1. Which of the following describes the purpose and function of the Anticipatory Reactor Trip System (ARTS)?

The purpose of ARTS is to initiate a reactor trip to minimize the __(1)__.
ARTS initiates a reactor trip by opening contacts in series with the Control Rod Drive Trip Breaker __(2)__.

A. (1) severity of a Main Steam line break accident
(2) Shunt Trip Coils

B. (1) severity of a Main Steam line break accident
(2) Undervoltage Coils

C. (1) probability of actuation of the Power Operated Relief Valve (PORV)
(2) Shunt Trip Coils

D. (1) probability of actuation of the Power Operated Relief Valve (PORV)
(2) Undervoltage Coils

Answer: D

Explanation/Justification:

A. Incorrect - minimize PORV lifting is ARTS purpose per Tech Spec Bases 3.3.16. ARTS trips are in series with UV coils – See Tech Spec Bases 3.3.4. MS line break is plausible because it is one of the design bases events for SFRCS and an SFRCS trip causes an ARTS trip. See Tech Spec Bases 3.3.11. Shunt Trip Coils is plausible because the shunt trip is actuated by UV sensing relay in parallel with CRD breaker UV coil, so Shunt Trip will trip when ARTS trips.
B. Incorrect – minimize PORV lifting is ARTS purpose per Tech Spec Bases 3.3.16. MS line break is plausible because it is one of the design bases events for SFRCS and an SFRCS trip causes an ARTS trip. See Tech Spec Bases 3.3.11.
C. Incorrect – ARTS trips are in series with UV coils – See Tech Spec Bases 3.3.4. Plausible because shunt trip is actuated by UV sensing relay in parallel with CRD breaker UV coil. Part 1 is correct.
D. Correct - PORV – see Tech Spec Bases 3.3.16; UV Trip – See Tech Spec Bases 3.3.4. See also DB-OP-06403 R20 RPS and NI Operating Procedure Attachment 4.

Sys #	System	Category	KA Statement
000007	Reactor Trip	Generic	Knowledge of the purpose and function of major system components and controls

K/A# 2.1.28 **K/A Importance** 4.1 **Exam Level** RO

References provided to Candidate None **Technical References:** Tech Spec Bases 3.3.16 and 3.3.4; DB-OP-06403 R20 Attachment 4

Question Source: New

Question Cognitive Level: Low – Recall **10 CFR Part 55 Content:** (CFR: 41.7)

Objective: OPS-GOP-303-05K

2. The plant is operating at 100% power.

The following conditions are noted:
- 4-1-D PZR RLF VLV OPEN alarm
- Containment Air Cooler 1 Suction Temperature TI1356 is 160 ºF
- Containment Air Cooler 2 Suction Temperature TI1357 is 155 ºF
- Computer alarm T770 RC PRZR PRESS RLF OUT TMP, RC12-2 high

Which of the following describes:
(1) the event that has occurred?
(2) its effect, if any, on indicated Pressurizer (PZR) level?

A. (1) Partially open PZR Power Operated Relief Valve
(2) No effect on PZR level

B. (1) Partially open PZR Power Operated Relief Valve
(2) PZR level indicates higher than actual

C. (1) Partially open PZR Code Safety Relief Valve
(2) No effect on PZR level

D. (1) Partially open PZR Code Safety Relief Valve
(2) PZR level indicates higher than actual

Answer: D

Explanation/Justification:

A. Incorrect – Safety valve open indicated by computer alarm. See DB-OP-02513 R11 step 2.5.2. PORV open would have T773 computer alarm. See DB-OP-02513 R11 step 2.2.4. PZR level reads high due to reference leg heat up. Elevated CAC suction temperatures indicate reference leg heat up. See DB-OP-06003 R30 PZR Operating Procedure step 2.2.9. Plausible because of similarities in computer alarm nomenclature; PORV leak symptoms step 2.4.3 lists no change in PZR level. See DB-OP-02513 R11 step 2.4.3.

B. Incorrect – Safety valve open indicated by computer alarm. See DB-OP-02513 R11 step 2.5.2. PORV open would have T773 computer alarm. See DB-OP-02513 R11 step 2.2.4. Plausible because of similarities in computer alarm nomenclature. Part 2 is correct.

C. Incorrect – PZR level reads high due to reference leg heat up. Elevated CAC suction temperatures indicate reference leg heat up. See DB-OP-06003 R30 PZR Operating Procedure step 2.2.9. Plausible because DB-OP-02513 R11 section 2.5 symptoms for leaking safety is silent on PZR level. Part 1 is correct.

D. Correct – Safety valve open indicated by computer alarm. See DB-OP-02513 R11 step 2.5.2. PZR level reads high due to reference leg heat up. See DB-OP-06003 R30 PZR Operating Procedure step 2.2.9.

Sys #	System	Category	KA Statement
000008	Pressurizer (PZR) Vapor Space Accident	AK2 Knowledge of the interrelations between the Pressurizer Vapor Space Accident and the following:	Sensors and detectors

K/A# AK2.02 **K/A Importance** 2.7* **Exam Level** RO

References provided to Candidate None **Technical References:** DB-OP-02513 R11 step 2.5.2; DB-OP-06003 R30 step 2.2.9

Question Source: New

Question Cognitive Level: High - Comprehension **10 CFR Part 55 Content:** (CFR 41.7 / 45.7)

Objective: OPS-GOP-113-01K

3. The plant was tripped from 100% power due to a Reactor Coolant System (RCS) leak.

The operators have performed all required actions prior to implementing the applicable Symptom Mitigation Section of the governing procedure.

The plant has been stabilized. Current conditions:

- The RCS leak has been isolated.
- RCS pressure is 1275 psig.
- RCS Thot is 540 ºF.
- Incore temperatures are 545 ºF.
- Borated Water Storage Tank (BWST) level is 38 feet.

Which of the following Technical Specifications ACTIONS are required to be met for current conditions?

A. Restore RCS pressure to ≥ 2064.8 psig within 30 minutes per LCO 3.4.1 RCS Pressure, Temperature, and Flow Departure from Nucleate Boiling (DNB) Limits.

B. Restore RCS cooldown rate to within limits within 30 minutes per LCO 3.4.3 RCS Pressure and Temperature (P/T) Limits.

C. Immediately initiate action to lower incore temperature to ≤ 535 ºF per LCO 3.4.6 RCS Loops – MODE 4.

D. Restore BWST level to > 38.6 feet within one hour per LCO 3.5.4 Borated Water Storage Tank.

Answer: D

Explanation/Justification:

A. Incorrect - LCO 3.4.1 is not applicable. LCO 3.4.1 applies in MODE 1 only and the plant is in MODE 3 due to the reactor trip. Plausible because LCO 3.4.1 pressure limit is not met due to low RCS pressure from SBLOCA and Action would be correct.

B. Incorrect – LCO 3.4.3 is met. RCS P/T is within the limits of Figure 1 of the PTLR and RCS did not cool down 100 ºF. Plausible because LCO 3.4.3 is applicable at all times and required Action and Completion Time would be correct.

C. Incorrect – LCO 3.4.6 is not applicable. LCO 3.4.6 applies in MODE 4 and the plant is in MODE 3 due to the reactor trip. Plausible for determining that the required RCS loop is not in operation because all RCPs were stopped. Action would place plant in compliance with LCO 3.4.6 NOTE b and Completion Time is consistent with Condition A.

D. Correct – LCO 3.5.4 is applicable because the plant is in MODE 3 due to the reactor trip. BWST is inoperable due to low water volume, so Condition B applies which has one hour completion time. See also DB-OP-02003 R16 Window 3-1-C step 3.3

Sys #	System	Category	KA Statement
000009	Small Break LOCA	Generic	Knowledge of less than or equal to one hour Technical Specification action statements for systems

K/A# 2.2.39 **K/A Importance** 3.9 **Exam Level** RO

References provided to Candidate None **Technical References:** LCO 3.5.4; DB-OP-02003 R16 Window 3-1-C

Question Source: New

Question Cognitive Level: High - Comprehension **10 CFR Part 55 Content:** (CFR: 41.7 / 41.10 / 43.2 / 45.13)

Objective: OPS-GOP-343-01K

4. The plant is operating at 100% power.

A Design Basis Loss of Coolant Accident (DBLOCA) occurs.

Which of the following describes the bases for the Borated Water Storage Tank (BWST) level at which the operators transfer Low Pressure Injection (LPI) Suction to the Emergency Sump?

The specified BWST level for transfer of LPI suction to the Emergency Sump is designed to __(1)__ and __(2)__.

A. (1) maximize Core cooling during the DBLOCA Injection Phase
(2) minimize Containment pressure during the DBLOCA Injection Phase

B. (1) maximize Core cooling during the DBLOCA Injection Phase
(2) ensure sufficient LPI Pump NPSH prior to the completion of the transfer of LPI Suction to the Emergency Sump

C. (1) ensure sufficient LPI Pump NPSH during the DBLOCA Recirculation Phase
(2) ensure sufficient LPI Pump NPSH prior to the completion of the transfer of LPI Suction to the Emergency Sump

D. (1) ensure sufficient LPI Pump NPSH during the DBLOCA Recirculation Phase
(2) minimize Containment pressure during the DBLOCA Injection Phase

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Answer: C

Explanation/Justification:

A. Incorrect – Plausible misconception because Injection Phase water from the BWST is colder than Recirculation Phase water from the Containment Sump. Both items occur with larger Injection Phase volumes, but are not the bases of the transfer setpoint.
B. Incorrect – Plausible because it contains one of the correct items.
C. Correct – See System Description for Decay Heat Removal System SD-042 R6 item 2.1.2.3 page 2-6
D. Incorrect – Plausible because it contains one of the correct items.

Sys #	System	Category	KA Statement
000011	Large Break LOCA	EK3 Knowledge of the reasons for the following responses as they apply to the Large Break LOCA: Criteria for shifting to recirculation mode	Criteria for shifting to recirculation mode

K/A# EK3.15 **K/A Importance** 4.3 **Exam Level** RO

References provided to Candidate None **Technical References:** SD-042 R6 item 2.1.2.3 page 2-6

Question Source: New

Question Cognitive Level: Low - Memory **10 CFR Part 55 Content:** (CFR 41.5 / 41.10 / 45.6 / 45.13)

Objective: OPS-GOP-309-04K

5. The plant is operating at 70% power.
   - RCS Loop 1 flow is 74 mpph
   - RCS Loop 2 flow is 75 mpph

   RCP 2-2 trips

   (1) Which of the following is the signal the ICS will receive for Tave input?

   (2) How will the trip of RCP 2-2 impact SG levels?

A. (1) Loop 2 Tave
(2) SG 1 level will be higher than SG 2 Level

B. (1) Loop 1 Tave
(2) SG 1 level will be higher than SG 2 Level

C. (1) Loop 1 Tave
(2) SG 2 level will be higher than SG 1 Level

D. (1) Loop 2 Tave
(2) SG 2 level will be higher than SG 1 Level

Answer: B

Explanation/Justification:

A. Incorrect. Plausible since Loop 2 Tave is the normal controlling Tave Loop. Since a Loop 2 RCP trips, Loop 1 will have the highest flow FW flow and therefore SG level will be higher in SG 1 which is correct.

B. Correct. The Smart Analog Selector Switch (SASS) for Tave automatically selects the Loop with the Highest RCS Flow when a RCP is stopped. Since a Loop 2 RCS trips, Loop 1 will have the highest flow and Loop 1 Tave will be selected. ICS will ratio FW flow to the Steam Generators based on RCS flow or about 2.5 to 1 with the 2 RCP loop SG receiving the higher Feedwater Flow and will operate at a higher Steam Generator Level.

C. Incorrect. Plausible Since a Loop 2 RCP trips, Loop 1 will have the highest flow FW flow and therefore SG level will be higher in SG 1.

D. Incorrect. Plausible since Loop 2 Tave is the normal controlling Tave Loop.

Sys #	System	Category	KA Statement
000015/000017	Reactor Coolant Pump (RCP) Malfunctions	AK1 Knowledge of the operational implications of the following concepts as they apply to Reactor Coolant Pump Malfunctions (Loss of RC Flow):	Consequences of an RCPS failure

K/A# AK1.02 **K/A Importance** 3.7 **Exam Level** RO

References provided to Candidate None **Technical References:** DB-OP-02515 R12 RCP and Motor Abnormal Operation Attachment 1 RCP Shutdown

Question Source: Bank - #172683

Question Cognitive Level: High - Comprehension **10 CFR Part 55 Content:** (CFR 41.8 / 41.10 / 45.3)

Objective: OPS-GOP-115 05K

6. The plant is operating at 100% power.
   - Component Cooling Water (CCW) Pump 1 is operating.

   A CCW System leak occurs.
   - CCW Surge Tank Level side 1 lowers to 33 inches and stabilizes
   - CCW Surge Tank Level side 2 lowers to 30 inches and continues lowering slowly

   NO operator actions have been taken.

   Which of the following is correct regarding the status of CCW loads?

A. Neither MU Pump has CCW cooling because CC1460 CCW to MU Pump Coolers has closed.

B. The Pressurizer Quench Tank Cooler has no CCW cooling because CC1411B CCW to Containment has closed.

C. The Control Rod Drive Mechanisms have no CCW cooling because CC5097 Non-Essential CCW Containment Building Return Line 1 Isolation has closed.

D. Reactor Coolant Pump 1-1 Seal Cooler has no CCW cooling because CC1495 CCW to Aux Building Non-Essential Header has closed.

Answer: C

Explanation/Justification:

A. Incorrect – flow through MU pump #1 oil coolers still exists via the #1 Essential Header supply and operating CCW Pump 1. See OS-0021 sheet 2 R31, F-27. Plausible because CC1460 is closed at 35 inches to isolate the non-essential supply to both MU Pumps. See OS-0021 sheet 1 R37, CL-3.

B. Incorrect – Quench Tank Cooler is isolated by CC1495. See OS-0021 sheet 2 R31, C-19 and OS-0021 sheet 1 R37, B-10. Plausible for misconception that the Quench Tank Cooler is in Containment with the Quench Tank instead of outside Containment.

C. Correct - See OS-0021 sheet 2 R31, C-28 and OS-0021 sheet 1 R37 J-11, CL-7.

D. Incorrect – RCP 1-1 seal cooler is isolated by CC1411B. See OS-0001B sheet 1 R26, J-3 and OS-0021 sheet 2 R30, D-29. Plausible because RCP Seal Return Coolers are supplied by CC1495. See OS-0021 sheet 2 R30, D-20.

Sys #	System	Category	KA Statement
000026	Loss of Component Cooling Water (CCW)	AA1 Ability to operate and / or monitor the following as they apply to the Loss of Component Cooling Water:	Loads on the CCWS in the control room

K/A# AA1.02 **K/A Importance** 3.2 **Exam Level** RO

References provided to Candidate None **Technical References:** OS-0021 sheet 2 R31, C-28; OS-0021 sheet 1 R37 J-11, CL-7.

Question Source: New

Question Cognitive Level: High - Comprehension **10 CFR Part 55 Content:** (CFR 41.7 / 45.5 / 45.6)

Objective: OPS-GOP-123-04K

7. The plant is operating at 100% power.

All attempts to trip the Reactor from the Control Room have failed.

An operator is dispatched to the Low Voltage Switchgear Rooms to open Reactor Trip Breakers.

Which pair of Reactor Trip Breakers located in the Low Voltage Switchgear Rooms will trip the Reactor when opened?

A. A and B

B. C and D

C. A and C

D. B and D

Answer: A

Explanation/Justification:

A. Correct – DB-OP-02000 directs opening of Trip Breakers A, B, and C in the Low Voltage Switchgear Rooms. See DB-OP-02000 R27 step 3.3 RNO. A and B open will cause a reactor trip. See DB-OP-06402 R25 CRD Operating Procedure Attachment 4 CRD System Power Diagram (page 162)

B. Incorrect – Trip Breaker D is in the CRD Cabinet Room. Plausible because C and D open would trip the reactor.

C. Incorrect – CRDMs still energized via B and D. Plausible because both breakers are in the Low Voltage Switchgear Rooms.

D. Incorrect - CRDMs still energized via A and C. Plausible for faulty recall of CRD power supply diagram.

Sys #	System	Category	KA Statement
000029	Anticipated Transient Without Scram (ATWS)	EK2 Knowledge of the interrelations between the following and an ATWS:	Breakers, relays, and disconnects

K/A# EK2.06 **K/A Importance** 2.9* **Exam Level** RO

References provided to Candidate None **Technical References:** DB-OP-02000 R27 step 3.3; DB-OP-06402 R25 Attachment 4 (page 162)

Question Source: Bank – 165796 Modified

Question Cognitive Level: Low – Recall **10 CFR Part 55 Content:** (CFR 41.7 / 45.7)

Objective: OPS-GOP-302-05K

8. The plant WAS operating at 100% power.
   - A Steam Generator Tube Rupture (SGTR) occurred on Steam Generator (SG) 2.
   - All operator actions were completed in accordance with the governing procedures.

   The Reactor Coolant System (RCS) is now at 500 °F and 1000 psig with SG 2 isolated.
   - All four Reactor Coolant Pumps (RCPs) are running.
   - The operators initiate an RCS Cooldown in accordance with the governing procedures.

   Which of the following describes the criteria for securing an RCP during an SGTR?

   The first RCP stopped during the RCS Cooldown should be in _____.

A. RCS Loop 1 to maximize cooling of SG 2 from reverse heat transfer

B. RCS Loop 1 to maximize RCS pressure control from Pressurizer Spray

C. RCS Loop 2 to minimize heat addition to the RCS from RCP operation

D. RCS Loop 2 to minimize contamination of SG 2 from flow through ruptured tube

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Answer: B

Explanation/Justification:

A. Incorrect –Plausible because stopping a Loop 1 RCP puts 70% of total RCS flow through Loop 2, which would tend to raise reverse heat transfer. Additional cooling of an isolated SG is desirable to raise maximum RCS Cooldown with an isolated SG. See DB-OP-06903 R47 Plant Cooldown section 5.0 Cooldown with one SG step 5.4. Reverse heat transfer is described in DB-OP-02000 NOTE 8.44 (page 120)

B. Correct – All RCPs left running per DB-OP-02000 Section 8. At step 8.52, exit to DB-OP-06903 Plant Cooldown with REFER TO DB-OP-02531 SGTL. DB-OP-02531 step 4.13 for RCS Cooldown is REFER TO DB-OP-02543 Rapid Cooldown. DB-OP-02543 step 4.17 directs stop of Loop 1 RCP to maximize PZR spray capability.

C. Incorrect – Loop 1 preferred for first RCP stopped. Plausible misconception because stopping RCPs will lower RCS heat input. RCPs are stopped to minimize RCS heat input during Lack of Heat Transfer event – see Bases and Deviation document for DB-OP-02000 R20 Step 6.3

D. Incorrect – Loop 1 preferred for first RCP stopped. Plausible for misconception that pressure control is not the highest priority.

Sys #	System	Category	KA Statement
000038	Steam Generator Tube Rupture (SGTR)	EK3 Knowledge of the reasons for the following responses as they apply to the SGTR:	Criteria for securing RCP

K/A# EK3.08 **K/A Importance** 4.1 **Exam Level** RO

References provided to Candidate None **Technical References:** DB-OP-02000 R27 step 8.52; DB-OP-02531 R20 SGTL step 4.13; DB-OP-02543 R9 step 4.17

Question Source: New

Question Cognitive Level: Low – Memory **10 CFR Part 55 Content:** (CFR 41.5 / 41.10 / 45.6 / 45.13)

Objective:

9. The plant is operating at 100% power.
   - Auxiliary Feed Water (AFW) Pump 1 is out of service.

   Both Main Feed Water Pumps trip.
   - AFW Pump 2 trips when it starts.

   Both Steam Generators (SGs) are at 1000 psig and 24 inches Startup Level

   When the RO enables the Motor Driven Feedwater Pump (MDFP) Discharge Valves, the:
   - The CONTROL VALVE OFF light for FW 6459 SG 1 level control valve goes OFF
   - The CONTROL VALVE OFF light for FW 6460 SG 2 level control valve stays LIT

   The RO verifies LIC 6459 and LIC 6460 are set to minimum output.

   Which of the following describes the sequence for restoring level in both SGs that establishes feedwater flow THE FASTEST without running out the MDFP?

   (1) Start the MDFP
   (2) Raise SG 1 level to 49 inches at full flow using LIC 6459 as required
   (3) Raise SG 2 level to 49 inches at full flow using LIC 6460 as required
   (4) Direct local operator to throttle closed FW6398 MDFP TO AUXILIARY FEED LINE 1 ISOLATION
   (5) Direct local operator to throttle closed FW6397 MDFP TO AUXILIARY FEED LINE 2 ISOLATION

A. 1, 2, 4, 3

B. 1, 3, 5, 2

C. 4, 1, 2, 3

D. 5, 1, 3, 2

Answer: B

Explanation/Justification:

A. Incorrect – This method results in runout of the MDFP from full flow through both feed lines. FW6460 is failed open and not yet isolated in this sequence. Plausible for candidate reverse interpretation of the Control Valve Off lights.

B. Correct – FW6460 is failed open (see DB-OP-06225 R21 step 5.1.4 and OS-0012A sheet 1 R26, B-16) and FW6459 is closed. When the MDFP is started, MDFP flow will be limited to 800 gpm by the Cavitating Venturi. See OS-0017A sheet 1 R31, G-10. When proper level is reached, FW6460 is isolated by local operator closing FW6397. See OS-0012A sheet 1 R26, B-17. Full flow can then be established to SG 1 using LIC 6459 without running out the MDFP. See DB-OP-06225 R21 CAUTION 5.1.10. Faster to start MDFP first, then throttle closed manual valve.

C. Incorrect – This method throttles the wrong manual valve. Plausible for candidate reverse interpretation of the Control Valve Off lights and misconception that MDFP connects to AFW lines downstream of Cavitating Venturis.

D. Incorrect – Faster to start MDFP first, then throttle closed manual valve. Plausible for misconception that MDFP connects to AFW lines downstream of Cavitating Venturis.

Sys #	System	Category	KA Statement
000054	Loss of Main Feedwater (MFW)	AA1 Ability to operate and / or monitor the following as they apply to the Loss of Main Feedwater (MFW):	AFW controls, including the use of alternate AFW sources

K/A# AA1.01 **K/A Importance** 4.5 **Exam Level** RO

References provided to Candidate None **Technical References:** OS-0012A sheet 1 R26; OS-0017A sheet 1 R31; DB-OP-06225 R21 step 5.1.4 and CAUTION 5.1.10

Question Source: New

Question Cognitive Level: High – Comprehension **10 CFR Part 55 Content:** (CFR 41.7 / 45.5 / 45.6)

Objective: OPS-GOP-303-05K

10. The Plant has experienced a complete loss of AC Power.
    - Performance of DB-OP-02521 Loss of AC Bus Power Sources is in progress.

    At 1 hour following the beginning of the event AC power is still lost.
    - Battery 1P is in service supplying Panel D1P only.
    - Batteries 1N, 2P and 2N are isolated from all loads.

    How long will it be before DC power is no longer available?

A. less than 2 hours

B. approximately 8 hours

C. approximately 16 hours

D. greater than 24 hours

Answer: D

Explanation/Justification: DC Bus Load shedding is performed to reduce Discharge Rate and therefore extend battery life.

A. Incorrect – Plausible because the batteries are designated as having a 1500 amp-hour rating based on an 8 hour discharge rate.
B. Incorrect – Plausible if it is assumed there are 250V loads required to remain energized following load shedding
C. Incorrect – Plausible since one battery (1P) will remain in service and 16 hours is a multiple of 8.hours
D. Correct – Approximately 39 hours for D1P followed by D2P. See DB-OP-02521 R23 Attachment 17 (page 129) last paragraph.

Sys #	**System**	**Category**	**KA Statement**
000055	Loss of Offsite and Onsite Power (Station Blackout)	EK1 Knowledge of the operational implications of the following concepts as they apply to the Station Blackout :	Effect of battery discharge rates on capacity

K/A# EK1.01 **K/A Importance** 3.3 **Exam Level** RO

References provided to Candidate **Technical References:** DB-OP-02521 R23 Attachment 17 page 129 last paragraph

Question Source: Bank – DB 2013 NRC Exam #48

Question Cognitive Level: Low – Recall **10 CFR Part 55 Content:** (CFR 41.8 / 41.10 / 45.3)

Objective: OPS-SYS-121-11K

11. The plant has been operating at 100% power for one year.

A Loss of Offsite Power occurs.

NO operator actions are taken.

Reactor Coolant System (RCS) temperatures stabilize post-trip.

Which of the following describes the values of RCS Thot and Tcold?
(1) RCS Thot will be _____.
(2) RCS Tcold will be _____.

A. (1) 596 to 600 °F
(2) 550 to 554 °F

B. (1) 596 to 600 °F
(2) 530 to 534 °F

C. (1) 550 to 554 °F
(2) 550 to 554 °F

D. (1) 550 to 554 °F
(2) 530 to 534 °F

Answer: A

Explanation/Justification:

A. Correct – LOP causes loss of RCPs and SFRCS Isolation Trip on reverse FW dP due to loss of MFW pumps on loss of AC oil pumps. Lowest SG safety valve lift pressure is 1050 psig (1065 psia). Tsat SG 552.3 °F. Full power core ΔT 46 °F, so Thot about 598 °F

B. Incorrect – ΔT > 50 °F. See DB-OP-06903 R47 Plant Cooldown Section 6.0 Cooldown on Natural Circulation step 6.3. Part 1 is correct. 530 to 534 °F Tcold plausible because this is normal MODE 3 Tave for a reactor startup.

C. Incorrect – LOP causes loss of RCPs so RCS ΔT should be near the full power value of 46 °F, not zero. Part 2 is correct. Plausible because post-trip forced flow ΔT approaches zero.

D. Incorrect – Plausible ΔT for normal MODE 3 Tave for a reactor startup following sustained operation at lower power (40-45%).

Sys #	**System**	**Category**	**KA Statement**
000056	Loss of Offsite Power	AA2 Ability to determine and interpret the following as they apply to the Loss of Offsite Power:	RCS hot-leg and cold-leg temperatures

K/A# AA2.57 **K/A Importance** 3.9 **Exam Level** RO

References provided to Candidate Steam Tables **Technical References:** TS Table 3.7.1-1; DB-OP-06903 R47 Plant Cooldown Section 6.0 Cooldown on Natural Circulation step 6.3

Question Source: New

Question Cognitive Level: High – Comprehension **10 CFR Part 55 Content:** (CFR: 43.5 / 45.13)

Objective: OPS-GOP-303-04K

12. The plant experienced a loss of 120V AC Essential Panel Y3.
    - The problem with Y3 has been corrected.
    - Y3 has been re-energized from Transformer XY3.
    - Y3 will be transferred from Transformer XY3 to Inverter YV3 as part of the recovery process.

Which of the following describes the correct sequence of steps to swap Y3 from XY3 to YV3?

A. 1. Depress the ALTERNATE SOURCE TO LOAD pushbutton on YV3.
2. Place Inverter YV3 MANUAL BYPASS SWITCH in the ALTERNATE position
3. Check YV3 ALTERNATE SOURCE SUPPLYING LOAD RED light ON.

B. 1. Depress the ALTERNATE SOURCE TO LOAD pushbutton on YV3.
2. Place the MANUAL BYPASS SWITCH on YV3 in the NORMAL position.
3. Depress the INVERTER TO LOAD pushbutton on YV3.

C. 1. Place the MANUAL BYPASS SWITCH on YV3 in the NORMAL position.
2. Depress the INVERTER TO LOAD pushbutton on YV3.
3. Depress the ALTERNATE SOURCE TO LOAD pushbutton on YV3.

D. 1. Place the MANUAL BYPASS SWITCH on YV3 in the NORMAL position.
2. Depress the ALTERNATE SOURCE TO LOAD pushbutton on YV3.
3. Check YV3 INVERTER SUPPLYING LOAD yellow light ON.

Answer: B

Explanation/Justification:

A. Incorrect – this is sequence for transfer from YV3 to XY3. Plausible for inversion of normal and alternate sources.
B. Correct – see DB-OP-06319 R29 Instrument AC System Procedure section 3.44 (page 87)
C. Incorrect – plausible candidate inversion of switch functions.
D. Incorrect – plausible because it is 2 of the 3 required actions in proper order.

Sys #	System	Category	KA Statement
000057	Loss of Vital AC Electrical Instrument Bus	AA1 Ability to operate and / or monitor the following as they apply to the Loss of Vital AC Instrument Bus:	Manual inverter swapping

K/A# AA1.01 **K/A Importance** 3.7* **Exam Level** RO

References provided to Candidate None **Technical References:** DB-OP-06319 R29 Instrument AC System Procedure section 3.44 (page 87)

Question Source: New

Question Cognitive Level: Low – Recall **10 CFR Part 55 Content:** (CFR 41.7 / 45.5 / 45.6)

Objective: OPS-SYS-408-05K

13. The plant is operating at 100% power.
    - Charger DBC2P is aligned to Battery 2P
    - Charger DBC2N is aligned to Battery 2N

    The following conditions are observed:
    - Annunciator 1-6-G DC BUS 2 TRBL alarms
    - CHARGER DBC2N indicator II 6284 reads zero amps
    - BATTERY 2N indicator II 6290 reads 100 amps DISCHARGE

    Which of the following will eventually occur if NO operator actions are taken?

