detect a 1 gpm RCS leak within 1 hour. With surveillance 2BwOS RF-1 current, the LCO is still met when the alarm actuates. Loss of the annunciator function results in a loss of a redundant means of leak detection UNTIL the surveillance is performed using PC002/PC003. The subject surveillance is NOT normally current.

A: Incorrect. See explanation.
B: Incorrect. See explanation.
C: Correct. See explanation.
D: Incorrect. See explanation. However, "exceeding superheat assumptions that form the basis for equipment qualification in Containment during an assumed LOCA" is plausible and relates to TS 3.3.3 PAM Instrumentation bases and Regulatory Guide 1.97.

Objective: S.RC1-12-D.

Technical References: LCO 3.6.4, Containment Pressure, and bases (page B.3.6.4-3). LCO 3.4.15, RCS Leak Detection Instrumentation, and bases.

LOD: 3

98 **ID: 881704** **Points: 1.00**

Answer: C

Answer Explanation

New Question (2013 NRC exam question 98)
SRO level
Tier 3
Low Cog

2.3.6 Ability to approve release permits.

RO 2.0 SRO 3.8

Meets K/A, examinee must have knowledge of containment release procedure. SRO as the release permit authorization is a specific SRO responsibility and the question requires detailed knowledge of the release permit procedural limitations.

10CFR55.43(b)(5) Assessment of facility conditions and selection of appropriate procedures during normal, abnormal, and emergency situations.

Answer: C. Ensure the containment release is initiated within 48 hrs of a routine analyzed sample of containment atmosphere. Per Attachment 1 of RP-BR-980 it is the SROs responsibility to ensure the release is initiated within this time period. Although, the is a general note in the SRO responsibility section of the procedure that the SRO is responsible to "Review the discharge data and ensure the form is filled out properly", the distractors are functions of other procedure users.

A is Incorrect. See explanation. This is a Rad Protection/Chemistry responsibility.
B is Incorrect. See explanation. This is a Rad Protection/Chemistry responsibility.
C is Incorrect. See explanation.
D is Correct. See explanation. This is a Control Room Operator (RO) responsibility.

Objective: S-HP-002.
Technical References: RP-BR-980, rev. 12 page 4.
LOD: 3-4

EXAMINATION ANSWER KEY (ANSWERS ONLY)

2013 NRC SRO EXAM

99 **ID: 881705** **Points: 1.00**

Answer: D

Answer Explanation

New Question (2013 NRC exam question 99)
SRO level
Tier 3
High Cog

2.4.4 Ability to recognize abnormal indications for system operating parameters that are entry-level conditions for emergency and abnormal operating procedures.
RO 4.5 SRO 4.7

Meets K/A, examinee must assess the status of bus 141 based on system abnormal indications, assess plant conditions based on parameters, and select correct procedure transition.
10CFR55.43(b)(5) Assessment of facility conditions and selection of appropriate procedures during normal, abnormal, and emergency situations.
SRO level because examinee must assess plant conditions and select correct transition.

Answer: D. leave bus 141 de-energized, cross-tie bus 142 to Unit 2, then transition to 1BwCA-0.1 LOSS OF ALL AC POWER RECOVERY WITHOUT SI REQUIRED. 1BwCA-0.0 step 8 diagnoses whether bus 141 is faulted via annunciators present when the bus 141 feed breakers are all in PTL. In the given scenario, the presence of annunciators 1-21-A7, BUS 141 FD BRKR 1412 TRIP and 1-21-B9, DG 1A OVERLOAD lit indicates bus 141 is faulted and should be left de-energized. The procedure then directs cross-tie of bus 142 to 242. The transition criteria to 1BwCA-0.1 is met (subcooling acceptable and Pressurizer level greater than 14% (28% adverse containment) and no ECCS actuation on power restoration. Distractors are plausible based on mis-diagnosis that bus 141 is NOT faulted (cross-tie both buses) and not meeting SI termination criteria (some examinees will remember the 28% criteria as normal containment value thus think the current Pressurizer level is too low and determine the transition is to 1BwCA-0.2.

A is Incorrect. See explanation.
B is Incorrect. See explanation.
C is Incorrect. See explanation.
D is Correct. See explanation.

Objective: T.CA1-09A.

Technical References: 1BwCA-0.0 rev. 204.

LOD: 3

EXAMINATION ANSWER KEY (ANSWERS ONLY)

2013 NRC SRO EXAM

100 **ID: 881706** **Points: 1.00**

Answer: C

Answer Explanation

Modified Question (2013 NRC exam question 100)
SRO level
Tier 3
High Cog

2.4.23 Knowledge of the bases for prioritizing emergency procedure implementation during emergency operations.
RO 3.4 SRO 4.4

Meets K/A, examinee must determine the correct priority for actions to mitigate a loss of core cooling and the bases for that action. The question is SRO level because it requires assessment of conditions and direct appropriate MCR actions and level of detail beyond just the note and overall mitigating strategy 10CFR55.43(b)(5) Assessment of facility conditions and selection of appropriate procedures during normal, abnormal, and emergency situations.
Answer: C. immediately start EITHER the 1A or 1C RCP regardless of the support conditions. Starting one of these RCPs may provide temporary core cooling. Only RCPs in loops with SG levels high enough to ensure the U-tubes are covered are started. With adverse containment, this value is 31% (normal is 10%). Opening PZR PORVs is a mitigating strategy if NO SG levels are adequate for starting an RCP in this situation. A note in the procedure clarifies that normal support conditions are desired, but not required for starting the RCPs in this situation. Starting both RCPs would temporarily improve core cooling, just as starting one RCP does, however in order to restore long term core cooling, the inventory issue must be addressed, so starting RCPs is only a temporary mitigating strategy. The procedure has the operators start one, check to see if it was sufficient to temporarily reduce CETCs below 1200^{o}F, and if not, then start the next RCP.

A is Incorrect. See explanation.
B is Incorrect. See explanation.
C is Correct. See explanation.
D is Incorrect. See explanation.

Objective: 7D.FR-002-A.

Technical References: 1BwFR-C.1, INADEQUATE CORE COOLING rev. 200. ILT Lesson plan I1-FR-XL-02, rev. 7a, Function Restoration Procedures (FR-C.1, C.2, C.3) page 9.

LOD: 3

EXAMINATION ANSWER KEY
(ANSWERS ONLY)

2013 NRC SRO EXAM

ORIGINAL QUESTION: (THIS QUESTION IS QUESTION 85 ON THE ILT 11-1 CERTIFICATION EXAM)

VISION ID: SE10074-C01

Given:

- An inadequate core cooling event is in progress on Unit 1.
- The crew is performing 1BwFR-C.1, RESPONSE TO INADEQUATE CORE COOLING.
- At step 3, CHECK RCP SUPPORT CONDITIONS, support conditions were NOT established due to no seal injection flow and high RCP leakoff temperatures.
- Continued attempts to re-establish RCP support conditions have been UNSUCCESSFUL so far.

- Currently, the crew is at step 16, CHECK IF RCPs SHOULD BE STARTED.
- All RCPs are shutdown.
- CETCs are 1235°F and slowly rising.
- Containment is ADVERSE.
- SG NR Levels are as follows:

1A 18%
1B 21%
1C 24%
1D 28%

With the above conditions, the US will direct the crew to...

A. NOT start an RCP and continue with the next mitigating strategy by opening both PZR PORVs.

B. remain at step 16 until support conditions are established, then start the 1D RCP.

C. immediately start the 1D RCP regardless of the support conditions.

D. continue with the procedure while attempting to establish support conditions, then return to step 16 when support conditions are established.

Answer: A