A. Power Operated Relief Valve (PORV) RC2A won't open if required

B. Battery Charger DBC2PN automatically charges Battery 2N

C. Reactor Protection System Channel 3 de-energizes

D. Main Feed Pump 1 Emergency Bearing Oil Pump won't start if required

---

Answer: A

Explanation/Justification:

A. Correct – With no operator action, battery 2N will continue to discharge and voltage will continue to lower on 125V DC Panel D2N until the RC2A solenoid coils will no longer function. RC2A is a D2N load. See DB-OP-02540 R08 Loss of D2N and DBN Attachment 1 (page 13)

B. Incorrect – Swing charger must be manually aligned. Plausible because this is a procedure-driven manual action. See DB-OP-02001 R30 Window 1-6-G step 3.7.3

C. Incorrect – Rectifier YRF4 will continue to supply 120V AC panel Y4 via Inverter YV4. See UFSAR R30 8.3.2.1.5 (page 8.3-46). Plausible because Y4 would be supplied from battery 2N during a concurrent loss of AC input. RPS Channel 3 supplied from Y4.

D. Incorrect – MFP 1 EBOP is DC MCC 1 load. Plausible for loss of either DBC1P or DBC1N. See OS-0060 sheet 1 R29

Sys #	**System**	**Category**	**KA Statement**
000058	Loss of DC Power	AK1 Knowledge of the operational implications of the following concepts as they apply to Loss of DC Power:	Battery charger equipment and instrumentation

K/A# AK1.01 **K/A Importance** 2.8 **Exam Level** RO

References provided to Candidate None **Technical References:** DB-OP-02540 R8 Attachment 1

Question Source: New

Question Cognitive Level: High - Comprehension **10 CFR Part 55 Content:** (CFR 41.8 / 41.10 / 45.3)

Objective: OPS-GOP-137-03K

14. The plant is operating at 100% power.
    - Component Cooling Water (CCW) Pump 1 is operating.

    The Control Room receives a report of a Service Water (SW) rupture on SW Pump 1 strainer.
    - Bus C1 locks out concurrent with the rupture report.
    - The C1 lockout can NOT be reset.

    Which of the following describes the action to allow restoration of normal SW operating parameters in the affected loop?

A. Align the Backup SW Pump to SW Loop 1 in SLOW speed.

B. Align the Backup SW Pump to SW Loop 1 in FAST speed.

C. Align SW Pump 3 to SW Loop 1.

D. Align SW Pump 2 to SW Loop 1 and 2.

Answer: B

Explanation/Justification:

A. Incorrect – SLOW speed is used for Dilution Pump function of BUSW Pump, which provides lower head than a SW pump. Plausible because aligning BUSW Pump to Loop 1 bypasses the effect of the C1 lockout and strainer rupture.

B. Correct – Aligning the BUSW Pump to Loop 1 in FAST speed bypasses the effect of the C1 lockout and strainer rupture. See OS-0020 sheet 1 R95 and DB-OP-02511 R16 Loss of SW Pumps/Systems Attachment 5. FAST speed provides the same operating characteristics as a SW pump.

C. Incorrect – Aligning SW Pump 3 as 1 requires power available from Bus C1 which is locked out. See DB-OP-02511 R16 Loss of SW Pumps/Systems Attachment 1. Plausible because aligning SW Pump 3 as 1 bypasses the effect of the strainer rupture.

D. Incorrect – No procedure guidance exists for single SW Pump supplying both loops since this makes both loops inoperable. Plausible because lineup could be established via SW pump 3 piping.

Sys #	**System**	**Category**	**KA Statement**
000062	Loss of Nuclear Service Water	AA2 Ability to determine and interpret the following as they apply to the Loss of Nuclear Service Water:	The valve lineups necessary to restart the SWS while bypassing the portion of the system causing the abnormal condition

K/A# AA2.03 **K/A Importance** 2.6 **Exam Level** RO

References provided to Candidate None **Technical References:** OS-0020 sheet 1 R95; DB-OP-02511 R16 step 4.1.7 and Attachment 5 step 10; DB-OP-06261, Note 4.1.3

Question Source: New

Question Cognitive Level: High - Comprehension **10 CFR Part 55 Content:** (CFR: 43.5 / 45.13)

Objective: OPS-GOP-111-02K

15. The plant is operating at 100% power.

PI810 INSTRUMENT AIR HEADER PRESS lowers to 50 psig and stabilizes.

The operators perform the required abnormal procedure actions then implement DB-OP-02000 RPS, SFAS, SFRCS Trip or SG Tube Rupture.

During the performance of Attachment 1 Primary Inventory Control Actions the following indications are noted:

- Letdown Flow FI MU7 45 gpm
- RCP 1-1 Seal Injection Flow FI MU30C 15 gpm
- RCP 1-2 Seal Injection Flow FI MU30D zero gpm
- RCP 2-1 Seal Injection Flow FI MU30A 15 gpm
- RCP 2-2 Seal Injection Flow FI MU30B 15 gpm

Which of the following additional failures is consistent with these indications?

A. RCP tripped during the transient

B. Essential DC Distribution Panel D2P de-energized

C. Inadvertent SFAS Level 3 actuation of Channel 2 only

D. Seal Injection Isolation valve Air Volume Tank leak

Answer: D

Explanation/Justification:

A. Incorrect – Plausible because seal injection flow lowers when an RCP is stopped, but only to around 3 gpm. See Makeup & Purification System Description SD-048 R04 page 2-9

B. Incorrect – D2P loss would also close MU66A and MU3, resulting in zero flow on FI MU7 and FI MU30A See DB-OP-06405 R13 SFAS Procedure step 3.2.4 (page 11) and Attachment 4 Page 4 of 4 (page 79)

C. Incorrect –SFAS Level 3 on Actuation Channel 2 would also have closed MU66A, resulting in zero gpm on FI MU30A, too. See DB-OP-02000 Table 4 (page 427)

D. Correct – Question is written for Air Volume Tanks which serve the same purpose as backup Nitrogen supply at D-B. The Air Volume Tanks are supplied from the Instrument Air System via check valves which prevent back-leakage from the tanks to the depressurized Instrument Air supply. MU3 letdown isolation and MU66 valves are equipped with Air Volume Tank to maintain them open. Air Volume Tank leak for MU66D would result in its closure and zero flow on FI MU30D. See DB-OP-02528 R22 Instrument Air System Malfunctions Attachment 18 Failure Position of Pneumatic Valves (page 110), Makeup & Purification System Description SD-048 R04 2.4.8 (pages 2-24 and 2-25) and OS-0002 sheet 2

Sys #	**System**	**Category**	**KA Statement**
000065	Loss of Instrument Air	AA2 Ability to determine and interpret the following as they apply to the Loss of Instrument Air:	Whether backup nitrogen supply is controlling valve position

K/A# AA2.07 **K/A Importance** 2.8* **Exam Level** RO

References provided to Candidate None **Technical References:** OS-0002 sheet 2 R21; DB-OP-02528 R22 Attachment 18

Question Source: New

Question Cognitive Level: High – Comprehension **10 CFR Part 55 Content:** (CFR: 43.5 / 45.13)

Objective: OPS-GOP-128-08K

16. The plant is operating at 25% power.

An event occurs.

The following conditions are noted:
- 8-5-A SWYD ACB 34560 TRIP alarm
- 8-5-B SWYD ACB 34561 TRIP alarm
- 14-6-D ICS IN TRACK alarm
- Turbine Bypass Valves and Atmospheric Vent Valves are open
- JI 6003 MEGAWATTS indicates 43 MWe

Which of the following describes the response of the following controls during the event?

(1) Main Generator Voltage Regulator
(2) Main Turbine DEHC Load Control

A. (1) remains in AUTO
(2) transfers to MANUAL

B. (1) transfers to MANUAL
(2) remains in AUTO

C. (1) remains in AUTO
(2) remains in AUTO

D. (1) transfers to MANUAL
(2) transfers to MANUAL

Answer: A

Explanation/Justification:

A. Correct – Load rejection has occurred. See DB-OP-02520 R 7 Load Rejection 2.1 Symptoms. Part 1 – Automatic Voltage Regulator trips to manual on loss of potential transformer signals or Generator Field Breaker trip. See DB-OP-02016 R25 Window 16-4-B. Field breaker stays closed on Load Rejection because the main generator transformer lockout relays don't actuate.

B. Incorrect – Part 1 incorrect. Part 2 incorrect. Part 1 plausible for generator trip. Part 2 plausible because Power Load Unbalance circuit actuates to place turbine in MANUAL and this signal does not interface with the ICS transfer to MANUAL logic. See M-00175 R4 Logic String 1.

C. Incorrect – Part 2 is incorrect. Part 1 correct. Plausible because Power Load Unbalance circuit actuates to place turbine in MANUAL and this signal does not interface with the ICS transfer to MANUAL logic.

D. Incorrect – Part 1 incorrect. Part 2 correct. Plausible for generator trip.

Sys #	System	Category	KA Statement
000077	Generator Voltage and Electric Grid Disturbances	AK2 Knowledge of the interrelations between Generator Voltage and Electric Grid Disturbances and the following:	Turbine / generator control

K/A# AK2.07 **K/A Importance** 3.6 **Exam Level** RO

References provided to Candidate None **Technical References:** DB-OP-02520 R 7 Load Rejection 2.1 Symptoms; DB-OP-02016 R25 Window 16-4-B

Question Source: New

Question Cognitive Level: High – Comprehension **10 CFR Part 55 Content:** (CFR: 41.4, 41.5, 41.7, 41.10 / 45.8)

Objective: OPS-GOP-120-01K

17. The plant has experienced a Loss of ALL Feedwater.

The following conditions exist:

- Incore temperatures 620 ºF stable
- Reactor Coolant System (RCS) pressure 1770 psig stable
- Steam Generator (SG) levels 10 inches stable
- SG pressures 700 psig slowly lowering

The local operator reports Auxiliary Feedwater Pump Turbine (AFPT) 1 Trip Throttle Valve (TTV) is reset. The operator is standing by to open ICS38C AFPT1 TTV to restore feedwater.

Which of the following describes establishing Auxiliary Feed Water (AFW) flow to SG 1?

As ICS38C is opened, the desired initial flow to SG 1 on AUX FW FLOW FI6426 is __(1)__.

An indication of SG heat transfer being established is RCS pressure __(2)__ and SG 1 PRESS PI SP12B __(3)__.

A. (1) 100 gpm
(2) lowering
(3) rising

B. (1) 100 gpm
(2) stable
(3) lowering

C. (1) full flow
(2) lowering
(3) rising

D. (1) full flow
(2) stable
(3) lowering

Answer: C

Explanation/Justification:

A. Incorrect – No AFW flow limit for dry SG during Lack of Heat Transfer (LOHT). See DB-OP-02000 R27 Attachment 5 Section B NOTE 4 (page 285). Plausible because items 2 & 3 are correct (see Correct Answer explanation), item 1 is the correct flow limit if not in LOHT because all RCPs would be stopped for lack of adequate subcooling margin.

B. Incorrect - No AFW flow limit for dry SG during Lack of Heat Transfer (LOHT). See DB-OP-02000 R27 Attachment 5 Section B NOTE 4 (page 285). Plausible because item 1 is the correct flow limit if not in LOHT, items 2 & 3 plausible because they are the initial response to the initiation of AFW to SG 1 before heat transfer is established. See Bases and Deviation Document for DB-OP-02000 R20 step 6.11 (page 94).

C. Correct – Specific Rule 4 requires full continuous AFW flow until SG reaches setpoint. AFW flow is limited to about 800 gpm by the Cavitating Venturi. See DB-OP-02000 R27 Attachment 5 Section B step 5 (page 285) and Specific Rule 4.3.1 (page 246). RCS is saturated, so RCS pressure will lower as voids condense due to primary to secondary heat transfer. SG pressure will rise. See Areva Technical Document 74-1152414-10 Part II Section 3.3 Indication of Primary to Secondary Coupling page Vol.3, II.B-10

D. Incorrect - items 2 & 3 are the initial response to the initiation of AFW to SG 1 before heat transfer is established. See Bases and Deviation Document for DB-OP-02000 R20 step 6.11 (page 94). Plausible for initial response and item 1 being correct

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Sys #	System	Category	KA Statement
BW/E04	Inadequate Heat Transfer - Loss Of Secondary Heat Sink	Generic	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

K/A# 2.2.44 **K/A Importance** 4.2 **Exam Level** RO

References provided to Candidate None

Technical References: DB-OP-02000 R27 Attachment 5 Section B step 5 (page 285) and Specific Rule 4.3.1 (page 246); Areva Technical Document 74-1152414-10 Part II Section 3.3 page Vol.3, II.B-10

Question Source: New

Question Cognitive Level: High – Comprehension

10 CFR Part 55 Content: (CFR: 41.5 / 43.5 / 45.12)

Objective: OPS-GOP-305-02K

18. The plant is experiencing an unisolable steam leak in Containment.

Which of the following describes an action required of the Reactor Operator and the reason for the action?

A. Open the Atmospheric Vent Valve on the affected Steam Generator to blow it down to atmosphere to ensure compliance with TNC 8.7.1 Steam Generator Pressure/Temperature Limitation.

B. Open the Atmospheric Vent Valve on the affected Steam Generator to blow it down to atmosphere to ensure compliance with LCO 3.6.1 Containment.

C. After blowing down the affected Steam Generator, close its Atmospheric Vent Valve to ensure compliance with LCO 3.6.1 Containment.

D. After blowing down the affected Steam Generator, close its Atmospheric Vent Valve to ensure compliance with TNC 8.7.1 Steam Generator Pressure/Temperature Limitation.

Answer: C

Explanation/Justification:

A. Incorrect – Plausible because AVV is opened for steam leak in Containment and opening AVV would reduce SG pressure if TNC 8.7.1 was applicable. .

B. Incorrect – Plausible because AVV is opened for steam leak in Containment and opening #2 AVV limits containment pressure rise.

C. Correct – 2 AVV must be closed following SG blowdown to isolate direct path from containment atmosphere through steam rupture to outside atmosphere via AVV. See DBOPBASES R20 step 7.26 (page 138).

D. Incorrect – Plausible because closing AVV after SG blowdown is correct action.

Sys #	System	Category	KA Statement
BW/E05	Steam Line Rupture – Excessive Heat Transfer	EK3 Knowledge of the reasons for the following responses as they apply to the (Excessive Heat Transfer):	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.

K/A# EK3.4 **K/A Importance** 3.8 **Exam Level** RO

References provided to Candidate None **Technical References:** Bases and Deviation Document for DB-OP-02000 R20 Step 7.26 page 138

Question Source: New

Question Cognitive Level: Low – Recall **10 CFR Part 55 Content:** (CFR: 41.5 / 41.10, 45.6, 45.13)

Objective: OPS-GOP-306-03K

19. The plant is operating at 100% power.

A power reduction to 70% is started.

- The Integrated Control System (ICS) is in Full Automatic
- The Unit Load Demand (ULD) is in Automatic with its Rate of Change set to 0.5%/min.

At 85% power, the following conditions are noted:

- Annunciator 5-2-E CRD ASYMMETRIC ROD alarms
- ASYMMETRY FAULT light on the Rod Control Panel is lit.
- Control Rod 7-1 indicates 7% higher than Group 7 average

Which of the following identifies:
(1) the power level limit (power < value) for the initial attempt to realign Control Rod 7-1?
(2) the control station to use for the power change to the power level limit?

A. (1) 60%
(2) ULD

B. (1) 42%
(2) ULD

C. (1) 60%
(2) Rod Control Panel in MANUAL

D. (1) 42%
(2) Rod Control Panel in MANUAL

Answer: A

Explanation/Justification:

A. Correct – event is misaligned rod. See DB-OP-02516 R14 CRD Malfunctions step 2.2.1; 60% correct per step 4.2.2. ULD is preferred station per DB-OP-02504 R20 Rapid Shutdown step 4.1.
B. Incorrect – 42% is 3-RCP limit for recovering a misaligned rod. Part 2 is correct. Plausible for misapplication of power limit.
C. Incorrect – ULD is preferred station per DB-OP-02504 R20 Rapid Shutdown step 4.1. Part 2 is correct. Plausible because control rod will be recovered with the Rod Control Panel in MANUAL.
D. Incorrect – 60% is 4-RCP limit for recovering a misaligned rod. ULD is the preferred station for the power change per DB-OP-02504 R20 Rapid Shutdown step 4.1. Plausible for misapplication of power limit and because control rod will be recovered with the Rod Control Panel in MANUAL.

Sys #	System	Category	KA Statement
000005	Inoperable/Stuck Control Rod	AA1 Ability to operate and / or monitor the following as they apply to the Inoperable / Stuck Control Rod:	Reactor and turbine power

K/A# AA1.04 **K/A Importance** 3.9 **Exam Level** RO

References provided to Candidate None **Technical References:** DB-OP-02516 R14 CRD Malfunctions steps 2.2.1 and 4.2.2; DB-OP-02504 R20 Rapid Shutdown step 4.1.

Question Source: New

Question Cognitive Level: High – Comprehension **10 CFR Part 55 Content:** (CFR 41.7 / 45.5 / 45.6)

Objective: OPS-GOP-116-03K

20. The plant is operating at 100% power.

    Assuming NO operator actions have been taken, which of the following describes the plant response to a leak on the reference leg of the selected Pressurizer Level Transmitter?

    Makeup Tank level __(1)__.
    Pressurizer Heaters __(2)__.

A. (1) lowers
   (2) de-energize

B. (1) lowers
   (2) remain energized

C. (1) rises
   (2) de-energize

D. (1) rises
   (2) remain energized

Answer: D

Explanation/Justification:

A. Incorrect – MUT rises and PZR heaters stay energized. Plausible because this is plant response to variable leg leak (level input failing low). See DB-OP-02513 R11 Pressurizer System Abnormal Operation steps 2.6.4 and 2.6.5.

B. Incorrect – response describes letdown leak. Plausible because item 2 is correct. See DB-OP-02522 R13 Small RCS Leaks Attachment 13 Background Information Letdown System Leaks (page 50).

C. Incorrect –response describes significant RCS leak after automatic transfer of MU Pump suction to the BWST at 17 inch MU Tank level. See OS-0002 sheet 2 R21 DUN 13-0024-001-001 CL-8. Plausible for misconception of significant potential RCS mass loss from reference leg leak. See DB-OP-02522 R13 Small RCS Leaks Attachment 12 Align MU Pump Recirc to the BWST (page 47).

D. Correct – PZR level indication uses a wet reference leg dP transmitter – see RCS System Description SD-039A R06 section 2.5.1.10 (page 2-55) Reference leg leak causes level input to indicate higher than actual level. High level causes PZR Level Control Valve MU32 to throttle closed to lower MU flow. Lower MU flow with constant letdown flow causes MU Tank level to rise. See DB-OP-02513 R11 Pressurizer System Abnormal Operation step 2.6.3. PZR heaters are affected by low level, not high level, so they remain energized. DB-OP-02513 R11 step 2.6.5

Sys #	**System**	**Category**	**KA Statement**
000028	Pressurizer (PZR) Level Control Malfunction	AK1 Knowledge of the operational implications of the following concepts as they apply to Pressurizer Level Control Malfunctions:	PZR reference leak abnormalities

K/A# AK1.01 **K/A Importance** 2.8* **Exam Level** RO

References provided to Candidate None **Technical References:** SD-039A R06 section 2.5.1.10 (page 2-55); DB-OP-02513 R11 steps 2.6.3 and 2.6.5.

Question Source: New

Question Cognitive Level: High - Comprehension **10 CFR Part 55 Content:** (CFR 41.8 / 41.10 / 45.3)

Objective: OPS-GOP-113-05K

21. The plant is in MODE 3 with Tave at 532 °F.

Which of the following will cause a loss of Source Range Nuclear Instrument (NI) 1?

A. 120V AC Distribution Panel Y4 breaker Y408 RPS Channel 4 in OFF

B. 120V AC Distribution Panel Y3 breaker Y308 RPS Channel 3 in OFF

C. Reactor Protection System Channel 2 SYSTEM AC POWER breaker in OFF

D. Reactor Protection System Channel 1 SYSTEM AC POWER breaker in OFF

Answer: C

Explanation/Justification:

A. Incorrect – Y408 powers RPS Channel 4 which powers NI-3. See DB-OP-06403 R20 RPS and NI Operating Procedure steps 3.1.4 and 3.1.17. Plausible for incorrect concept of RPS Channel number to NI.

B. Incorrect – Y308 powers RPS Channel 3 which powers NI-4. See DB-OP-06403 R20 RPS and NI Operating Procedure steps 3.1.4 and 3.1.18. Plausible for incorrect concept of RPS Channel number to NI.

C. Correct – SYSTEM AC POWER breaker open de-energizes RPS cabinet 2 which de-energizes NI-1. See DB-OP-06403 R20 RPS and NI Operating Procedure steps 3.1.6 and 3.1.17.

D. Incorrect – RPS Channel 1 powers NI-2. See DB-OP-06403 R20 RPS and NI Operating Procedure step 3.1.17. Plausible for misconception that RPS Channel number equals NI Channel number.

Sys #	System	Category	KA Statement
000032	Loss of Source Range Nuclear Instrumentation	AK2 Knowledge of the interrelations between the Loss of Source Range Nuclear Instrumentation and the following:	Power supplies, including proper switch positions

K/A# AK2.01 **K/A Importance** 2.7* **Exam Level** RO

References provided to Candidate None **Technical References:** DB-OP-06403 R20 RPS and NI Operating Procedure steps 3.1.3, 3.1.4, 3.1.6 and 3.1.17

Question Source: New

Question Cognitive Level: Low - Memory **10 CFR Part 55 Content:** (CFR 41.7 / 45.7)

Objective: OPS-SYS-502-03K

22. The plant experienced a Loss of Coolant Accident (LOCA) inside Containment.

    A 10 gpm non-isolable leak from the Containment Sump to the Auxiliary Building is discovered.

    Containment pressure is 35 psia.

    What will be the approximate leak rate when Containment pressure lowers to 20 psia?

A. 8.4 gpm

B. 7.6 gpm

C. 5.0 gpm

D. 2.5 gpm

Answer: C

Explanation/Justification:

A. Incorrect – see explanation of correct answer. For this distracter 50 and 35 were used for the dP values. F_2 = (10 x 5.916) / 7.071= 8.37. Plausible for gauge to absolute pressure relationship inversion.

B. Incorrect – This distracter based on using 35 and 20 for dP values. F_2 = (10 x 4.472) / 5.916 = 7.56. Plausible for candidate using values given as gauge pressures (containment pressure – zero).

C. Correct – dP for calculation is containment pressure – atmospheric pressure. dP_1 = 35 psia – 15 psia = 20 psi; dP_2 = 20 psia – 15 psia = 5 psi. Relationship is $(F_1 / \sqrt{dP_1}) = (F_2 / \sqrt{dP_2})$. $F_2 = (F_1 \times \sqrt{dP_2}) / \sqrt{dP_1}$. F_2 = (10 x 2.236) / 4.472 = 5.0

D. Incorrect – see explanation of correct answer. This distracter based on linear ratio of dPs (20 and 5) to leak rates. F_2 = (10 x 5) / 20 = 2.5. Plausible for candidate forgetting the square root in relationship.

Sys #	System	Category	KA Statement
000069	Loss of Containment Integrity	AK1 Knowledge of the operational implications of the following concepts as they apply to Loss of Containment Integrity:	Effect of pressure on leak rate

K/A# AK1.01 **K/A Importance** 2.6 **Exam Level** RO

References provided to Candidate None **Technical References:**

Question Source: Bank – ANO 2011 #24

Question Cognitive Level: High - Comprehension **10 CFR Part 55 Content:** (CFR 41.8 / 41.10 / 45.3)

Objective: OPS-GOP-311-03K

23. A power change from 60% power to 100% power is in progress.
    - The Integrated Control System (ICS) is in Automatic
    - The Load Control Panel is in Automatic with its Rate of Change set to 0.5%/min.

    Annunciator 2-1-A LETDOWN RAD HI alarms.

    Which of the following would meet the REQUIRED operator actions for these conditions?

    (1) Perform Source Check of RI 1998 FAILED FUEL IN LETDOWN INDICATOR to determine if the radiation monitor is operating properly.
    (2) Press OPEN on the standby Mixed Bed Demineralizer inlet valve switch HISMU10A or HISMU10B and observe Letdown Flow FI MU7 rises.
    (3) Divert Letdown to the Clean Waste Receiver Tank and batch to the Reactor Coolant System at the present Boron concentration.
    (4) Press MAN on the ICS Load Control Panel and observe the ULD SETPOINT changes to the current ULD OUTPUT.

A. 1 and 2

B. 2 and 3

C. 1 and 4

D. 3 and 4

Answer: C

Explanation/Justification:

A. Incorrect – item 2 placing the standby Mixed Bed Demineralizer in service not a requirement and would not, by itself, raise letdown flow. See DB-OP-02535 R09 High Activity in the RCS step 4.10 which lists it as a potential action to evaluate. See also DB-OP-06006 R35 step 3.20.2. Item 1 is correct - see DB-OP-02535 R09 High Activity in the RCS step 4.5. Plausible because additional RCS cleanup may be desirable.

B. Incorrect – item 2 incorrect (see above); item 3 is also not a requirement. Plausible because additional RCS cleanup may be desirable and feed and bleed of RCS would provide some activity reduction.

C. Correct – See DB-OP-02535 R09 High Activity in the RCS steps 4.1 and 4.5

D. Incorrect – item 3 incorrect (see above). Plausible because feed and bleed of RCS would provide some activity reduction.

Sys #	**System**	**Category**	**KA Statement**
000076	High Reactor Coolant Activity	AA1 Ability to operate and / or monitor the following as they apply to the High Reactor Coolant Activity:	Failed fuel-monitoring equipment

K/A# AA1.04 **K/A Importance** 3.2 **Exam Level** RO

References provided to Candidate None **Technical References:** DB-OP-02535 R09 High Activity in the RCS steps 4.1 and 4.5

Question Source: New

Question Cognitive Level: Low - Memory **10 CFR Part 55 Content:** (CFR 41.7 / 45.5 / 45.6)

Objective: OPS-GOP-135-02K

24. The plant is operating at 90% power.

Which of the following conditions will cause an Integrated Control System (ICS) Runback?

A. Reactor Coolant Pump 1-1 current 300 amps

B. Main Feed Pump 1 Lube Oil pressure 10 psig

C. Main Feed Pump 2 discharge pressure 1470 psig

D. Deaerator Storage Tank 1 level 6.0 feet

Answer: C

Explanation/Justification:

A. Incorrect – Plausible because RCP trip causes a runback and current is 40 amps high. See DB-OP-02014 R14 Window 14-3-C

B. Incorrect – MFP trips at 4 psig lube oil pressure. Plausible because MFPT trip causes a runback and lube oil pressure is low.

C. Correct – MFP high discharge pressure runback actuates at 1433 psig. See DB-OP-02014 R14 Window 14-3-D.

D. Incorrect – Low DAST level runback occurs at 4.0 feet. See DB-OP-02014 R14 Window 14-3-D. Plausible because 6.0 feet is below the low level alarm.

Sys #	System	Category	KA Statement
BW/A01	Plant Runback	AK2 Knowledge of the interrelations between the (Plant Runback) and the following:	Components, and functions of control and safety systems, including instrumentation, signals, interlocks, failure modes, and automatic and manual features.

K/A# AK2.1 **K/A Importance** 3.7 **Exam Level** RO

References provided to Candidate None **Technical References:** DB-OP-02014 R14 Window 14-3-D

Question Source: New

Question Cognitive Level: Low - Recall **10 CFR Part 55 Content:** (CFR: 41.7 / 45.7)

Objective: OPS-SYS-514-03K

25. The plant is operating at 100% power.
    - Auxiliary Feed Water (AFW) Pump 1 is out of service.

    The following alarms actuate:
    - 11-1-E CLNG TWR BASIN LVL LO
    - 15-1-F HP CNDSR PRESS HI annunciator
    - 15-2-F LP CNDSR PRESS HI annunciator
    - 15-3-F CNDSR PIT FLOODED annunciator

    After the control room operators take the prescribed actions to stabilize the plant, which of the following is correct?
    Feed Water is being supplied by __(1)__.
    Equipment issues due to local water level are being addressed per __(2)__.

A. (1) AFW Pump 2 only
   (2) DB-OP-06272 Station Drainage and Discharge System

B. (1) AFW Pump 2 only
   (2) DB-OP-02517 Circulating Water System Malfunctions

C. (1) AFW Pump 2 and the Motor Driven Feed Pump
   (2) DB-OP-06272 Station Drainage and Discharge System

D. (1) AFW Pump 2 and the Motor Driven Feed Pump
   (2) DB-OP-02517 Circulating Water System Malfunctions

Answer: B

Explanation/Justification:

A. Incorrect –Flooding mitigation would be addressed using DB-OP-02517. DB-OP-06272 is plausible since it provides guidance for normal station drains operation.

B. Correct - Flooding is in progress in the Condenser Pit. MDFP would not be running because of flooding. See DB-OP-02517 Attachment 3 step 4.0. Leak isolation and flooding issues are addressed using DB-OP-02517 Attachment 3. .

C. Incorrect – MDFP would not have been started. DB-OP-02517 used for flooding issues. Plausible because MDFP would be started by DB-OP-02000 Specific Rule 4 step 4.1 if not for the flooding. DB-OP-06272 is plausible since it provides guidance for normal station drains operation.

D. Incorrect - MDFP would not have been started. Part 2 is correct. Plausible because MDFP would be started by DB-OP-02000 Specific Rule 4 step 4.1 if not for the flooding.

Sys #	System	Category	KA Statement
BW/A07	Flooding	AA2 Ability to determine and interpret the following as they apply to the (Flooding):	Facility conditions and selection of appropriate procedures during abnormal and emergency operations

K/A# AA2.1 **K/A Importance** 3.0 **Exam Level** RO

References provided to Candidate None **Technical References:** DB-OP-02517 R06 Circulating Water System Malfunctions steps 2.3, 4.3.1, and Attachment 3.

Question Source: New

Question Cognitive Level: High – Comprehension **10 CFR Part 55 Content:** (CFR: 43.5 / 45.13)

Objective: OPS-GOP-117-04K

26. Plant conditions:
    - The plant tripped from 100% power due to a loss of offsite power.
    - A Reactor Coolant System (RCS) Cooldown has been initiated to comply with Technical Specification requirements.
    - RCS Cooldown rate is 10 °F/hr.

    The following conditions are observed:
    - RCS pressure stable
    - Makeup Tank level sudden rise
    - Pressurizer (PZR) level sudden rise
    - Both RCS Tsat meters indicate 30 °F subcooling margin (SCM)
    - Reactor Vessel Head Vent temperature T012 indicates 19 °F subcooled

    Which of the following describes the REQUIRED operator action(s) for these conditions?

A. Turn on PZR heaters to compress the RCS steam bubble that is NOT in the PZR.

B. Initiate full MU/HPI flow to compress the RCS steam bubble that is NOT in the PZR.

C. Open the RCS Loop 1 and Loop 2 High Point Vents to vent off the steam bubble(s) in the Hot Leg(s).

D. Throttle open the AVVs for RCS Cooldown rate of 100 °F/hr to condense the steam bubble(s) in the Hot Leg(s).

Answer: A

Explanation/Justification:

A. Correct – steam bubble exists in a location other than the PZR. See DB-OP-06903 R47 Plant Cooldown steps 6.4 and 6.5 (page 80).

B. Incorrect – full MU/HPI is NOT REQUIRED because SCM ≥ 20 °F per Tsat meters. See DB-OP-02000 step 4.1 (page 18) and Specific Rule 3.2.1 (page 241). Plausible because full MU/HPI flow would compress the non-PZR steam bubble.

C. Incorrect – not required by procedure. Plausible because opening the Loop High Point Vents is an action for Lack of Heat Transfer. See DB-OP-02000 step 6.14 RNO (page 62). Inadequate local heat transfer led to the Hot Leg steam bubble formation. .

D. Incorrect – not required by procedure. Plausible because raising the steaming rate of the SGs promotes natural circulation flow which would help condense the steam bubble(s).

Sys #	System	Category	KA Statement
BW/E09	Natural Circulation Cooldown	EK3 Knowledge of the reasons for the following responses as they apply to the (Natural Circulation Cooldown):	Manipulation of controls required to obtain desired operating results during abnormal, and emergency situations

K/A# EK3.3 **K/A Importance** 3.8 **Exam Level** RO

References provided to Candidate None **Technical References:** DB-OP-06903 R47 Plant Cooldown steps 6.4 and 6.5 (page 80).

Question Source: Bank –#178901

Question Cognitive Level: High - Comprehension **10 CFR Part 55 Content:** (CFR: 41.5 / 41.10, 45.6, 45.13)

Objective: OPS-GOP-206-03K

27. The plant is operating at 100% power.

A Loss of Offsite Power occurs.

NO operator actions have been taken.

Which of the following annunciator alarms has the highest priority for operator response under these conditions?

A. 1-1-A EDG 1 TRBL

B. 9-1-F INST AIR HDR PRESS LO

C. 10-2-G AFPT 1 OVRSPD TRIP

D. 14-2-D ICS/NNI 118 VAC PWR TRBL

Answer: C

Explanation/Justification:

A. Incorrect – Plausible because 1-1-A indicates potential EDG problem. EDG trip would require Specific Rule 6 implementation for loss of power to Bus C1, but lower priority than Specific Rule 4. See DB-OP-02000 R27 Specific Rule 6.1. (page 250).

B. Incorrect – Plausible because action is required per DB-OP-02000 R27 step 4.7. Specific Rule 4 has higher priority.

C. Correct – operators perform Attachments 5 and 6 to start the MDFP per Specific Rule 4.1. See DB-OP-02000 R27 page 245. Specific Rule 4 is the highest priority condition. See Bases and Deviation Document R20 Specific Rule Prioritization (page 8).

D. Incorrect – Plausible because action is required per DB-OP-02000 R27 step 4.6. Specific Rule 4 has higher priority.

Sys #	**System**	**Category**	**KA Statement**
BW/E13	EOP Rules	Generic	Ability to prioritize and interpret the significance of each annunciator or alarm

K/A# 2.4.45 **K/A Importance** 4.1 **Exam Level** RO

References provided to Candidate None **Technical References:** DB-OP-02000 R27 Specific Rule 4.1 (page 245); Bases and Deviation Document R20 Specific Rule Prioritization (page 8)

Question Source: New

Question Cognitive Level: High – Comprehension **10 CFR Part 55 Content:** (CFR: 41.10 / 43.5 / 45.3 / 45.12)

Objective: OPS-GOP-300-05K

28. The plant is operating at 35% power.

RCP 2-1 Upthrust Bearing temperature is 220 °F.

What operator actions are REQUIRED?

A. Trip the Reactor and stop RCP 2-1.

B. Perform a Rapid Shutdown and stop RCP 2-1.

C. Stop RCP 2-1 and notify I & C to reduce the RPS High Flux Trip setpoints.

D. Lower CCW temperature to 85 °F and start RCP 2-1 AC Lift Oil Pump.

Answer: C

Explanation/Justification:

A. Incorrect – Reactor trip not required. Plausible because these are the actions for reactor critical with 3 RCPs operating. See DB-OP-02515 R12 RCP and Motor Abnormal Operation step 4.6.1 RNO.

B. Incorrect – Rapid Shutdown not required. Power is 35%, Rapid Shutdown required if power is > 72%. See DB-OP-02515 R12 RCP and Motor Abnormal Operation Attachment 1 RCP Shutdown step 1. Plausible because these would be the correct actions at full power.

C. Correct – See DB-OP-02515 R12 RCP and Motor Abnormal Operation step 4.6.1 RNO and Attachment 1 RCP Shutdown steps 3 and 7.

D. Incorrect – RCP stop required for bearing temperature ≥190 ºF per DB-OP-02515 R12 RCP and Motor Abnormal Operation step 4.6.1 RNO. Plausible because these are the actions for bearing temperature above 185 ºF but less than 190 ºF. See DB-OP-06005 R31 RCP Operation steps 4.2.3 and 4.2.5.

Sys #	System	Category	KA Statement
003	Reactor Coolant Pump System (RCPS)	Generic	Ability to evaluate plant performance and make operational judgments based on operating characteristics, reactor behavior, and instrument interpretation

K/A# 2.1.7 **K/A Importance** 4.4 **Exam Level** RO

References provided to Candidate None **Technical References:** DB-OP-02515 R12 RCP and Motor Abnormal Operation step 4.6.1 RNO and Attachment 1 RCP Shutdown steps 3 and 7.

Question Source: New

Question Cognitive Level: High - Comprehension **10 CFR Part 55 Content:** (CFR: 41.5 / 43.5 / 45.12 / 45.13)

Objective: OPS-SYS-105-08K

29. The plant is operating at 70% power.
    - Core ΔT (Reactor Coolant System Thot – Tcold) is 33 ºF

    Reactor Coolant Pump (RCP) 1-2 breaker opens spuriously.

    NO operator actions are taken.

    Which of the following describes the change in Core ΔT when the plant stabilizes?

    Core ΔT will _____.

A. go to approximately 1 ºF following the automatic reactor trip

B. lower to approximately 25 ºF due to the reduction in RCS flow

C. remain at 33 ºF since reactor power does not change

D. rise to approximately 44 ºF due to the reduction in RCS flow

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Answer: D

Explanation/Justification:

A. Incorrect – reactor does not trip from stop of RCP at 70% power. Plausible for RCP trip at higher power.
B. Incorrect – Plausible for misapplication of Q=mΔT. This value is 75% of the given value pf 33 ºF.
C. Incorrect - Plausible for misapplication of Q=mΔT.
D. Correct – for power constant at 70% with RCS flow reduction to 75%, ΔT = 33 ÷ 0.75 = 44 ºF. See DB-PF-06703 R22 Miscellaneous Operation Curves CC2.2 and CC2.3

Sys #	System	Category	KA Statement
003	Reactor Coolant Pump System (RCPS)	K3 Knowledge of the effect that a loss or malfunction of the RCPS will have on the following:	RCS

K/A# K3.01 **K/A Importance** 3.7 **Exam Level** RO

References provided to Candidate None **Technical References:** DB-PF-06703 R22 CC2.2 and CC2.3

Question Source: New

Question Cognitive Level: Low – Recall **10 CFR Part 55 Content:** (CFR: 41.7 / 45.6)

Objective: OPS-SYS-105-03K

30. A Lack of Heat Transfer event has occurred.

The operators are performing the actions for Recovery from MU/HPI PORV Cooling.

- Reactor Coolant System (RCS) Subcooling Margin (SCM) has been restored.
- Letdown flow has been established through Orifice Block MU4 and Letdown Flow Control MU6.
- The normal Makeup System alignment has been established with flow through Pressurizer Level Control Valve MU32 only.

The operators close the Power Operated Relief Valve (PORV) RC2A.

MU6 fails closed.

Which of the following describes the operator action required to offset the MU6 failure when controlling RCS pressure?

A. Raise flow through MU4.

B. Raise flow through MU32.

C. Lower flow through MU4.

D. Lower flow through MU32.

Answer: D

Explanation/Justification:

A. Incorrect – MU4 block orifice valve is already full open, so flow cannot be raised. Plausible for candidate inversion of MU4 operation and MU6 operation. MU6 is a throttle valve. Raising letdown flow would restore the letdown – makeup flow balance for RCS pressure control.
B. Incorrect – Plausible if candidate misses that SG heat transfer must be established to recover from MU/HPI PORV Cooling and focuses on the cooling effect of raising MU flow. Lowering RCS temperature lowers RCS pressure.
C. Incorrect – closing MU4 orifice block valve makes the letdown – makeup flow imbalance worse, causing a higher rise in RCS pressure. Plausible for candidate inversion of the effect of letdown flow on solid RCS pressure control.
D. Correct – MU6 closure lowers letdown flow which raises RCS pressure. MU32 must be throttled closed to compensate. DB-OP-02000 R27 CAUTION 6.9 and step 7 (page 402)

Sys #	System	Category	KA Statement
004	Chemical and Volume Control System	K6 Knowledge of the effect of a loss or malfunction on the following CVCS components:	Methods of pressure control of solid plant (PZR relief and water inventory)

K/A# K6.26 **K/A Importance** 3.8 **Exam Level** RO

References provided to Candidate None **Technical References:** DB-OP-02000 R27 CAUTION 6.9 and step 7 (page 402)

Question Source: New

Question Cognitive Level: High - Comprehension **10 CFR Part 55 Content:** (CFR: 41.7 / 45.7)

Objective: OPS-GOP-305-05K

31. The Decay Heat Removal System design feature which can provide flow to the Makeup (MU) and High Pressure Injection (HPI) Systems is called Piggyback operation.

    Which of the following describes the Design Basis of Piggyback operation?
    Piggyback operation was designed to ensure _______.

A. maximum HPI flow following a loss of all MU flow capability

B. maximum MU/HPI flow during a Lack of Heat Transfer event

C. adequate NPSH for the MU Pumps during Injection Phase of a Loss of Coolant Accident

D. adequate NPSH for the HPI Pumps during Recirculation Phase of a Loss of Coolant Accident

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Answer: D

Explanation/Justification:

A. Incorrect – not the design basis. Plausible because HPI Piggyback operation is initiated for this event. See DB-OP-02512 R14 Makeup and Purification System Malfunctions step 4.1.11 RNO
B. Incorrect – not the design basis. Plausible because MU/HPI Piggyback operation is initiated for this event. See DB-OP-02000 R27 step 6.3.3 (page 56) and Attachment 8 step 2.b (page 314)
C. Incorrect – not the design basis. Plausible because there is no MU flow limit based on NPSH when Piggybacked. See DB-OP-02000 R27 Specific Rule 3.2.4 (page 241)
D. Correct – see UFSAR Section 6.3.2.11 page 6.3-6

Sys #	System	Category	KA Statement
005	Residual Heat Removal System (RHRS)	K4 Knowledge of RHRS design feature(s) and/or interlock(s) which provide or the following:	Lineup for "piggy-back" mode with high-pressure injection

K/A# K4.08 **K/A Importance** 3.1* **Exam Level** RO

References provided to Candidate None **Technical References:** UFSAR Section 6.3.2.11 page 6.3-6

Question Source: New

Question Cognitive Level: Low - Memory **10 CFR Part 55 Content:** (CFR: 41.7)

Objective: OPS-SYS-303-06K

32. The plant is operating at 100% power.

Which of the following will prevent High Pressure Injection Pump 1 from starting?

_____ Lockout Relays actuated

A. Emergency Diesel Generator 1

B. Emergency Diesel Generator 2

C. 4160V AC Bus C1

D. 4160V AC Bus D1

Answer: C

Explanation/Justification:

A. Incorrect – C1 remains energized from its normal source (Bus C2) via AC110 and nothing interferes with an automatic start of HPI Pump 1. The EDG lockouts do not affect AC110. See OS-0041A CD-2 (sheet 1). Plausible because HPI Pump 1 won’t automatically start during a LOCA concurrent with loss of offsite power, which is its design function

B. Incorrect – EDG 2 supports HPI Pump 2. Plausible for inversion of HPI pump power supplies.

C. Correct – See OS-0003 R36 CL-2.

D. Incorrect – plausible for inversion of HPI pump power supplies.

Sys #	System	Category	KA Statement
006	Emergency Core Cooling System (ECCS)	K2 Knowledge of bus power supplies to the following:	ECCS pumps

K/A# K2.01 **K/A Importance** 3.6 **Exam Level** RO

References provided to Candidate None **Technical References:** OS-0003 R36 CL-2

Question Source: New

Question Cognitive Level: Low - Memory **10 CFR Part 55 Content:** (CFR: 41.7)

Objective: OPS-SYS-302-03K

33. The plant is operating at 100% power.

Which of the following describes:

(1) An inadvertent SFAS Incident Level trip that requires entry into DB-OP-02000 RPS, SFAS, SFRCS Trip or SG Tube Rupture?

(2) The DB-OP-02000 Response Not Obtained action for the Verify Turbine Valves closed Immediate Action?

A. (1) 3
(2) Initiate and Isolate SFRCS

B. (1) 2
(2) Initiate and Isolate SFRCS

C. (1) 3
(2) Stop BOTH EHC Fluid Pumps

D. (1) 2
(2) Stop BOTH EHC Fluid Pumps

Answer: A

Explanation/Justification:

A. Correct –SFAS Level 3 requires DB-OP-2000 entry. See DB-OP-02000 R27 step 1.2.2. Initiate & Isolate SFRCS per step 3.5 RNO.

B. Incorrect – Inadvertent Level 2 does NOT require entry into DB-OP-02000. Part 2 is correct. Plausible because Level 2 isolates letdown which requires a plant shutdown if not corrected. See DB-OP-02512 R14 Makeup and Purification System Malfunctions step 4.3.8 RNO.

C. Incorrect – Initiate & Isolate SFRCS per step 3.5 RNO. Part 1 correct. Stop both EHC pumps plausible because that is the RNO action for tripping the turbine in the turbine trip procedure. See DB-OP-02500 R13 Turbine Trip step 4.1 RNO.

D. Incorrect – Inadvertent Level 2 does NOT require entry into DB-OP-02000. See DB-OP-02000 R27 step 1.2.2. Initiate & Isolate SFRCS per step 3.5 RNO. Plausible because Level 2 isolates letdown which requires a plant shutdown if not corrected. See DB-OP-02512 R14 Makeup and Purification System Malfunctions step 4.3.8 RNO. Stop both EHC pumps plausible because that is the RNO action for tripping the turbine in the turbine trip procedure. See DB-OP-02500 R13 Turbine Trip step 4.1 RNO.

Sys #	System	Category	KA Statement
006	Emergency Core Cooling System (ECCS)	Generic	Knowledge of EOP entry conditions and immediate action steps

K/A# 2.4.1 **K/A Importance** 4.6 **Exam Level** RO

References provided to Candidate None **Technical References:** DB-OP-02000 R27 steps 1.2.2 and 3.5

Question Source: New

Question Cognitive Level: Low – Recall **10 CFR Part 55 Content:** (CFR: 41.10 / 43.5 / 45.13)

Objective: OPS-GOP-304-03K

34. The plant is operating at 100% power.

The following conditions are noted in the control room:

- LI225 Quench Tank Level 9 feet and slowly lowering
- LI1721 Reactor Coolant Drain Tank Level 20 inches and slowly rising
- Quench Tank Circ Pump GREEN light is LIT

Which of the following is occurring?

A. Pressurizer Code Safety Valve leakage

B. Pressurizer Power Operated Relief Valve leakage

C. Pressurizer High Point Vent line valves leaking by

D. Quench Tank Demineralized Water makeup valves leaking by

Answer: D

Explanation/Justification:

A. Incorrect – safety valve leakage would raise Quench Tank temperature which would start the Circ Pump. See OS-0001A sheet 3 CL-9 (sheet 4). Plausible because the Circ Pump is not required to drain the Quench Tank. See DB-OP-06004 R10 Quench Tank NOTE 4.2.4.
B. Incorrect – same as Safety Valve leakage.
C. Incorrect – same as Safety Valve leakage.
D. Correct – Demin Water in-leakage causes Quench Tank level rise. At 9.5 ft, RC225A opens to start water transfer to the RCDT See OS 0001A sheet 3 R26 C-43 and sheet 4 R24 CL-10. Demin Water in-leakage would not cause a rise in Quench Tank temperature, so Circ Pump would not start. See OS-0001A Sheet 3 R26 CL-9.

Sys #	System	Category	KA Statement
007	Pressurizer Relief Tank /Quench Tank System (PRTS)	A3 Ability to monitor automatic operation of the PRTS, including:	Components which discharge to the PRT

K/A# A3.01 **K/A Importance** 2.7* **Exam Level** RO

References provided to Candidate None **Technical References:** OS-0001A sheets 3 & 4 CL-9 and CL-10

Question Source: New

Question Cognitive Level: High – Comprehension **10 CFR Part 55 Content:** (CFR: 41.7 / 45.5)

Objective: OPS-SYS-104-04K

35. Emergency Diesel Generator 1 Jacket Cooling Water (JCW) Heat Exchanger is being returned to service following maintenance.
    - The Component Cooling Water (CCW) side of the heat exchanger was isolated and drained for the maintenance activity.
    - The CCW side of the heat exchanger will be filled and vented.
    - Fill water will be provided from the CCW Surge Tank volume.

    Which of the following describes:
    (1) the preferred status of CCW Pump 1 during the JCW Heat Exchanger 1 CCW fill and vent evolution?
    (2) the method to maintain CCW Surge Tank level?

    (1) CCW Pump 1 should be _____.
    (2) Maintain CCW Surge Tank level 51 to 53 inches by _____ as required.

A. (1) stopped to minimize potential air entrainment
(2) opening DW2643 using HIS 2643 DEMIN WTR MAKEUP

B. (1) stopped to minimize potential air entrainment
(2) opening SW234 and SW233 SW HEADER 1 TIE TO CCW SYSTEM ISOLATION valves

C. (1) operating to ensure complete filling of the JCW Heat Exchanger
(2) opening DW2643 using HIS 2643 DEMIN WTR MAKEUP

D. (1) operating to ensure complete filling of the JCW Heat Exchanger
(2) opening SW234 and SW233 SW HEADER 1 TIE TO CCW SYSTEM ISOLATION valves

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Answer: A

Explanation/Justification:

A. Correct – CCW pump OFF to minimize air entrainment per DB-OP-06262 R36 CCW System Procedure step 2.2.17. Demin Water makeup per section 3.23.
B. Incorrect - Demin Water makeup per section 3.23. Part 1 is correct. Plausible because SW is emergency backup to demin water. See DB-OP-06262 R36 section 5.1.
C. Incorrect – CCW pump OFF to minimize air entrainment. Part 2 is correct. Plausible for higher pressure = better fill.
D. Incorrect – CCW pump OFF to minimize air entrainment. Demin Water makeup per section 3.23. Plausible for higher pressure = better fill and because SW is backup to demin water.

Sys #	System	Category	KA Statement
008	Component Cooling Water System (CCWS)	A4.02 Ability to manually operate and/or monitor in the control room:	Filling and draining operations of the CCWS including the proper venting of the components

K/A# A4.02 **K/A Importance** 2.5* **Exam Level** RO
References provided to Candidate **Technical References:** DB-OP-06262 R36 CCW System Procedure step 2.2.17 and Section 3.23.
Question Source: New
Question Cognitive Level: Low - Memory **10 CFR Part 55 Content:** (CFR: 41.7 / 45.5)
Objective: OPS-SYS-304-07K

36. The plant is operating at 100% power.
   - Component Cooling Water (CCW) Pump 1 is operating.

   PI810 INSTRUMENT AIR HEADER PRESS lowers to 50 psig and stabilizes.

   The operators perform the required abnormal procedure actions then implement DB-OP-02000 RPS, SFAS, SFRCS Trip or SG tube Rupture.

   During the performance of the applicable abnormal procedure in parallel with DB-OP-02000, the operators take actions to mitigate the effects of this failure.

   Which of the following describes an impact of the low Instrument Air pressure and the operator action to mitigate its effects?

A. CCW Pump 1 experiences run-out when Decay Heat Cooler 1 outlet valve CC1467 fails open. The operators manually isolate CCW flow to Decay Heat Cooler 1 to restore normal CCW Pump flow rate.

B. The CCW Containment Header experiences flow starvation when Decay Heat Cooler 2 outlet valve CC1469 fails open. The operators manually isolate CCW flow to Decay Heat Cooler 2 to restore normal CCW Containment Header flow rate.

C. The Control Rod Drive (CRD) Booster Pump experiences flow starvation when the Spent Fuel Pool (SFP) Heat Exchanger Outlet Valves CC1454 and CC1457 fail open. The operators manually isolate CCW flow to the SFP Heat Exchangers to restore normal CRD Booster Pump flow rate

D. Reactor Coolant Pumps lose CCW flow through their seal coolers when CCW to Aux Building Non-essential Header isolation valve CC1495 fails closed. The operators open the manual bypass valve CC43 to restore Reactor Coolant Pump Seal Cooling.

Answer: A

Explanation/Justification:

A. Correct – On a loss of instrument air, the DH cooler outlet valves fail open and the Aux Building Non-essential header isolation valve fails closed. See DB-OP-02528 R22 Instrument Air System Malfunctions Attachment 18 Failure Position of Pneumatic Valves (page 106). All of the valves on the Containment header are motor operated and do not reposition. CCW flow for this condition consists of 1350 gpm minimum flow through the EDG cooler (SD-016 2.1.2.3), 6000 gpm through the DH cooler (SD-016 2.1.2.5) and 2375 gpm flow through the Containment Header – 1400 gpm RCP cooling (SD-016 2.1.2.6), 175 gpm CRD cooling (SD-016 2.2.5), and 800 gpm letdown coolers (SD-016 Table 1.2-2). This nominal total of 9725 gpm is greater than the maximum single pump CCW flow of 9216 gpm per SD-016 2.2.2, so runout occurs. DB-OP-02528 Attachment 8 CCW System Actions CAUTION 1 second bullet also describes the run-out damage concern for CCW Pump 1. DHR HX is isolated per Attachment 8 CCW System Actions step 3. .

B. Incorrect – CCW Pump 1 is supplying the Containment Header, so flow starvation affecting letdown cooling on CCW Pump 2 won't occur. Plausible because CC1469 fails open (DB-OP-02528 R22 Attachment 18 page 106) and its isolation is directed by DB-OP-02528 R22 Attachment 8 step 3.

C. Incorrect – CCW System flow is not affected when CC1454 and CC1457 fail open because their supply is isolated when CC1495 fails closed. See OS-0021 sheet 2 and sheet 1. Plausible because CC1454 and CC1457 fail open.

D. Incorrect – RCP cooling is supplied by the Containment Header. See OS-0021 sheet 2. Plausible because this header supplies the RCP Seal Return Coolers, CC1495 fails closed (DB-OP-02528 R22 Attachment 18 page 106), and CC43 is directed to be opened per DB-OP-02528 R22 Attachment 8 CCW System Actions step 4.

Sys #	System	Category	KA Statement
008	Component Cooling Water System (CCWS)	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:	Effect of loss of instrument and control air on the position of the CCW valves that are air operated

K/A# A2.05 **K/A Importance** 3.3* **Exam Level** RO

References provided to Candidate None **Technical References:** DB-OP-02528 R22 Attachment 18 page 106, Attachment 8 page 62; SD-016 R5

Question Source: New

Question Cognitive Level: High - Comprehension **10 CFR Part 55 Content:** (CFR: 41.5/43.5/45.3/45.13)

Objective: OPS-SYS-304-07K

37. The following conditions exist:

Reactor Coolant System pressure is 485 psig.
Quench tank pressure is 20 psig.
The Pressurizer Power Operated Relief Valve (PORV) RC2A lifts.

What is the PORV tailpipe downstream temperature?

A. 235 to 245 ºF

B. 260 to 270 ºF

C. 330 to 340 ºF

D. 460 to 470 ºF

Answer: C

Explanation/Justification:

A. Incorrect – plausible because it is saturation temperature for 20 psia (common error)
B. Incorrect – plausible because it is 1205 BTU/lb expanded to 35 psia, but at constant entropy
C. Correct – enthalpy at 500 psia 100% quality is 1205 BTU/lb. expand to 35 psia = 335 ºF
D. Incorrect – plausible because it is saturation temperature for 500 psia (common error).

Sys #	System	Category	KA Statement
010	Pressurizer Pressure Control System (PZR PCS)	K5 Knowledge of the operational implications of the following concepts as they apply to the PZR PCS:	Constant enthalpy expansion through a valve

K/A# K5.02 **K/A Importance** 2.6 **Exam Level** RO

References provided to Candidate Steam Tables with Mollier Diagram **Technical References:**

Question Source: Bank # 167005

Question Cognitive Level: High – Comprehension **10 CFR Part 55 Content:** (CFR: 41.5 / 45.7)

Objective: OPS-SYS-104-03K

38. The plant was operating at 100% power.

A manual Reactor trip was initiated, but the Control Rod Drive (CRD) breakers did NOT open.

Reactor was shut down from the Control Room by alternate means.

- NO Trip Confirm signal was generated
- The CRD breakers are still closed

Which of the following describes Steam Generator (SG) pressure control for these conditions?

SG pressures are being maintained at about __(1)__ by the __(2)__.

A. (1) 880 psig
(2) Turbine Bypass Valves

B. (1) 880 psig
(2) Atmospheric Vent Valves

C. (1) 995 psig
(2) Turbine Bypass Valves

D. (1) 995 psig
(2) Atmospheric Vent Valves

Answer: A

Explanation/Justification:

A. Correct – The turbine was manually tripped per Immediate Action 3.4. Reactor Shutdown by de-energizing E2 and F2 leaves the CRD trip breakers closed. The reactor tripped status input to the ICS turbine header pressure control logic is the Trip Confirm signal. See DB-OP-06402 R25 CRD Operating Procedure Attachment 2 Rod Control Panel Indicating Lights item 1 (page 147). Since there is no Trip Confirm signal and the turbine is tripped, there is no bias added to the Turbine Header Pressure set point of 880 psig. See DB-OP-06401 R23 ICS Operating Procedure Attachment 9 (page 103).

B. Incorrect – SG pressure control transfers from the TBVs to the AVVs on low vacuum of closure of either MSIV. See DB-OP-06401 R23 Attachment 10 item 5 (page 106). Neither of these conditions exists. Plausible because part 1 is correct SG pressure control is based on individual SG pressure signals when the turbine stop valves are closed. See DB-OP-06401 R23 Attachment 10 item 2. Individual SG pressure signal control is often confused with AVV control.

C. Incorrect – no 115 psi bias signal because there is no Trip Confirm signal. Part 2 is correct. Plausible because this is the normal response to a reactor trip.

D. Incorrect – both parts are incorrect. Plausible because 995 psig is normal pressure control set point post-trip and misapplication of pressure signal transfer to AVVs.

Sys #	System	Category	KA Statement
012	Reactor Protection System (RPS)	K3 Knowledge of the effect that a loss or malfunction of the RPS will have on the following:	Steam Dump System

K/A# K3.03 **K/A Importance** 3.1* **Exam Level** RO

References provided to Candidate None **Technical References:** DB-OP-06402 R25 (page 147); DB-OP-06401 R23 (page 103)

Question Source: New

Question Cognitive Level: High - Comprehension **10 CFR Part 55 Content:** (CFR: 41.7 / 45.6)

Objective: OPS-SYS-501-06K

39. The plant is operating at 100% power.

Two of the Reactor Protection System (RPS) trip functions utilize variable setpoints that are calculated by Trip Setpoint Calculators.

Which of the following sets of Trip Setpoint Calculator malfunctions will cause BOTH RPS Channels to trip?

(1) RPS Channel 1 Flux/Delta Flux/Flow Trip setpoint fails __(1)__.

(2) RPS Channel 2 RCS Pressure/Temperature Trip setpoint fails __(2)__.

A. (1) low
(2) low

B. (1) low
(2) high

C. (1) high
(2) low

D. (1) high
(2) high

Answer: B

Explanation/Justification:

A. Incorrect – P-T bistable trips when RCS pressure is lower than the calculated setpoint. The P-T setpoint calculator output failing low drives the variable low pressure trip setpoint even farther below actual RCS pressure. Setpoint pressure calculation is 16.25 Thot – 7885.5 psig, so normal full power setpoint is about 1945 psig. Plausible because item 1 is correct and candidate can easily invert parameter – setpoint relationship when answering part 2.

B. Correct – Flux/Delta Flux Flow bistable trips when reactor power signal is higher than the calculated setpoint. Setpoint calculator output low = trip because actual NI power is above the failed low setpoint. See UFSAR 7.2.1.2.2 item 7 (page 7.2-6). Pressure/Temperature (aka Variable Low RC Pressure) bistable trips when RCS pressure signal is lower than the calculated setpoint. Setpoint calculator output high = trip because actual RCS pressure is below the failed high setpoint. See UFSAR 7.2.1.2.2 item 4 (page 7.2-5) and TRM Table 8.3.1-2

C. Incorrect – Flux/Delta Flux Flow bistable trips when reactor power signal is higher than the calculated setpoint. The setpoint calculator failing high drives the Flux/Delta Flux/Flow high power trip setpoint even higher above actual power. P-T bistable trips when RCS pressure is lower than the calculated setpoint. The P-T setpoint calculator output failing low drives the variable low pressure trip setpoint even farther below actual RCS pressure. Both plausible because candidate can easily invert parameter – setpoint relationship when answering. Item 1 also plausible if candidate equates setpoint calculator high failure with high Delta Flux input which would cause a trip.

D. Incorrect - Flux/Delta Flux Flow bistable trips when reactor power signal is higher than the calculated setpoint. The setpoint calculator failing high drives the Flux/Delta Flux/Flow high power trip setpoint even higher above actual power. Part 2 is correct. Plausible because candidate can easily invert parameter – setpoint relationship when answering

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Sys #	System	Category	KA Statement
012	Reactor Protection System (RPS)	K6 Knowledge of the effect of a loss or malfunction of the following will have on the RPS:	Trip setpoint calculators

K/A# K6.11 **K/A Importance** 2.9* **Exam Level** RO

References provided to Candidate None **Technical References:** UFSAR 7.2.1.2.2; TRM Table 8.3.1-2

Question Source: New

Question Cognitive Level: High – Comprehension **10 CFR Part 55 Content:** (CFR: 41.7 / 45/7)

Objective: OPS-SYS-504-05K

40. The plant is operating at 100% power.

A Design Bases Loss of Coolant Accident (DBLOCA) occurs.

Which of the following describes:
(1) the definition of a Safety Features Actuation System (SFAS) safety train?
(2) the operational implication of the failure of one SFAS safety train on the DBLOCA Analyses assumptions?

(1) SFAS Channels __(1)__ Output Modules comprise Safety Actuation Train 1.
(2) DBLOCA Analyses assumptions __(2)__ met.

A. (1) 1 and 4
(2) are

B. (1) 1 and 3
(2) are

C. (1) 1 and 4
(2) are NOT

D. (1) 1 and 3
(2) are NOT

Answer: B

Explanation/Justification:

A. Incorrect – SFAS Channels 1 and 3 Output Modules comprise Actuation Channel 1. See Bases 3.3.7 2nd paragraph. Part 2 is correct. Plausible for Channels 1 & 4 Output Modules = Safety Train 1.
B. Correct – SFAS Channels 1 and 3 Output Modules comprise Actuation Channel 1. See Bases 3.3.7 2nd paragraph. DBLOCA Analyses assumptions are met. See UFSAR R30 6.3.2.11.
C. Incorrect - SFAS Channels 1 and 3 Output Modules comprise Actuation Channel 1. See Bases 3.3.7 2nd paragraph. DBLOCA Analyses assumptions are met. See UFSAR R30 6.3.2.11. Plausible for Channels 1 & 4 Output Modules = Safety Train 1 and single Safety Train actuation provides insufficient ECCS.
D. Incorrect – DBLOCA Analyses assumptions are met. See UFSAR R30 6.3.2.11. Part 1 is correct. Plausible for single Safety Train actuation provides insufficient ECCS.

Sys #	System	Category	KA Statement
013	Engineered Safety Features Actuation System (ESFAS)	K5 Knowledge of the operational implications of the following concepts as they apply to the ESFAS:	Definitions of safety train and ESF channel

K/A# K5.01 **K/A Importance** 2.8 **Exam Level** RO

References provided to Candidate None **Technical References:** Bases 3.3.7 2nd paragraph; UFSAR R30 6.3.2.11 page 6.3-8

Question Source: New

Question Cognitive Level: Low - Recall **10 CFR Part 55 Content:** (CFR: 41.5 / 45.7)

Objective: OPS-SYS-506-05K

41. The plant is operating at 100% power.
    - Containment Air Coolers 1 and 2 are operating.

    The following events occur:
    - Large Break Loss of Coolant Accident
    - Loss of Offsite Power
    - Bus D1 Lockout

    NO operator actions are taken.

    Five minutes after the above events, what is the status of the Containment Air Cooler (CAC) Fans?

    CAC Fan 1 speed is __(1)__.

    CAC Fan 2 speed is __(2)__.

A. (1) slow
   (2) zero

B. (1) zero
   (2) slow

C. (1) zero
   (2) zero

D. (1) slow
   (2) slow

Answer: A

Explanation/Justification:

A. Correct - CACs start in SLOW from SFAS Level 2 signal. See DB-OP-02000 R27 page 418. CAC 2 is at zero speed because it has no power due to D1 lockout.

B. Incorrect – backwards. Plausible for misconception of D1 power to CAC 1 (#1 bus to #1 component).

C. Incorrect – Plausible because this would be the status of both CACs following LOP only. See OS-0020 sheet 2 CL-11. Fans are normally in FAST speed. See OS-0033A Note 13.

D. Incorrect – Plausible because this would be the status without the D1 lockout.

Sys #	**System**	**Category**	**KA Statement**
022	Containment Cooling System (CCS)	K2 Knowledge of power supplies to the following:	Containment cooling fans

K/A# K2.01 **K/A Importance** 3.0* **Exam Level** RO

References provided to Candidate None **Technical References:** DB-OP-02000 R27 page 418; OS-0020 sheet 2

Question Source: New

Question Cognitive Level: High - Comprehension **10 CFR Part 55 Content:** (CFR: 41.7)

Objective: OPS-SYS-305-05K

42. The plant has experienced a Containment Design Basis Loss of Coolant Accident.

Following the transfer of Low Pressure Injection (LPI) Suction to the Emergency Sump, a small rise in Containment pressure is noted.

Which of the following describes the reason for this pressure rise?

Heat removal from Containment is reduced because _____.

A. LPI and Spray discharge temperatures rise significantly when suction is transferred to the sump

B. throttling of the Containment Spray Discharge Valve lowers the heat removal from Spray

C. stopping High Pressure Injection Pump for the transfer lowers core cooling flow

D. establishing Long Term Boron Dilution after the transfer lowers flow through the Decay Heat Cooler

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Answer: A

Explanation/Justification:

A. Correct – See UFSAR R30 Section 6.2.1.3.2 page 6.2-11 Long-term Containment Analysis. Containment pressure rises for the first 2000 seconds (half hour) after swap to sump.

B. Incorrect – per UFSAR Section 6.2.1.3.2 page 6.2-11 Long-term Containment Analysis, the majority of heat removal from Containment during recirculation is performed by the CAC and the Decay Heat Removal Cooler, so throttling of spray flow has a minor effect. Plausible because Containment Spray flow is lowered by throttling.

C. Incorrect – Plausible because HPI is stopped prior to swap to sump. See DB-OP-02000 R28 steps 10.12 and 10.13.

D. Incorrect – Plausible because Long Term Boron Dilution is established following swap to sump. DB-OP-02000 R28 steps 10.13 and 10.17.

Sys #	System	Category	KA Statement
026	Containment Spray System (CSS)	A1 Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating the CSS controls including:	Containment pressure

K/A# A1.01 **K/A Importance** 3.9 **Exam Level** RO

References provided to Candidate None **Technical References:** UFSAR R30 Section 6.2.1.3.2 page 6.2-11,

Question Source: New

Question Cognitive Level: Low – Memory **10 CFR Part 55 Content:** (CFR: 41.5 / 45.5)

Objective: OPS-SYS-306-02K

43. The plant is operating at 100% power.

A large break Loss of Coolant Accident occurs.

The operators take all required procedure actions and are preparing to transfer Low Pressure Injection (LPI) Suction to the Emergency Sump.

At this point it is observed that the Main Steam Isolation Valves (MSIVs) MS100 and MS101 are closed.

Which of the following describes why the MSIVs are closed?

A. Manual closure required by procedure

B. Manual trip of all Reactor Coolant Pumps

C. Automatic Steam Feed Rupture Control System Actuation

D. Automatic Safety Features Actuation System Level 4 Actuation

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Answer: C

Explanation/Justification:

A. Incorrect – no manual SFRCS trip is directed in the routing for a Large LOCA. Plausible because Containment isolation is desirable.

B. Incorrect – RCP trip causes Actuation Only SFRCS trip. Plausible because manual trip of all RCPs will be performed and candidate may have misconception that this causes an SFRCS Isolation trip.

C. Correct – trip of all RCPs is required for loss of Subcooling Margin per Specific Rule 2. Trip of all RCPs causes Steam & Feed Rupture Control System (SFRCS) Actuation Only Trip which starts Auxiliary Feed Water (does NOT close MSIVs). SFAS Level 2 actuation raises the SG level control setpoint from 49 inches to 124 inches, so full AFW flow is supplied to both SGs. Since the RCS and the SGs are no longer hydraulically coupled due to the LOCA, SG pressures lower rapidly. An SFRCS Isolation trip occurs at 630 psig and closes the MSIVs. See DB-OP-02000 R27 Specific Rule 2 (page 240), step 5.7 (page 42), Table 2 (page 419), and Table 1 (page 415). MSIVs are Containment Isolation Valves

D. Incorrect – SA Level 4 actuates Level 3 Containment Isolation (the highest), but it does not close MSIVs. See DB-OP-02000 R27 Table 2 (page 421) and UFSAR 6.2.4.2.1 page 6.2-57. Plausible because Containment Isolation is desirable.

Sys #	System	Category	KA Statement
039	Main and Reheat Steam System (MRSS)	K4 Knowledge of MRSS design feature(s) and/or interlock(s) which provide for the following:	Reactor building isolation

K/A# K4.07 **K/A Importance** 3.4 **Exam Level** RO

References provided to Candidate None **Technical References:** DB-OP-02000 R27 Specific Rule 2, step 5.7, Table 2, and Table 1

Question Source: New

Question Cognitive Level: High – Comprehension **10 CFR Part 55 Content:** (CFR: 41.7)

Objective: OPS-SYS-202-06K

44. The plant is at 45% power.
- Reactor Coolant Pump 1-1 is NOT operating.

The reactor trips.

Which of the following describes the response of Integrated Control System (ICS) Rapid Feedwater Reduction (RFR)?

RFR will _____.

A. NOT actuate since one Steam Generator is on Low Level Limits

B. actuate causing Main Feedwater Pump speed to go to approximately 4600 rpm

C. NOT actuate because one Main Feedwater Pump is tripped

D. actuate causing the Main Feedwater Control Valves to go to 15% open

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Answer: B

Explanation/Justification:

A. Incorrect – RFR actuates. SG Low Level Limits is not an input to RFR actuation logic. See M-533 00178 R13 Logic String 11. Plausible for confusion of single SG release from RFR at Low Level Limits or after 2.5 minutes. See M-533-00178 R13 Logic String 15 and DB-OP-02000 R27 step 2.1.4.

B. Correct – RFR actuates. See M-533 00178 R13 Logic String 11. MFPT to target speed per Logic string 11 FWD27.1 and FWD27.2 and M-533-00176-2 R FW21.9. Target speed 4600 rpm per DB-OP-02000 R27 step 2.1.4.

C. Incorrect – RFR actuates. See M-533 00178 R13 Logic String 11. Plausible because both MFPTs tripped would prevent RFR actuation.

D. Incorrect – MFW Control valves close. Plausible for inversion with SUFW valves.

Sys #	**System**	**Category**	**KA Statement**
059	Main Feedwater (MFW) System	K4.18 Knowledge of MFW design feature(s) and/or interlock(s) which provide for the following:	Automatic feedwater reduction on plant trip

K/A# K4.18 **K/A Importance** 2.8* **Exam Level** RO

References provided to Candidate None **Technical References:** DB-OP-02000 R27 step 2.1.4; M-533-00178 R13 Logic String 11

Question Source: Bank #168736

Question Cognitive Level: High - Comprehension **10 CFR Part 55 Content:** (CFR: 41.7)

Objective: OPS-SYS-207-06K

45. The plant is operating at 100% power.

Computer point T879 SG 1 AFW NOZZLE TEMP alarms.

- T879 indicates 210 ºF and rising.
- The high temperature condition is confirmed locally at Auxiliary Feedwater (AFW) to Steam Generator (SG) 1 Line Stop valve AF608.

Which of the following describes the operational implications of this condition as described in DB-OP-06233 Auxiliary Feedwater System?

A. AFW flow to SG 1 may be limited by line voiding. Only one Emergency Feedwater Train is inoperable during mitigation of the condition.

B. AFW Train 1 is steam bound and may NOT produce sufficient flow. Mitigation of the condition requires all three Emergency Feedwater Trains to be made inoperable for a short period of time.

C. AF608 may not close if needed due to being outside of its Environmental Qualification temperature. NO Emergency Feedwater Trains are inoperable during mitigation of the condition.

D. Water hammer could induce a steam break on SG 1 if AFW flow is initiated. Mitigation of the condition requires two Emergency Feedwater Trains to be made inoperable for a short period of time

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Answer: B

Explanation/Justification:

A. Incorrect - DB-OP-06233 R37 NOTE 4.9.5 references step 2.1.6 which states all three EFW Trains are inoperable while AF608 is closed for venting. Plausible because flow could be limited and AF608 closure effect on the other two trains could be overlooked.

B. Correct – See DB-OP-06233 R37 Section 4.9 Discovery and Resolution of Steam Binding in AFW Train 1 Components.

C. Incorrect – Plausible because AF608 is an EQ valve, no lineup changes would be required for cooling it down.

D. Incorrect – All three EFW Trains inoperable while AF608 is closed for venting – See DB-OP-06233 R37 step 2.1.6. Plausible because water hammer could induce an AFW line break; MDFP and AFW Train 1 both discharge through AF608.

Sys #	System	Category	KA Statement
061	Auxiliary / Emergency Feedwater (AFW) System	K5 Knowledge of the operational implications of the following concepts as they apply to the AFW:	Feed line voiding and water hammer

K/A# K5.05 **K/A Importance** 2.7 **Exam Level** RO

References provided to Candidate None **Technical References:** DB-OP-06233 R37 Section 4.9 and step 2.1.6

Question Source: New

Question Cognitive Level: High - Comprehension **10 CFR Part 55 Content:** (CFR: 41.5 / 45.7)

Objective: OPS-SYS-213-13K

46. If the Auxiliary Feedwater (AFW) Pumps start automatically, the Control Room contacts an operator to locally shift the AFW Pump recirculation flow path.

Performing this action maintains which of the following?

A. AFW Pump seal and bearing temperatures within limits

B. Condensate Storage Tank chemistry parameters within specification

C. Offsite radioactive material releases As Low As Reasonably Achievable

D. The margin assumed in the Condensate Storage Tank Capacity analysis

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Answer: D

Explanation/Justification:

A. Incorrect – local operator opens AF50 & AF51, then closes AF59. See DB-OP-02000 R27 step 4.18 (page 34) and Bases and Deviation Document for DB-OP-02000 R20 step 4.18 (page 43). Plausible because pumps are self-cooled. Without the installed restriction orifices RO 501 and RO 555, candidate could determine that pump flows go up because two valves are opened and one is closed on the recirc line. See OS-0010 R23 sheet 1.

B. Incorrect – Plausible because this is the reason for the normal lineup having AF59 open. See Bases and Deviation Document for DB-OP-02000 R20 step 4.18 (page 43)

C. Incorrect – Plausible for secondary side radioactive contamination because closing AF59 isolates the flow path to the CST overflow and ultimately the environment. See OS-0010 R23 sheet 1

D. Correct – AF59 normally open to direct AFP recirc water to the storm drain to prevent degradation of chemistry of the CSTs if AFW pumps start with suction from SW. After AFW pumps start, local operator opens AF50 & AF51, then closes AF59 to shift recirc to CSTs to preserve CST inventory. See DB-OP-02000 R27 step 4.18 (page 34) and Bases and Deviation Document for DB-OP-02000 R20 step 4.18 (page 43)

Sys #	System	Category	KA Statement
061	Auxiliary / Emergency Feedwater (AFW) System	Generic	Knowledge of local auxiliary operator tasks during an emergency and the resultant operational effects

K/A# 2.4.35 **K/A Importance** 3.8 **Exam Level** RO

References provided to Candidate None **Technical References:** DB-OP-02000 R27 step 4.18 (page 34) and Bases and Deviation Document for DB-OP-02000 R20 step 4.18 (page 43)

Question Source: New

Question Cognitive Level: Low - Memory **10 CFR Part 55 Content:** (CFR: 41.10 / 43.5 / 45.13)

Objective: OPS-SYS-213-11K

47. The plant is at 100% power.

120V AC Panel YAR will be transferred to its alternate supply from 120V AC Panel YBR.

The governing procedure requires the following before YAR is transferred:
- Diverse Scram System (DSS) Channel 1 is de-energized
- Caldon Cabinet C5757E is de-energized

These actions are performed in accordance with the applicable procedures.

Which of the following describes the effect on:
(1) DSS and
(2) Integrated Control System (ICS) Unit Load Demand (ULD)?

A. (1) DSS will trip the Reactor if required.
(2) ICS ULD can be operated in AUTO.

B. (1) DSS will trip the Reactor if required.
(2) ICS ULD can NOT be operated in AUTO.

C. (1) DSS will NOT trip the Reactor if required.
(2) ICS ULD can be operated in AUTO.

D. (1) DSS will NOT trip the Reactor if required.
(2) ICS ULD can NOT be operated in AUTO.

Answer: C

Explanation/Justification:

A. Incorrect – part 2 is correct. Part 1 is incorrect because DSS is a 2/2 coincidence energize to trip system. Plausible for examinee misconception of DSS as 1/2 de-energize to trip system.

B. Incorrect - Part 1 is incorrect because DSS is a 2/2 coincidence energize to trip system. Plausible for examinee misconception of DSS as 1/2 de-energize to trip system. Part 2 is incorrect because ICS ULD can be operated in AUTO using MFW Flow Venturis for thermal power calculation. Plausible because ULD is placed in MANUAL prior to taking LEFM signal to bypass (DB-OP-06407 R15 step 4.20.3.c.3) or for examinee misconception that Venturis can't provide input to ULD heat balance.

C. Correct – DSS is a 2/2 coincidence energize to trip system. See DB-OP-06402 R25 CRD Operating Procedure NOTE 4.18 (page113). Leading Edge Flow Meter (LEFM) signal is bypassed in ULD when de-energizing Caldon cabinet. See DB-OP-06407 R15 NNI Operating Procedure step 4.20.3.c.4 (page 40). ICS ULD can be operated in AUTO using MFW Flow Venturis for thermal power calculation. See NOTE and step 4.20.3.c.5

D. Incorrect – Part 1 is correct. . Part 2 is incorrect because ICS ULD can be operated in AUTO using MFW Flow Venturis for thermal power calculation. Plausible because ULD is placed in MANUAL prior to taking LEFM signal to bypass (DB-OP-06407 R15 step 4.20.3.c.3) or for examinee misconception that Venturis can't provide input to ULD heat balance.

Sys #	System	Category	KA Statement
062	AC Electrical Distribution System	A1 Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating the ac distribution system controls including:	Effect on instrumentation and controls of switching power supplies

K/A# A1.03 **K/A Importance** 2.5 **Exam Level** RO

References provided to Candidate None **Technical References:** DB-OP-06402 R25 CRD Operating Procedure NOTE 4.18; DB-OP-06407 R15 NNI Operating Procedure step 4.20.3.c.4 and 4.20.3.c.5)

Question Source: New

Question Cognitive Level: Low - Memory **10 CFR Part 55 Content:** (CFR: 41.5 / 45.5)

Objective: OPS-SYS-408-02K

48. The plant is at 100% power.

Which of the following will cause a rise in Charger DBC1N amps?

A. Start of Main Turbine Generator Emergency Bearing Oil Pump

B. Start of Low Pressure Injection Pump 1

C. Closing AF3870 Auxiliary Feedpump 1 to Steam Generator 1 discharge valve

D. Start of Main Generator Emergency Seal Oil Pump

Answer: A

Explanation/Justification:

- **A.** Correct –EBOP powered from DC MCC 1 so its start raises load on Charger DBC1N. See OS-0060 sheet 1 R25.
- **B.** Incorrect – No effect on Charger DBC 1N. Plausible for inversion with HPI Pump1 which has a DC lube oil pump.
- **C.** Incorrect – AF3870 is powered from D1P, so no effect on Charger DBC1N. Plausible because AF3870 is powered from a Train 1 DC bus. See OS-0060 sheet 1.
- **D.** Incorrect – Emergency Seal Oil Pump source is DC MCC 2, so Charger DBC1N output would not be affected. Plausible for confusion with Emergency Bearing Oil Pump power supply. See OS-0060 sheet 1 R25.

Sys #	System	Category	KA Statement
063	DC Electrical Distribution System	K1 Knowledge of the physical connections and/or cause-effect relationships between the DC electrical system and the following systems:	Battery charger and battery

K/A# K1.03 **K/A Importance** 2.9 **Exam Level** RO

References provided to Candidate None **Technical References:** OS-0060 sheet 1 R25

Question Source: Bank # 167376 modified

Question Cognitive Level: High – Comprehension **10 CFR Part 55 Content:** (CFR: 41.2 to 41.9 / 45.7 to 45.8)

Objective: OPS-SYS-409-10K

49. The plant is at 100% power.
   - Component Cooling Water (CCW) Pump 1 is operating.

   A Loss of Offsite Power occurs.

   Five minutes later, EDG 1 trips.

   NO operator actions have been taken.

   Which of the following describes the status of CCW Pump 1 and Service Water (SW) Pump 1 breakers?
   (1) CCW Pump 1 breaker is _____.
   (2) SW Pump 1 breaker is _____.

A. (1) open
(2) open

B. (1) open
(2) closed

C. (1) closed
(2) closed

D. (1) closed
(2) open

Answer: D

Explanation/Justification:

A. Incorrect – CCW Pump 1 breaker remains closed. Bus UV does not affect CCW Pump 1 breaker. See OS-0021 sheet 1 R37 CL-2. Part 2 is correct. Plausible for misconception that Bus UV opens CCW Pump breaker.
B. Incorrect – CCW Pump 1 breaker remains closed. Bus UV does not affect CCW Pump 1 breaker. See OS-0021 sheet 1 R37 CL-2. SW Pump 1 breaker opens on Bus UV. See OS-0020 sheet 2 R51 CL-3. Plausible for candidate inversion of pump responses to Bus UV.
C. Incorrect – SW Pump 1 breaker opens on Bus UV. See OS-0020 sheet 2 R51 CL-3. Part 1 is correct. Plausible for misconception that SW Pump responds the same as CCW pump.
D. Correct – CCW and SW Pumps are the major loads that sequence on to the EDG for a non-SFAS condition. CCW Pump 1 breaker remains closed. Bus UV does not affect CCW Pump 1 breaker. See OS-0021 sheet 1 R37 CL-2. SW Pump 1 breaker opens on Bus UV. See OS-0020 sheet 2 R51 CL-3.

Sys #	System	Category	KA Statement
064	Emergency Diesel Generator (ED/G) System	K3 Knowledge of the effect that a loss or malfunction of the ED/G system will have on the following:	Systems controlled by automatic loader

K/A# K3.01 **K/A Importance** 3.8* **Exam Level** RO

References provided to Candidate None **Technical References:** OS-0021 sheet 3 R12 CL-13 and sheet 1 CL-2; OS-0020 sheet 2 R51 CL-3

Question Source: New

Question Cognitive Level: Low – Recall **10 CFR Part 55 Content:** (CFR: 41.7 / 45.6)

Objective: OPS-SYS-405-19K

50. The plant is at 100% power.

Emergency Diesel Generator (EDG) 1 is started and loaded for a normal surveillance test.

- EDG 1 Jacket Water (JW) Thermostatic Control Valve JW112 is stuck closed.
- NO operator actions are taken.

Which ONE of the following describes the effect on EDG 1?

EDG 1 __(1)__ temperature(s) rise(s) until EDG 1 stops from __(2)__.

A. (1) JW only
(2) high JW temperature trip

B. (1) JW and Lube Oil
(2) high JW temperature trip

C. (1) JW only
(2) the engine seizing up

D. (1) JW and Lube Oil
(2) the engine seizing up

Answer: B

Explanation/Justification:

A. Incorrect – JW112 stuck closed prevents cooling of the JW and lube oil. See OS-0041A sheet 1 R32. Part 2 is correct. Plausible for misconception of lube oil cooling directly by CCW.

B. Correct - JW112 stuck closed prevents cooling of the JW and lube oil. See OS-0041A sheet 1 R32. High JW temperature trips EDG because EDG start was manual, not Emergency. See DB-OP-02001 R30 Window 1-1-B.

C. Incorrect – JW112 stuck closed prevents cooling of the JW and lube oil. See OS-0041A sheet 1 R32. High JW temperature trips EDG because EDG start was manual, not Emergency. See DB-OP-02001 R30 Window 1-1-B. Plausible for misconception of lube oil cooling directly by CCW and misapplication of Emergency start bypass of JW temperature trip. See DB-OP-02000 Bases and Deviation Document R20 page 455.

D. Incorrect – High JW temperature trips EDG because EDG start was manual, not Emergency. See DB-OP-02001 R30 Window 1-1-B. Part 1 is correct. Plausible for misapplication of Emergency start bypass of JW temperature trip. See DB-OP-02000 Bases and Deviation Document R20 page 455.

Sys #	System	Category	KA Statement
064	Emergency Diesel Generator (ED/G) System	K1 Knowledge of the physical connections and/or cause-effect relationships between the ED/G system and the following systems:	D/G cooling water system

K/A# K1.02 **K/A Importance** 3.1 **Exam Level** RO

References provided to Candidate None **Technical References:** OS-0041A sheet 1 R32; DB-OP-02001 R30 Window 1-1-B

Question Source: New

Question Cognitive Level: Low – Recall **10 CFR Part 55 Content:** (CFR: 41.2 to 41.9 / 45.7 to 45.8)

Objective: OPS-SYS-406-06K

51. A release of Clean Waste Monitor Tank (CWMT) 1 is in progress using CWMT Transfer Pump 1.

Which of the following describes how, if at all, that the release can be stopped from the Control Room?

A. Release can NOT be stopped from the Control Room. Local valve operation is required.

B. Push HIS1708 CWMT Transfer Pump 1 STOP button.

C. Press CLOSE on HIS1771 Clean Waste System Outlet Flow Valve.

D. Press the TEST button on RE1770A module until the HIGH alarm comes in.

Answer: D

Explanation/Justification:

A. Incorrect – Plausible because all actions to stop release are local per DB-OP-03011 R23 Radioactive Liquid Batch Release. See step 4.9.25.e (page 74), 4.9.32 (page 78), and 4.9.33 (page 79). See OS-0028A sheet 4 R14

B. Incorrect – CWMT Transfer Pump control is local only. See OS-0028A sheet 4 R14. Plausible because this is how the release is normally terminated. See DB-OP-03011 R23 Radioactive Liquid Batch Release step 4.9.33 (page 79).

C. Incorrect – WC1771 control is local only. See OS-0028A sheet 4 R14. Plausible because WC1771 is closed to stop release. See DB-OP-03011 R23 Radioactive Liquid Batch Release steps 4.9.25.e (page 74) and 4.9.32 (page 78).

D. Correct –Trip check of monitor prior to release is performed in this manner. See DB-OP-03011 R23 Radioactive Liquid Batch Release step 4.9.18 (page 71).

Sys #	System	Category	KA Statement
073	Process Radiation Monitoring (PRM) System	A4 Ability to manually operate and/or monitor in the control room:	Effluent release

K/A# A4.01 **K/A Importance** 3.9 **Exam Level** RO

References provided to Candidate None **Technical References:** DB-OP-03011 R23 Radioactive Liquid Batch Release step 4.9.18 (page 71)

Question Source: New

Question Cognitive Level: Low – Memory **10 CFR Part 55 Content:** (CFR: 41.7 / 45.5 to 45.8)

Objective: OPS-SYS-115-06K

52. The plant is operating at 100% power.
    - Component Cooling Water (CCW) Pump 1 is operating.

    Which of the following describes the impact of extended cold weather operation on the Service Water (SW) System and the actions required to mitigate the potential consequences?

    Extended cold weather operation causes SW supply header pressures to __(1)__.
    To mitigate the potential consequences on SW Loop 2, the operators __(2)__.

A. (1) rise
(2) establish flow through the standby Turbine Plant Cooling Water Heat Exchanger

B. (1) rise
(2) establish flow through the standby CCW Heat Exchanger

C. (1) lower
(2) throttle closed on the operating Loop 2 SW Pump discharge valve

D. (1) lower
(2) align Circulating Water to supply SW secondary loads

Answer: A

Explanation/Justification:

A. Correct – Lower SW temperature during cold weather operation causes temperature control valves to throttle closed which raises SW supply header pressures. With CCW Pump 1 operating, SW Loop 2 is the secondary loop. Standby TPCW HX is used for pressure control of secondary loop. See DB-OP-06261 R63 SW System Operating Procedure Section 3.13.

B. Incorrect – With CCW Pump 1 operating, SW Loop 2 is the secondary loop. Standby TPCW HX is used for pressure control of secondary loop. See DB-OP-06261 R63 SW System Operating Procedure section 3.8. Plausible because SW pressure rise is correct.

C. Incorrect – SW supply pressure rises. Plausible because throttling closed on SW pump discharge valve would raise SW pump discharge pressure.

D. Incorrect - SW supply pressure rises. Plausible because Circ Water automatically aligns to supply secondary loads during a low pressure condition.

Sys #	System	Category	KA Statement
076	Service Water System (SWS)	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:	Service water header pressure

K/A# A2.02 **K/A Importance** 2.7 **Exam Level** RO

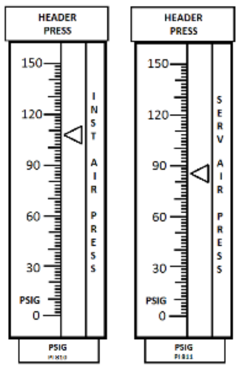
References provided to Candidate None **Technical References:** DB-OP-06261 R63 SW System Operating Procedure step 2.2.9

Question Source: New

Question Cognitive Level: High – Comprehension **10 CFR Part 55 Content:** (CFR: 41.5 / 43.5 / 45/3 / 45/13)

Objective: OPS-SYS-305-03K

53. The plant is operating at 100% power.
Which of the following will result in the stable readings on the gauges below?



A. Instrument Air Dryer Switching Failure

B. Leak on the air header to the Atmospheric Vent Valves

C. Leak on the air header to the Turbine Plant Cooling Water Heat Exchanger temperature control valves

D. Leak on the process air header to the Moisture Separator Reheater Demineralizer skid resin transfer system

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Answer: D

Explanation/Justification:

A. Incorrect – IA and SA pressure would be about equal and lower for this failure. See DB-OP-02528 R19 Attachment 24 (page 124). Plausible for misdiagnosis since both headers have low pressure. See DB-OP-02528 R22 step 2.2.2.

B. Incorrect – IA pressure would still lower. This is an IA leak which is downstream of IA450. See OS-0019A sheet 2 R19 H-20. Plausible for misconception of header supplying valves.

C. Incorrect – IA pressure would still lower. This is an IA leak which is downstream of IA72. See OS-0019A sheet 2 R19 D-22 and DB-OP-02528 R22 Attachment 17 (page 101). Plausible for misconception of header supplying valves.

D. Correct – Leak is on station air header See DB-OP-02528 R22 Instrument Air System Malfunctions step 4.1.6 and Attachment 24 Background Information page 124 2nd paragraph. MSRD skid resin transfer air is on SA header. See OS-0019B sheet 2 R21 D-30.

Sys #	**System**	**Category**	**KA Statement**
078	Instrument Air System (IAS)	A4 Ability to manually operate and/or monitor in the control room:	Pressure gauges

K/A# A4.01 **K/A Importance** 3.1 **Exam Level** RO

References provided to Candidate None **Technical References:** DB-OP-02528 R22 step 4.1.6 and Attachment 24 (page 124); OS-0019B sheet 2 R21

Question Source: Oconee 2010 #53 modified

Question Cognitive Level: High – Comprehension **10 CFR Part 55 Content:** (CFR: 41.7 / 45.5 to 45.8)

Objective: OPS-GOP-128-01K

54. The plant is operating at 100% power.

All Control Room Instrument Air (IA) and Station Air (SA) System pressure indicators lower to 80 psig and stabilize.

Which of the following lists the correct order of automatic actions that occurred?

(1) Station Air Compressor (SAC) 1 started
(2) IA Dryer Bypass Valves IA932 and IA962 opened
(3) Emergency Instrument Air Compressor (EIAC) started

A. 1, 2, 3

B. 1, 3, 2

C. 3, 1, 2

D. 3, 2, 1

Answer: B

Explanation/Justification:

A. Incorrect - See DB-OP-02528 R22 IA Malfunctions page 123. Plausible for misconception that EIAC is last resort action.

B. Correct - See DB-OP-02528 R22 IA Malfunctions page 123.

C. Incorrect – See DB-OP-02528 R22 IA Malfunctions page 123. Plausible for off-normal lineup of EIAC operating in LEAD status.

D. Incorrect - See DB-OP-02528 R22 IA Malfunctions page 123. Plausible for off-normal lineup of EIAC operating in LEAD status and dryers bypassed earlier to support that status.

Sys #	System	Category	KA Statement
078	Instrument Air System (IAS)	A3 Ability to monitor automatic operation of the IAS, including:	Air pressure

K/A# A3.01 **K/A Importance** 3.1 **Exam Level** RO

References provided to Candidate None **Technical References:** DB-OP-02528 R22 IA Malfunctions page 123

Question Source: New

Question Cognitive Level: Low – Memory **10 CFR Part 55 Content:** (CFR: 41.7 / 45.5)

Objective: OPS-SYS-602-08K

55. The plant is operating at 100% power.
- HIS 2022A SFAS CHANNEL 1 ACTUATE switch arcs across its TRIP position contacts and causes a Channel 1 Manual SFAS Actuation.
- The circuit problem that caused the actuation clears a few moments later.

Which of the following describes the effect of the inadvertent Channel 1 Manual SFAS Actuation on Containment and the actions required to mitigate the potential consequences?

A. The Containment Peak Pressure Analysis is challenged by rising Containment air temperature. Reset SFAS and return Containment Air Cooler Fan 1 to FAST speed per DB-OP-06910 Trip Recovery.

B. Containment Equipment Qualification is challenged by Containment Spray Pump 1 operation. Block SFAS and stop Containment Spray Pump 1 per DB-OP-02000 Attachment 9 Miscellaneous Post Accident Actions.

C. The Containment Vessel Negative Pressure Analysis is challenged by isolation of five Containment Vacuum Relief Valves. Reset SFAS and reopen the Containment Vacuum Relief Isolation Valves per DB-OP-06910 Trip Recovery.

D. The Containment Fire Hazards Analysis is challenged by loss of Component Cooling Water (CCW) to all Reactor Coolant Pumps. Block SFAS and reopen the CCW Containment Isolation Valves per DB-OP-02000 Attachment 9 Miscellaneous Post Accident Actions.

Answer: C

Explanation/Justification:

A. Incorrect – Containment temperature rise from shift of one CAC to SLOW is minimal. Heat input to Containment is lowered significantly because the operators trip the reactor and all RCPs in response to the SFAS. Plausible because recovery actions are correct (see DB-OP-06910 steps 6.3.2 and 6.3.3.e).

B. Incorrect – Manual Containment Spray actuation is a separate circuit. See DB-OP-06405 R13 SFAS Operating Procedure step 5.2.2.b (page 65). Plausible because Manual SFAS Actuation actuates all of the Level 4 Containment Isolation functions, but does not start the Spray Pump. See DB-OP-06405 R13 SFAS Operating Procedure step 5.2.2.a (page 65). Stop of a Containment Spray Pump that was inadvertently started could be performed per DB-OP-02000 Attachment 9.

C. Correct – SFAS Manual Actuation Channel initiates SA Levels 1-4 of Containment Isolation, but does NOT start the Containment Spray Pump. See DB-OP-06405 R13 SFAS Operating Procedure step 5.2.2.a (page 65). Channel 1 SA Level 2 isolates 5 of the 10 Containment Vacuum Breakers. See DB-OP-02000 R27 page 418. At least 6 vacuum breakers are required per the Inadvertent Containment Spray analysis. See UFSAR R30 page 6.2-14. Trip Recovery provides guidance for SFAS reset and reopening the Vacuum breaker isolation valves. See DB-OP-06910 R27 steps 6.3.2 (page 47) and 6.3.3.g (page 49). Attachment 9 does NOT provide guidance for reopening the vacuum breaker isolations. See DB-OP-02000 R27 page 322.

D. Incorrect – Major fire hazard in Containment is the RCP lube oil system per FHAR R26 9.1.3.1 (page 9-12). Operators stop all RCPs when CCW and seal injection are both lost per DB-OP-02515 R12 RCP and Motor Operation step 4.4.1, which mitigates the challenge. Plausible because CCW supplies cooling for the RCP oil coolers. CCW valves could be reopened per Attachment 9 step 2.6.

Sys #	**System**	**Category**	**KA Statement**
103	Containment System	A2 Ability to (a) predict the impacts of the following malfunctions or operations on the containment system and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations:	Phase A and B isolation

K/A# A2.03 **K/A Importance** 3.5* **Exam Level** RO

References provided to Candidate None **Technical References:** DB-OP-06405 R13 SFAS Operating Procedure step 5.2.2.a (page 65), DB-OP-02000 R27 page 418, UFSAR R30 page 6.2-14, DB-OP-06910 R27 steps 6.3.2 (page 47) and 6.3.3.g (page 49)

Question Source: New

Question Cognitive Level: High – Comprehension **10 CFR Part 55 Content:** (CFR: 41.5 / 43.5 / 45.3 / 45.13)

Objective: OPS-SYS-108-02K

56. The following plant conditions exist:

The plant is in Mode 3.

Control Rod Drive (CRD) Trip Breakers C and D have been closed locally.

Which condition listed below will prevent the closing of CRD Trip Breakers A and B when the TRIP RESET pushbutton on the Rod Control Panel is depressed?

A. Annunciator 5-1-G, RPS CH 1 TRIP, is lit.

B. The operating CRD Booster Pump flow is 116 gpm.

C. The ELECTRONIC TRIP D light on the Rod Control Panel is lit.

D. The APSR GROUP IN LIMIT light on the Rod Control Panel is off.

Answer: B

Explanation/Justification:

A. Incorrect – 2 channels of RPS tripped would be required to prevent breaker closure. See DB-OP-02005 R18 Window 5-1-G NOTE 2.1. Plausible because CRD Operating Procedure resets all RPS trips prior to breaker closure. See DB-OP-06402 R25 step 3.7.5.

B. Correct – Minimum CRD flow for breaker closure is 146 gpm. See DB-OP-06402 R25 CRD Operating Procedure step 3.7.7.

C. Incorrect – this light is expected to be lit and goes off when the Trip Reset button is pressed. See DB-OP-06402 R25 NOTE 3.7.15.c. and step 3.7.15.e. Plausible for misconception on Source Interruption Device actuated by UV on one Power Supply Train, not two. See DB-OP-06402 R25 NOTE 3.7.16.a. One of the other items that will light the ELECTRONIC TRIP D light is CRD Trip Breaker D open. See DB-OP-06402 R25 page 150.

D. Incorrect – APSR (Group 8) IN LIMIT is not required to close a CRD breaker. Plausible because Group 1-7 IN LIMITS are required. See DB-OP-06402 R25 NOTE 3.7.11-14 and step 3.7.14.

Sys #	**System**	**Category**	**KA Statement**
001	Control Rod Drive	K4 Knowledge of CRDS design feature(s) and/or interlock(s) which provide for the following:	Resetting of CRDM circuit breakers

K/A# K4.11 **K/A Importance** 2.7 **Exam Level** RO

References provided to Candidate None **Technical References:** DB-OP-06402 R25 CRD Operating Procedure step 3.7.7

Question Source: Bank - #167286

Question Cognitive Level: Low - Recall **10 CFR Part 55 Content:** (CFR: 41.7)

Objective: OPS-SYS-501-07K

57. The Data Acquisition and Display System/Safety Parameter Display System (DADS/SPDS) computer is being used to perform a Reactor Coolant System Water Inventory Balance calculation.
    - DADS/SPDS automatic data retrieval is being utilized.
    - NO computer points are out of service.

    Which of the following describes the requirements for using the computer for this calculation?

A. NO parameter values must be manually entered. There are NO restrictions on maintaining steady state plant conditions after the final values are entered.

B. Reactor Coolant Pump Seal Leakage Indicator values must be manually entered. Steady state plant conditions must be maintained for at least 15 minutes after the final values are entered.

C. Reactor Coolant Pump Seal Leakage Indicator values must be manually entered. There are NO restrictions on maintaining steady state plant conditions after the final values are entered.

D. Reactor Coolant Pump Seal Leakage Indicator and Quench Tank parameter values must be manually entered. Steady state plant conditions must be maintained for at least 15 minutes after the final values are entered.

Answer: B

Explanation/Justification:

A. Incorrect – Plausible because this is how an automated data retrieval calculation would work if RCP Seal Leakage totalizers had computer points.

B. Correct – manual entry of RCP Seal Leakage readings required per DB-SP-03357 R19 RCS Water Inventory Balance step 4.1.12.b. 15 minute wait period required per step 4.1.8.

C. Incorrect – Plausible for misconception that final data time = end of calculation.

D. Incorrect – Per step 4.1.12, Quench Tank level is NOT manually entered for computer calculation. Plausible because RCP Seal Leakage Indicator values are recorded on an attachment entitled Attachment 1 RCP Seals Leak Rate and Quench Tank In-Leakage Calculation Sheet. 15 minute wait period is correct.

Sys #	System	Category	KA Statement
002	Reactor Coolant System (RCS)	A4 Ability to manually operate and/or monitor in the control room:	RCS leakage calculation program using the computer

K/A# A4.01 **K/A Importance** 3.5* **Exam Level** RO

References provided to Candidate None **Technical References:** DB-SP-03357 R19 RCS Water Inventory Balance steps 4.1.12.b and 4.1.8.

Question Source: New

Question Cognitive Level: Low – Recall **10 CFR Part 55 Content:** (CFR: 41.7 / 45.5 to 45.8)

Objective: OPS-SYS-525-01S

58. The plant is operating at 100% power.
- Component Cooling Water (CCW) Pump 1 is operating.

A Loss of Offsite Power occurs.

NO operator actions have been taken.

Which of the following additional malfunctions will cause ZERO Makeup Pumps to be operating one minute after the Loss of Offsite Power?

A. Bus C1 locks out.

B. Containment Pressure rises to 18.0 psia.

C. Emergency Diesel Generator 2 does NOT start.

D. Safety Features Actuation System Channel 4 Sequencer does NOT actuate.

Answer: C

Explanation/Justification:

A. Incorrect. Since MU Pump 2 was previously running and is not affected by C1 lockout, it restarts. Plausible because bus lockout trips and locks out its associated MU Pump. See OS-00002 sheet 3 R33 CL-10.
B. Incorrect. Plausible for Containment pressure above 18.4 psia which would cause SFAS Level 3 start of LPI Pump 2 which would trip MU Pump 2 after auto-restart. See OS-00002 sheet 3 R33 CL-10.
C. Correct – MU Pump 2 was running prior to the LOP per normal alignment. Previously running MU Pump load sheds on bus UV, then restarts 2.5 seconds after its associated EDG breaker closes. Since EDG doesn't start, zero MU Pumps will be running. See OS-0002 sheet 4 R24 CL-15.
D. Incorrect. Plausible for misconception that MU Pump starts from Sequencer.

Sys #	System	Category	KA Statement
011	Pressurizer Level Control System	K2 Knowledge of bus power supplies to the following:	Charging pumps

K/A# K2.01 **K/A Importance** 3.1 **Exam Level** RO

References provided to Candidate None **Technical References:** OS-0002 sheet 4 R24 CL-15

Question Source: New

Question Cognitive Level: Low – Memory **10 CFR Part 55 Content:** (CFR: 41.7)

Objective: OPS-SYS-106-14K

59. The plant is at 100% power.

- Power Range Nuclear Instrument (NI) 5 Power indicates 100%
- NI 5 Imbalance indicates -10%.

Which of the following describes the effect of the loss of NI 5 upper detector power supply?

(1) NI 5 Power indicates _____.
(2) NI 5 Imbalance indicates _____.

A. (1) 55%
(2) -55%

B. (1) 55%
(2) +45%

C. (1) 45%
(2) -55%

D. (1) 45%
(2) +45%

Answer: A

Explanation/Justification:

A. Correct – Imbalance = Power upper – Power lower, so prior to the failure, Power upper = 45% and Power lower = 55%. When the upper detector power supply cable becomes disconnected, Power upper = 0, so total power = 55% and imbalance = -55%.
B. Incorrect – Imbalance = -55%. Part 1 is correct. Plausible for inversion of Imbalance relationship (Lower – Upper).
C. Incorrect – Power = 55%. Part 2 is correct. Plausible for inversion of power values.
D. Incorrect – both parts wrong. Plausible for inversion of Imbalance relationship (Lower – Upper).

Sys #	System	Category	KA Statement
015	Nuclear Instrumentation System	K6 Knowledge of the effect of a loss or malfunction on the following will have on the NIS:	Component interconnections

K/A# K6.03 **K/A Importance** 2.6 **Exam Level** RO

References provided to Candidate None **Technical References:** UFSAR R30 pages 7.2-2 and 7.8-2

Question Source: New

Question Cognitive Level: High – Comprehension **10 CFR Part 55 Content:** (CFR: 41.7 / 45.7)

Objective: OPS-SYS-502-03K

60. The plant is at 100% power.

The Reactor Coolant System (RCS) Loop 1 Flow signal shorts to ground in the Non-Nuclear Instrumentation (NNI) cabinet.

Which of the following describes the effect, if any, on plant protection systems?

A. No effect on plant protection systems.

B. One Reactor Protection System (RPS) channel trips.

C. One Steam Feed Rupture Control System (SFRCS) channel trips.

D. One RPS channel and one SFRCS channel trip.

Answer: A

Explanation/Justification:

A. Correct – RPS provides RCS Flow signal to NNI. See DB-OP-06403 R20 RPS and NI Operating Procedure step 4.3.3. RPS isolation amplifier prevents fault from feeding back into protection system, so RPS does not trip on Flux/ΔFlux/Flow. See UFSAR R30 section 7.1.2.3.

B. Incorrect – RPS isolation amplifier prevents fault from feeding back into protection system. See UFSAR R30 section 7.1.2.3. Plausible because RPS provides RCS Flow signal to NNI and channel would trip on Flux/ΔFlux/Flow if isolation amplifier didn't prevent fault from feeding back into RPS cabinet. See DB-OP-06403 R20 step 4.3.3.

C. Incorrect – SFRCS monitors RCP motor current for pump status input, so failure doesn't affect SFRCS. See UFSAR R30 7.4.1.3.10.4 (page 7.4-8). Plausible for misconception that SFRCS monitors flow for RCP status.

D. Incorrect – RPS isolation amplifier prevents fault from feeding back into protection system, so RPS does not trip on Flux/ΔFlux/Flow. SFRCS monitors RCP motor current for pump status input, so failure doesn't affect SFRCS. Plausible because RPS provides RCS Flow signal to NNI and RPS channel would trip on Flux/ΔFlux/Flow if isolation amplifier didn't prevent fault from feeding back into RPS cabinet. Plausible for misconception that SFRCS monitors flow for RCP status.

Sys #	System	Category	KA Statement
016	Non-nuclear Instrumentation	K5 Knowledge of the operational implication of the following concepts as they apply to the NNIS:	Separation of control and protection circuits

K/A# K5.01 **K/A Importance** 2.7* **Exam Level** RO

References provided to Candidate None **Technical References:** UFSAR R30 section 7.1.2.3

Question Source: New

Question Cognitive Level: Low – Memory **10 CFR Part 55 Content:** (CFR: 41.5 / 45.7)

Objective: OPS-SYS-507-12K

61. The plant is operating at 100% power.

The operating Spent Fuel Pool (SFP) Pump 1 trips and can NOT be restarted.

Which ONE of the following describes the preferred order of the listed options for SFP cooling?

(1) Use SFP Pump 2
(2) Use Decay Heat Train 2
(3) Makeup from Demineralized Water

A. 1, 2, 3

B. 1, 3, 2

C. 2, 1, 3

D. 2, 3, 1

Answer: A

Explanation/Justification:

A. Correct – See DB-OP-02547 R4 SFP Cooling Malfunctions step 4.1.12 and DB-OP-06021 R26 SFP Operating Procedure section 3.19

B. Incorrect – Demin water 3rd option per DB-OP-02547 R4 SFP Cooling Malfunctions step 4.1.12 RNO. Plausible because Demin Water makeup is normal source to make up for evaporation.

C. Incorrect – Plausible because DH train has larger cooling capability than SFP train.

D. Incorrect - Plausible because DH train has larger cooling capability than Demin Water makeup.

Sys #	System	Category	KA Statement
033	Spent Fuel Pool Cooling	Generic	Knowledge of abnormal condition procedures

K/A# 2.4.11 **K/A Importance** 4.0 **Exam Level** RO

References provided to Candidate None **Technical References:** DB-OP-02547 R4 SFP Cooling Malfunctions step 4.1.12, DB-OP-06021 page 2

Question Source: New

Question Cognitive Level: Low - Recall **10 CFR Part 55 Content:** (CFR: 41.10 / 43.5 / 45.13)

Objective: OPS-GOP-147-01K

62. The plant is in MODE 3 following a transient.
    - Reactor Coolant System (RCS) Tave is 545 ºF
    - All Reactor Coolant Pumps (RCPs) are operating.

    The operators will perform an RCS cool down to 532 ºF using the Turbine Bypass Valves.

    Which of the following Steam Generator (SG) pressure changes produces an RCS cool down to 532 ºF at the maximum allowable rate?

A. Lower SG pressure by 50 psia over 4 minutes.

B. Lower SG pressure by 50 psia over 8 minutes.

C. Lower SG pressure by 100 psia over 8 minutes.

D. Lower SG pressure by 100 psia over 16 minutes.

Answer: C

Explanation/Justification:

A. Incorrect – 50 psi lowering only cools down to about 538 ºF. Plausible because rate is correct.

B. Incorrect – 50 psi lowering only cools down to about 538 ºF. Plausible because rate would be correct for heatup or natural circulation cooldown. See DB-OP-06903 R47 Plant Cooldown step 6.2 (page 80).

C. Correct – Maximum cooldown rate for forced circulation is 100 ºF/hr or 1.67 ºF/min. See DB-OP-06910 Trip Recovery R27 step 2.2.1.a. SG pressure from 1000 psia to 900 psia equals cooldown from 545 ºF to 532 ºF. 13 ºF ÷ 1.67 ºF/min = 8 min.

D. Incorrect – Cooldown rate is only 50 ºF/hr. Plausible because final temperature is correct and rate would be correct for heatup natural circulation cooldown.

Sys #	System	Category	KA Statement
035	Steam Generator	A1 Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating the S/GS controls including:	S/G pressure

K/A# A1.02 **K/A Importance** 3.5 **Exam Level** RO

References provided to Candidate Steam Tables **Technical References:** DB-OP-06910 Trip Recovery R27 step 2.2.1.a

Question Source: New

Question Cognitive Level: High – Comprehension **10 CFR Part 55 Content:** (CFR: 41.5 / 45.5)

Objective: OPS-SYS-201-08K

63. The plant is at 8% power following a mid-cycle outage.
    - The Rod Control Panel is in AUTO.
    - The Reactor Demand Station is in HAND.

    Main Steam Isolation Valve (MSIV) MS101 10% Closed limit switch spuriously actuates.
    - MS101 remains full open.

    Without operator actions, what effect, if any, will this have on the steady state values of Reactor Power and Reactor Coolant System (RCS) Tave?

A. Reactor Power lowers. RCS Tave rises.

B. No effect on Reactor power. RCS Tave rises.

C. Reactor Power lowers. No effect on RCS Tave.

D. No effect on Reactor Power. No effect on RCS Tave.

<u>Answer: D</u>

Explanation/Justification:

A. Incorrect – Reactor Demand Station in HAND with Rod Control Panel in AUTO maintains Reactor power constant. Tave doesn't change. Plausible for misapplication of AVV steam flow of 5% per valve and the natural reactivity feedback that would make power lower if not for the status of rod control.

B. Incorrect – Tave doesn't change. Part 1 is correct. Plausible for misapplication of AVV steam flow of 5% per valve.

C. Incorrect - Reactor Demand Station in HAND with Rod Control Panel in AUTO maintains Reactor power constant. Part 2 is correct.

D. Correct – Failure of MSIV limit switch logic input to steam dump control causes spurious shift of control from the TBVs to the AVVs. When in HAND, Reactor Demand maintains constant neutron power, so Reactor power is not affected. See DB-OP-06401 R23 ICS Operating Procedure page 94 and M-533-00179 R4. When the MSIV 10% Closed switch actuates, the Turbine Bypass Valves (TBVs) close and the Steam Generator (SG) pressure control signals are transferred to the Atmospheric Vent Valves (AVVs). See DB-OP-06401 R23 page 106. AVVs can pass 10% steam flow so Tave doesn't change. See UFSAR 10.4.4.3 (page 10.4.7).

Sys #	System	Category	KA Statement
041	Steam Dump/Turbine Bypass Control	K3 Knowledge of the effect that a loss or malfunction of the SDS will have on the following:	RCS

K/A# K3.02 **K/A Importance** 3.8 **Exam Level** RO

References provided to Candidate None **Technical References:** DB-OP-06401 Att. 2, step 1, M-533-00179, DB-OP-06401 R23 ICS Operating Procedure page 106, UFSAR 10.4.4.3 (page 10.4.7)

Question Source: Bank – #172527 2008 NRC modified

Question Cognitive Level: High – Comprehension **10 CFR Part 55 Content:** (CFR: 41.7 / 45.6)

Objective: OPS-SYS-201-08K

64. The plant is operating at 100% power.

The Main Turbine trips.

Which of the following describes the response of the Main Generator?

(1) The Main Generator Output Breakers ACB34560 and ACB34561 trip __(1)__.
(2) The Generator Field Breaker __(2)__.

A. (1) after the reverse power relay timer times out
(2) trips when the ACBs trip

B. (1) after the reverse power relay timer times out
(2) stays closed

C. (1) immediately after closure of turbine stop valves
(2) stays closed

D. (1) immediately after closure of turbine stop valves
(2) trips when the ACBs trip

Answer: A

Explanation/Justification:

A. Correct –See DB-OP-02000 R27 step 2.1.5.b and DB-OP-02016 R25 Window 16-6-C. Also System Description SD-005 R4 Main Generator and Auxiliaries pages 2-27 and 2-28.
B. Incorrect – Field breaker opens when ACBs open. Part 1 is correct. Plausible for misinterpretation of DB-OP-02500 Turbine Trip Attachment 2 which implies manual opening of field breaker is required.
C. Incorrect – ACBs open based on timer and field breaker opens at the same time. Part 1 plausible for misdiagnosis as generator trip. Part 2 field breaker staying closed is plausible for misinterpretation of DB-OP-02500 Turbine Trip Attachment 2 which implies manual opening required.
D. Incorrect – ACBs open based on timer. Part 2 is correct. 16-1-C actuated by 81U2 and 81U1 which also actuate generator lockout. See DB-OP-02016 R Window 16-1-C and OS-0055 sheet 2 R38 CD-1. Plausible for misdiagnosis as generator trip.

Sys #	**System**	**Category**	**KA Statement**
045	Main Turbine Generator	A3 Ability to monitor automatic operation of the MT/G system, including:	Generator trip

K/A# A3.11 **K/A Importance** 2.6* **Exam Level** RO

References provided to Candidate None **Technical References:** DB-OP-02000 R27 step 2.1.5.b and DB-OP-02016 R25 Window 16-6-C

Question Source: New

Question Cognitive Level: Low - Recall **10 CFR Part 55 Content:** (CFR: 41/7 / 45.5)

Objective: OPS-SYS-401-02K

65. The plant is operating at 100% power.

A Loss of Offsite Power occurs.

The following annunciators alarm:
- 1-3-D BUS C1 LOCKOUT
- 1-3-H BUS D1 LOCKOUT
- 10-5-G AFP 1 SUCT PRESS LO
- 10-5-H AFP 2 SUCT PRESS LO
- 13-1-B CNDS STRG TK LVL

Condensate Storage Tank 1 Level LI 512 indicates ZERO feet.
Condensate Storage Tank 2 Level LI 516 indicates ZERO feet.

Which of the following describes the ability to supply feedwater to the Steam Generators (SGs) under these conditions that does NOT require the installation of temporary piping or hoses?

A. Startup Feed Pump from the Deaerator Storage Tanks

B. Auxiliary Feedwater Pump 1 from the Diesel Fire Pump

C. Motor Driven Feedwater Pump from the Backup Service Water Pump

D. NO feedwater is available for the SGs

Answer: B

Explanation/Justification:

A. Incorrect – The only available onsite AC power source is the Station Blackout Diesel Generator (SBODG) which powers Bus D2. SUFP is powered from Bus C2 which has no power and can't be aligned to Bus D2 due to the lockouts of C1 and D1 Buses. Plausible because this would be a feedwater source if C2 power could be restored. See DB-OP-02000 R27 Attachment 5 Section C (page 287) and DB-OP-06226 R15 Startup Feed Pump Operating Procedure NOTE 5.1 (page 14).

B. Correct – See DB-OP-02600 R13 Operational Contingency Response Action Plan Attachment 12 AFW Emergency Fire Protection Water to AFW Pump Suction (page 73). Diesel Fire Pump is available to provide suction head for AFW Pump operation.

C. Incorrect – Bus C1 lockout has stopped Service Water Pump 1 which is the emergency backup suction supply for the MDFP. See OS-0012A sheet 1 R26. BUSW Pump can't be used in place of SW Pump 1 because Bus C2 can't be powered form the SBODG due to the C1 and D1 lockouts. Plausible because the MDFP can be powered from the SBODG.

D. Incorrect – Plausible for misconception that Diesel Fire Pump is not available. See OS-0047A sheet 1 R25.

Sys #	System	Category	KA Statement
086	Fire Protection System (FPS)	K1 Knowledge of the physical connections and/or cause-effect relationships between the Fire Protection System and the following systems:	AFW system

K/A# K1.03 **K/A Importance** 3.4* **Exam Level** RO

References provided to Candidate None

Technical References: DB-OP-02600 R13 Operational Contingency Response Action Plan Attachment 12 AFW Emergency Fire Protection Water to AFW Pump Suction (page 73)

Question Source: New

Question Cognitive Level: High – Comprehension

10 CFR Part 55 Content: (CFR: 41.2 to 41.9 / 45.7 to 45.8)

Objective: OPS-SYS-601-02K

66. The plant is in MODE 6 with Fuel Movement in progress.

- Refueling Canal Water Level LI 1627 is stable at 23.5 ft.
- No water additions or drain operations are planned or will be allowed this shift.
- Decay Heat (DH) Loop 1 has been operating continuously for the past 48 hours to provide core cooling.

The Fuel Handling Director requests DH Pump 1 be stopped to aid in Fuel Movement.

In accordance with Technical Specifications, what is the maximum time DH Pump 1 may be stopped, if at all?

A. DH Pump 1 may NOT be stopped.

B. 15 minutes

C. 30 minutes

D. 60 minutes

Answer: D

Explanation/Justification:

A. Incorrect – maximum allowable 1 hour stopped per eight hour period per LCO 3.9.4 NOTE. Plausible because it would be correct without NOTE.
B. Incorrect – Plausible because this is the allowable stopped time for LCO 3.9.5 which would apply for LI 1627 at 22.5 feet.
C. Incorrect – Plausible for multiple of LCO 3.9.5 allowable stop time.
D. Correct – 1 hour stopped per eight hour period allowed per DB-NE-06101 R25 Fuel/Control Component Shuffle step 2.2.2 and LCO 3.9.4.

Sys #	**System**	**Category**	**KA Statement**
N/A	N/A	Generic	Knowledge of the Refueling process

K/A# 2.1.41 **K/A Importance** 2.8 **Exam Level** RO

References provided to Candidate None **Technical References:** LCO 3.9.4

Question Source: Bank - Oconee 2010 #95

Question Cognitive Level: Low – Memory **10 CFR Part 55 Content:** (CFR: 41.2 / 41.10 / 43.6/ 45.13)

Objective: OPS-GOP-439-01K

67. Which of the following describes a function of the Makeup and Purification System?

The Makeup and Purification System is used to control Dissolved Oxygen in the Reactor Coolant System to _____.

A. control pH

B. minimize corrosion

C. control source term

D. minimize Nitrogen 16 production

Answer: B

Explanation/Justification:

A. Incorrect – system is used to vary lithium to control pH. See UFSAR 9.3.4.1.f. Plausible because pH control is a function of the system.

B. Correct – system is used to maintain dissolved Hydrogen in RCS to scavenge dissolved Oxygen to reduce corrosion. See UFSAR 9.3.4.1.f and TRM B 8.4.1.

C. Incorrect – source term is not controlled within a range (like pH). MU & P System is used to vary zinc concentration to reduce source term. Plausible because source term reduction is a function of the system. See UFSAR 9.3.4.1. f

D. Incorrect – N16 reduction is not a function of the system. See UFSAR 9.3.4.1. Plausible for misconception that O16 is removed from the core rather than converted to water when scavenged by the Hydrogen.

Sys #	**System**	**Category**	**KA Statement**
N/A	N/A	Generic	Knowledge of system purpose and/or function

K/A# 2.1.27 **K/A Importance** 3.9 **Exam Level** RO

References provided to Candidate None **Technical References:** UFSAR R30 9.3.4.1.f and TRM B 8.4.1

Question Source: New

Question Cognitive Level: Low - Memory **10 CFR Part 55 Content:** (CFR: 41.7)

Objective: OPS-SYS-106-01K

68. During a plant shutdown, Heater Drain Tank 1 is placed on recirculation per DB-OP-06227 Low Pressure Feedwater Heaters which includes a valve lineup in accordance with Attachment 5 of the procedure (provided).

Which of the following valves remains in its normal full power position when the attachment is completed?

References provided

A. HD 5

B. HD 49

C. HD 27

D. HD 35

Answer: B

Explanation/Justification:

A. Incorrect – Heater Drain Pumps are operating at full power with HD 5 open. Attachment 5 has HD 5 closed. Plausible because HD 5 is closed when Heater Drain Pump 1 is stopped. See DB-OP-06227 step 3.5.4.

B. Correct – See OS-0013 sheet 1 R15. Operations Schematics show 100% Power lineups

C. Incorrect – HD 27 is open at full power. Attachment 5 has HD 27 closed. Plausible for misconception of valve name “drain” vs process line.

D. Incorrect – HD 35 is open at full power. Attachment 5 has HD 27 closed. Plausible because HD 35 is closed during loop seal restoration. See DB-OP-06227 step 4.5.5.

Sys #	System	Category	KA Statement
N/A	N/A	Generic	Ability to determine the expected plant configuration using design and configuration control documentation, such as drawings, line-ups, tag-outs, etc.

K/A# 2.2.15 **K/A Importance** 3.9 **Exam Level** RO

References provided to Candidate DB-OP-06227 Attachment 5 Page 1 of 2 and OS-0013 sheet 1.

Technical References: DB-OP-06227 R14 Attachment 5 Page 1 of 2 and OS-0013 sheet 1 R15.

Question Source: New

Question Cognitive Level: High – Comprehension

10 CFR Part 55 Content: (CFR: 41.10 / 43.3 / 45.13)

Objective: OPS-GOP-505-02K

69. The plant is at 100% power.
    - Emergency Diesel Generator 1 is out of service for a planned 96 hour maintenance outage.

    Which of the following conditions, if not corrected, would result in a required action that must be completed within one hour?

A. Safety Features Actuation System Channel 4 Sequencer is discovered to be INOPERABLE

B. Containment Spray Pump 2 automatic start circuit is discovered to be INOPERABLE

C. Control Room Emergency Vent Fan 2 is discovered to be INOPERABLE

D. Station Emergency Ventilation System Fan 2 is discovered to be INOPERABLE

Answer: A

Explanation/Justification:

A. Correct – 3.8.1 Condition G applies which requires removal of inoperable sequencer module within one hour.

B. Incorrect – LCO 3.8.1 Action B.2 gives 4 hours from redundant feature inoperable to declare supported feature (Spray Pump 1) inoperable. Plausible because both trains of containment spray will become inoperable.

C. Incorrect – LCO 3.8.1 Action B.2 gives 4 hours from redundant feature inoperable to declare supported feature (CREV Fan 1) inoperable. Plausible because inoperability of CRE requires immediate suspension of fuel movement regardless of power supply status; however, CRE operability is not affected by fan status.

D. Incorrect – LCO 3.8.1 Action B.2 gives 4 hours from redundant feature inoperable to declare supported feature (SFP EVS) inoperable. Plausible because both trains of SFP EVS inoperable requires immediate suspension of fuel movement in the SFP.

Sys #	System	Category	KA Statement
N/A	N/A	Generic	Ability to analyze the effect of maintenance activities, such as degraded power sources, on the status of limiting conditions for operations

K/A# 2.2.36 **K/A Importance** 3.1 **Exam Level**

References provided to Candidate None **Technical References:** LCO 3.8.1

Question Source: New

Question Cognitive Level: Low – Recall **10 CFR Part 55 Content:** (41.7 / 41.10 / 43.2 / 45.13)

Objective: OPS-GOP-438-02A

70. The plant is at 5% power during a startup.

13.8 kV Bus A locks out.

Which of the following describes required operator action?

A. Initiate Reactor shutdown due to the delay in plant startup.

B. Adjust Turbine Bypass Valve controls following the AUTOMATIC Reactor trip.

C. Adjust Turbine Bypass Valve controls in response to the lowered Reactor Coolant flow.

D. Initiate Reactor shutdown because less than three Reactor Coolant Pumps are operating.

Answer: D

Explanation/Justification:

- **A.** Incorrect – wrong reason. Plausible because this would be the action and reason for a different delay if the reactor was still subcritical. See DB-OP-06912 R17 Approach to Criticality step 4.23.
- **B.** Incorrect – A Bus lockout trips RCPs 1-2 and 2-1. This leaves one RCP running in each loop, a combination that does not result in an automatic flux to pumps RPS trip. See Tech Spec Table 3.3.1-1. No automatic Flux-Delta Flux Flow trip. Trip setpoint lowers to around 60% power as RCS flow lowers when the RCPs stop. Power Range channels are all at zero, so no trip occurs. Plausible because automatic trip would occur at higher power level or for misconception of RCP/loop/13.8 kV bus relationship. TBVs would close when the 115 psi bias was applied by the reactor trip. DB-OP-06401 R23 ICS Operating Procedure Attachment 9. TBVs would have to be placed in HAND or the header pressure setpoint lowered to maintain Tave constant. See DB-OP-02000 Attachment 2 step 2 RNO.
- **C.** Incorrect – No TBV adjustment is required. Header pressure setpoint does not change and TBVs are controlling SG pressures in auto. RCS ΔT is < 1 ºF at 5% power, so Tavg change due to loss of 25% of RCS flow is negligible. Plausible for TBVs in HAND.
- **D.** Correct – A Bus lockout trips RCPs 1-2 and 2-1. This leaves one RCP running in each loop, a combination that does not result in an automatic RPS trip. See Tech Spec Table 3.3.1-1. Operating License 2.C(3)(a) states FENOC shall not operate the reactor in MODES 1 and 2 with < 3 RCPs in operation. Inserting rods places the unit in MODE 3 where the license condition does not apply.

Sys #	System	Category	KA Statement
N/A	N/A	Generic	Knowledge of conditions and limitations in the facility license

K/A# 2.2.38 **K/A Importance** 3.6 **Exam Level** RO

References provided to Candidate None **Technical References:** Operating License 2.C(3)(a)

Question Source: New

Question Cognitive Level: High – Comprehension **10 CFR Part 55 Content:** (CFR: 41.7 / 41.10 / 43.1 / 45.13)

Objective: OPS-GOP-115-06K

71. Today is February 2. An operator has accumulated 200 mRem Total Effective Dose Equivalent (TEDE) radiation exposure so far this year, all of it at Davis-Besse.

Assuming the operator is permitted to continue work until BOTH limits are reached, which of the following describes the cumulative time the operator could perform normal work in a 50 mRem/hr radiation field before the:
(1) Site Administrative Control Limit dose is reached?
(2) 10CFR20 dose limit is reached?

A. (1) 1 hour
(2) 21 hours

B. (1) 16 hours
(2) 21 hours

C. (1) 16 hours
(2) 96 hours

D. (1) 96 hours
(2) 96 hours

Answer: C

Explanation/Justification:

A. Incorrect. Plausible for quarterly limitations on Site ACL and on 10CFR20 annual limit values (like in the old days).
B. Incorrect – Plausible for quarterly limitation on 10CFR20 annual limit value (like in the old days). 16 hours is correct for Site ACL.
C. Correct – Site ACL is 1000 mRem/yr. 800 Mrem remaining ÷ 50 mRem/hr = 16 hours. See NOP-OP-4201 R2 Routine External Exposure Monitoring NOTE 6.5.1 (page14). 10CFR20 dose limit is 5.0 Rem/yr. 4800 MRem remaining ÷ 50 mRem/hr = 96 hours. See 10CFR20
D. Incorrect – Plausible for Site ACL = 10CFR20 limit. 96 hours is correct 10CFR20 limit.

Sys #	System	Category	KA Statement
N/A	N/A	Generic	Knowledge of radiation exposure limits under normal or emergency conditions

K/A# 2.3.4 **K/A Importance** 3.2 **Exam Level** RO

References provided to Candidate None **Technical References:** NOP-OP-4201 R2 Routine External Exposure Monitoring NOTE 6.5.1 (page14); 10CFR20

Question Source: New

Question Cognitive Level: High – Comprehension **10 CFR Part 55 Content:** (CFR: 41.12 / 43.4 / 45.10)

Objective: OPS-GOP-511-02K

72. Which of the following are actions an operator is REQUIRED to PERFORM prior to EACH USE of a portable radiation survey instrument per DBBP-RP-1007 Meter Source and Response Testing?

(1) Perform an instrument _____.
(2) Make an entry in the _____.

A. (1) Calibration
(2) Use/Response Log

B. (1) Calibration
(2) Daily Source Check Log

C. (1) Response Check
(2) Use/Response Log

D. (1) Response Check
(2) Daily Source Check Log

Answer: C

Explanation/Justification:

A. Incorrect – Calibration not performed by operator, just checked current per sticker. See DBBP-RP-1007 R32 Meter Source and Response Testing step 3.2.1.1. Part 2 is correct. Plausible because instrument calibration must be current.

B. Incorrect – Calibration not performed by operator, just checked current per sticker. Plausible because daily source check log entry is required for daily source check.

C. Correct – Response check required per DBBP-RP-1007 R32 Meter Source and Response Testing step 3.2.2.1. Use/Response Log entry required per step 3.2.2.1.H

D. Incorrect – Source Check Log entry not made because operator does not perform source check. Part 1 is correct.

Sys #	System	Category	KA Statement
N/A	N/A	Generic	Ability to use radiation monitoring systems, such as fixed radiation monitors and alarms, portable survey instruments, personnel monitoring equipment, etc.

K/A# 2.3.5 **K/A Importance** 2.9 **Exam Level** RO

References provided to Candidate None **Technical References:** DBBP-RP-1007 R32 Meter Source and Response Testing steps 3.2.2. and 3.2.2.1.H

Question Source: New

Question Cognitive Level: Low – Memory **10 CFR Part 55 Content:** (CFR: 41.11 / 41.12 / 43.4 / 45.9)

Objective: OPS-GOP-511-02K

73. The plant is at 75% power.

An operator will be making a Containment entry to manually throttle RC2 Pressurizer Spray valve per the governing abnormal procedure.

Which of the following describes requirements for this entry per DB-OP-01101 Containment Entry?
Continuous Radiation Protection coverage __(1)__ required.
The Containment Elevator __(2)__ be used during this entry.

A. (1) is
(2) should NOT

B. (1) is
(2) should

C. (1) is NOT
(2) should NOT

D. (1) is NOT
(2) should

Answer: A

Explanation/Justification:

A. Correct – See NOP-OP-4104 R6 Job Coverage step 4.4.1 and DB-OP-01101 R13 Containment Entry CAUTION 5.2.9. Containment elevator travel path (shaft) includes high neutron dose rate areas. See step 6.3.4.a of DB-OP-01101

B. Incorrect – Containment Elevator NOT used for personnel use during power entries. See DB-OP-01101 R13 Containment Entry CAUTION 5.2.9. Part 1 is correct. Plausible because elevator is operational for Containment entries during shutdown.

C. Incorrect – Continuous RP coverage is required. See DB-OP-01101 R13 Containment Entry step 6.1.2. Part 2 is correct. Plausible because continuous RP coverage is not required for Containment entries during shutdown.

D. Incorrect – Containment Elevator NOT used for personnel use during power entries. See DB-OP-01101 R13 Containment Entry CAUTION 5.2.9. Continuous RP coverage is required. See DB-OP-01101 R13 Containment Entry step 6.1.2. Plausible because elevator is operational and continuous RP coverage is not required for Containment entries during shutdown.

Sys #	System	Category	KA Statement
N/A	N/A	Generic	Knowledge of radiological safety principles pertaining to licensed operator duties, such as containment entry requirements, fuel handling responsibilities, access to locked high-radiation areas, aligning filters, etc.

K/A# 2.3.12 **K/A Importance** 3.2 **Exam Level** RO

References provided to Candidate None **Technical References:** NOP-OP-4104 R6 Job Coverage step 4.4.1 and DB-OP-01101 R13 Containment Entry CAUTION 5.2.9.

Question Source: New

Question Cognitive Level: Low – Recall **10 CFR Part 55 Content:** (CFR: 41.12 / 45.9 / 45.10)

Objective: OPS-GOP-511-03K

74. The plant is at 100% power.

Which of the following REQUIRES FES Unit System Dispatch notification per NOBP-OP-1015 Event Notifications?

A. Transferring 13.8 KV Bus A to Startup Transformer 01

B. Idle Starting Emergency Diesel Generator 1

C. Transferring Main Generator Voltage Regulator from AUTOMATIC to MANUAL

D. Adjusting Main Generator output by 10 MEGAVARS OUT to maintain the Voltage Schedule

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Answer: C

Explanation/Justification:

A. Incorrect – no notification requirement. See DB-OP-06314 R13 13.8 KV Buses Switching Procedure section 3.8 and NOBP-OP-1015 R3 Event Notifications Attachment 66 (page 221). Plausible because transfer is to offsite power source.

B. Incorrect – no notification requirement. See DB-OP-06316 R57 Diesel Generator Operating Procedure section 4.30 and NOBP-OP-1015 R3 Event Notifications Attachment 66 (page 221). Plausible because it would add generation to the grid if it were loaded.

C. Correct – See DB-OP-06301 R27 Generator and Exciter Operating Procedure step 3.4.1 and NOBP-OP-1015 R3 Event Notifications Attachment 66 (page 221).

D. Incorrect – no notification requirement for small MVAR changes. See DB-OP-06301 R27 Generator and Exciter Operating Procedure section 3.5. Threshold for MVAR reporting is >100 per NOBP-OP-1015 R3 Event Notifications Attachment 66 (page 221). Plausible because it does affect the grid conditions.

Sys #	System	Category	KA Statement
N/A	N/A	Generic	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

K/A# 2.4.30 **K/A Importance** 2.7 **Exam Level** RO

References provided to Candidate None **Technical References:** NOBP-OP-1015 R3 Event Notifications Attachment 66 (page 221)

Question Source: New

Question Cognitive Level: Low – Memory **10 CFR Part 55 Content:** (CFR: 41.10 / 43.5 / 45.11)

Objective: OPS-GOP-510-02K

75. The plant was operating at 100% power.

A non-fire incident required evacuation of the Control Room.

- The required Immediate Actions of the governing procedure were performed.
- NO Supplemental Actions were performed prior to Control Room Evacuation.

Under these conditions, the Balance of Plant Reactor Operator is responsible for ensuring completion of which of the following actions?

A. Tripping the Main Turbine to stop an Overcooling event

B. Opening Reactor Trip Breakers to shut down the Reactor

C. Tripping both Main Feed Pumps to initiate the Steam Feed Rupture Control System

D. Isolating Instrument Air to the Atmospheric Vent Valves to allow manual operation

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Answer: D

Explanation/Justification:

A. Incorrect – Overcooling event is not in progress because SFRCS Isolation Trip was manually actuated in Immediate Action 3.2. SFRCS Isolation Trip closes the MSIVs MS101 and MS100 which prevents an Overcooling event due to Main Turbine failure to trip. See DB-OP-02508 R16 Control Room Evacuation step 3.2 and DB-OP-02000 R27 Table 1. Immediate Actions were performed per the stem. Plausible because BOP RO trips turbine per step 2 of Attachment 4 since Supplementary Actions were not completed prior to evacuation.

B. Incorrect – Reactor is shut down in Immediate Action 3.1. Plausible because the BOP RO opens CRD breakers if the Immediate Actions were NOT performed. See DB-OP-02508 R16 Control Room Evacuation Attachment 4 step 1.1.

C. Incorrect – SFRCS initiation is an Immediate Action. See DB-OP-02508 R16 Control Room Evacuation step 3.2. Plausible because BOP RO would trip both feedpumps if Immediate Actions had NOT been performed.

D. Correct – See DB-OP-02508 R16 Control Room Evacuation Attachment 4 step 3.0.

Sys #	System	Category	KA Statement
N/A	N/A	Generic	Knowledge of RO tasks performed outside the main control room during an emergency and the resultant operational effects

K/A# 2.4.34 **K/A Importance** 4.2 **Exam Level** RO

References provided to Candidate None **Technical References:** DB-OP-02508 R16 Control Room Evacuation Attachment 4 step 3.0.

Question Source: New

Question Cognitive Level: High – Comprehension **10 CFR Part 55 Content:** (CFR: 41.10 / 43.5 / 45.13)

Objective: OPS-GOP-108-03K

76. The plant is operating at 100% power.
    - Makeup Pump 2 is operating.

    The following annunciators are received:
    - (2-2-C) MU TK LVL LO
    - (4-2-E) PZR LVL LO

    The following conditions are noted:
    - MU Pump 2 Discharge Pressure PI MU25B is 1700 psig.
    - Total Seal Injection flow FI MU19 is 30 gpm and lowering.
    - Seal Injection Flow Control Valve MU19 demand is 80% and rising.
    - Makeup Flow Control Valve MU32 demand is 100%.
    - CTMT Normal Sump level is constant.
    - ECCS ROOM 2 SUMP PUMP RUNNING lights IL4621A and IL4621B are lit.

    Based on these indications, which DB-OP-02522, Small RCS Leaks attachment and action requires implementation NEXT to mitigate this event?

A. Perform Attachment 6, Isolation of Leaks in the Makeup System.

B. Perform Attachment 11, Use of the Makeup Alternate Injection Line.

C. Perform Attachment 5, Isolation of Leaks in the Letdown System.

D. Perform Attachment 8, Isolation of Leaks in the Seal Injection Header.

Answer: A

Explanation/Justification: Meets the requirements of the SRO only white paper Section II .E page 7 first bullet. SRO is required to assess plant conditions and select the appropriate attachment to address mitigating the leak. The SRO must be familiar with the procedure actions and implementation priority to select the attachment to perform and have an understanding of the actions contained in the procedure.

A. Correct – Per DB-OP-02522, Small RCS Leaks, Attachment 4, the key indication is the lower than normal Makeup Pump Discharge Pressure which is less than 2200 psig which directs performance of Attachment 6.

B. Incorrect – Leak is in the Makeup System which is mitigated using Attachment 6. Attachment 6 is performed before Attachment 11. Attachment 11 is not directed to be performed until step 7 of Attachment 6. Plausible since isolation of MU32 may stop the leak and placing the alternate injection line in service may provide makeup but the first action is to stop the leak by stopping makeup flow

C. Incorrect – Leak is in the Makeup System which is mitigated using Attachment 6. Plausible because a letdown leak would cause 2-2-C alarm.

D. Incorrect – Leak is in the Makeup System which is mitigated using Attachment 6. Leak in seal injection header would be indicated by closure of MU19, not opening. Plausible since a leak in the Seal injection system would cause abnormal flow and demand indications.

Sys #	**System**	**Category**	**KA Statement**
000022	Loss of Reactor Coolant Makeup	AA2 Ability to determine and interpret the following as they apply to the Loss of Reactor Coolant Makeup:	Whether charging line leak exists

K/A# AA2.01 **K/A Importance** 3.8 **Exam Level** SRO

References provided to Candidate None **Technical References:** DB-OP-02522 R13 Small RCS Leaks Attachments 4 and 6; OS-0002 sheet 3 R33.

Question Source: New

Question Cognitive Level: High **10 CFR Part 55 Content:** (CFR 43.5/ 45.13)

Objective:

77. The Plant is in Mode 6 with a Refueling Outage is in progress. RCS Level is at 80 inches, following Reactor Head Removal. Decay Heat Removal Train 2 is in service. Both SG primary side manways are removed to vent the reactor coolant system.

The following events occur:
- All Offsite Power is Lost
- EDG 1 does not start and cannot be manually started.
- EDG 2 starts.
- The SBODG cannot be started.

The following annunciator alarm is received:
- (1-3-H) BUS D1 LOCKOUT

Which of the following DB-OP-02527, Loss of Decay Heat Removal Action and Attachment must be performed to mitigate this event?

A. Start #1 DHR Pump to provide core cooling per Attachment 1, Starting Decay Heat Pump 1.

B. Restart #2 DHR Pump to provide core cooling per Attachment 2, Starting Decay Heat Pump 2.

C. Start either train of Auxiliary Feedwater and establish Steam Generator Heat Transfer per Attachment 3, Establish Steam Generator Heat Transfer.

D. Align the BWST to provide injection flow to the RCS to establish Feed and Bleed cooling per Attachment 10: Using Gravity Drain of the BWST to the RCS.

Answer: D

Explanation/Justification: Meets the requirements of the SRO only white paper Section II .E page 7 first bullet. SRO is required to have knowledge of the content of the procedure Attachments and be able to diagnose the plant configuration based upon the equipment status stated in the stem. The SRO must analyze the status of the electrical power supplies select the available strategy to mitigate the loss of RHR.

A. Incorrect – Plausible because at reduce inventory, DHR Pump 1 is maintained in standby to provide core cooling. In this scenario, C1 bus will not be energized and placing #1 DHR Pump in service is not possible based on no power available.

B. Incorrect – Plausible because on a loss of off-site power, #2 EDG Auto starts to restore power to D1. As a result, the operator only has to restart DHR Train 2 to provide Core Cooling. In this scenario, D1 is locked out and cannot be repowered.

C. Incorrect – Plausible because with different operating conditions, establishing SG heat transfer is the preferred heat removal mode during loss of Decay Heat Removal.. In this condition with the SG Manways removed, SG Heat Transfer is not possible.

D. Correct – Given the Plant Conditions, no electrical power will be available to provide inventory to the Reactor Coolant System. Feed and Bleed will be established using gravity drain of the BWST and venting the steam from the RCS with the SG Manways.

Sys #	System	Category	KA Statement
000025	Loss of RHR System	Generic	Knowledge of low power/shutdown implications in accident (e.g., loss of coolant accident or loss of residual heat removal) mitigation strategies

K/A# 2.4.9 **K/A Importance** 4.2 **Exam Level** SRO

References provided to Candidate None **Technical References:** DB-OP-02527 R19 Loss of Decay Heat Removal step 4.1.7 RNO and Attachment 3 step 3.

Question Source: New

Question Cognitive Level: High **10 CFR Part 55 Content:** (CFR: 41.10 / 43.5 / 45.13)

Objective:

78. QUESTION DELETED
~~The plant is operating at 100 percent power.~~

~~The following conditions are noted:~~
- ~~PRSRC2B Reactor Coolant (RC) Pressure Loop 1 is 2090 psig and slowly lowering.~~
- ~~PRSRC2A2 RC Pressure Loop 2 is 2090 psig and slowly lowering.~~
- ~~All Pressurizer Heater Banks are ON.~~
- ~~FI MU34 Makeup (MU) Flow Train 2 indicates 25 gpm.~~

~~Which of the following describes:~~
~~(1) the correct section of DB-OP-02513 Pressurizer System Abnormal Operation to implement? and~~
~~(2) the action to implement if the initial mitigation actions are NOT successful?~~

~~A.~~ ~~(1) Pressurizer Spray Valve RC 2 Failed Open~~
~~(2) Evaluate for continued operation per NOP-OP-1010 Operational Decision Making~~

~~B.~~ ~~(1) Pressurizer Spray Valve RC 2 Failed Open~~
~~(2) Initiate shutdown per DB-OP-02504 Rapid Shutdown~~

~~C.~~ ~~(1) Pressurizer Vapor Space Leak~~
~~(2) Evaluate for continued operation per NOP-OP-1010 Operational Decision Making~~

~~D.~~ ~~(1) Pressurizer Vapor Space Leak~~
~~(2) Initiate shutdown per DB-OP-02504 Rapid Shutdown~~

Answer: B

Explanation/Justification: Meets the requirements of the SRO only white paper Section II .E page 7 second bullet. SRO is required to have knowledge of the content of the procedure action and mitigation strategies. Requires selection of appropriate abnormal procedure and knowledge of decision point in the body of the procedure. The SRO must diagnose the plant response to the failed equipment and select the correct procedural actions. The SRO is required to understand the actions of the procedure and alternate actions if they are not successful. The plant power will have to be reduced to secure the RCP with the affected valve.

A. Incorrect – Decision point at step 4.2.1.b requires power reduction and RCP stop. Part 1 is correct. NOP-OP-1010 plausible for evaluation of continued operation with the spray block valve closed if RCS pressure was stable, but power reduction for RCP stop required because RCS pressure is still lowering.

B. Correct – 25 gpm is normal MU flow value. The spray valve failure does not affect MU flow. See DB-OP-02513 R11 PZR System Abnormal Operation step 2.2.3. Decision point at step 4.2.1 requires power reduction and RCP stop – all PZR heaters are already ON with RCS pressure lowering per the stem and isolation attempts have failed.

C. Incorrect – PZR level rises per DB-OP-02513 step 2.7.1, so MU flow would lower to 12 gpm which is MU32 bypass value when MU32 is closed (minimum 10 gpm per DB-OP-06006 R35 step 2.2.40). Plausible because RCS pressure lowering and all heaters ON are consistent with vapor space leak. NOP-OP-1010 plausible for continued operation with leak to containment per step 4.7.5.

D. Incorrect – PZR level rises per DB-OP-02513 step 2.7.1, so MU flow would lower to 12 gpm MU32 bypass value when MU32 closed. Plausible because RCS pressure lowering and all heaters ON are consistent with vapor space leak. Part 2 correct since RCS pressure is slowly lowering in the stem, rapid shutdown per step 4.7.1.

Sys #	System	Category	KA Statement
000027	Pressurizer Pressure Control System (PZR PCS) Malfunction	AA2 Ability to determine and interpret the following as they apply to the Pressurizer Pressure Control Malfunctions:	Makeup flow indication

K/A# AA2.07 **K/A Importance** 3.1 **Exam Level** SRO

References provided to Candidate None **Technical References:** DB-OP-02513 R11 PZR System Abnormal Operation steps 2.2.3, 2.7.1, and 4.2.1 RNO

Question Source: New

Question Cognitive Level: High **10 CFR Part 55 Content:** (CFR: 43.5 / 45.13)

Objective:

79. The plant is operating at 100% power.

The breaker for MS107 Steam Generator 2 to Auxiliary Feed Pump Turbine 2 trips open and cannot be reset.

Which of the following describes the required action?

The __(1)__ Limiting Condition for Operation must be restored within __(2)__.

A. (1) Steam and Feed Rupture Control System Actuation Logic
(2) 72 hours

B. (1) Emergency Feedwater System
(2) 7 days

C. (1) Steam and Feed Rupture Control System Actuation Logic
(2) 7 days

D. (1) Emergency Feedwater System
(2) 72 hours

Answer: B

Explanation/Justification: Meets the requirements of the SRO only white paper Section II .B page 7 first and third bullet. SRO is required to have knowledge of Required Actions and Surveillance Requirements for Tech Specs. The SRO must determine which TS condition is required to be entered and understand the function of SFRCS system.

A. Incorrect – SFRCS Actuation Logic LCO 3.3.13 does not apply because the actuation channel terminates at the output relays. See B 3.3.13. Plausible because Main Steam Valve Control function is degraded. 72 hours is correct time for 3.3.13 Condition A.

B. Correct – EFW LCO 3.7.5 Condition A applies because each AFW Pump requires operable redundant steam supplies from each SG. See B 3.7.5. Completion time is 7 days.

C. Incorrect – SFRCS Actuation Logic LCO 3.3.13 does not apply because the actuation channel terminates at the output relays. See B 3.3.13. 7 days is correct Completion Time for the correct LCO.

D. Incorrect – EFW LCO 3.7.5 Condition A Completion Time is 7 days. EFW is the correct LCO. Plausible because 72 hours is the Completion Time for an AFW Train inoperable for a different reason.

Sys #	System	Category	KA Statement
000040	Steam Line Rupture	Generic	Knowledge of system purpose and/or function

K/A# 2.1.27 **K/A Importance** 4.0 **Exam Level** SRO

References provided to Candidate None **Technical References:** LCO 3.7.5, Bases 3.7.5

Question Source: New

Question Cognitive Level: High – Comprehension **10 CFR Part 55 Content:** (CFR: 41.7)

Objective:

80. The plant is operating in Mode 1 at 100% power.

- Engineering has completed review of the recently completed Battery 1P Performance Discharge Test, conducted per SR 3.8.6.6
- The analysis shows that Battery 1P is able to produce a maximum capacity of 78% of the battery nameplate rating

Which of the following describes the OPERABILITY impact, if any, on the Electrical Power Systems (Technical Specification 3.8)

A. No Electrical Power System components are INOPERABLE

B. ONLY Battery 1P is INOPERABLE

C. ONLY Battery 1P AND DC Train 1 are INOPERABLE

D. Battery 1P AND DC Train 1 AND Inverter YV1 are INOPERABLE

Answer: D

Explanation/Justification: Meets the requirements of the SRO only white paper Section II .B page 3 third bullet. SRO is required to know the battery nameplate rating from the TS bases and that both TS for the Battery and DC sources are applicable based upon information from the TS bases.

A. Incorrect – Plausible if the candidate does not recognize that 78% is less than the minimum percent of nameplate capacity. This minimum name plate capacity is provided in the Bases for TS 3.8.4.

B. Incorrect – Plausible because TS 3.8.6 SR 3.8.6.6 failure results in Battery Inoperable if capacity test is less than 80% but the battery is also required for the DC Train and the Inverter per Tech Spec bases 3.8.4 and 3.8.7

C. Incorrect – Plausible because TS 3.8.6 SR 3.8.6.6 failure results in Battery Inoperable if capacity test is less than 80% and the Battery is required for Operability per TS Bases 3.8.4 but the battery is also required for the Inverter per Tech Spec bases 3.8.7

D. Correct – Failing SR 3.8.6 requires entering TS 3.8.6 and declaring the Battery Inoperable. TS 3.8.4 Bases specifies "An OPERABLE DC electrical power source requires two batteries and one charger per battery to be operating and connected to the associated DC bus. TS Bases 3.8.7 specifies an Operable Inverter requires power input from a 125 VDC station Inverter and Battery 1P supplies Inverter YV1

Sys #	**System**	**Category**	**KA Statement**
000058	Loss of DC Power	Generic	Ability to apply Technical Specifications for a system

K/A# 2.2.40 **K/A Importance** 4.7 **Exam Level** SRO

References provided to Candidate None **Technical References:** Bases TS 3.8.4 and 3.8.6

Question Source: New

Question Cognitive Level: High **10 CFR Part 55 Content:** (CFR: 41.10 / 43.2 / 43.5 / 45.3)

Objective:

81. While operating at 100% power, a reactor trip occurs due to a loss of all Main Feedwater. The post trip review performed in accordance with DB-OP-06910, Trip Recovery determined the peak RCS Pressure reached during the event was 2775 psig.

The plant is currently in Mode 3, at Normal operating temperature and pressure. The Motor Driven Feedwater Pump is in service in the Main Feedwater Mode.

Which of the following requirements, if any, must be met prior to restarting the reactor?

References provided

A. No action is required. The RCS did not exceed the hydrostatic test pressure of 125% of design pressure.

B. Replace the Pressurizer Code Safety Valves in accordance with DB-MM-09001, Pressurizer Code Relief Valve Maintenance.

C. Request a fracture mechanics evaluation of the reactor vessel material AND evaluate compliance with TS 3.4.3, RCS Pressure and Temperature (P/T) Limits

D. The Corrective Action Review Board (CARB) must review the DB-OP-06910, Trip Recovery, Attachment 6, Post Trip Review prior to restart.

Answer: C

Explanation/Justification: Meets the requirements of the SRO only white paper Section II B page 3 first bullet. SRO is required to know the design pressure and administrative limitations of the RCS and actions required if the limits are exceeded. The administrative requirements are SRO only knowledge.

A. Incorrect – Plausible - while the RCS did not exceed the hydrostatic test pressure (design time 1.25 = 3125 psig), this does not preclude performing the DB-OP-06910, Trip Recovery required actions for exceeding a safety limit of 2750 psig.

B. Incorrect – Plausible because the Safety valves must be removed and inspected but not replaced however the first part is incorrect

C. Correct per Step 4.3 of Attachment 6 of DB-OP-06910, Trip Recovery.

D. Incorrect – Plausible because this event would lead to a Root Cause investigation and investigation at that level are reviewed by the CARB, but this review is not a specific requirement for restart following exceeding a Safety Limit and because a review is required by the Plant Operations Review Committee (PORC)

Sys #	System	Category	KA Statement
BW/E10	Post-Trip Stabilization	EA2 Ability to determine and interpret the following as they apply to the (Post-Trip Stabilization):	Adherence to appropriate procedures and operation within the limitations in the facility's license and amendments

K/A# EA2.2 **K/A Importance** 4.0 **Exam Level** SRO

References provided to Candidate DB-OP-06910, Trip Recovery Attachment 6 **Technical References:** DB-OP-06910, Trip Recovery Attachment 6, DB-PF-06703 CC1.3 (pages 13-14)

Question Source: New

Question Cognitive Level: Low **10 CFR Part 55 Content:** (CFR: 43.5, 45.13)

Objective:

82. The Miscellaneous Waste Monitor Tank (MWMT) has been aligned to transfer the contents of the MWMT to the Miscellaneous Waste Drain Tank (MWDT) for further processing to reduce radioactivity levels in accordance with DB-OP-06111, Miscellaneous Waste Liquid Waste System Section 4.5, Transferring the Contents of the MWMT to the MWDT.

Once the transfer is started, the following conditions are noted:

- Annunciator 9-1-G FIRE OR RADIATION TROUBLE alarms
- Miscellaneous Radwaste System Outlet RI 1878A1 and B1 High Alarm lights are lit
- Station Effluent Indicator RI 8433 indications have not changed
- Radiation Control Monitor (RCM) RE 8433 Low Flow light is lit.
- Computer alarm Z670 MISC WST SYS OUT VLVS NC

Based on these indications, which of the following actions, if any, are required?

A. Continue the transfer. These indications are consistent with the proper transfer of high activity liquid from the MWMT to the MWDT.

B. Continue the transfer. Refer to RA-EP-02861, Radiological Incidents to have Radiation Protection take additional surveys as required for radiation monitors in alarm.

C. Stop the transfer per DB-OP-03011 Radioactive Liquid Batch Release Attachment 22 Response to a RE Warn or High Alarm. An accidental release was NOT in progress.

D. Stop the transfer and restore the valve lineup per DB-OP-06111 Section 4.5. An accidental release was in progress.

Answer: D

Explanation/Justification: Meets the requirements of the SRO only white paper Section II .D page 6 second bullet. The SRO must diagnose the event in progress based upon indications, then select the appropriate procedure to mitigate the event. They must determine that an accidental release was in progress based upon indications provided.

A. Incorrect – Plausible because Radiation Element RE1778A and B are in the recirc flowpath for the MWMT Pump used for this evolution, but not in the flowpath for transferring MWMT contents to the MWDT.

B. Incorrect – Plausible because Radiation Element RE1778A and B are in the recirc flowpath for the MWMT Pump used for this evolution, but not in the flowpath for transferring MWMT contents to the MWDT. RA-EP-02861, is used to respond to high radiation levels.

C. Incorrect – Attachment 22 of DB-OP-03011 only adjusts RE setpoints or release flow rate in response to an alarm. It does not stop the MWMT Pump or reposition any valves. Plausible because RE1778A&B are not in the transfer flowpath so transfer must be stopped and Attachment 22 title looks like it would do that. No release plausible for candidate missing the low sample flow condition on RE8443.

D. Correct – The flowpath for the transfer does not use RE1878A/B, so valves are misaligned and the transfer must be stopped. DB-OP-06111 Section 4.5 stops the MWMT Pump and closes the MWMT outlet valve WM1855 which stops the release. The computer alarm indicates a flowpath to the collection box exists. The misleading stable indication on RE 8433 is due to loss of sample flow.

Sys #	System	Category	KA Statement
000059	Accidental Liquid Radwaste Release	AA2 Ability to determine and interpret the following as they apply to the Accidental Liquid Radwaste Release:	Failure modes, their symptoms, and the causes of misleading indications on a radioactive-liquid monitor

K/A# AA2.03 **K/A Importance** 3.6 **Exam Level** SRO

References provided to Candidate **Technical References:** DB-OP-06111, OS -29

Question Source: New

Question Cognitive Level: High **10 CFR Part 55 Content:** (CFR: 43.5 / 45.13)

Objective:

83. The plant was operating at 100 percent power with Component Cooling Water (CCW) Pump 1 in operation when a Loss of Offsite Power occurs.

Both Emergency Diesel Generators (EDGs) are supplying their respective emergency buses.

The following annunciators are subsequently received:

- 1-4-H BUS D1 VOLTAGE
- 9-1-F INST AIR HDR PRESS LO
- 11-1-B CCW HX 1 OUTLET TEMP HI

Which of the following requires implementation to correct the highest priority condition?

A. DB-OP-02528 Instrument Air System Malfunctions

B. DB-OP-02523 Component Cooling Water System Malfunctions

C. DB-OP-02000 Attachment 6 Reenergization of Buses D2, F7, and MCC F71

D. DB-OP-02000 Attachment 28 Restore Power to C1 or D1 Bus from the SBODG

Answer: C

Explanation/Justification: Meets the requirements of the SRO only white paper Section II .E page 7 first bullet. SRO is required to have knowledge of the content of the alarm response procedures. The SRO must diagnose the plant response to the failed equipment and select the correct procedural actions. Specific knowledge of the annunciator input is required to differentiate the procedure selection and priority.

A. Incorrect – DB-OP-02000 is a higher priority. Plausible because 9-1-F is in alarm.

B. Incorrect – DB-OP-02000 is a higher priority. Plausible because 11-1-B is in alarm and EDG cooling is addressed by DB-OP-02000 Specific Rule 6.

C. Correct – DB-OP-02000 Attachment 6 addresses restoration of instrument air pressure, which is the highest priority. DB-OP-02000 Specific Rule 4.2 references Attachment 3. Attachment 3 step C.1 directs the performance of Attachment 6 if Instrument Air is not available.

D. Incorrect – Attachment 28 is directed to be performed if both C1 and D1 remain de-energized. See Specific Rule 6.2. Attachment 28 is written for both EDG breakers open, so it will not correct the problem with EDG 1 since both buses are already energized by the EDGs. Plausible because 1-4-H is in alarm and for misconception of proper Attachment 28 application.

Sys #	System	Category	KA Statement
BW/A05	Emergency Diesel Actuation	Generic	Ability to prioritize and interpret the significance of each annunciator or alarm

K/A# 2.4.45 **K/A Importance** 4.3 **Exam Level** SRO

References provided to Candidate None **Technical References:** DB-OP-02000 R27 Specific Rule 4.2, Attachments 3 and 6

Question Source: New

Question Cognitive Level: High **10 CFR Part 55 Content:** (CFR: 41.10 / 43.5 / 45.3 / 45.12)

Objective:

84. Plant conditions:

- Refueling operations in progress

The following event occurs:

- A Spent Fuel assembly has just been transferred from the Spent Fuel Pool
- Main FH Bridge Operator reports assembly at full up in mast over basket
- Main FH Bridge Operator reports lowering Refueling Canal Water level
- 3-1-A, REFUELING CANAL LVL alarms in the Control Room
- 4-3-A CTMT NORM SUMP LVL HI alarms in the Control Room
- An Operator reports water spilling from SG1 lower manway

Which of the following identifies the actions that should be initiated **FIRST** based on these conditions and what procedure will direct these actions??

A. Maintain Refueling Canal level in accordance with DB-OP-06203, Fill, Drain and Purification of the Refueling Canal

B. Maintain Refueling Canal level in accordance with DB-OP-02527, Loss of Decay Heat Removal

C. Lower assembly back into the basket and lower the basket in accordance with DB-OP-00030, Fuel Handling Operations

D. Lower assembly into the Refueling Canal Racks in accordance with DB-NE-06101, Fuel/Control Component Shuffle

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Answer: C

Explanation/Justification: Meets the requirements of the SRO only white paper Section II .E page 7 third bullet. The SRO is required to know the specific procedure details as to the action to take when Refueling Canal Level is lowering and selecting which procedure provides this direction

A. Incorrect – plausible because DB-OP-06203, Fill, Drain and Purification of the Refueling Canal is used to fill the Refueling Canal

B. Incorrect – plausible because Loss of Decay Heat Removal has a section for loss of inventory but the guidance is to place the fuel in a safe condition and does not address inventory restoration or the location of the safe condition

C. Correct – DB-OP-00030 directs placing the fuel in a safe condition upon decreasing canal level and lists a lowered basket as a safe location

D. Incorrect – Plausible because Refueling Canal Racks are a possible location and are addressed as a location from which fuel should be removed and not placed

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Sys #	System	Category	KA Statement
BW/A08	Refueling Canal Level Decrease	AA2 Ability to determine and interpret the following as they apply to the (Refueling Canal Level Decrease):	Facility conditions and selection of appropriate procedures during abnormal and emergency operations

K/A# AA2.1 **K/A Importance** 4.0 **Exam Level** SRO

References provided to Candidate None **Technical References:** DB-OP-02003, 3-1-A and DB-OP-00030

Question Source: Modified from TMI 2011

Question Cognitive Level: Low-Memory **10 CFR Part 55 Content:** (CFR: 43.5 / 45.13)

Objective:

85 The plant was operating at 100% power with all components in normal alignment.

A large break Loss of Coolant Accident (LOCA) occurs.
10 minutes after the start of the LOCA the following indications are observed:

- Reactor Coolant System (RCS) pressure is 170 psig
- Low Pressure Injection (LPI) flow is 1500 gpm in each injection line
- Borated Water Storage Tank (BWST) level is 37 feet

Low Pressure Injection (LPI) Pump 1 trips.

Which of the following DB-OP-02000 attachments requires implementation at this time?

A. Attachment 11 HPI Flow Balancing

B. Attachment 12 Establishing Long Term Boron Dilution using the Alternate Method

C. Attachment 14 Establishing HPI Alternate Minimum Recirc Flowpath

D. Attachment 22 Cross Connect LPI Pump Discharge

Answer: D

Explanation/Justification: Meets the requirements of the SRO only white paper Section II .E page 7 first bullet. SRO is required to have knowledge of the content of the post EOP attachments. The SRO must determine RCS drain rate and status of the available equipment, then select the correct attachment to implement.

A. Incorrect – Plausible for misconception of piggybacked HPI Pump 1 lost along with LPI Pump 1.

B. Incorrect – Attachment 12 is performed after swap to sump. See DB-OP-02000 step 10.17. Plausible because this would be the correct method for establishing long term boron dilution.

C. Incorrect – Attachment 14 would be performed if BWST level was lowering at < 2 ft/hr. See DB-OP-02000 step 10.12 RNO 3. BWST has lowered from 40 feet to 37 feet over 10 minutes for a rate of 18 ft/hr. Loss of LPI Pump 1 still puts rate > 9 ft/hr. Plausible because HPI would have to remain in service after the swap to sump unless Attachment 22 is performed and ≥1350 gpm flow is maintained in both LPI lines for 20 minutes or more. See DB-OP-02000 step 10.12 and Specific Rule 3.5.1.

D. Correct – See DB-OP-02000 R27 step 10.7 RNO.

Sys #	System	Category	KA Statement
BW/E14	EOP Enclosures	Generic	Ability to evaluate plant performance and make operational judgments based on operating characteristics, reactor behavior, and instrument interpretation

K/A# 2.1.7 **K/A Importance** 4.7 **Exam Level** SRO

References provided to Candidate None **Technical References:** DB-OP-02000 R27 step 10.7

Question Source: New

Question Cognitive Level: High **10 CFR Part 55 Content:** (CFR: 41.5 / 43.5 / 45.12 / 45.13)

Objective:

86. The plant is at 100% power with all systems in a normal alignment with the exception of #1 MU Pump which is out of service for planned maintenance

A Reactor Trip occurs. Subcooling Margin is lost.

The ATC Reactor Operator reports DB-OP-02000, RPS, SFAS, SFRCS Trip or SG Tube Rupture, Attachment 8, Place HPI, LPI, MU in Service has been completed with no deficiencies. The Reactor Operator later reports Makeup Tank level is 86 inches and slowly rising.

Based on these indications, which Section of DB-OP-02000 Attachment 13 requires implementation to mitigate the rising MU Tank Level?

A. Transferring MU Pump Recirculation to the BWST.

B. Diverting Letdown to the Clean Waste Receiver Tank.

C. Transferring MU Pump Suctions to the BWST.

D. Placing the MU Alternate Injection Line in Service.

Answer: A

Explanation/Justification: Meets the requirements of the SRO only white paper Section II .E page 7 second bullet. SRO is required to have knowledge of the content of the EOP Attachment procedures. The SRO must determine the plant configuration based procedure guidance with the loss of subcooling. Then the SRO must have detailed procedure knowledge of Attachment 13 subsections.

A. Correct – With a loss of Subcooled Margin, MU Pump Suctions are locked on the BWST per Attachment 8, with the recirculation flowpath still aligned to the MU Tank. This caused MU tank level to rise. Transferring recirculation flow to the BWST will terminate the increase.

B. Incorrect – Plausible because in a normal alignment, diverting Letdown to the CWRT will reduce MU Tank Level, however Letdown is isolation per SFAS actuation and Attachment 8. Transferring Letdown to the CWRT will not affect MU Tank Level.

C. Incorrect - Plausible because in a normal alignment, transferring MU suctions to the BWST will lead to an auto transfer back to the MU tank at 86 inches, however, per Attachment 8 with a loss of SCM, MU Pump Suctions are Locked on the BWST preventing this auto transfer.

D. Incorrect - Plausible because in a normal alignment, placing the Alternate Injection Line in service would increase MU Flow and cause MU Tank Level to lower, however Attachment 8 places the Alternate Injection Line in service only when 2 MU Pumps are available. Performing this action would result in two injection lines on a single MU Pump which is not allowed.

Sys #	System	Category	KA Statement
004	Chemical and Volume Control System (CVCS)	Generic	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.

K/A# 2.2.44 **K/A Importance** 4.4 **Exam Level** SRO

References provided to Candidate None **Technical References:** DB-OP-02000 Attachment 8 (pages 318 and 320) Attachment 13 (pages 341 and 342)

Question Source: New

Question Cognitive Level: High **10 CFR Part 55 Content:** (CFR: 41.5 / 43.5 / 45.12)

Objective:

87. Plant conditions:
- Plant is in Mode 5 with Reactor Coolant System Loops filled
- Decay Heat Pump 2 is in service
- The Motor Driven Feedpump and Startup Feed Pump are available
- SG secondary side fill to wet layup is in progress
- SG 1 Full Range level is 645 inches
- SG 2 Startup Range level indicates 10 inches
- Emergency Diesel Generator 1 is INOPERABLE for testing

The following event occurs:
- Decay Heat Pump 2 trips on overcurrent
- Decay Heat Pump 1 is placed in service on the RCS

(1) Are Two Loops OPERABLE to comply with Tech Spec 3.4.7 RCS Loops – Mode 5, Loops Filled and,

(2) if not, which action would ensure compliance?

A. (1) Two Loops are NOT OPERABLE.
(2) Drain SG1 to 620 inches Full Range in accordance with DB-OP-06230, Steam Generator Secondary Side Fill, Drain and Layup Procedure

B. (1) Two Loops are NOT OPERABLE.
(2) Fill SG 2 to 16 inches on the Startup Range in accordance with DB-OP-06226, Startup Feed Pump Operating Procedure

C. (1) Two Loops are NOT OPERABLE.
(2) Place EDG 1 in standby in accordance with DB-OP-06316, Diesel Generator Operating Procedure

D. (1) Two RCS Loops are OPERABLE.
(2) No action is required.

Answer: A

Explanation/Justification: Meets the requirements of the SRO only white paper Section II .E page 7 first bullet and II.B Page 3 third bullet. SRO is required to have knowledge of the content of the procedures. Specifically the SRO must evaluate the plant status and determine which procedure to implement to meet the TS Operability requirements for RCS loops. Detailed knowledge of the bases information is required to select the correct procedure actions.

A. Correct –. This is correct Per Tech Spec Bases 3.4.7 “the steam generator maximum level must be maintained low enough such that the steam generator remains capable of heat removal by maintaining a steam flow path (i.e., ≤ 625 inches full range level)”. DHR 1 does not require an emergency power source to be considered operable. Per Tech Spec Bases 3.4.7, DHR pumps are OPERABLE if they are capable of being powered and are able to provide flow if required.

B. Incorrect – Plausible because 16 inches is the cutoff for indication of a dry SG per DB-OP-02000. This would not make RCS Loop 1 OPERABLE: Per Tech Spec Bases 3.4.7, “An OPERABLE SG requires ≥ 35 inches of secondary side water level above the lower tube sheet.” DB-OP-06226 provides no direction for filling SGs.

C. Incorrect – Plausible because DHR Loop1 may be considered INOPERABLE due to its emergency power supply (see explanation in correct answer). RCS loops may be determined to be operable because an electric feed pump is available and water exists in the SGs. Per TS Bases 3.4.7 “to ensure that the SGs can be used as a heat sink, an electrically driven feed pump is needed, because it is independent of steam”

D. Incorrect – Plausible since DHR 1 is Operable and an electric feed pump is available and water exists in the SGs. Per TS Bases 3.4.7 “However, to ensure that the SGs can be used as a heat sink, an electrically driven feed pump is needed, because it is independent of steam”

Sys #	System	Category	KA Statement
005	Residual Heat Removal System (RHRS)	A2 Ability to (a) predict the impacts of the following malfunctions or operations on the RHRS, and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations:	RHR pump/motor malfunction

K/A# A2.03 **K/A Importance** 3.1 **Exam Level** SRO

References provided to Candidate None **Technical References:** TS 3.4.7 Bases page 3.4.7-3, DB-OP-06230, pg 2

Question Source: New

Question Cognitive Level: High-Comprehension **10 CFR Part 55 Content:** (CFR: 41.5 / 43.5 / 45.3 / 45.13)

Objective:

88. SR 3.3.5.2, SFAS Channel 1 Monthly Functional is scheduled to be performed.

- Various SFAS Channel 1 parameters will be INOPERABLE during this test.
- The Test is scheduled for 4 hours.

Which of the following statements describes how Technical Specification 3.3.5 will be applied during this test?

Entry into associated Conditions and Required Actions_____________

A. will be required during the performance of this test unless compliance will cause undesired actuation of safety system components

B. may be delayed for up to 8 hours, provided two other channels of the same SFAS instrumentation Parameter are OPERABLE

C. will not be required since SFAS Channel 1 is required to be restored to OPERABLE status at least once per hour during the performance of the test

D. may be delayed indefinitely provided all three of the remaining channels of the same SFAS instrumentation Parameter are OPERABLE

Answer: B

Explanation/Justification: Meets the requirements of the SRO only white paper Section II .B page 3 first bullet. SRO is required to have knowledge of the system limits. The SRO is required to know that the entry into the TS Conditions and Actions is modified by a note that allows for a time limit to perform the surveillance test.

A. Incorrect – Plausible since undesired actuation of SFAS equipment could be an unintended consequence
B. Correct – This is as stated in the Note to SR 3.3.5.2 and DB-SC-03110 R20 SFAS Channel 1 Functional Test L&P step 2.1.2.a.4
C. Incorrect – Plausible since no action would be required if inoperability time was less than 1 hour
D. Incorrect – Plausible since one RPS Channel can be bypassed indefinitely implying 2 out of 3 logic is sufficient

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Sys #	System	Category	KA Statement
013	Engineered Safety Features Actuation System (ESFAS)	Generic	Ability to explain and apply system limits and precautions

K/A# 2.1.32 **K/A Importance** 4.0 **Exam Level** SRO
References provided to Candidate None **Technical References:** SR 3.3.5.2 page 3.3.5-3 of Tech Specs
Question Source: New
Question Cognitive Level: High **10 CFR Part 55 Content:** (CFR: 41.10 / 43.2 / 45.12)
Objective:

89. QUESTION DELETED
~~A Waste Gas Decay Tank release is in progress when the following occurs:~~

- ~~Annunciator 9-1-G FIRE OR RADIATION TROUBLE alarms~~
- ~~Alarm 7-1-C, WST GAS SYS OUT RAD HI alarms.~~
- ~~RE1822A Detector is observed to be failed high~~
- ~~RE1822B is indicating normal.~~

~~(1) What, if any, is the effect on the release of this failed detector?~~
~~(2) What actions, if any, are required to continue the release?~~

~~A.~~ ~~(1) Release still in progress due to the redundant instrument operating correctly~~
~~(2) Continue with the release. No additional action necessary, only one detector is required.~~

~~B.~~ ~~(1) Release still in progress due to the redundant instrument operating correctly~~
~~(2) The release can continue after at least two independent samples of the tank's content are analyzed and at least two independent verifications of the release rate calculations and discharge valve lineups are performed per the Offsite-Dose Calculation Manual.~~

~~C.~~ ~~(1) The release is terminated by the failed detector~~
~~(2) Disable the failed detector and restart the release. No additional action necessary, only one detector is required.~~

~~D.~~ ~~(1) The release is terminated by the failed detector~~
~~(2) Disable the failed detector. The release can continue after at least two independent samples of the tank's content are analyzed and at least two independent verifications of the release rate calculations and discharge valve lineups are performed per the Offsite-Dose Calculation Manual.~~

Answer: C

Explanation/Justification: Meets the requirements of the SRO only white paper Section II .E page 7 third bullet. The operator is required to diagnose and predict the impact of the monitor failure on the release pathway. The SRO is also required to know the actions required for an Inoperable detector

A. Incorrect – (1) Plausible because most safety and protective systems have redundant trip functions with coincidence logic (2) is correct in that only one detector is required per ODCM table 2-1

B. Incorrect – (1) Plausible because most safety and protective systems usually redundant trip functions with coincidence logic (2) is plausible because this the required action for two inoperable detectors per ODCM table 2-1

C. Correct – (1) is correct - either detector in alarm will trip close the gaseous release outlet valves (2) is correct in that only one detector is required per ODCM table 2-1

D. Incorrect – (1) either detector in alarm will trip close the gaseous release outlet valves (2) is plausible because this the required action for two inoperable detectors per ODCM table 2-1

Sys #	System	Category	KA Statement
073	Process Radiation Monitoring (PRM) System	A2 Ability to (a) predict the impacts of the following malfunctions or operations on the PRM system; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations:	Detector failure

K/A# A2.02 **K/A Importance** 3.2 **Exam Level** SRO

References provided to Candidate **Technical References:** ODCM Table 3-1 page 56, OS-0030 SH2 R20 CL-1

Question Source: New

Question Cognitive Level: Low-Memory **10 CFR Part 55 Content:** (CFR: 41.5/43.5/45.3/45.13)

Objective:

90. The plant is operating at 100% power with Service Water Returns aligned to the Cooling Tower.

A seismic event occurs that significantly damages piping in the non-seismic portion of the Service Water System.

Which of the following procedure driven actions are required to respond to this event?

A. Align Circ Water to supply Service Water Essential Header

B. Align Circ Water to supply Service Water Secondary Loads

C. Align Service Water Returns to the Collection Box

D. Align Service Water Returns to the Intake Forebay

Answer: D

Explanation/Justification: Meets the requirements of the SRO only white paper Section II .E page 7 first bullet. SRO is required to have knowledge of the content of the procedure content. The SRO must determine the plant configuration based event in progress and select the appropriate action to mitigate the loss of SWS event, which renders the system incapable of performing the design function. The SRO must have detailed knowledge of the procedure content to select the Attachment that restores the system flowpath.

A. Incorrect – Plausible because the essential loads are those that must be cooled to maintain safety functions. The Cooling Tower Return flowpath is non-seismic piping which may be pinched by the seismic event.

B. Incorrect – Plausible because the SW Piping to the Secondary loads is non-seismic piping. There are important loads such as the MDFP the candidate would prefer to have available to respond to plant events..

C. Incorrect – Plausible because the Cooling Tower Line is not seismic. If the line collapses, a loss of flowpath could exist. This alignment could restore a flowpath, but the inventory from the Ultimate Heat Sink would be lost.

D. Correct – The initial conditions has SW aligned to Cooling Tower Makeup. Following a seismic event, this alignment could lead to depletion of the Ultimate Heat sink. Action is required within 3 hours to protect the ultimate heat sink inventory.

Sys #	System	Category	KA Statement
076	Service Water System (SWS)	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:	Loss of SWS

K/A# A2.01 **K/A Importance** 3.7* **Exam Level** SRO

References provided to Candidate **Technical References:** DB-OP-02511 R16, Loss of Service Water Pumps/System

Question Source: New

Question Cognitive Level: High **10 CFR Part 55 Content:** (CFR: 41.5 / 43.5 / 45/3 / 45/13)

Objective:

91. The plant is in Mode 1 at 100% power following a refueling outage.

A Condition Report is received that identifies an error occurred when the Containment Purge Exhaust Valve (Inside CTMT Valve) local leak rate testing was conducted prior to entry into Mode 4. The leak rate was incorrectly calculated. The actual leakage exceeded the allowed leakage for that penetration but the leak rate does not exceed the overall containment leakage rate acceptance criteria.

Which of the following Technical Specification actions are required?

A. No action required because the isolation valve leakage does not exceed the overall containment leakage rate acceptance criteria.

B. No action is required because the penetration flow path remains isolated by the Purge Exhaust Valve (Outside CTMT Valve) which is already de-activated in the closed position.

C. Enter TS 3.6.1 Containment and be in Mode 3 within 6 hours and Mode 5 within 36 hours to allow repair/testing of the affected valve.

D. Enter TS 3.6.3 Containment Isolation Valves and verify the affected penetration is isolated within 24 hours and once per 31 days thereafter.

Answer: D

Explanation/Justification: Meets the requirements of the SRO only white paper Section II B page 3 first bullet. The SRO must evaluate the TS impact of the valve that exceeds the allowable leak rate and the impact on overall CNMT operability. The TS action per the surveillance is SRO knowledge. The SRO must know that the TS is applicable in Mode 4 and the actions required.

A. Incorrect – Plausible because the overall CTMT leak rate is still met, therefore the expected leakage following a design bases event would be less than the assumed leakage in the calculations that estimate off-site dose impact of an event.

B. Incorrect – Plausible because the conditions stated are true, an operable closed valve remains in the flowpath.

C. Incorrect – Plausible because per TS 3.6.3, the use of administrative controls to unisolate the penetration for testing is not permitted requiring a return to Mode 5 for repair/testing.

D. Correct – Leakage in excess of allowed requires entry into 3.6.3 Condition D, but with overall CTMT leakage less than acceptance criteria entry into TS 3.6.1 is not required.

Sys #	System	Category	KA Statement
029	Containment Purge	Generic	Knowledge of the bases in Technical Specifications for limiting conditions for operations and safety limits

K/A# 2.2.25 **K/A Importance** 4.2 **Exam Level** SRO

References provided to Candidate None **Technical References:** TS 3.6.3

Question Source: New

Question Cognitive Level: High **10 CFR Part 55 Content:** (CFR: 41.5 / 41.7 / 43.2)

Objective:

92. The plant is in Mode 1 at 100% power.

The following annunciators alarm:

- 13-2-B CNDS PMP DISCH HDR PRESS
- 13-4-B HP CNDSR HOTWELL LVL LO
- 13-4-C DEAR STRG TK 1 LVL
- 13-4-D DEAR STRG TK 2 LVL
- 15-3-F CNDSR PIT FLOODED

Based on these indications, which of the following describes the effect on the Condensate System and the procedures to implement for this failure?

The Condensate Pump motors __(1)__. Implement DB-OP-02000 RPS, SFAS, SFRCS Trip or SG Tube Rupture and transition to __(2)__.

A. (1) trip on low hotwell level
(2) DB-OP-06910 Trip Recovery Section 4.0 Recovery from Reactor Trip and SFRCS Actuation

B. (1) trip on low hotwell level
(2) DB-OP-06903 Plant Cooldown Section 3.0 Cooldown of the NSSS from HOT STANDBY (MODE 3) Condition.

C. (1) become submerged and fault
(2) DB-OP-06910 Trip Recovery Section 4.0 Recovery from Reactor Trip and SFRCS Actuation

D. (1) become submerged and fault
(2) DB-OP-06903 Plant Cooldown Section 3.0 Cooldown of the NSSS from HOT STANDBY (MODE 3) Condition

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Answer: A

Explanation/Justification: Meets the requirements of the SRO only white paper Section II .E page 7 second bullet. SRO is required to have knowledge of the content of the procedures and actions taken based upon conditions of the plant. The SRO must evaluate the potential water level that could result from the flooding of the condensate pumps and the interlocks associated with the pumps. Requires detailed knowledge of the procedure routing following the reactor trip.

A. Correct – Malfunction is condensate header rupture. Condensate Pumps trip on low hotwell level of 24 inches – see OS-0010 sheet 3 R15 CL-5. Spilled liquid in Turbine Building ends up in condenser pit and actuates automatic trip of Circ Pumps at 2.5 feet – see DB-OP-06272 R24 Station Drainage and Discharge System Attachment 3 pages 70 & 74 and OS-0016A R36. Loss of Circ Pumps results in loss of vacuum and automatic trip of Main Feedwater Pumps – see DB-OP-02518 R6 High Condenser Pressure page 22 last paragraph. MFW Pump trips causes SFRCS Isolation Trip on reverse Feedwater dP – see OS-0012A sheet 2 R32 CL12 and DB-OP-02000 Table 1. DB-OP-02000 R27 step 4.23 provides routing to DB-OP-06910. DB-OP-06910 R26 step 3.1.1 provides routing to Section 4.0.

B. Incorrect – DB-OP-02000 R27 step 4.23 provides routing to DB-OP-06910. Part 1 is correct. Plausible because a plant cooldown would be required to fix the condensate header rupture.

C. Incorrect – Condensate Pumps trip on low hotwell level of 24 inches. Part 2 is correct. Plausible because this is the result for condenser pit flooding from Circ Water without low hotwell level – see DB-OP-02517 R6 Circulating Water System Malfunctions Background Information for Large Leak/Rupture page 61. Even if condensate pump motors did become submerged, they were de-energized when low hotwell level opened their breakers.

D. Incorrect – Condensate Pumps trip on low hotwell level of 24 inches; DB-OP-02000 R27 step 4.23 provides routing to DB-OP-06910. Plausible for condenser pit flooding from Circ Water without low hotwell level and because a plant cooldown would be required to fix the condensate header rupture.

Sys #	System	Category	KA Statement
056	Condensate	A2 Ability to (a) predict the impacts of the following malfunctions or operations on the Condensate System; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations:	Loss of condensate pumps

K/A# A2.04 **K/A Importance** 2.8* **Exam Level** SRO

References provided to Candidate None **Technical References:** DB-OP-02518 page 22, OS-0010 CL-5 and DB-OP-02000 supplemental step 4.23

Question Source: New

Question Cognitive Level: High **10 CFR Part 55 Content:** (CFR: 41.5 / 43.5 / 45.3 / 45.13)

Objective:

93. The plant is operating at 100% power

The following event occurs:
- SG1 Startup Level selected to ICS indicates 0 inches

The following annunciators alarm:
- 12-3-A SG 1 OPERATE LVL HI
- 12-4-A SG 1 LVL LO
- 14-4-E ICS INPUT MISMATCH
- 14-5-E ICS SG 1 ON LO LVL LIMIT

(1) Select the correct PROCEDURE to be implemented to mitigate this event?
(2) What is Technical Specification BASIS for Technical Specification LCO challenged by this event?

A. (1) DB-OP-02526 Primary to Secondary Heat Transfer Upset
(2) To ensure Steam generator water inventory is maintained to provide adequate primary to secondary heat transfer

B. (1) DB-OP-02526 Primary to Secondary Heat Transfer Upset
(2) To preserve the initial condition assumptions for the steam generator inventory used in the main steam line break (MSLB) accident analysis

C. (1) DB-OP-02000 RPS, SFAS, SFRCS TRIP OR SG TUBE RUPTURE
(2) To ensure Steam generator water inventory is maintained to provide adequate primary to secondary heat transfer

D. (1) DB-OP-02000 RPS, SFAS, SFRCS TRIP OR SG TUBE RUPTURE
(2) To preserve the initial condition assumptions for the steam generator inventory used in the main steam line break (MSLB) accident analysis

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Answer: B

Explanation/Justification: Meets the requirements of the SRO only white paper Section II .E page 7 first bullet and II.B Page 3 third bullet. The SRO must diagnose the primary to secondary plant heat transfer event and cause and then select the appropriate mitigation procedure. The SRO is required to understand the TS bases for the LCO that is challenged by the failure.

A. Incorrect – Part 1 is correct. Part 2 is plausible because this is the TS basis for the low level limit

B. Correct –Malfunction is failure of controlling Startup (SU) level low which results in SG overfeed. See M-533-00171 R10. DB-OP-02526 R4 is correct procedure. See step 2.1.4. TS Bases as listed in B 3.7.18 page B 3.7.18-1

C. Incorrect – Plausible if it is determined the Reactor has or should be tripped on low or high level. Part 2 is plausible because this is the TS basis for the low level limit

D. Incorrect - Plausible if it is determined the Reactor has or should be tripped on low or high level. Part 2 is plausible because this is the TS basis for the low level limit. Part 2 is correct

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Sys #	System	Category	KA Statement
035	Steam Generator System (SG/S)	A2 Ability to (a) predict the impacts of the following malfunctions or operations on the Steam Generator System; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations:	Pressure/level transmitter failure

K/A# A2.03 **K/A Importance** 3.6 **Exam Level** SRO

References provided to Candidate None **Technical References:** DWG M-533-171-10, DB-OP-02526 page 4 and Bases B3.7.18 page B3.7.18-1

Question Source: New

Question Cognitive Level: High - Comprehension **10 CFR Part 55 Content:** (CFR: 41.5 / 43.5 / 45.3 / 45.5)

94. The plant is at 100% power at minimum staffing levels.

At 0200, the following events occur.

- The At the Controls Reactor Operator (ATC RO) falls in the Control Room and is unconscious.
- The First Aid Team requests an ambulance to transport the ATC RO to the hospital.

Which of the following actions is required in response to this event?

A. Unit Supervisor must accompany ATC RO to the hospital in the ambulance.

B. Maintain the plant in a stable condition until the next shift of operators arrives for day shift.

C. Immediately callout a Reactor Operator to return to a minimum functional shift complement.

D. Have the Safe Shutdown Equipment Operator assume the RO position to comply with the Technical Requirements Manual.

Answer: C

Explanation/Justification: Meets the requirements of the SRO only white paper Section II .A page 3 third bullet. The SRO is required to know the content of the administrative procedures related to shift staffing and the Technical Specification requirements. The actions to restore shift staffing are a SRO responsibility.

A. Incorrect – Loss of an SRO would make shift manning level worse. Plausible because supervisor is notified; however, RA-EP-02000 R5 Medical Emergencies step 6.2.9 states that when on-duty manning is minimal, a Management Representative shall be called to meet the patient at the treatment facility.

B. Incorrect – Plausible because NOP-OP-1002 step 4.1.13.3 does direct maintaining stable conditions, but allowing 3-4 hours to elapse is not consistent with taking action immediately.

C. Correct – per NOP-OP-1002 (R09), Conduction of Operations Step 4.1.13.3.

D. Incorrect – Even if the SSEO was licensed, minimum manning is not met per NOP-OP-1002 R9 Conduct of Operations Attachment 4. Plausible because the TRM does not require any non-licensed operators (see TRM 10.2.1) and per NOP-OP-1002, Conduct of Operations step 4.1.13.3 if the Shift Manager becomes incapacitated, the senior on shift licensed operator assumes the Shift Manager position; however, no such provision exists for other positions.

Sys #	System	Category	KA Statement
N/A	N/A	Generic	Knowledge of individual licensed operator responsibilities related to shift staffing, such as medical requirements, “no-solo” operation, maintenance of active license status, 10CFR55, etc.

K/A# 2.1.4 **K/A Importance** 3.8 **Exam Level** SRO

References provided to Candidate None **Technical References:** NOP-OP-1002 (R09) Step 4.1.13.3

Question Source: New

Question Cognitive Level: Low **10 CFR Part 55 Content:** (CFR: 41.10 / 43.2)

Objective:

95. The plant is at 100% power at 200 EFPD. Rod Height is 290 Rod Index.

Reactor Coolant Pump (RCP) 1-1 develops an oil leak and must be shutdown.

Once stable, the following conditions are noted:

- Reactor Power 72%
- RCP 1-1 stopped
- Axial Power Imbalance is -10%.
- Rod Height is 260 Rod Index.

Which of the following actions, if any, are the FIRST required to comply with Technical Specifications requirements?

References provided

A. No Action is required

B. Verify F_Q and $F^N_{\Delta H}$ are within limits by using the Incore Detector System to obtain a power distribution map within 2 hours

C. Reduce THERMAL POWER to ≤ 40% RTP within 2 hours

D. Reduce THERMAL POWER to less than or equal to the THERMAL POWER allowed by the regulating rod group insertion limits within 4 hours

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Answer: B

Explanation/Justification: Meets the requirements of the SRO only white paper Section II B page 3 first bullet. SRO must interpret the TS 3.2.1. Surveillance and graph, recognizing that the plant is in the restricted region and then select the appropriate TS action for this condition.

A. Incorrect – Plausible if the candidate uses the more typical COLR Figure 2a curve, 0 to 300 +10 EFPD, Four RC Pumps--2817 MWt RTP Davis-Besse 1, Cycle 19, instead of the correct three pump curve Figure 2c.

B. Correct – The plant is in the restricted region for 3 RCPs of Figure 2c. TS 3.2.1, Regulating Rod Insertion Limits Condition A requires performance of SR 3.2.5.1 within 2 hours.

C. Incorrect – This is the required action if TS 3.2.3, Axial Power Imbalance is not met which is possible for a rapid power reduction. In this case, Axial power imbalance is within the limits of TS 3.2.3 and therefore, not applicable

D. Incorrect – This is the required action if TS 3.2.1 Condition A is not met which would be required 4 hours from the initiating event .

Sys #	System	Category	KA Statement
N/A	N/A	Generic	Ability to interpret reference materials, such as graphs, curves, tables, etc.

K/A# 2.1.25 **K/A Importance** 4.2 **Exam Level** SRO

References provided to Candidate TS Section 3.2 and COLR Core Operating Limit Report Figures 2a, 2b, 2c, 2d, 3, 4a,.4b, 4c, 4d, 4e, 4f, 4g, 4h, 4i, 4j, Tables 4, 5, 6, 7

Technical References: LCO 3.2.1; COLR Figure 2c, LCO 3.2.1 Action A and SR 3.2.5.1

Question Source: New

Question Cognitive Level: High

10 CFR Part 55 Content: (CFR: 41.10 / 43.5 / 45.12)

Objective:

96. An overhead Annunciator Alarm in the Control Room is not operating properly.

To avoid nuisance alarms, the Operations Manager has determined that the Annunciator will be disabled by removing the affected Annunciator Point Card.

Which of the following documents must be completed to remove this point card to disable the affected annunciator alarm?

1. Annunciator System Operating Procedure
2. Work Order for point card removal
3. 50.59 Regulatory Applicability Determination (RAD) and/or Screen
4. Engineering Change Package
5. Temporary Modification Tags
6. Clearance and Tags

A. 1 and 3

B. 2, 4, and 5

C. 1 and 6

D. 2, 3 and 6.

Answer: A

Explanation/Justification: Meets the requirements of the SRO only white paper Section II .C page 6 third bullet. The SRO is required to know the administrative requirements for disabling annunciators. Additionally the SRO must be knowledgeable of the requirements for implementing other types of work as well to correctly identify the required documents to disable the alarm.

A. Correct. Disabling an Annunciator Window is directed using DB-OP-06411, Station Annunciator Procedure Section 4.5 which also requires a 50.59 RAD and/or Screen.

B. Incorrect - Disabling an Annunciator Window is directed using DB-OP-06411, Station Annunciator Procedure Section 4.5 which requires a 50.59 RAD and/or Screen. Plausible for another craft such as I&C or IS to perform card removal under a Work Order, pulled circuit cards may be considered Temporary Modifications per NOP-CC-2003 R19 Engineering Changes step 2.1.3, TM Tags described in NOP-CC-2003 Attachment 7.

C. Incorrect - Disabling an Annunciator Window is directed using DB-OP-06411, Station Annunciator Procedure Section 4.5 which requires a 50.59 RAD and/or Screen. A Clearance is not necessary or directed to perform this activity. Plausible to use OPS Only Clearance for equipment control per NOP-OP-1001 R21 Clearance and Tagging Program Section 4.10.

D. Incorrect - Disabling an Annunciator Window is directed using DB-OP-06411, Station Annunciator Procedure Section 4.5 which requires a 50.59 RAD and/or Screen. A Clearance is not necessary or directed to perform this activity. Plausible for another craft such as I&C or IS to perform card removal under a Work Order and Clearance.

Sys #	System	Category	KA Statement
N/A	N/A	Generic	Knowledge of the process for making design or operating changes to the facility

K/A# 2.2.5 **K/A Importance** 3.2 **Exam Level** SRO

References provided to Candidate None **Technical References:** DB-OP-06411 Section 4.5.

Question Source: New

Question Cognitive Level: Low **10 CFR Part 55 Content:** (CFR: 41.10 / 43.3 / 45.13)

Objective:

97. The Plant is in Mode 5.

Based on planned maintenance, the Key Shutdown Defense in Depth for Electrical Power Availability meets the minimum number of points to be rated Yellow.

The following event occurs:

- A Severe Thunderstorm Watch that includes Davis-Besse is issued by the National Weather Service.

Which of the following describes the impact on the Shutdown Defense In Depth indicator for the change in weather status and the maintenance controls that must be invoked?

Key Shutdown Defense in Depth for Electrical Power Availability ________________.

References provided

A. remains Yellow. This indicator is not affected by the weather forecast. Continue to comply with Yellow Risk Requirements of NOP-OP-1007, Risk Management.

B. remains Yellow but would require transition to Orange if a Severe Thunderstorm Warning is issued. Continue to comply with Yellow Risk Requirements of NOP-OP-1007, Risk Management.

C. would transition to Orange Risk. Comply with the Orange Risk Requirements of NOP-OP-1007, Risk Management.

D. would transition to Orange Risk, but require transition to Red if a Severe Thunderstorm Warning is issued. Comply with the Orange Risk Requirements of NOP-OP-1007, Risk Management.

Answer: C

Explanation/Justification: Meets the requirements of the SRO only white paper Section II .E page 7 first bullet. SRO is required to have knowledge of the content of the administrative procedures and actions taken based upon conditions of the plant. Requires detailed knowledge of the procedure and evaluation of the impact on th risk level based upon changes in the weather conditions.

A. Incorrect - Per NOP-OP-1005 Checklist, issuing a Severe Watch or Warning requires a reduction of one point which would cause the indicator to go to Orange.

B. Incorrect - Per NOP-OP-1005 Checklist, issuing a Severe Watch or Warning requires a reduction of one point which would cause the indicator to go to Orange. No further upgrade would be required if a warning is later issued.

C. Correct. Per NOP-OP-1005 Checklist, issuing a Severe Watch or Warning requires a reduction of one point which would cause the indicator to go to Orange. No further upgrade would be required if a warning is later issued.

D. Incorrect Per NOP-OP-1005 Checklist, issuing a Severe Watch or Warning requires a reduction of one point which would cause the indicator to go to Orange. Reduction of another point would drive the indicator to Red. No further upgrade would be required if a warning is later issued.

Sys #	System	Category	KA Statement
N/A	N/A	Generic	Knowledge of the process for managing maintenance activities during shutdown operations, such as risk assessments, work prioritization, etc.

K/A# 2.2.18 **K/A Importance** 3.9 **Exam Level** SRO

References provided to Candidate NG-DB-00117 and Form NOP-OP-1005-02 **Technical References:** NOP-OP-1005 Checklist and NOP-OP-1005 step 4.3, NG-DB-00117 attachment 2

Question Source: New

Question Cognitive Level: High **10 CFR Part 55 Content:** (CFR: 41.10 / 43.5 / 45.13)

Objective:

98. A seismic event has occurred.

High Radiation Alarms are received on the following:

- RE 8426 SFP Area
- RE 8427 SFP Area
- RE 8417 Fuel Handling Area
- RE 8418 Fuel Handling Area
- RE 8425 Equipment Hatch Area

Spent Fuel Pool (SFP) Level LI1600 is 9 feet and stable.

Which one of the following actions and procedures require implementation?

A. Align a Decay Heat Removal Train to provide SFP Cooling per RA-EP-02820, Earthquake.

B. Evacuate the Spent Fuel Pool Area per RA-EP-02861, Radiological Incidents.

C. Perform off-site Dose Assessment per RA-EP-02240, Off-Site Dose Assessment.

D. Implement the Severe Accident Management Guidelines for a Severe Accident in the Spent Fuel Pool.

Answer: B

Explanation/Justification: Meets the requirements of the SRO only white paper Section II .D page 6 second bullet. SRO must analyze the Radiation levels based upon the alarms received and then select the appropriate procedure to implement. The SRO is required to have knowledge of the procedure content which includes evacuating the area based upon the rise in activity and the current level in the SFP.

A. Incorrect – Plausible because RA-EP-02820 R9 would apply and step 6.2.2.h suggests this action for a loss of SFP cooling; however, this action is incorrect for a large leak. Minimum level to operate DHR Pump on SFP is 12 feet per DB-OP-02547 R4 SFP Cooling Malfunctions step 4.2.8

B. Correct – A minimum of 9.5 feet of level in the SFP is required to provide adequate biological shielding. With level below 9.5 feet and multiple high radiation alarms, RA-EP-02861 should be implemented and the area should be evacuated. RA-EP-02861 entry is also directed by DB-OP-02547 R4 SFP Cooling Malfunctions step 4.2.9.

C. Incorrect – Airborne release not in progress or imminent. See RA-EP-02240 R8 Offsite Dose Assessment step 5.0 Initiating Conditions. Plausible because the inventory lost from the SFP has gone somewhere, however, Spent Fuel remains covered and even if the SFP contents are outside the SFP area, the inventory would not leave the site without specific action to pump the marsh area.

D. Incorrect – Plausible because a Spent Fuel Pool level of 1 foot requires entry into the Severe Accident Management Guidelines. See DB-OP-02547 R4 SFP Cooling Malfunctions step 4.2.17 RNO.

Sys #	System	Category	KA Statement
N/A	N/A	Generic	Knowledge of radiation or contamination hazards that may arise during normal, abnormal, or emergency conditions or activities

K/A# 2.3.14 **K/A Importance** 3.8 **Exam Level** SRO

References provided to Candidate None **Technical References:** DB-OP-02547 step 4.2.9 and USAR page 9.1-9.

Question Source: New

Question Cognitive Level: High **10 CFR Part 55 Content:** (CFR: 41.12 / 43.4 / 45.10)

Objective:

99. The Plant is operating at 100% power when the following occurs:

- Multiple Fire Alarms are received from Room 603, CONTROL ROOM AC EQUIPMENT ROOM, Fire Area HH
- The Fire Brigade is dispatched in accordance with DB-OP-02529, Fire Procedure. The Fire Brigade Captain reports a significant fire is in progress and requests off-site assistance
- The ATC Reactor Operator reports High Pressure Injection Pump 2 and Containment Spray Pump 2 have spuriously started
- The Reactor trips
- No other effects of the fire are indicated at this time

Which of the following procedures should be transitioned to NEXT?

A. DB-OP-02000, RPS, SFAS, SFRCS Trip or SG Tube Rupture

B. DB-OP-02501, Serious Station Fire

C. DB-OP-02508, Control Room Evacuation

D. DB-OP-02519, Serious Control Room Fire

Answer: B

Explanation/Justification: Meets the requirements of the SRO only white paper Section II .E page 7 first bullet. SRO is required to know the actions contained in the abnormal procedures. The SRO must diagnose that equipment has spuriously actuated and that the procedure rules of use govern implementation of the serious station fire procedure.

A. Incorrect. This answer is plausible because in general, the correct procedure to implement following a Reactor Trip is DB-OP-02000.

B. Correct –Spurious operation of safety related equipment requires implementation of DB-OP-02501which takes priority over DB-OP-02000. See DB-OP-01003 R14 Operations Procedure Use Instructions step 6.5.2.a.

C. Incorrect. This answer is plausible because DB-OP-02519, Serious Station Fire Attachment 20 for Fire Area HH directs use of DB-OP-02508, Control Room Evacuation if the fire in area HH affects Control Room Habitability. In addition, a fire in the Control Room AC area could introduce smoke into the Control Room.

D. Incorrect. This answer is plausible because a fire in the Control Room AC area could introduce smoke into the Control Room, however the Control Room circuits would not be involved in the fire which would require use of DB-OP-02519, Serious Control Room Fire.

Sys #	**System**	**Category**	**KA Statement**
N/A	N/A	Generic	Knowledge of the organization of the operating procedures network for normal, abnormal, and emergency evolutions

K/A# 2.4.5 **K/A Importance** 4.3 **Exam Level** SRO

References provided to Candidate

Technical References: DB-OP-01003 step 6.5.2, DB-OP-02501, step 2.1 page 9 and Attachment 20 page 110.

Question Source: New

Question Cognitive Level: High **10 CFR Part 55 Content:** (CFR: 41.10 / 43.5 / 45.13)

Objective:

100 A large break Loss of Coolant Accident has occurred. An Equipment Operator is directed to perform DB-OP-02000, Attachment 7, Section 1, Action to Close Breakers for DH7A, DH7B, DH9A, DH9B, and HP31. The assigned operator reports that RE8426 and 8427, Spent Fuel Pool Area Radiation Monitors located near MCC F11B read 30 REM/hr. The operator must access F11B to complete Attachment 7.

Which one of the following Emergency Operating Procedure DB-OP-02000 Attachments should be directed to be performed based on the indicated dose rate?

A. Continue with performance of DB-OP-02000, Attachment 7, (Section 1), Transferring LPI Suctions to the Emergency Sump. Worst case conditions for the route provided have been assumed in the development of this attachment.

B. Stop DB-OP-02000 Attachment 7 and perform Attachment 11, HPI Flow Balancing instead. The indicated dose rate prevents access to MCC F11B. As a result, train 2 of HPI will be lost requiring HPI Flow Balancing.

C. Stop DB-OP-02000 Attachment 7 and perform DB-OP-02000 Attachment 14, Establishing HPI Alternate Minimum Recirc instead. The indicated dose rate prevents access to MCC F11B. As a result, the normal recirc flowpath for train 2 of HPI will be lost. The Alternate HPI recirc flowpath must be placed in service

D. Stop DB-OP-02000 Attachment 7 and perform Attachment 22, Cross Connect LPI Pump Discharge instead. The indicated dose rate prevents access to MCC F11B. As a result, Train 2 of LPI will lost. LPI must be cross connected to mitigate a possible LPI line break.

Answer: A

Explanation/Justification: Meets the requirements of the SRO only white paper Section II .D page 6 second bullet. SRO must evaluate plant conditions based upon the dose rates and select a procedurally driven course of action. Requires detailed knowledge of the procedure actions and basis for assumed dose levels of transit paths contained in the procedure.

A. Correct – DB-OP-02000 Attachment 7 Warning provides information that the assumed worst case dose rate for performance of this action is 34 REM/hr. Continuing with Attachment 7 will allow transfer of the ECCS Pump Suctions to the Emergency Sump without exceeding the projected 2 REM total dose for this activity.

B. Incorrect – Plausible because if Attachment 7 is not performed, the High Pressure Injection System would lose suction once the BWST is depleted. The actions to close the breakers are required because the supply breakers are open to prevent spurious Mispositioning during a fire. Normally, only a single train is protected for each serious station fire area, so it is plausible that only a single train of HPI would be lost and therefore Flow Balancing would be required.

C. Incorrect – Plausible because if Attachment 7 is not performed, the High Pressure Injection System Train 1 Recirc Flowpath to the BWST via HP31 would not have power. As a result, the candidate could assume the alternate recirc flowpath must be used..

D. Incorrect – Plausible because if Attachment 7 is not performed, the Low Pressure Injection System would lose suction once the BWST is depleted. The actions to close the breakers are required because the supply breakers are open to prevent spurious Mispositioning during a fire. Normally, only a single train is protected for each serious station fire area, so it is plausible that only a single train of LPI would be lost and therefore cross connecting HPI would be required.

Sys #	System	Category	KA Statement
N/A	N/A	Generic	Knowledge of the operational implications of EOP warnings, cautions, and notes

K/A# 2.4.20 **K/A Importance** 4.3 **Exam Level** SRO

References provided to Candidate None **Technical References:** DB-OP-02000 Attachment 7 Warning

Question Source: New

Question Cognitive Level: High **10 CFR Part 55 Content:** (CFR: 41.10 / 43.5 / 45.13)

Objective: