QUESTION 1

Given the following conditions:

- A loss of offsite power has occurred
- The plant has responded as designed to this event
- The crew is performing EOP 2528, Loss of Offsite Power/Loss of Forced Circulation

Per EOP 2528, which of the choices listed below correctly completes the statement to describe the MAXIMUM acceptable loop ΔT when checking for natural circulation?

When confirming natural circulation flow in at least one loop, check loop ΔT is less than ____°F

A. 25

B. 35

C. 45

D. 55

K&A Rating: E02 EA1.2 (3.3, 3.9)

K&A Statement: Ability to operate and or monitor the following as they apply to Reactor Trip Recovery: Operating behavior characteristics of the facility.

Key Answer: **D**

Justification (Question 1):

A. **Incorrect:** EOP 2528 step 11 says 55°F.
Plausible: 25°F is an example number given in the LP for 2% decay heat. Turbine load at 25% is a threshold for condenser backpressure limits (OP-2202). Reactor power at 25% is a threshold, below which FRV bypass valve operation is permitted. Per OP-2206, EOP 2525 is entered if pressurizer level lowers to less than 25%.

B. **Incorrect:** EOP 2528 step 11 says 55°F.
Plausible: This is a physically plausible number. Refuel pool level less than 35'6" requires compensatory actions per OP 2207. No load Tcold is maintained between 530°F and 5**35**°F.

C. **Incorrect**: EOP 2528 step 11 says 55°F.
Plausible: This is a physically plausible number. OP-2204 provides direction for starting the second feed pump between 45% and 48% power.

D. **Correct:** EOP 2528 step 11 says 55°F.

References: None Student Ref: NONE

Learning Objective:

Question Source: new

Question History: new

Cognitive Level: Memory/Fundamental Knowledge: X
Comprehensive/Analysis:

10CFR55: CFR 41.5

Comments (Question 1):

QUESTION 2

With the Unit operating at 100% power, the Reactor trips on low pressurizer pressure.

- Quench Tank pressure indicates 0 psig
- A PORV opened inadvertently and is now stuck partially open
- Pressurizer level went off-scale low
- Pressurizer pressure is 1600 psia
- CETs are 607°F

Pressurizer level is now returning to an on-scale indication.

Which ONE of the following characterizes the relationship between pressurizer level and the reactor coolant inventory and the reason for this relationship?

A. Pressurizer level is NOT an accurate indication of inventory. RCS voiding may result in a rapidly increasing pressurizer level.

B. Level is an accurate indication of inventory. RCP flow will sweep any voids from the RCS to the pressurizer steam space.

C. Pressurizer level is NOT an accurate indication of inventory. The pressurizer level instruments indicate high during high temperature, low pressure conditions.

D. Pressurizer level is an accurate indication of inventory. Voiding will occur first in the pressurizer due to the low pressure caused by the open PORV.

K&A Rating: 008 AK3.01 (3.7, 4.4)

K&A Statement: Knowledge of the reasons for the following responses as they apply to the Pressurizer Vapor Space Accident: Why PZR level may come back on scale if RCS is saturated.

Key Answer: **A**

Justification (Question 2):

A. **Correct:** Stem conditions indicate subcooling has been lost and a bubble is forming in the reactor vessel head area. Therefore PZR level is no longer indicative of RCS inventory.

B. **Incorrect**: Level does NOT indicate inventory accurately during vapor space accidents. **Plausible:** Common misconception that voids forming in the RCS will be transported by the reactor coolant pumps to the PZR. However once sub cooling is lost a bubble will form in the head area.

C. **Incorrect**: Although the pressurizer level instruments may be somewhat inaccurate as compared to normal plant conditions of 2250 psig, in this case the inaccuracy would not cause level indication to go off scale and then return on scale.
Plausible: Pressurizer level instruments may be somewhat inaccurate as compared to normal plant conditions of 2250 psig.

D. **Incorrect**: Level does NOT indicate inventory accurately during vapor space accidents. **Plausible:** Common misconception that the lowest pressure in the system is at the leak and therefore any flashing to steam would occur in the PZR and not in the vessel area.

References: None   Student Ref: NONE

Learning Objective:

Question Source: new

Question History: new

Cognitive Level: Memory/Fundamental Knowledge: X
Comprehensive/Analysis:

10CFR55: CFR 41.5, 41.10

Comments (Question 2):

QUESTION 3

The Unit has transitioned to two phase Natural Circulation flow (Reflux boiling) due to a small break LOCA with inadequate HPSI flow.

The Crew can enhance Reflux boiling by increasing...

A. RCS T-cold to >550°F.

B. PZR level from 15 to 55%.

C. SG NR level from 10% to 50%.

D. PZR pressure from 1500 to 1600 psia.

K&A Rating: 009 Small Break LOCA EK1.01 (4.2)

K&A Statement: Knowledge of the operational implications of the following concepts as they apply to small break LOCA: Natural circulation and cooling, including reflux boiling.

Key Answer: **C**

Justification (Question 3):

A. **Incorrect:** Changing RCS parameters will have negligible effect on reflux boiling.

B. **Incorrect**: Changing RCS parameters will have negligible effect on reflux boiling.

C. **Correct**: Reflux boiling is the process of steam going up the SG tubes, condensing and falling back into the RCS. The greater the tube coverage the greater the cooling.

D. **Incorrect**: Changing RCS parameters will have negligible effect on reflux boiling.

References: None Student Ref: NONE

Learning Objective: N/A

Question Source: Bank Palo Verde

Question History: Palo Verde 2007 RO NRC Exam

Cognitive Level: Memory/Fundamental Knowledge: X
Comprehensive/Analysis:

10CFR55: CFR 41.8, 41.10

Comments (Question 3):

QUESTION 4

The plant has tripped due to a Large-Break LOCA and the crew has been successfully mitigating the event using the applicable EOP.

The following plant conditions exist six hours into the event:

- SIAS, CIAS, CSAS, MSI and SRAS have all been verified as completely actuated.
- CTMT pressure = 2.3 psig and lowering slowly.
- CTMT temperature = 220°F and lowering slowly.
- Reactor Vessel Level = 19% and stable.
- All other plant equipment is functioning as designed.

Then, at that time, a state wide blackout causes a loss of the RSST and the following conditions now exist:

- Facility 1 components are unavailable due to electrical fault on bus 24C and/or 24E (24E is presently aligned to 24C.)
- "B" EDG starts and its output breaker closes but the 2 Sequencer has failed at Sequence '0' and does NOT re-start any components.

Which ONE of the following lists the pumps that are procedurally required to be placed in service and why?

A. Service Water, RBCCW and HPSI pumps for core cooling.
Service Water and RBCCW pumps and CAR Fans for CTMT cooling.

B. Service Water, RBCCW and LPSI pumps for core cooling.
Service Water and RBCCW pumps and CAR Fans for CTMT cooling.

C. Service Water, RBCCW and HPSI pumps for core cooling.
Service Water, RBCCW, and CTMT Spray pumps for CTMT cooling.

D. Service Water, RBCCW and LPSI pumps for core cooling.
Service Water, RBCCW, and CTMT Spray pumps for CTMT cooling.

K&A Rating: 011 Large Break LOCA with Generic 2.4.9 (3.8,4.2)

K&A Statement: Knowledge of low power / shutdown implications in accident (e.g. LOCA or loss of RHR) mitigation strategies.

Key Answer: **A**

Justification (Question 4):

A. **Correct:** SW is the heat sink to RBCCW. RBCCW is the heat sink to the RCS because vessel level is too low to use the SG's as a heat sink. HPSI is required for flow through the core because LPSI cannot be used during sump Recirc. Present CTMT pressure and time dictate that CAR fans be used for CTMT cooling, not CTMT Spray.

B. **Incorrect:** In sump recirc (SRAS) the LPSI pumps are not used for RCS or core cooling.

C. **Incorrect:** With CTMT pressure less than 7 psig, CTMT spray would be secured by procedure.

D. **Incorrect**: In sump recirc (SRAS) the LPSI pumps are not used for RCS or core cooling.

References: EOP-2532, St, 5, 13, 22, 23 and 60. Student Ref: NONE

Learning Objective:

Question Source: Bank Q ID 8000002

Question History: MS2 2009 NRC Exam

Cognitive Level: Memory/Fundamental Knowledge:
Comprehensive/Analysis: X

10CFR55: CFR 41.7

Comments (Question 4):

QUESTION 5

In response to alarms, the following data for "A" Reactor Coolant Pump (RCP) was recorded on Attachment 7 of OP-2301C, Reactor Coolant Pump Operation.

Attachment 7
RCP Estimated Seal Stage Failure Rate Worksheet
(Sheet 1 of 1)

Affected RCP: A

Parameters		DATA		
Data acquisition time	(Time)	0000	0800	2400
RCS pressure	(A)	2250	2250	2250
Middle seal pressure	(B)	1390	1240	790
Upper seal pressure	(C)	545	250	250
Vapor seal pressure	(D)	60	60	60

Based on the data, which of the following correctly describes the failure and degradation status of the seal stages on this RCP?

A. The upper seal has failed. The middle seal has degraded.

B. The upper seal has failed. No other seal has failed or degraded.

C. The middle seal has failed. The upper seal has degraded.

D. The middle seal has failed. No other seal has failed or degraded.

K&A Rating: 015/017 RCP Malfunctions AK3.02 (3.0, 3.5)

K&A Statement: AA2.01 Ability to determine and interpret the following as they apply to the Reactor Coolant Pump Malfunctions (Loss of RC Flow): Cause of RCP failure

Key Answer: **A**

Justification (Question 5):

A. **Correct:** By 0800 the upper seal has failed (stage d/p at 190 psid) and at that point the middle seal begins to degrade (stage pressure 160 psig lower than nominal 1400 psi). By 2400 the seal conditions meet shutdown requirements of 2301C section 4.15.

B. **Incorrect:** The middle seal is degrading.

C. **Incorrect:** Opposite of what is actually happening.

D. **Incorrect**: The middle seal is degrading.

References: OP-2301C Section 4.15, Attachments 4, 5 Student Ref: NONE

Learning Objective: MB 01955

Question Source: Bank Q ID 88010

Question History: None

Cognitive Level: Memory/Fundamental Knowledge:
Comprehensive/Analysis: X

10CFR55: CFR 41.3

Comments (Question 5): A seal stage is considered failed when d/p across that stage is <200 psid AND RCS pressure is between 2200 and 2300 psia. A stage is considered degraded if stage pressure deviates from nominal values by 150 psig. Nominal stage pressures are as follows:

- Middle Seal 1,400 to 1,600
- Upper Seal 600 to 800
- Vapor Seal 60 to 90

QUESTION 6

Given the following conditions:

- A loss of all charging flow has occurred due to failure of all charging pumps
- The reactor has been tripped
- AOP 2512, Loss of All Charging and EOP 2526, Reactor Trip Recovery are in progress

Which of the following is the procedurally required action to ensure adequate shutdown margin while performing the stated procedures?

A. Maintain Tcold above 530°F while charging is restored

B. Initiate Emergency Boration by alternate means

C. Commence cooldown and inject with HPSI

D. Initiate SIAS at 10% pressurizer level

K&A Rating: 022AK3.02 (3.5, 3.8)

K&A Statement: Knowledge of the reasons for the following responses as they apply to the loss of RCS makeup: Actions contained in SOPs and EOPs for RCPs, loss of makeup, loss of charging, and abnormal charging

Key Answer: **C**

Justification (Question 6):

A. **Incorrect:** Pressurizer level drops due to RCP bleedoff. The plant must be depressurized to inject.
Plausible: Maintain hot standby avoids positive reactivity due to cooldown

B. **Incorrect:** There are no available means of boron injection.
Plausible: The applicant may not know this.

C. **Correct**

D. **Incorrect:** SI is not required.
Plausible: Rx trip is required at 10% below programmed level; applicant may remember the number but not the context.

References: AOP 2512, Loss of All Charging, Rev 001-04 Student Ref: NONE
A-12-01C ppt

Learning Objective:

Question Source: New

Question History: New

Cognitive Level: Memory/Fundamental Knowledge:
Comprehensive/Analysis: X

10CFR55: CFR 41.10

Comments (Question 6):

QUESTION 7

A LOCA has occurred. SRAS has actuated. HPSI Pumps "A" and "C" are running. RCS pressure is 870 psia with the following HPSI indications:
:

- HPSI injection is fluctuating between 100 and 200 gpm total flow
- HPSI pump amps are fluctuating

Which of the following is a possible cause of these indications and an action specified IAW EOPs to address that cause?

A. High RCS pressure is impeding HPSI flow; stop one HPSI pump and establish stable conditions for the remaining pump.

B. Containment sump suction blockage is occurring; align HPSI suction to the RWST.

C. High RCS pressure is impeding HPSI flow; throttle HPSI and establish stable operating conditions for the HPSI pumps.

D. Containment sump suction blockage is occurring; stop one HPSI pump for equipment preservation.

K&A Rating: 025AK2.05 (2.6, 2.6)

K&A Statement: Knowledge of the interrelations between the Loss of RHR System and the following: Reactor building sump.

K&A Justification: Post event RHR function is HPSI in recirc mode, LPSI shutdown; "RHR System" is interpreted as the system providing the RHR function using the containment sump.

Key Answer: **B**

Justification (Question 7):

A. **Incorrect:** Conditions indicate sump strainer clogging. HPSI pumps are at shutoff head at 1280 psig. HPSI flow should be approximately 600 gpm at the given pressure.
Plausible: Procedure addresses high RCS pressure as a possible condition, action is correct for that condition.

B. **Correct:** HPSI flow is significantly lower than expected for current RCS pressure. The fluctuating low flow and fluctuating amps are consistent with sump clogging. EOP 2540C1 (IC-2), Step 16 Contingency Actions directs operators to align HPSI suction to RWST if unable to maintain sump recirc (i.e. inadequate recirc flow rate) and if RWST inventory is available.

C. **Incorrect:** Conditions indicate sump strainer clogging and HPSI pump flow should be greater than 200 gpm at the given pressure.
Plausible: Action is correct for that condition provided in the first part of the distractor.

D. **Incorrect:** Action incorrect.
Plausible: Action seems reasonable for a loss of suction issue.

References: EOP 2540C IC-2
ECCS LP ECC-01-C Rev 4

Student Ref: NONE

Learning Objective:

Question Source: New

Question History: New

Cognitive Level: Memory/Fundamental Knowledge:
Comprehensive/Analysis: X

10CFR55: CFR 41.10

Comments (Question 7):

QUESTION 8

The plant was operating at 100% when a reactor trip occurred.

Given the following conditions and events:

- 2 charging pumps are operating.
- 3 CEAs failed to insert.
- Boric Acid Isolation, 2-CH-514, will NOT open.
- Gravity Feed Isolations, 2-CH-508 and 509, will NOT open.

Which ONE of the following statements correctly describes the procedure and required actions to be taken?

A. Continue EOP-2541 "Appendix 3 - Emergency Boration" and emergency borate from the RWST.

B. Continue EOP-2525, "Standard Post Trip Actions" to determine if any other problems exist. Maintain Tavg at or above 500°F.

C. Refer to EOP-2540A, "Functional Recovery of Reactivity Control" and emergency borate using success path RC-3 (Boration using SI).

D. Refer to AOP-2558, "Emergency Boration" and emergency borate for at least 2 hours by opening Boric Acid Flow Control Valve, 2CH-210Y.

K&A Rating: 029 ATWS 2.1.23 (4.3)

K&A Statement: 2.1.23 Ability to perform specific system and integrated plant procedures during all modes of plant operation.

Key Answer: A

Justification (Question 8):

A. **Correct:** EOP 2525 directs the applicant to emergency borate using EOP 2541 appendix 3. There is no time limit provided under emergency conditions. This boration path uses the charging pumps for injection

B. **Incorrect:** If the candidate thinks that stuck 3 CEAs will not pose a problem as long as Tavg remains above 500 F, this answer is plausible. However, EOP 2525 directs the operator to emergency borate using EOP 2541 appendix 3.

C. **Incorrect:** If the candidate thinks that a failure of the CVCS primary emergency boration flow path is justification for referring to EOP 2540A, they could possibly select this answer. This is the correct success path if RC-1 (CEA Insertion) and RC-2 (Boration using CVCS) are not available. This success path uses the SI pumps not the charging pumps. Note that RC-2 directs the operator to borate using EOP 2541 Appendix 3.

D. **Incorrect:** If the candidate thinks that referring to the AOP is permissible under these circumstances, the flow path will provide boric acid flow to the RCS. The thumb rule requirement in the AOP is to borate 1.5 hours for each additional CEA stuck beyond 1. In this case, if the AOP was used, the requirement to borate would be 3 hours not 2 hours. The applicant would select 2 hours if they used the thumb rule for 3 CEAs stuck out and neglected to recall that one of the CEAs is already considered stuck out in the safety analysis.

References: EOP 2525 Student Ref: NONE

Learning Objective:

Question Source: MS2 Bank #54226

Question History: MS2 2005 NRC Exam

Cognitive Level: Memory/Fundamental Knowledge:
Comprehensive/Analysis: X

10CFR55: CFR 41.10

Comments (Question 8):

QUESTION 9

A SGTR has occurred in #1 SG concurrent with a loss of off-site power.

Initial cooldown on both RCS loops has been completed and #1 SG has been completely isolated.

What parameter and value would indicate that the RCS cooldown was too aggressive and that the loops had become uncoupled?

A. #1 loop Tc greater than or equal to 5° F lower than #2 loop Tc.

B. #1 loop Th greater than or equal to 10° F higher than #2 loop Th.

C. #1 loop delta-P greater than or equal to 5 psi lower than #2 loop delta-P.

D. #1 SG pressure greater than or equal to 20 psi higher than #2 SG pressure.

K&A Rating: 038 SGTR 2.1.7 (4.4)

K&A Statement: 2.1.7 Ability to evaluate plant performance and make operational judgments based on operating characteristics, reactor behavior, and instrument interpretation.

Key Answer: **B**

Justification (Question 9):

A. **Incorrect:** Once #1 SG is completely isolated, #1 loop Tc will remain higher

B. **Correct:** Uncoupling of the two loops is indicated by failure of Th in the loop with the isolated steam generator to track Th in the operating loop. Hot leg temperatures differing by more than 10°F is an indication that the isolated steam generator is limiting RCS cooldown and depressurization. (2nd note in note block, EOP-2534, Pg 26 of 67).

C. **Incorrect:** Natural circ delta-P is ~1/2 # or less in loop #2, can't get 5# less.

D. **Incorrect:** Isolated SG pressure remains elevated as part of success strategy to minimize pri-to-sec leakage

References: EOP 2534, Rev 026 Student Ref: NONE

Learning Objective:

Question Source: MS2 Bank #1000045

Question History: MS2 2005 NRC Exam

Cognitive Level: Memory/Fundamental Knowledge:
Comprehensive/Analysis: X

10CFR55: CFR 41.5

Comments (Question 9):

QUESTION 10

The plant was operating at 100% power when a steam leak occurred. The crew is taking actions in EOP 2536, Excess Steam Demand Event, with the following conditions and events in sequence:

- The Reactor was manually tripped
- Main Steam Isolation has actuated
- Safety Injection Actuation Signal has occurred
- Reactor Coolant Pumps have been secured
- Tcold and S/G pressure on Loop 2 are decreasing much faster than Tcold and S/G pressure on Loop 1
- Auxiliary Feedwater Actuation Signal has NOT actuated
- Containment pressure and temperature are increasing

Which of the following actions must be taken on Panel C-05 in accordance with EOP 2536, Excess Steam Demand Event to prevent feeding the most affected S/G?

A. Place the aux feed isolation air assisted check valve, FW-12B to CLOSE.
B. Place both auxiliary feed OVERRIDE/MAN/START RESET handswitches in PULL-TO-LOCK.
C. Place both auxiliary feed regulating valve controllers in MANUAL and CLOSED.
D. Place the aux feed regulating valve, FW-43B, RESET/NORM/OVRD handswitch momentarily to OVRD.

K&A Rating: EPE E05 Steam Line Rupture-Excessive Heat Transfer, EK2.2 (3.7, 4.2)

K&A Statement: Knowledge of the interrelations between the (Excess Steam Demand) and the following: Facility's heat removal systems, including primary coolant, emergency coolant, and the decay heat removal systems, and relations between the proper operation of these systems to the operation of the facility.

Key Answer: **B**

Justification (Question10):

A. **Incorrect:** The air assisted check valves are designed to provide containment isolation in the event of an accident inside containment. These valves are 6 inch swing checks that will prevent a reversal of flow. Normal AFW flow will open the valves.
Plausible: EOP Step (EOP-2536, Step 9.L, Pg 12 of 62) directs closing this valve in the event of a steam line break. Applicant may think that closing this valve will prevent AFW from reaching the most affected S/G.

B. **Correct:** The AFW feed regulating valves will be closed until AFAS is actuated. Placing these switches in PULL-TO-LOCK prior to AFAS blocks the automatic initiation signal that opens the AFW FRVs. (AFW-00-C, Pg 19 of 56).

C. **Incorrect:** An auto actuation signal will open the AFW feed regulating valves even if the manual loading stations are in MANUAL and CLOSED.
Plausible: applicant may assume that the valve will not automatically open when in MANUAL.

D. **Incorrect**: The No. 2 S/G AFW FRV's RESET NORM OVRD switch has no function until an AFAS occurs. Manipulating this switch now will not prevent feeding the most affected S/G if AFAS occurs after the RESET NORM OVRD was momentarily (spring return to normal) in OVRD.
Plausible: applicant may think that once overridden, the valve will not react to an auto actuation signal until this same switch is taken to RESET.

References: EOP-2536, Step 9 Student Ref: NONE

Learning Objective:

Question Source: Bank Q ID 71648

Question History: MS2 2005 NRC Exam

Cognitive Level: Memory/Fundamental Knowledge:
Comprehensive/Analysis: X

10CFR55: CFR 41.7

Comments (Question 10):

QUESTION 11

The plant is operating normally at 100% power when a loss of feedwater occurs. The crew has entered EOP 2537, Loss of All Feedwater. The only source of feed flow is the "A" Condensate Pump, which is running. A flowpath has been established from the hotwell to both Steam Generators (S/Gs). Other than the plant status described below, all other plant systems and components are operating normally. The following conditions exist:

- #1 S/G wide range level = 123"
- #2 S/G wide range level = 98"
- #1 S/G pressure = 665 psia
- #2 S/G pressure = 650 psia
- RC-402, Power Operated Relief Valve (PORV) is unavailable
- S/G depressurization at the maximum controllable rate has been initiated

Regarding Once-Through-Cooling (OTC), which of the following describes the expected action in accordance with EOP 2537?

A. Initiate OTC BEFORE either S/G lowers to 70" wide range.

B. Do NOT initiate OTC, even if both S/Gs are less than 70" wide range, if condensate flow is greater than 125 gpm to each S/G.

C. Do NOT initiate OTC UNTIL both S/Gs are less than or equal to 70" wide range.

D. Initiate OTC AFTER either S/G lowers to 70" wide range.

K&A Rating: EPE E06 EA 1.3 Loss of Main Feedwater

K&A Statement: Ability to operate and / or monitor the following as they apply to the (Loss of Feedwater): Desired operating results during abnormal and emergency situations. (3.2, 4.0)

Key Answer: **A**

Justification (Question 11):

A. **Correct:** Once through cooling should be initiated prior to steam generator wide range level reaching 70 inches if less than two trains of PORVs available.

B. **Incorrect:** Adequate RCS Heat Removal is not determined by condensate flow rate.
Plausible: Adequate secondary heat removal is restored by feeding the S/Gs.

C. **Incorrect:** With any one S/G <70 inches and level not restoring, OTC should be initiated but crew should not wait for S/G wide range level to drop below 70 inches because only 1 PORV train is available in order to raise the likelihood of success of OTC, it should be initiated immediately.
Plausible: OTC is not desired if S/G heat sink is available. Logical that one would want to wait to initiate until both S/Gs lower to 70 inches wide range.

D. **Incorrect**: Because 1 PORV train is unavailable, operators should not wait for inadequate RCS Heat Removal which is determined by at least one S/G < 70 inches and level not restoring and heat removal via OTC should be established.
Plausible: The procedure directs initiation with one S/G at 70 inches.

References: EOP-2537, Rev 022, NOTE before step 5. Student Ref: NONE

Learning Objective: MB 05960

Question Source: Modified Bank Q ID 56617

Question History: MS2 2002 Audit

Cognitive Level: Memory/Fundamental Knowledge:
Comprehensive/Analysis: X

10CFR55: CFR 41.10

Comments (Question 11):

QUESTION 12

EOP 2530 Station Blackout (SBO) directs operators to perform DC load reduction for Vital Battery 201A if either of its battery chargers is NOT expected to be restored within ___(1)___ of a SBO event and involves de-energizing ___(2)___.

A. (1) 1 hour
   (2) Inverter 2-INV-1

B. (1) 8 hours
   (2) Inverter 2-INV-1

C. (1) 1 hour
   (2) Inverter 2-INV-3

D. (1) 8 hours
   (2) Inverter 2-INV-3

K&A Rating: 000055 Station Blackout EA 1.04 (3.5)

K&A Statement: Ability to operate and monitor the following as they apply to a Station Blackout: Reduction of loads on the battery.

Key Answer: **C**

Justification (Question 12):

A. **Incorrect:** Inverter 1 is not de-energized due to the need to keep Vital Instrument Panel VA-10 energized, even though this vital instrument panel is backed up by an inverter powered by the turbine battery. (Right time, wrong load)
Plausible: Inverters 1 and 3 are powered off the same vital battery bus.

B. **Incorrect:** During a SBO, DC load reduction should occur on the associated bus if either battery charger cannot be restored within 1 hour of SBO event initiation. Inverter 1 is not de-energized; see reason in justification above. (Wrong time, wrong load).
Plausible: Common misconception: 8 hours is the SBO coping time which assumes that DC load reduction occurred within 1 hour of event.

C. **Correct:** During a SBO, DC load reduction should occur for vital battery if either of its battery chargers cannot be restored within 1 hour of SBO event initiation. Inverter 3 is de-energized. (Right time, right load).

D. **Incorrect**: During a SBO, DC load reduction should occur on the associated bus if either battery charger cannot be restored within 1 hour of SBO event initiation. (Wrong time, right load).
Plausible: Common misconception: 8 hours is the SBO coping time which assumes that DC load reduction occurred within 1 hour of event.

References: EOP 2530, Step 12; EOP 2541 Appendix 28 Steps 3 & 4 Student Ref: NONE

Learning Objective: MB 05912

Question Source: New

Question History:

Cognitive Level: Memory/Fundamental Knowledge: X
Comprehensive/Analysis:

10CFR55: CFR 41.8

Comments (Question 12):

QUESTION 13

A cooldown is in progress following a sustained loss of offsite power. The PPO is directed to cool the pressurizer while maintaining adequate subcooling. The following conditions exist:

- Highest RCS loop average temperature is 445.0°F
- Highest Core Exit Thermocouple temperature is 460.0°F
- Highest RCS cold leg temperature is 430.1°F
- Pressurizer pressure is 900 psia

In accordance with the EOPs, which of the following is the MINIMUM permissible pressure for the current conditions to maintain adequate subcooling?

A. 622 psia

B. 467 psia

C. 402 psia

D. 540 psia

K&A Rating: 000056 Loss of Offsite Power AK1.04 (3.1, 3.2)

K&A Statement: Knowledge of the operational implications of the following concepts as they apply to Loss of Offsite Power: Definition of saturation conditions, implication for the systems

Key Answer: **A**

Justification (Question 13):

A. **Correct:** Saturation pressure for 490°F which is CET max temp plus 30 degrees of subcooling.

B. **Incorrect:** Distractor: Psat for Tsat of 460°F
Plausible: Applicant could establish a margin from the given CET temperature and forget about the 30 degrees of subcooling required by EOP 2541 Appendix 2, RCS P/T.

C. **Incorrect:** Distractor: Psat for Tsat of 445.0°F
Plausible: Applicant could establish a margin from the RCS average temperature and forget that during natural circulation, CET is the most accurate and thus preferred indication of RCS temperature.

D. **Incorrect**: Distractor: Psat for Tsat 475°F
Plausible: Applicant could establish a 30 degree subcooling margin from the RCS average temperature instrument reading, forgetting that during natural circulation, CET is the most accurate and thus preferred indication of RCS temperature.

References: EOP 2528, Step 10, 11; EOP 2541 Appendix 2 Student Ref: Steam Tables

Learning Objective: MB-05861

Question Source: Bank Question ID 71607

Question History:

Cognitive Level: Memory/Fundamental Knowledge:
Comprehensive/Analysis: X

10CFR55: CFR 41.5

Comments (Question 13): The distractors are different in value from the original bank question but changes do not meet the "modified question" criteria in ES-401.

QUESTION 14

Initial plant conditions:

- The plant is operating steady state at 100% power
- "C" Charging pump is operating
- "A" Charging pump is in standby
- "B" Charging pump is in PULL TO LOCK and aligned to Facility 2
- Charging Pump Selector Switch, 2HS-4868, is in P1 & P2 position
- Pressurizer Level Controllers, LIC-110X and LIC-110Y are in AUTO REMOTE
- Pressurizer Level Control HS-110 is selected to Channel "X"

A plant transient condition occurs. The reactor operator observes multiple alarms and makes an initial report of the following:

- INVERTER INV-1 TROUBLE (C-08) alarm is actuated
- Pressurizer Pressure Indicator PI-102A reads 1500 psia
- Power Range Power Indicator JI-005 reads 0%

With NO operator action, which of the following choices correctly describes status of charging pumps and letdown flow approximately 10 seconds after the plant transient condition occurs?

A. ONLY ONE of the charging pumps is running.
Letdown Flow Instrument FI-202 indicates approximately 40 gpm.

B. ONLY ONE of the charging pumps is running.
Letdown Flow Instrument FI-202 indicates approximately 0 gpm.

C. TWO of the charging pumps are running.
Letdown Flow Instrument FI-202 indicates approximately 28 gpm.

D. TWO of the charging pumps are running.
Letdown Flow Instrument FI-202 indicates approximately 0 gpm.

K&A Rating: 000057 Loss of Vital AC Inst. Bus AA1.02 (3.8, 3.7)

K&A Statement: Ability to operate and / or monitor the following as they apply to the Loss of Vital AC Instrument Bus: Manual control of PZR level

Key Answer: **C**

Justification (Question 14):

A. **Incorrect:** C Charging pump is running but letdown flow is not at 40 gpm. Letdown flow is reduced to minimum as a result of the LIC-100X Pressurizer Level Channel X controller failing low.
Plausible: The applicant may not think letdown flow is affected by the loss of VA-10.

B. **Incorrect:** C Charging pump is running but letdown flow is not 0 gpm. Letdown flow is reduced to minimum as a result of the LIC-100X Pressurizer Level Channel X controller failing low.
Plausible: Applicant may confuse Loss of VA-10 with the loss of Non Vital Instrument Bus VR-11, which would cause letdown to go to 0 gpm.

C. **Correct:** Conditions provided are indicative of a loss of VA-10. Both A and C Charging pumps are running as a result of LIC-100X Pressurizer Level Channel X failing low. Letdown is reduced to the minimum flow setting of the letdown limiter (28 gpm) as part of automatic pressurizer level response.

D. **Incorrect:** Both A and C Charging pumps are running. However letdown flow is reduced to minimum, not lowered to 0 gpm.
Plausible: Applicant may confuse Loss of VA-10 with the loss of Non Vital Instrument Bus VR-11, which would cause letdown to go to 0 gpm.

References: AOP 2504C Rev 003-09 Student Ref: NONE

Learning Objective: MB 05737

Question Source: New

Question History:

Cognitive Level: Memory/Fundamental Knowledge:
Comprehensive/Analysis: X

10CFR55: CFR 41.7

Comments (Question 14):

QUESTION 15

Given the following conditions:

- A plant cooldown is in progress in accordance with OP 2207, Plant Cooldown
- The Shutdown Cooling (SDC) system is operating concurrent with Reactor Coolant Pumps
- A loss of Vital 125 VDC Instrument Panel DV10 has occurred.

Which one of the following will result from the loss of DV10?

A. "B" RBCCW HX RBCCW outlet temperature will rise (C-06/7, TI-6032)

B. "B" RBCCW HX service water flow will lower (C-06/7, FI-6434)

C. SDC return temperature will lower (C-01, T351Y)

D. SDC system flow will rise (C-01, FIC-306)

K&A Rating: 058 Loss of DC Power AA1.03 (3.1, 3.3)

K&A Statement: Ability to operate and / or monitor the following as they apply to the Loss of DC Power: Vital and battery bus components

Key Answer: **D**

Justification (Question 15):

A. **Incorrect:** 2-SW-8.1B, "B" RBCCW HX Temperature Control Valve (TV6307), fails OPEN. HX outlet temperature will lower.
Plausible: Valve fails on loss of DV-10 but open, not closed.

B. **Incorrect:** 2-RB-13.1A, "A" SDC HX RBCCW Outlet Isolation (HV6050), fails OPEN. HX outlet flow will rise.
Plausible: Valve fails on loss of DV-10 but open, not closed.

C. **Incorrect:** 2-SI-657 SDC HX Flow Control Valve fails CLOSED. SDC system goes to minimum flow through the SDC heat exchangers because 657 fails closed but maximum total SDC flow because 306 fails open. SDC return temperature will rise due to lack of HX cooling and increased HX bypass flow.
Plausible: Valve fails on loss of DV-10 but closed, not open.

D. **Correct:** 2-SI-306, SDC Total Flow Control Valve fails OPEN. Total SDC flow will rise.

References: AOP 2506A Rev 002-05 Student Ref: NONE

Learning Objective: MB 05727

Question Source: Modified Bank ID 71660

Question History:

Cognitive Level: Memory/Fundamental Knowledge:
Comprehensive/Analysis: X

10CFR55: CFR 41.7

Comments (Question 15):

QUESTION 16

The plant was in MODE 1 at 100% power when a Loss of Normal Power and a Loss of Coolant Accident occurred. The reactor tripped and SIAS, EBFAS and CIAS actuated. The crew entered EOP 2532 Loss of Coolant Accident.

One hour later, while performing a cooldown, the following occurs:

- DIESEL GEN 12U TROUBLE annunciator actuates on C-08
- PEO reports the SERVICE WATER FLOW LOW alarm actuated on "A" Diesel Generator Alarm Panel C-38 and also reports diesel service water flow is < 1 gpm and steady
- Offsite power has NOT been restored

Assuming service water cannot be restored, IAW the SERVICE WATER FLOW LOW alarm response procedure, the diesel must be tripped within _____ minute(s).

A. 10

B. 5

C. 3

D. 1

K&A Rating: 000062 Loss of Nuclear Service Water AA2.06 (2.8/3.1)

K&A Statement: AA2.06 Ability to determine and interpret the following as they apply to the Loss of Nuclear Service Water (SWS): The length of time after the loss of SWS flow to a component before that component may be damaged.

Key Answer: **C**

Justification (Question 16):

A. **Incorrect:** The ARP directs action within 3 minutes, not 10 minutes.
Plausible: 10 minutes is a frequently used time limit. Example: LPSI motor starting duty limit of 10 minutes running between subsequent starts.

B. **Incorrect:** The ARP directs action within 3 minutes, not 5 minutes.
Plausible: 5 minutes is a frequently used time limit. Example: AOP-2564 Loss of RBCCW RCP trip criterion – loss of RBCCW for >5 minutes.

C. **Correct:** The ARP states, "IF all service water flow is lost and flow cannot be established within 3 minutes, manually TRIP diesel water temperature will rise as a result of the loss of service water flow.

D. **Incorrect:** The ARP directs action within 3 minutes, not 1 minute
Plausible: 1 minute is a plausible time limit value. It would be reasonable to assume the vendor would not recommend running the diesel generator fully loaded for more than a minute with no service water.

References: SWS-00-C Rev 7 Change 1, Student Ref: NONE
EDG-000-C Rev 7, Change 6 p.93, ARP 2591A-004 Rev 001-04,
ARP 2591A-009 Rev 001-05, ARP 2591A-035 Rev 001-01

Learning Objective: MB-02449

Question Source: NEW

Question History:

Cognitive Level: Memory/Fundamental Knowledge: X
Comprehensive/Analysis:

10CFR55: CFR 43.5

Comments (Question 16):

QUESTION 17

Which of the following choices indicates a manual reactor trip is required per AOP-2563, Loss of Instrument Air, during a loss of Instrument Air at 100% power?

A. Letdown is isolated. VCT level is 69%.

B. Instrument Air header pressure is 84 psig and lowering.

C. Containment Instrument Air Isolation Valve IA-27.1 goes closed and will not re-open.

D. FRV position is constant. SG#1 level is 54% and lowering. SG#2 level is 71% and rising.

K&A Rating: 065 Loss of Instrument Air AK3.03 (2.9, 3.4)

K&A Statement : Knowledge of the reasons for the following responses as they apply to the Loss of Instrument Air: Knowing effects on plant operation of isolating certain equipment from instrument air

Key Answer: **D**

Justification (Question 17):

A. **Incorrect:** With letdown isolated, plant operation may continue and operators will control pressurizer level using charging pumps.
Plausible: During a loss of Instrument Air, VCT level will lower. At VCT level <70% operator action is required to switch charging suction to the RWST.

B. **Incorrect:** Reactor Trip criteria are met when Instrument air header pressure is 80 psig or less.
Plausible: Applicant could think that trip criteria is met when Instrument Air pressure is <85 psig. If instrument air header pressure falls below 85 psig, station air valves, SA10.1 and SA-11.1 automatically open and close respectively.

C. **Incorrect:** Plant operation may continue with instrument air to containment isolated because all safety related equipment that uses instrument air will fail in the safety position.
Plausible: Applicant may believe that if instrument air is isolated to containment then many safety related valves cannot function.

D. **Correct**: Per the AOP discussion section, "the reactor is tripped immediately when IA pressure lowers to the point where control of important systems is questionable. This may be indicated by system response or…". AOP Step 6.4 directs manually tripping the reactor if SG levels cannot be maintained between 55%-75%. Given conditions are indicative of the Feedwater Regulating Valves failing AS-IS on a loss of instrument air. Although OP-2385 provides direction for SGFP speed adjustment to control level, the divergent level trends of the SGs preclude effective level control with SGFP speed. Speed adjustment in either direction would adversely impact level in one or the other SG.

References: AOP 2563, Rev 009-07 Step 6.4
OP-2385, Rev 010-08

Student Ref: None

Learning Objective: MB-05702

Question Source: Bank Question ID 71785

Question History:

Cognitive Level: Memory/Fundamental Knowledge:
Comprehensive/Analysis: X

10CFR55: CFR 41.5, 41.10

Comments (Question 17):

QUESTION 18

The Control Room is notified by CONVEX of degrading voltage condition. The crew has entered AOP 2580 Degraded Voltage and is carrying out actions. The Unit Supervisor directs the BOP operator to raise MVARs. While the BOP is raising MVARs, the MAXIMUM EXCITATION LIMIT annunciator alarms on C-06/7. The operator stops raising MVARs and reports the alarm to the Unit Supervisor.

Assuming NO further operator action, which of the following correctly describes a potential or actual consequence?

A. Generator power factor (PF) could become leading which is a prohibited condition and could result in generator damage.

B. The VOLTAGE REG RECTIFIER OVERCURRENT alarm will actuate and the red light above CS-43, AC/DC REG TRANS, will be illuminated.

C. Engineered Safety Function (ESF) components could be damaged as a result of high motor winding temperatures.

D. The EXCITER FIELD BREAKER TRIP alarm will actuate and the turbine will trip on a loss of generator excitation.

K&A Rating: 000077 Generator Voltage & Electric Grid Disturbances AK2.02 (3.1, 3.3)

K&A Statement: AK2.02 Knowledge of the interrelations between Generator Voltage and Electric Grid Disturbances and the following: Breakers, relays

Key Answer: **D**

Justification (Question 18):

A. **Incorrect**: Raising MVARs on the unit causes the generator to become more lagging not leading.
Plausible: Applicant could confuse leading and lagging power factors. There is a caution statement in OP 2204 Attachment 16 Generator Voltage Adjustment that warns against operation with a lagging power factor, CONVEX OI 6913 does not permit operating with reduced field current at a leading power factor (VARS in).

B. **Incorrect:** The voltage reg rectifier overcurrent could possibly actuate under maximum excitation conditions. However, actuation of the alarm would cause the voltage regulator to swap to manual, illuminating the green light above the control switch.
Plausible: Applicant could conclude that raising excitation will actuate the alarm and recognize the red indicator is normally lit and could conclude the alarm response requires operator manual action to shift the regulator to manual.

C. **Incorrect:** ESF components are at risk of winding damage due to high current as a result of the degraded grid voltage and NOT raising MVARs on the unit.
Plausible: Applicant could remember that the purpose of this AOP is to protect ESF components from damage due to high current.

D. **Correct:** IF excitation voltage is not reduced below the annunciator setpoint within 10 seconds, the exciter field breaker trips. A turbine trip occurs due to the loss of excitation.

References: AOP 2580 Rev 003-05, Step 3.9b, OP-2204 Att.16 Rev 025-06, ARP 2590E-223, Rev 00-01, ARP 2590E-218 Rev 00-0

Student Ref: None

Learning Objective: MB 05532

Question Source: NEW

Question History:

Cognitive Level: Memory/Fundamental Knowledge:
Comprehensive/Analysis: X

10CFR55: CFR 41.4, 41.5, 41.7, 41.10

Comments (Question 18):

QUESTION 19

Reactor power was lowered to 55% with Group 7 CEAs inserted to 155 steps for repairs to a Steam Generator Feed Pump.

Following repairs, a power escalation is in progress and the PPO begins to withdraw Group 7 CEAs in MANUAL SEQUENTIAL to raise power. The PPO releases the CEA Control Switch to respond to an expected alarm on Panel C-01. The PPO quickly depresses the CEDS "OFF" button, but NOT hard enough to actuate the contact. The PPO neglects to verify the CEDS "OFF" light lit. The withdraw contact on the control switch did NOT open when the switch was released. Group 7 CEAs continue to withdraw.

Assuming all systems respond to this event as designed and there is NO operator action, which of the following is a sequence of control room indications that will occur during this event?

A. RPS PRE TRIP alarm (C-04, AA-7)
High Linear Power pre-trips on RPS Channels A thru D
NIS HI PWR TRIP CH A, B, C, D alarms (C-04, CA-4/CB-4/DA-4/DB-4)
The reactor trips

B. RPS PRE TRIP alarm (C-04, AA-7)
High Linear Power pre-trips on RPS Channels A thru D
CEA WITHDRAW PROHIBIT alarm (C-04, AA-15)
Group 7 CEAs stop moving

C. RPS PRE TRIP alarm (C-04, AA-7)
High Pressurizer Pressure pre-trips on RPS Channels A thru D
CEA WITHDRAW PROHIBIT alarm (C-04, AA-15)
Group 7 CEAs stop moving

D. RPS PRE TRIP alarm (C-04, AA-7)
Thermal Margin / Low Pressure pre-trips on RPS Channels A thru D
TM-LP TRIP CH A, B, C, D alarms (C-04, CA-3/CB-3/DA-3/DB-3)
The reactor trips

K&A Rating: 000001 Continuous Rod Withdrawal Generic 2.4.46 (4.2, 4.2)

K&A Statement: Ability to verify that the alarms are consistent with the plant conditions.

Key Answer: **B**

Justification (Question 19):

A. **Incorrect:** A CEA Withdrawal Prohibit (CWP) would stop CEA withdraw once 2 of 4 High Power pre-trips are received. A CWP would prevent further CEA withdraw and prevent a reactor trip by limiting the contribution of the CEAs to the power increase.
Plausible: Applicant may believe that this event would cause a reactor trip on High Linear Power which shows protection during a continuous rod withdraw casualty.

B. **Correct:** RPS also causes a signal in the CEDS logic that prohibits further CEA withdrawal if 2/4 pre trips from TM/LP or High Power are received. This CEA Withdrawal Prohibit (CWP) signal tries to prevent a reactor trip by limiting the contribution of the CEAs withdrawal to a power increase.

C. **Incorrect:** Hi Pressurizer Pressure pre-trips do not trigger a CWP.
Plausible: Applicant may think that 2/4 High Pressurizer Pressure pre-trips trigger a CWP.

D. **Incorrect**: CEA motion would stop on 2/4 TM/LP pre-trips which trigger a CWP.
Plausible: Applicant may believe that this event would cause a reactor trip TM/LP which shows protection during a continuous rod withdraw casualty.

References: ARP 2590C Rev 005-01, OP2302A Rev 018-03 Attachment 5, OP2204 Rev 025-06 Att 14, CED-01-C LP R5C0
Student Ref:

Learning Objective: MB 02263

Question Source: New

Question History:

Cognitive Level:	Memory/Fundamental Knowledge:	
	Comprehensive/Analysis:	X

10CFR55: CFR 41.10

Comments (Question 19):

QUESTION 20

The unit is in MODE 1 with all rods out when CEA #39, a Group 7 CEA, falls into the core 10 steps and stops. CEA #39 will NOT move in response to motion demand signals. There are NO identified problems with CED or CEA position indication systems.

The crew has entered AOP 2556 CEA Malfunctions and has commenced a rapid down power in accordance with AOP 2575 Rapid Downpower. During the downpower, at 82% reactor power, a Local Power Density (LPD) pre-trip comes in on Channel B.

How should the crew proceed?

A. Continue the rapid downpower and trip the reactor when power is <30%.

B. Insert CEAs to maintain Axial Shape Index (ASI) within 0.05 axial shape units of Equilibrium Shape Index (ESI).

C. Trip the reactor from the current power level and perform SPTAs.

D. Continue the rapid downpower to be in MODE 3 within 6 hours from the time that CEA #39 became stuck.

K&A Rating: 000005 Inoperable/Stuck Control Rod AK1.01 (3.1, 3.8)

K&A Statement: Knowledge of the operational implications of the following concepts as they apply to Inoperable / Stuck Control Rod: Axial power imbalance

Key Answer: **C**

Justification (Question 20):

A. **Incorrect:** Because there is a LPD pre-trip on Channel C, AOP 2556 directs tripping the reactor immediately and not waiting for an automatic RPS trip as a result of ASI becoming more or less negative.
Plausible: Step 8.7 of AOP 2556 for an Untrippable CEA directs to trip the reactor at less than 30% power. If the LPD pre-trip had not occurred, this would be the correct course of action.

B. **Incorrect:** CEA group 7 may be used for ASI control only if all group 7 CEAs are available for insertion. CEA#39 is a Group 7 CEA and it is stuck, thus NOT available for insertion.
Plausible: ASI control is normally performed using Group 7 CEAs and according to OP2393 Core Power Distribution Monitoring and Control, *For power transients or plant conditions that deviate from the reactivity plan, MAINTAIN ASI as follows (not to interfere with event mitigation): ASI shall be controlled within 0.05 axial shape index units of the ESI or within the COLR limits, whichever is more limiting.*

C. **Correct:** Step 8.5 of AOP 2556 directs immediately tripping the reactor and performing SPTAs if one or more Local Power Density pre-trip alarm actuates.

D. **Incorrect**: Because there is a LPD pre-trip on Channel C, AOP 2556 directs tripping the reactor immediately.
Plausible: Performing a rapid downpower to Mode 3 within 6 hours is the initial direction in AOP 2556 Section for Untrippable CEA.

References: AOP 2556 Rev 016-10 Steps 8.2, 8.5, 8.7, OP 2393 Rev 15-0, Step 4.1.9
Student Ref: None

Learning Objective:

Question Source: NEW

Question History:

Cognitive Level: Memory/Fundamental Knowledge:
Comprehensive/Analysis: X

10CFR55: CFR 41.8, 41.10

Comments (Question 20):

QUESTION 21

The plant is in MODE 2 and a reactor startup is in progress. Shutdown Banks A and B, and Regulating Groups 1, 2, and 3 CEAs are fully withdrawn. Group 4 CEAs are at 90 steps withdrawn when the Channel "A" Wide Range Nuclear Instrument (WRNI) suddenly fails high.

Which of the following describes expected effects of the failure?

A. Channel "A" WRNI is NOT OPERABLE.
Startup may continue as long as all other WRNIs are OPERABLE.
CEAs will respond to inward and outward motion demand.

B. High Linear Power and TM/LP pre-trips and trips occur on RPS Channel "A."
The SG Low Pressure trip is NOT automatically enabled.
CEAs will NOT respond to inward and outward motion demand.

C. High Linear Power pre-trip and trip occur on RPS Channel "A".
The TM/LP trip is automatically enabled.
CEAs will respond to inward and outward motion demand.

D. Multiple Regulating Group Power Dependent Insertion Limit alarms actuate on C-04.
A Continuous Motion Inhibit (CMI) occurs.
CEAs will NOT respond to inward and outward motion demand.

K&A Rating: 000032 Loss of Source Range NI AK3.01 (3.2, 3.6)

K&A Statement: Knowledge of the reasons for the following responses as they apply to the Loss of Source Range Nuclear Instrumentation: Startup termination on source-range loss

Key Answer: **D**

Justification (Question 21):

A. **Incorrect:** Startup cannot continue in the current state because CEAs will not move because the Channel "A" Level 2 bistable tripped. This bistable enables the CEAPDS PDIL Continuous Motion Inhibit. A CMI occurs because several groups of CEAs are below their Transient Insertion Limit.
Plausible: Technical Specification 3.3.1 Reactor Protection Instrumentation requires 3 Power Level Hi channel functional units to be operable in Modes 1, 2 and 3.

B. **Incorrect:** SG low pressure trip is automatically enabled above 800 psia SG pressure.
Plausible: Channel "A" TM/LP and Hi Linear Power trips occur. Applicant may not remember that the PDIL CMI is enabled when any WRNI level 2 bistable trips at 10E-4% power.

C. **Incorrect:** CEA motion is affected because a CMI occurs due to Regulating Group CEAs not above the Transient Insertion Limit.
Plausible: A Hi Linear Power trip on Channel "A" occurs and the TM/LP trip is enabled. Applicant may recognize these two facts but not remember that all 4 WRNI channel Level 2 bistables must be below their respective reset point for the CEAPDS PDIL CMI to be bypassed. If 1 out of 4 Level 2 bistables is tripped, the CEAPDS PDIL CMI is enabled.

D. **Correct**: A WRNI channel failing high or de-energizing at low power would automatically remove the block on the CEAPDS PDIL and PPDIL. The existing low height of the CEA groups activates an erroneous CMI. The CEAPDS PDIL CMI is enabled when the "LVL 2" bistable is tripped at $\geq$ 10E-4% power. All 4 WRNI channel "LVL 2" bistables must be below their respective reset point for the CEAPDS PDIL CMI to be bypassed. The level 2 bistable is tripped on Channel "A" due to WRNI Channel "A" failing high. If the lowest CEA in a group is within 9 steps of the Technical Specification Transient Insertion Limit for the existing power level, a Pre-Power Dependent Insertion Limit (PPDIL) alarm will actuate. If the CEA inserts 5 steps further, such that it is 4 steps above the Transient Insertion Limit, the PDIL alarm will actuate and a CMI on all 61 CEAs will occur.

References: Unit 2 Technical Specifications, CED-01-C LP R5C0
Student Ref: None

Learning Objective:

Question Source: NEW

Question History:

Cognitive Level:	Memory/Fundamental Knowledge:	
	Comprehensive/Analysis:	X

10CFR55: CFR 41.5, 41.10

Comments (Question 21):

QUESTION 22

During a core to core movement of a once used fuel bundle, the bundle is dropped and is lying across the remaining fuel bundles. There is NO indication of any broken or damaged fuel pins. Containment purge is in operation with both personnel access doors open. Health Physics has been notified to coordinate a containment evacuation and the containment evacuation alarm has been sounded.

Which of the following is required per AOP 2577, Fuel Handling Accident?

A. The containment purge valves will remain open to provide a path for any potential radioactive release and one containment access door will remain open to allow for recovery of the dropped bundle.

B. After all personnel have been evacuated from containment, the personnel access doors will be closed and the containment purge valves will remain open until a containment ventilation high radiation signal is processed.

C. At least one personnel access door will remain closed during the evacuation of containment and the containment purge valves will be closed only after a valid containment radiation monitor alarm is received.

D. The personnel access doors will be closed after all personnel have been evacuated and the containment purge valves will be closed to contain any potential radioactive release.

K&A Rating: 000036 (BW/A08) Fuel Handling Accident (3.2, 3.6)

K&A Statement: AK3.03 Knowledge of the reasons for the following responses as they apply to the Fuel Handling Incidents: Guidance contained in EOP for fuel handling incident

Key Answer: **D**

Justification (Question 22):

A. **Incorrect:** AOP 2577 requires the containment purge valves to be closed and the personnel access doors to be closed when all personnel have been evacuated. The personnel access doors will be opened, one at a time, for personnel entry to recover the dropped bundle
Plausible: AOP 2577 directs operators to develop a plan for the recovery of the fuel bundle which would require a containment access door to be opened.

B. **Incorrect:** While it is true that the purge valves will close when a containment ventilation high radiation signal is processed, the purge valves must be closed at the onset of a fuel handling accident, per AOP 2577.
Plausible: Purge valves will close on a containment ventilation high radiation signal.

C. **Incorrect**: Both personnel air lock doors will be open until all personnel are evacuated. Additionally, the containment purge valves must be closed at the onset of a fuel handling accident, per AOP 2577.
Plausible: Both containment doors need to be shut after all personnel have evacuated containment. Examinee may think it would be more conservative to only use one door for evacuation. Purge valves will close on a containment ventilation high radiation signal.

D. **Correct:** Containment closure will be established after all personnel are evacuated from containment. Containment purge valves are closed.

References: AOP 2557 Rev 008-04 Steps 3.4, 3.5
Student Ref: None

Learning Objective: MB 05552

Question Source: Bank ID # 1100014

Question History: 2002 ILT Audit Exam

Cognitive Level: Memory/Fundamental Knowledge:
Comprehensive/Analysis: X

10CFR55: CFR 41.5, 41.10

Comments (Question 22):

QUESTION 23

Given the following conditions:

- Reactor is operating at 100% in the month of April
- Circ Water Pump "A" has just tripped due to high traveling screen ΔP
- The three remaining circ water pumps are operating normally

What will be correctly completes the statement to describe the effect on main generator output?

Main generator output will be ______________________.

A. zero, because a manual reactor trip would have been required

B. stable greater than zero, but reduced due to degraded condensing ability

C. continuously reducing, but restored when the waterbox crosstie is opened

D. unchanged, because the three remaining pumps are sufficient to maintain load

K&A Rating: 051 AK1.01 (2.4)

K&A Statement: Knowledge of the operational implications of the following concepts as they apply to Loss of Condenser Vacuum: Relationship of condenser vacuum to circulating water, flow rate, and temperature.

Key Answer: **B**

Justification (Question 23):

A. **Incorrect:** Trip required if <u>two</u> pumps lost in one waterbox
Plausible: Loss of one pump degrades the plant

B. **Correct:** Three pumps are enough to maintain vacuum above a trip threshold, but a reduction in circ water flow means loss of thermal efficiency.

C. **Incorrect:** Reduced flow = increased ΔT and outlet temp, which = reduced efficiency.
Plausible: Opening the crosstie will increase available heat transfer surface.

D. **Incorrect**: Three pumps are sufficient for operation but thermal efficiency will be degraded.
Plausible: Three pumps can handle full power

Note: Lesson Plans/ AOPs do not explicitly discuss the issue of reduced efficiency. They do discuss loss of load as an indicator of loss of flow.

References: AOP 2517 Circ Water Malfunction
AOP 2574 Loss Cond Vacuum

Student Ref: NONE

Learning Objective:

Question Source: New

Question History: New

Cognitive Level: Memory/Fundamental Knowledge:
Comprehensive/Analysis: X

10CFR55: CFR 41.5

Comments (Question 23):

QUESTION 24

The following conditions exist:

- The plant is in MODE 5
- A Containment Purge is in progress
- RM-8262B and RM-8123B (Containment Gaseous Radiation Monitor) alarm setpoint is 7.0 E 4
- RM-8262B is currently reading 7.5 E 4
- RM-8123B is currently reading 6.8 E 4
- NO alarms attributable to any Containment Radiation Monitoring are present.

What action must you take in response to the report?

A. Determine the cause of the gaseous activity increase.

B. Request chemistry sample Containment atmosphere.

C. Ensure Purge Supply Fan, F-23, automatically stops.

D. Close or verify closed the purge isolation valves.

K&A Rating: 000061 ARM System Alarms (3.6)

K&A Statement: AA1.01 Ability to operate and/or monitor the following as they apply to the Area Radiation Monitoring (ARM) System Alarms: Automatic actuation.

Key Answer: **D**

Justification (Question 24):

A. Incorrect: The cause or legitimacy of the high rad. reading should occur after action to isolate.

B. Incorrect: The cause or legitimacy of the high rad. reading should occur after action to isolate.

C. Incorrect: F-23 does not auto trip.

D. Correct: OP-2314B and T.S. 3.3.4 (CTMT Purge Valve Isolation Signal) Rad. reading above setpoint should be believed until proven wrong. Therefore, manually perform Purge Isolation as ESAS should have.

References: OP-2314B Student Ref: NONE

Learning Objective: NA

Question Source: Bank 54733

Question History: 2000 MS2 NRC Exam

Cognitive Level: Memory/Fundamental Knowledge: X
Comprehensive/Analysis:

10CFR55: CFR 41.7

Comments (Question 24):

QUESTION 25

Unit 2 has experienced a LOCA and Containment pressure is 10 psig.

- FAC 2 CIAS failed to actuate
- FAC 2 CIAS operated valves did NOT close

Which ONE of the following would indicate that containment integrity is lost and the design feature that should have prevented this condition?

A. CH-515 Reactor Coolant Letdown Valve is open.
FAC 1 SIAS should have closed CH-515.

B. P-33-B Containment Drain Sump Pump is running with SSP-16.1 Containment Sump Drain Isolation Valve open.
FAC 1 CIAS should have closed SSP-16.1.

C. CH-516 Reactor Coolant Letdown Valve is open.
FAC 1 CIAS should have closed CH-516.

D. P-33-B Containment Drain Sump Pump is running with SSP-16.2 Containment Sump Drain Isolation Valve open.
FAC 1 SIAS should have closed SSP-16.2.

K&A Rating: 069 (W/E14) Loss of CTMT Integrity

K&A Statement: AA2.02 Ability to determine and interpret the following as they apply to the Loss of Containment Integrity: Verification of automatic and manual means of restoring integrity

Key Answer: **A**

Justification (Question 25):

A. **Correct**: CH-515 Letdown Loop Isolation Valve, closed by FAC 1 SIAS, is in series with Inboard Containment Letdown Isolation CH-516 and Outboard Containment Letdown Isolation CH-089. Both CH-516 and CH-089 receive FAC 2 CIAS to close. CH-515 therefore provides the redundant FAC 1 containment isolation function for the letdown line penetration.

B. **Incorrect:** FAC 1 CIAS, not FAC 1 SIAS, should have closed SSP-16.2.
Plausible: Pumping down the containment sump during a LOCA is a loss of containment integrity. Examinee may think FAC 1 SIAS closes SSP-16.2.

C. **Incorrect**: CH-515, not CH-516, will close on FAC 1 SIAS as the redundant containment isolation to CH-516 and CH-089 isolation valves. Also, the isolation signal for CH-516 is FAC 2 CIAS.
Plausible: Examinee may think CH-516 is the redundant containment isolation for this penetration and that it receives a FAC 1 CIAS.

D. **Incorrect:** FAC 2 CIAS, not FAC 1 CIAS, should have closed SSP-16.1 and tripped P-33-B.
Plausible: Pumping down the containment sump during a LOCA is a loss of containment integrity. Applicant may think that SSP-16.1 should be closed by FAC 1 CIAS.

References: LP ESA-01-C.R3C6, TRM Table 3.6-1 Student Ref: NONE

Learning Objective: MB 02468

Question Source: New

Question History: None

Cognitive Level: Memory/Fundamental Knowledge:
Comprehensive/Analysis: X

10CFR55: CFR 41.3

Comments (Question 25):

QUESTION 26

Given the following conditions:

- A LOCA has occurred.
- Both HPSI pumps have failed after a few minutes of injection.
- RCS pressure is approximately 800 psig.
- Subcooling is 0°F.
- The crew has entered EOP2540 and is implementing IC2.

Which ONE of the following actions is required?

A. Stop LPSI pumps for equipment preservation.

B. Depressurize for LPSI injection; cooldown with SGs and use normal pressurizer spray.

C. Restart a RCP to enhance SG cooling.

D. Depressurize for LPSI injection; cooldown with SGs and use PORVs.

K&A Rating: 000074EK2.05 (3.9)

K&A Statement: Knowledge of the interrelations between Inadequate Core Cooling and the following: LPI pumps.

Key Answer: **D**

Justification (Question 26):

A. **Incorrect:** A LOCA means injection is needed.
   Plausible: LPSI pumps are shut off above 360# if injection flow is adequate, which it won't be with no HPSI. The intent of LPSI shutdown is to prevent damaging the LPSI pumps as a result of extended operation without adequate flow through the pump.
B. **Incorrect:** IC2 says depressurize the RCS, but spray won't do it with no RCPs.
   Plausible: IC2 does call for depress for adequate ECCS flow, main/aux spray options.
C. **Incorrect:** Not a procedural action
   Plausible: Would enhance SG cooling.
D. **Correct:** PORVs and "control RCS heat removal" are the only workable actions. SG steaming would seem to be the only means of "control heat removal".

From IC2:

Depressurize the RCS

*__ 3. IF high RCS pressure is preventing adequate safety injection flow, DEPRESSURIZE the RCS by performing ANY of the following:

a. CONTROL RCS heat removal.

b. CONTROL pressurizer heaters and main or auxiliary pressurizer spray.

c. IF HPSI throttle/stop criteria are met, PERFORM ANY of the following:

- CONTROL charging and letdown.
- THROTTLE HPSI flow.

d. OPERATE the PORVs.

References: EOP 2540 IC2
EOP Technical Guide for EOP 2540C1, Functional Recovery of IC

Learning Objective:

Question Source: New

Question History: New

Cognitive Level: Memory/Fundamental Knowledge:

Comprehensive/Analysis: X

10CFR55: CFR 41.10

Comments (Question 26):

QUESTION 27

The unit is operating normally at 100% power.

During the initiation of the surveillance to force Pressurizer sprays, a malfunction occurs causing RC-100E, Loop 1 Spray Valve, to stick open.

The plant is manually tripped due to lowering RCS pressure. During the performance of EOP 2525, Standard Post Trip Actions, all 4 RCPs were tripped to stop the pressure reduction.

EOP 2525, Standard Post Trip Actions, are completed and the following conditions are noted:

- Both SGs are at 12% level and lowering
- Both SGs are at 885 psia and lowering
- Pressurizer level is 22% and lowering with only the "A" charging pump running
- Thot is 556°F and lowering
- Tcold is 530°F and lowering
- The highest CET is 570°F degrees
- Pressurizer pressure is 1850 psia and lowering
- All equipment is operating as expected

Which ONE of the following describes the action required by EOP 2528, Loss of Offsite Power/Loss of Forced Circulation, to respond to the loss of forced circulation?

A. Start both motor driven auxiliary feedwater pumps to restore SG level to between 10% and 80%.

B. Place HIC-4165, Steam Dump Tavg Controller, in MANUAL and closed to stabilize Tc below 535°F.

C. Realign "B" charging pump to FAC 2 and restore Pressurizer level to between 35% and 70%.

D. Place atmospheric steam dumps in MANUAL and throttle to maintain RCS Tave between 530°F and 535°F.

K&A Rating: CE A13 Natural Circ: AK2.1 (3.0)

K&A Statement: Knowledge of the interrelations between Natural Circulation Operations and the following: Components, and functions of control and safety systems, including instrumentation signals, interlocks, failure modes and automatic and manual features.

Key Answer: **B**

Justification (Question 27):

A. **Incorrect:** because S/G level is NOT a criteria for checking natural circulation flow. This is credible because the procedure requires S/G level to be between 40 and 70%, but this is for RCS heat removal, NOT for natural circulation flow verification

B. **Correct:** Per EOP 2528, Loss of Offsite Power/Loss of Forced Circulation, one of the steps listed under the heading of "Check Single Phase Natural Circulation" is to ensure that HIC-4165, Steam Dump Tavg Controller is in MANUAL and closed when NO RCPs are operating.

C. **Incorrect:** because there is NO procedural requirement to check Pressurizer level for natural circulation flow. This is credible because older revisions of this procedure required pressure level and 35 to 70% is the normal range of Pressurizer level

D. **Incorrect:** incorrect because lowering Tave is NOT required to verify natural circulation flow. This is credible because older revisions of the procedure required Tave to be maintained between 530-535°F; NOT for natural circulation flow, but for RCS heat removal. The procedure now requires Tc to be maintained less than 535 degrees F

References: EOP 2528 Student Ref: None

Learning Objective: NA

Question Source: Bank # 1000101

Question History: 2002 MS2 NRC Exam

Cognitive Level: Memory/Fundamental Knowledge:
Comprehensive/Analysis: X

10CFR55: CFR 41.10

Comments (Question 27):

QUESTION 28

At T = 0 seconds:

- The reactor is operating at 100% power
- RBCCW is in a normal alignment using 'A' and 'C' pumps and heat exchangers
- 'B' RBCCW pump is not aligned mechanically to either facility
- Bus 24E is aligned to Bus 24C

At T = 3 seconds

- A fault on Bus 24A results in the loss of Bus 24A

At T=10 seconds:

- EDG 15G-12U closes onto its respective bus

Which ONE of the following describes

(1) the operating status at T=15 seconds of the 'A' and 'C' RBCCW Pumps and
(2) required action regarding aligning and starting the 'B' RBCCW Pump, if any?

A. (1) 'A' running, 'C' running
   (2) No action required

B. (1) 'A' running, 'C' NOT running
   (2) Align and Start 'B'

C. (1) 'A' NOT running, 'C' running
   (2) No action required

D. (1) 'A' NOT running, 'C' running
   (2) Align and Start 'B'

K&A Rating: 003 K2.02 (2.5)

K&A Statement: Knowledge of bus power supplies to the following: CCW pumps.

Key Answer: **C**

Justification (Question 28):

A. **Incorrect:** 'A' RBCCW is not running at this time. At T=18 seconds (8 seconds after the EDG powers Bus 24C), 'A' RBCCW will be sequenced onto the bus and restarted. Plausible if candidate does not recall when RBCCW pumps are sequenced onto the bus.

B. **Incorrect:** 'A' RBCCW has lost power. Plausible if candidate does not recall power supply to 'A' RBCCW. Aligning and starting 'B' RBCCW pump is not required in this situation.

C. **Correct:** Due to loss of the 24C Bus, the 'A' RBCCW pump has initially stopped. The EDG has loaded onto its bus. Due to load sequencing, the 'A' RBCCW pump is restarted at T=18 seconds (8 seconds after the EDG powers Bus 24C). Thus at T=15 seconds, A RBCCW is not running but will be at T=18 seconds; no need to align and start the 'B' RBCCW pump.

D. **Incorrect:** Due to loss of the 24C bus, the 'A' RBCCW pump has initially stopped. The EDG has loaded onto its bus. Due to load sequencing, the 'A' RBCCW pump is started 8 seconds after the EDG loads the bus. Thus at T=15 seconds, A RBCCW is not running but will be at T=18 seconds; no need to align and start the 'B' RBCCW pump. Plausible if candidate does not recall when RBCCW pumps are sequenced onto the bus.

References: RBC-00-C, Rev. 7/1

Learning Objective: MB3015d, MB3005a

Question Source: New

Question History: New

Cognitive Level: Memory/Fundamental Knowledge:
Comprehensive/Analysis: X

10CFR55: CFR 41.7

Comments (Question 28):

QUESTION 29

With the unit operating at 100% power the following occurs:

- "B" SGFP trips during surveillance testing
- The reactor automatically trips on steam generator low level
- Bus 25B fails to transfer to the RSST

Select the choice below that describes the status, 30 seconds after the reactor trip, of the following “B” and “D” Reactor Coolant Pump components:

(1) 6.9kV motor supply breakers
(2) bearing lift oil pumps

A. (1) closed
   (2) NOT running

B. (1) closed
   (2) running

C. (1) open
   (2) NOT running

D. (1) open
   (2) running

K&A Rating: 003 Reactor Coolant Pump (RCPS) A3.05 (2.7)

K&A Statement: Ability to monitor automatic operation of the RCPs, including: RCP lube oil and bearing lift pumps.

Key Answer: **A**

Justification (Question 29):

A. **Correct:** RCP Breakers do not trip on UV. If the RCP breaker doesn't open, the lift oil pump will not auto start.

B. **Incorrect**: RCP Breakers will be closed however second part is wrong, lift oil pump will not be running.

C. **Incorrect:** RCP Breakers will be closed and therefore is incorrect.

D. **Incorrect:** RCP Breakers will be closed and therefore is incorrect.

References: NA Student Reference: None

Learning Objective: MB03042

Question Source: MS2 Bank #78260

Question History: None

Cognitive Level: Memory/Fundamental Knowledge:
Comprehensive/Analysis: X

10CFR55: CFR 41.7

Comments (Question 29):

QUESTION 30

The unit is at 100% power with "A" Charging Pump operating and Letdown Flow Controller LIC-110 in AUTO.

The LETDOWN FLOW HI alarm actuates on C-02/03.

Which of the following describes actions the operator would take per ARP, AND what is the basis for the action?

A. Actions: Verify Letdown flow is high, check RCS temperature not changing, verify Pressurizer level, place Letdown flow control "LIC-110" in Manual, and stabilize Pressurizer level.
Basis: To prevent overheating resin in CVCS Ion Exchangers.

B. Actions: Verify Letdown flow is high, check RCS temperature not changing, verify Pressurizer level, place Letdown flow control "LIC-110" in Manual, and stabilize Pressurizer level.
Basis: To maintain Pressurizer level within the program band.

C. Actions: Check RCS temperature rising, verify Pressurizer level, verify charging and letdown flow have equalized.
Basis: With rising RCS temperature, Pressurizer level is maintained in the program band.

D. Actions: Check RCS temperature rising, verify Pressurizer level, verify charging and letdown flow have equalized.
Basis: To prevent overheating resin in CVCS Ion Exchangers.

K&A Rating: 004 Chemical and Volume Control (CVCS) A2.22 (3.2)

K&A Statement: A2.22 Ability to (a) predict the impacts of the following malfunctions or operations on the CVCS; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions: Mismatch of letdown and charging flows.
or operations:

Key Answer: **B**

Justification (Question 30):

A. **Incorrect:** Basis is incorrect. Overheating resin is an issue associated with high letdown temperature, not high letdown flow.

B. **Correct:** ARP 2590B-058 provides this direction in order to restore pressurizer level control to normal.

C. **Incorrect:** The ARP directs restoring RCS temperature to normal if the letdown high flow condition is caused by rising RCS temperature.

D. **Incorrect:** The ARP directs restoring RCS temperature to normal if the letdown high flow condition is caused by rising RCS temperature.

References: ARP 2590B-058 Student Ref: NONE

Learning Objective: MB 00375

Question Source: Bank Q ID 86003

Question History: None

Cognitive Level: Memory/Fundamental Knowledge:
Comprehensive/Analysis: X

10CFR55: CFR 41.5

Comments (Question 30):

QUESTION 31

Given the following conditions:

- The plant has shut down for refueling
- Core offload commenced this shift
- A sequential failure of "A" and "B" LPSI pumps has occurred
- The crew has entered the appropriate Abnormal Operating Procedure (AOP)
- Containment spray (CS) pumps are available.

Which of the following is correct per the AOP regarding fuel movement following the LPSI pump failures

A. Fuel movement may continue for no more than 1 hour without SDC.

B. Suspend fuel movement. Do NOT recommence until SDC is restored with LPSI pumps.

C. Fuel movement may continue for 2 hours while aligning CS pumps for SDC.

D. Suspend fuel movement. It CAN be recommenced after SDC is restored using CS pumps.

K&A Rating: 005K3.07(3.2)

K&A Statement: Knowledge of the effect that loss or malfunction of the RHRS will have on the following: Refueling Operations

Key Answer: **B**

Justification (Question 31):

A. **Incorrect:** Fuel movement must be suspended per AOP 2572 Step 3.1 and per TS 3.9.8.1.
Plausible: CS is available for the SDC function and TS 3.9.8.1 allows for the required SDC train to be not in operation for up to 1 hour per 8 hour period.

B. **Correct:** Per AOP-2572, Step 3.1 directs *if fuel movement is in progress, notify RE to stop fuel movement*. Discussion Step 1.2 explains CS pumps for DHR does NOT meet definition of an operable SDC train (LCO 3.9.8). TS 3.9.8.1 Basis explains all CORE ALTERATIONS are stopped.

C. **Incorrect:** Fuel movement must be suspended until SDC is restored using LPSI pumps.
Plausible: The AOP does provide direction for aligning CS pumps to establish SDC and containment closure is required in two hours.

D. **Incorrect:** Fuel movement must be suspended.
Plausible: The AOP does provide direction for aligning CS pumps to establish.

References: AOP 2572 Loss of SDC, Rev. 009-08
Training Diagram Shutdown Cooling-RHR.pdf

Student Ref: NONE

Learning Objective:

Question Source: New

Question History: New

Cognitive Level: Memory/Fundamental Knowledge: X
Comprehensive/Analysis:

10CFR55: CFR 41.10

Comments (Question 31):

QUESTION 32

Given the following conditions:

- The plant tripped from 100% power
- A large break LOCA has occurred
- An automatic SIAS did NOT occur
- The reactor operator manually initiated SIAS
- Reactor pressure is 50 psig
- RWST level is 44 inches

Which of the following correctly describes the status of the ECCS pumps?

A. HPSI and LPSI pumps are aligned to the RWST and injecting into the reactor vessel.

B. HPSI and LPSI pumps are aligned to the recirculation sump and injecting into the reactor vessel.

C. HPSI pumps are aligned to the RWST and injecting into the reactor vessel.
LPSI pumps have tripped.

D. HPSI pumps are aligned to the recirculation sump and injecting into the reactor vessel.
LPSI pumps have tripped.

K&A Rating: 006 A1.15 (3.3)

K&A Statement: Ability to predict and/or monitor changes in parameters associated with operating the ECCS controls including: RWST level and temperature.

Key Answer: **D**

Justification (Question 32):

A. **Incorrect:** This would be the alignment if SRAS had not initiated.

B. **Incorrect:** The sump is the correct source but SRAS trips the LPSI pumps.

C. **Incorrect:** The RWST is the incorrect source of water once SRAS has initiated. The pump alignment is correct.

D. **Correct:** Manual SIAS actuation does not change the automatic response of ECCS equipment to a SRAS, which initiates at < 46 inches in the RWST. The SRAS signal will swap ECCS pump suction to the recirculation sump and trip LPSI pumps.

References: ESFAS Lesson plan Student Ref: NONE

Learning Objective: NA

Question Source: New

Question History: New

Cognitive Level: Memory/Fundamental Knowledge: X
Comprehensive/Analysis:

10CFR55: CFR 41.5

Comments (Question 32):

QUESTION 33

The crew is drawing a bubble in the pressurizer. RCS temperature is 205°F and all pressurizer heaters are energized. The LTOP SETPOINT SELECTOR switches are in LOW.

Which of the following choices describes the expected condition of the PORVs?

A. PORVs are closed. When RCS rises above 275°F, the PORVs will automatically open at 2397 psia in the pressurizer to provide over pressure protection.

B. PORVs are closed. When RCS rises above 275°F, the PORVS will automatically open at 410 psia in the pressurizer to provide over pressure protection.

C. PORVs are open to allow the Quench Tank to accept Pressurizer drainage during bubble formation.

D. PORVs are open to prevent taking the plant solid during bubble formation.

K&A Rating: 007 Pressurizer Relief/Quench Tank (PRTS) (3.1, 3.4)

K&A Statement: K5.02 Knowledge of the operational implications of the following concepts as they apply to PRTS: Method of forming a steam bubble in the PZR

Key Answer: **A**

Justification (Question 33):

A. **Correct:** PORVs are closed for steam bubble formation. When RCS temperature is >275°F, the bypass circuitry is removed without regard to positioning of the LTOP SETPOINT SELECTOR switches. Both PORVS will open if two of the four safety channel Pressurizer pressure detectors reach 2397 psia. PORVs are ensured closed by placing their hand switches in NORM while drawing the bubble in OP2301D step 4.2.19.

B. **Incorrect:** PORVs are closed for steam bubble formation. However, with PORV LTOP SETPOINT SELECTOR switches in LOW, the PORVs will open for low pressure overpressure protection at 410 psia. However, this low pressure relief function is automatically removed above 275°F RCS.
Plausible: PORVs are shut when drawing a bubble. They were recently being used for LTOP protection. Applicant may confuse setpoints in the PORV bypass circuitry.

C. **Incorrect**: The Quench Tank is not used to accept drainage from the Pressurizer during bubble formation. The letdown system is aligned to accept the water displaced by the steam bubble.
Plausible: Applicant may think that the Quench Tank can be used for drainage during bubble formation. Prior to bubble formation, the Quench Tank is used to accept overflow while filling and venting the Pressurizer.

D. **Incorrect:** The Quench Tank is not used to prevent the plant from going solid during bubble formation. The plant is taken solid prior to commencing bubble formation.
Plausible: Applicant may think that the Quench Tank can be used to prevent the Pressurizer from going solid during bubble formation. There is a NOTE in OP2301D before step 4.2.19 that states: *When the PORV is closed, the RCS is potentially solid while it is heated to 285°F. Water must be removed from the RCS to compensate for the thermal expansion of the water in the pressurizer. To minimize the potential for excessive RCS pressure rise, performance of step 4.2.27* [which directs controlling letdown flow with backpressure regulator PIC-201] *must not be delayed.*

References: OP 2301D Rev 028-05, RCS-00-C.R9chg1 Figure 14 PORV LOGIC (86002901),
Student Ref: None

Learning Objective:
Question Source: New
Question History:
Cognitive Level: Memory/Fundamental Knowledge: X
Comprehensive/Analysis:
10CFR55: CFR 41.5

Comments (Question 33):

QUESTION 34

Given the following:

- The plant is in MODE 3.
- RCS temperature is 535°F.
- "A" and "C" RCPs are running.
- The "C" RBCCW Pump trips and will NOT restart.
- The "B" RBCCW Pump is NOT available for at least the next 30 minutes.

Assuming NO other operator intervention, which of the following statements is true?

A. Letdown isolation valves will close on high temperature.

B. Reactor power will rise slowly due to letdown temperature.

C. Purification ion exchangers will bypass on high temperature.

D. Running RCP controlled bleedoff will rise to the limiting temperature.

K&A Rating: 008 Component Cooling Water (CCWS) (3.4, 3.5)

K&A Statement: K3.01 Knowledge of the effect that a loss or malfunction of the CCWS will have on the following: Loads cooled by CCWS

Key Answer: **C**

Justification (Question 34):

A. **Incorrect:** Letdown temperature will NOT increase to the 470°F setpoint to isolate Letdown because charging is still available to the Regenerative Heat Exchanger.
Plausible: Applicant may forget that the Regenerative Heat Exchanger is not cooled by RBCCW.

B. **Incorrect:** Letdown temperature will increase causing a drop in boron absorption in the Purification Ion Exchangers. Negative reactivity is added as a result of the ion exchangers' ability to absorb boron.
Plausible: Applicant may confuse letdown temperature reactivity affects.

C. **Correct:** At letdown heat exchanger outlet temperature (T-224) of 145°F, CH-520, ION EXCH BYPASS," bypasses the Purification Ion Exchangers to protect resin. Ion exchanger resin damage will occur at temperatures above 145F.

D. **Correct:** "A" and "C" pumps are not the affected by the loss of "C" RBCCW pump.
Plausible: Applicant may forget that "A" and "C" RCPs are cooled by the Train "A" RBCCW header.

References: OP 2330A Rev 024-02, AOP 2564 Rev 004-05, ARP 2590B-033 Rev 001-00
Student Ref: None

Learning Objective: MB 3011

Question Source: Modified Bank ID #53871

Question History:

Cognitive Level: Memory/Fundamental Knowledge:
Comprehensive/Analysis: X

10CFR55: CFR 41.5

Comments (Question 34):

QUESTION 35

Given the following conditions:

- The plant is operating at 100% power
- Forcing Pressurizer Sprays Using PIC-100X is in progress for Boron Equalization Surveillance
- Pressure Indicating Controller, PIC-0100 setpoint is at 2200 psia
- Both Spray Valves are in AUTO
- ALL Proportional Heaters and Backup Heaters are ON
- Pressurizer Pressure Channel Selector Switch, HS-100, is on Channel "X"

Subsequently, Pressurizer Pressure Transmitter PT-0100X fails HIGH.
With NO operator action, what is the status of the Pressurizer Heaters and Pressurizer Spray Valves one (1) minute later?

A. Backup Heaters are ON, Proportional Heater breakers are OPEN,
BOTH Spray Valves are FULLY OPEN.

B. Backup Heater breakers are OPEN, Proportional Heaters are ON at minimum output,
BOTH Spray Valves are FULLY OPEN.

C. Backup Heaters are ON, Proportional Heater breakers are OPEN,
Spray Valve 100E is FULLY OPEN, and Spray Valve 100F position has not changed.

D. Backup Heater breakers are OPEN, Proportional Heaters are ON at minimum output,
Spray Valve 100E is FULLY OPEN, and Spray Valve 100F position has not changed.

K&A Rating: 010 Pressurizer Pressure Control (PZR PCS) (3.2, 3.6)

K&A Statement: K6.03 Knowledge of the effect of a loss or malfunction of the following will have on the PZR PCS: PZR sprays and heaters

Key Answer: **B**

Justification (Question 35):

A. **Incorrect:** Backup heater breakers will open at 2350 psia. Proportional heaters go to minimum output when actual pressure is 25 psi above pressure setpoint.
Plausible: Applicant believe that only the proportional heaters are affected by the pressure transmitter failure and that these heater breakers open on high pressure to prevent raising pressurizer pressure further.

B. **Correct:** Backup heater breakers open at 2350 psia, proportional heaters go to minimum output (0 kW) when pressurizer pressure is 25 psi above PIC-100X setpoint and both spray valves fully open at 100 psi above PIC-100X setpoint.

C. **Incorrect:** PIC-100X controls both spray valves. There is no train separation for control of individual spray valves. Both spray valves are fully open when pressure is 100 psi above setpoint. Backup heaters breakers will open at 2350 psia. Proportional heaters go to minimum output when actual pressure is 25 psi above pressure setpoint.
Plausible: Applicant may believe that the spray valves are controlled by their specific channel's controller. The Channel "X" Pressure transmitter failure is causing the 100E Spray valve to Fully Open but the 100F spray valve would not be affected.

D. **Incorrect:** PIC-100X controls both spray valves. There is no train separation for control of individual spray valves. Both spray valves are fully open when pressure is 100 psi above setpoint.
Plausible: Applicant may believe that the spray valves are controlled by their specific channel's controller. The Channel "X" Pressure transmitter failure is causing the 100E Spray valve to Fully Open but the 100F spray valve would not be affected.

References: SP 2654B Rev 004-00, Classroom lesson plan PLC-01-C Rev 4 Change 2
Student Ref: None

Learning Objective:

Question Source: New

Question History:

Cognitive Level: Memory/Fundamental Knowledge:
Comprehensive/Analysis: X

10CFR55: CFR 41.7
Comments (Question 35):

QUESTION 36

Select the choice which correctly completes the following statement.

A loss of Vital DC Instrument Bus DV-40 while at 100% power will cause ______(1)______ and AOP 2506D Loss of DV-40 will direct operators to ______(2)______ .

A. (1) a reactor trip on High Pressurizer Pressure due to #1 and #2 MSIVs closure
   (2) emergency stop the "B" Diesel Generator and close the starting air header isolation valves

B. (1) a reactor trip on Low Steam Generator Level due to 2-FW-5B, #2 S/G FEEDWATER ISOLATION closure
   (2) emergency stop the "B" Diesel Generator and close the starting air header isolation valves

C. (1) Reactor Trip Circuit Breakers #2 and #6 to open
   (2) restore power to Bus DV-40

D. (1) Reactor Trip Circuit Breakers #4 and #8 to open
   (2) restore power to Bus DV-40

K&A Rating: 012 Reactor Protection (RPS) (3.2, 3.7)

K&A Statement: A2.07 Ability to (a) predict the impacts of the following malfunctions or operations on the RPS; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: Loss of dc control power

Key Answer: **D**

Justification (Question 36):

A. **Incorrect:** A loss of DV-10 or DV-20 will cause MSIVs to fail close and without operator action, the reactor will trip on High Pressurizer Pressure.
Plausible: Applicant may think that a loss of DV-40 will cause MSIVs to fail closed.

B. **Incorrect:** A loss of DV-20 will cause 2-FW-5B, #2 S/G FEEDWATER ISOLATION valve to close
Plausible: Applicant may think that a loss of DV-40 will cause this valve to fail closed if they confuse DV-20 loads with DV-40 loads.

C. **Incorrect** A loss of DV-20 causes Reactor Trip Circuit breakers #2 and #6 to open.
Plausible: Applicant may think that a loss of DV-40 opens these trip circuit breakers.

D. **Correct:** During a loss of DV-40, Reactor Trip Circuit breakers #4 and #8 lose control power and open. Continued operation at power is allowed and AOP 2506D directs operators to restore power to the bus.

References: AOP 2506A Rev 002-05, AOP 2506B Rev 002-06, AOP 2506C Rev 000-00, AOP 2506D Rev 000-00.
Student Ref: None

Learning Objective: MB-05724

Question Source: New

Question History:

Cognitive Level: Memory/Fundamental Knowledge: X
Comprehensive/Analysis:

10CFR55: CFR 41.5, 43.5

Comments (Question 36):

QUESTION 37

A normal plant cooldown is in progress. RCS temperature is 490°F. Both facilities of SIAS and MSI have been manually blocked.

Given current plant conditions, which of the following statements correctly describes the Engineered Safety Features Actuation System (ESAS)?

A. With the block present, depressing MSI 2 INITIATE manual pushbutton will close MSIV #1.

B. If 2 of 4 SG pressure channels from SG #1 spuriously rise to >700 psia, both MSIV's will automatically close.

C. With the block present, actuation will NOT occur if MSI auto initiation logic is satisfied.

D. If 2 of 4 pressurizer pressure channels rise to >1850 psia, both SIAS and MSI will automatically unblock.

K&A Rating: 013 K4.03 (3.9)

K&A Statement: Knowledge of the ESFAS design feature(s) and/or interlock(s) which provide for the following: Main Steam Isolation System

Key Answer: **A**

Justification (Question 37):

A. **Correct:** The block pushbuttons will not block manual initiation or automatic initiation from containment pressure. Either the MSI 1 INITIATE or the MSI 2 INITIATE pushbutton, by itself, and regardless of block status, will close both MSIVs.

B. **Incorrect:** The MSI block is automatically removed if any two sensor channels exceed 700 psia. However, SG pressure (Tsat/Psat) is approx. 620 psia, which is higher than the 572 psia MSI auto setpoint. MSI logic will not be met.
Plausible: MSI would occur if the other two channels were below the MSI setpoint.

C. **Incorrect:** The block pushbuttons will not block either a manual initiation or an automatic initiation on containment high pressure.
Plausible: The MSI block prevents auto initiation on low steam generator pressure.

D. **Incorrect:** MSI is not automatically unblocked by pressurizer pressure.
Plausible: The SIAS block is automatically removed if any two sensor channels exceed 1850 psia.

References: LP ESA-01-C, Rev. 3 Student Ref: NONE

Learning Objective: MB-02467

Question Source: Millstone Bank – modified

Question History: None

Cognitive Level: Memory/Fundamental Knowledge:
Comprehensive/Analysis: X

10CFR55: CFR 41.7

Comments (Question 37): Modification - added RCS temperature 490°F to stem to have SG pressure > MSI setpoint and changed the key answer.

QUESTION 38

The plant is at 100% power with Vital 120 VAC electrical bus VIAC-3 (VA-30) is aligned to its alternate power supply.

While in this alignment a complete Loss of Normal Power occurs concurrent with a loss of Inverter 4 (INV-4 is off-line)

During the performance of EOP-2525, the STA reports the following:

- RPS channels "C" and "D" momentarily de-energized until the Diesel Generators loaded.
- All parameters monitored by safety channels "C" and "D" (CTMT press., PZR press., SG level & press., etc.) momentarily failed until the Diesel Generators loaded.

Which ONE of the following describes the effects of this electrical alignment/casualty on the Engineered Safeguards Actuation System (ESAS)?

A. Both facilities of ESAS fully actuate the undervoltage signal only.

B. A total actuation of all ESAS components and systems has occurred.

C. Both facilities of ESAS fully actuate with the exception of AEAS and SRAS.

D. "C" and "D" ESAS sensor cabinets momentarily de-energized and then reenergized.

K&A Rating: 013 K4.07 (3.7)

K&A Statement: Knowledge of the ESFAS design feature(s) and/or interlock(s) which provide for the following: Power supply loss

Key Answer: **C**

Justification (Question 38):

A. **Incorrect:** See explanation for correct answer.

B. **Incorrect:** See explanation for correct answer.

C. **Correct:** All ESAS sensor channels have backup power from the opposite facility. Channel 'A' from VA-10/ 40, Channel 'B' from VA-20/30, Channel 'C' from VA-30/20 and Channel 'D' from VA-40/10. The Actuation Cabinets receive power from VA-10 and VA-20, which were not affected by any of the malfunctions indicated. In this question none of the cabinets lost both primary and backup power supplies, therefore ESAS will respond normally to the loss of offsite power.

   However, when the backup power to VA-30 & VA-40 (VR-11 & 21) momentarily de-energized on the LNP, ESAS saw two channels of safety parameters fail to their accident condition. This meets the 2/4 requirement and will result in a total ESAS actuation. The only exceptions to this are SRAS and AEAS. Because the RWST level loops get their power from the ESAS sensor cabinets, which never totally lost power, SRAS does not fire. AEAS does not actuate because EBFAS actuation blocks it.

D. **Incorrect:** SIAS signal does not open the normal CAR outlet valves.

References: NA

Student Ref: NONE

Learning Objective: MB 01121

Question Source: Bank Q ID 54051

Question History: None

Cognitive Level: Memory/Fundamental Knowledge:
Comprehensive/Analysis: X

10CFR55: CFR 41.7

Comments (Question 38):

QUESTION 39

The unit is in MODE 3 with CAR Fans A, C and D running normally in fast speed per OP-2313A, Containment Air Recirculation and Cooling System. CAR Fan B is stopped and RBCCW flow to its cooler has been isolated in accordance with OP-2313A, Step 4.2.6 by closing its inlet valve, its 10 inch outlet valve and its 6 inch outlet valve.

Subsequently, a spurious Facility 2 SIAS occurs.

Assuming no operator action, which of the choices correctly identifies **ALL** of the CAR Cooler Outlet RBCCW valves **listed below** that will be **OPEN** after the actuation.

Valve 1: "B" CAR Cooler 10 inch outlet valve
Valve 2: "B" CAR Cooler 6 inch outlet valve
Valve 3: "D" CAR Cooler 10 inch outlet valve
Valve 4: "D" CAR Cooler 6 inch outlet valve

A. Valves 2 and 4 ONLY

B. Valves 2, 3 and 4 ONLY

C. Valves 1, 3 and 4 ONLY

D. Valves 1, 2, 3 and 4

K&A Rating: 022 Containment Cooling (CCS) K1.01 (3.5)

K&A Statement: K1.01 Knowledge of the physical connections and/or cause effect relationships between the CCS and the following systems: SWS/cooling system

Key Answer: **C**

Justification (Question 39):

A. **Incorrect:** SIAS opens 10 inch valves and the 6 inch valve on D CAR will already be open.
Plausible: The applicant may think the 6 inch valves are the emergency valves that receive the SIAS to open.

B. **Incorrect:** SIAS opens the 10 inch valves, not the 6 inch valves.
Plausible: Both valves will be open on the D cooler per normal operating practice.

C. **Correct:** A Facility 2 SIAS automatically opens the 10 inch outlet valves on the B and D coolers. Per OP-2313A, both cooler outlet valves are opened when operating the CAR Fan coolers to maintain RBCCW pumps within their optimal flow range. Since D Fan is running when the spurious SIAS signal occurs, its 10 inch and 6 inch valves are already open and will remain open. The Facility 2 SIAS signal will open the 10 inch valve on the B CAR cooler. Applicant must remember the normal valve positions when operating and that only the 10 inch valves get the SIAS open signal.

D. **Incorrect:** SIAS does not open the 6 inch normal CAR outlet valves.
Plausible: The applicant may think that the SIAS opens both the 6 inch and 10 inch valves for maximum cooling of containment during an accident.

References: OP-2313A, Rev 009-06 (Sections 1.2 and 4.2) Student Ref: NONE

Learning Objective: MB 02229

Question Source: Modified Bank Q ID 53466

Question History: None

Cognitive Level: Memory/Fundamental Knowledge: X
Comprehensive/Analysis:

10CFR55: CFR 41.7

Comments (Question 39):

QUESTION 40

Given the following conditions:

- A large break LOCA is in progress
- Normal power was lost to the Facility 1 Safeguards Buses
- "A" Emergency Diesel is powering the Facility 1 Safeguards Buses
- "B" CS Pump has tripped, "A" CS Pump has degraded flow
- Facility 1 CAR fans are NOT running
- Facility 2 CAR fans are running
- Containment pressure is 30 psig and rising

Select the choice below that correctly completes the statement describing the appropriate actions per EOP-2532, Loss of Coolant Accident, for the given conditions.

ENSURE the running CAR fans are operating in __(1)__ speed AND ________2)________ .

A. (1) FAST
   (2) start ONE additional CAR fan in FAST speed (do NOT start the fourth)

B. (1) FAST
   (2) do NOT start additional CAR fans

C. (1) SLOW
   (2) start ONE additional CAR fan in SLOW speed (do NOT start the fourth)

D. (1) SLOW
   (2) start TWO additional CAR fans in SLOW speed

K&A Rating: 022 A1.02(3.6)

K&A Statement: Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating CCS controls including: containment pressure.

Key Answer: **D**

Justification (Question 40):

A. **Incorrect:** By design and by EOP requirements, all CAR fans must be running in SLOW on a high containment pressure condition.
Plausible: No more than 3 fans in fast is a normal operating precaution to prevent over-pressurizing ducting.

B. **Incorrect:** By design and by EOP requirements, all CAR fans must be running in SLOW on a high containment pressure condition.
Plausible: Fast speed would be logical because of the higher rate of heat transfer. Applicant may think the additional fans not desired when EDG is powering the bus.

C. **Incorrect:** By design and by EOP requirements, all CAR fans must be running in SLOW on a high containment pressure condition.
Plausible: Applicant may misapply the OP precaution on no more than 3 fans in operation.

D. **Correct:** By design and by EOP requirements, all CAR fans must be running in SLOW on a high containment pressure condition.

References: OP2313A (Precaution 3.3) Student Ref: NONE
Cntmt and Cntmt Systems LP
EOP 2532 (Step 10), EOP 2540F CTPC-2 (Step 1),
TS 3/4.6.2 Bases

Learning Objective:
Question Source: New

Question History: New

Cognitive Level: Memory/Fundamental Knowledge:
Comprehensive/Analysis: X

10CFR55: CFR 41.8

Comments (Question 40):

QUESTION 41

What prevents clogging of the containment spray nozzles following a Design Loss of Coolant Accident while on recirculation?

A. The screens in the recirculation sump will block any particles big enough to clog the nozzle.

B. Duplex filters on the pumps remove particles large enough to clog the spray nozzles.

C. Anti-vortex blades create centrifugal force to keep large particles out of the pump suctions.

D. The pump suction lines are located 2 feet above the recirculation sump floor.

K&A Rating: 026 K4.05 (2.8)

K&A Statement: Knowledge of the CSS design feature(s) and/or interlock(s) which provide for the following: Prevention of material from clogging nozzles during recirculation.

Key Answer: A

Justification (Question 41):

A. **Correct:** Accident analysis assumes 1/16 inch holes in sump screens will not allow particles to pass that are big enough to clog the CSS nozzles.

B. **Incorrect:** There are no filters on the discharge of the pumps.

C. **Incorrect**: Anti-vortex blades are present in the sump suction to improve flow conditions to the pumps, thus minimizing the potential for cavitation

D. **Incorrect:** Suction lines are located <1 foot above the sump floor (11 inches). Accident analysis assumes 1/16 inch holes in sump screens will not allow particles to pass that are big enough to clog the CSS nozzles

References: CSS Lesson Plan Student Ref: NONE

Learning Objective: NA

Question Source: Palo Verde 2005 NRC Exam

Question History: Palo Verde 2005 NRC Exam Q42

Cognitive Level: Memory/Fundamental Knowledge: X
Comprehensive/Analysis:

10CFR55: CFR 41.3

Comments (Question 41):

QUESTION 42

The plant is steady state at 80% power when an instrument air leak occurs in the turbine building. The equipment operator isolates the leak by closing 2-IA-474, the manual isolation for the affected instrument air branch line. This action removes control supply air for the following valves:

- 2-ES-76H, MSR Drain Tank 1A Normal Level Control Valve
- 2-ES-76F, MSR Drain Tank 1B Normal Level Control Valve
- 2-HD-103A, FWH 1A Normal Level Control Valve
- 2-HD-102A, FWH 1A High Level Control Valve
- 2-HD-103B, FWH 1A Normal Level Control Valve
- 2-HD-102B, FWH 1A High Level Control Valve

Assuming NO further operator action, which ONE of the choices below describes a plant effect of isolating control air to the listed valves?

A. Turbine efficiency will increase

B. Reactor power will increase

C. MSR level will increase

D. MSR tubes will experience water hammer

K&A Rating: 039 Main and Reheat Steam (MRSS) (3.1, 3.2)

K&A Statement: K1.01 Knowledge of the physical connections and/or cause-effect relationships between the MRSS and the following systems: S/G

Key Answer: **B**

Justification (Question 42):

A. **Incorrect:** Plant efficiency will decrease because of less preheating as MSR drains are no longer being added into the feedwater flow to the Steam Generators and there is less FW pre-heating in the #2 FW heaters.
Plausible: MSRs and FW heaters, when functioning properly, increase secondary plant efficiency.

B. **Correct:** The closure of the MSR Drn Tk normal level control valves will reduce feedwater preheating as this hot water will now be directed to the main condenser via the high level dump valves. Hot water from the #1 FW heaters will now bypass the shell of the #2 FW heaters and go directly into heater drain tanks, also reducing feedwater preheating. Colder FW into the steam generators will add positive reactivity, raising reactor power.

C. **Incorrect:** On a loss of Instrument Air pressure, the normal drain valve fails closed and the high level dump valves fail open. When the normal drain path is lost, drain tank level will increase until the High Level Dump to the condenser opens to keep water from backing up from the drain tank to the MSR.
Plausible: Applicant may think that because the MSR drain tanks cannot drain to feedheater drains, the MSRs will back up.

D. **Incorrect:** Reheater drains collect from the shell side of the MSRs. There is no impact to the tube side thus no risk of causing water hammer. Furthermore, drainage will still occur and if the drain tanks are full they will send drainage to the condenser via the high level dump valves.
Plausible: Distractor: water hammer is a common concern in steam piping systems.

References: Dwg 25203-26009 Sht 2 (G-8)
MSR LP MSR-00-C Rev 6/3
Dwg 25203-26003 Sht 1 (D-3)

Student Ref: None

Learning Objective:

Question Source: New

Question History:

Cognitive Level: Memory/Fundamental Knowledge:
Comprehensive/Analysis: X

10CFR55: CFR 41.2- 41.9

Comments (Question 42):

QUESTION 43

Given the following conditions:

- Unit is in MODE 1 operating at 100% power
- All Channel "B" indications have lost power
- The following annunciators lit on C-08:
    - INVERTER INV-2 TROUBLE
    - VA-20 ON ALTERNATE SUPPLY INV-6
    - INVERTER INV-6 TROUBLE
- The following annunciator is lit on C-05:
    - S/G LEVEL SETPOINT DEVATION HI/LO
- #1 Steam Generator level is 68% and steady
- #2 Steam Generator level is 76% and steady
- ALL level transmitter green LEDs are lit for BOTH Steam Generators

Which (1) immediate actions and (2) follow-up actions will the crew use to control #2 Steam Generator level?

A. (1) Trip the reactor and perform EOP 2525, Standard Post Trip Actions
   (2) Close SG 2 FRV Block Valve FW-42B and feed using SG 2 FRV Bypass FW-41B

B. (1) Press the "A" or "B" SGFP manual pushbutton, use RAISE or LOWER to control flow
   (2) Establish Local-Manual control of #2 FRV

C. (1) Press the "A" or "B" SGFP manual pushbutton, use RAISE or LOWER to control flow
   (2) Press MSTR, LIC-5274, controller "M" button and manually operate controller

D. (1) Press MSTR, LIC-5274, controller "M" button and manually operate #2 FRV
   (2) Transfer control to #2 Steam Generator alternate feedwater flow transmitter

K&A Rating: 059 Main Feedwater (MFW) (4.2, 4.4)

K&A Statement: 2.2.44 Ability to interpret control room indications to verify the status and operation of a system, and understand how operator actions and directives affect plant and system conditions.

Key Answer: **C**

Justification (Question 43):

A. **Incorrect:** Reactor trip is not required for a loss of Vital Instrument panel VA-20. Furthermore, FW-41B, #2 SG FRV bypass, closes and control from C-05 is lost during a loss of VA-20.
Plausible: Applicant may believe that a reactor trip is necessary for a loss of VA-20.

B. **Correct:** AOP 2585 Immediate Actions directs taking manual control of a SGFP to regain control of Steam Generator level for a level abnormality. The loss of VA-20 has caused the #2 Steam Generator FRV to fail as-is. Operators will not be able to control this valve from the control room. A PEO will be stationed at the valve for local-manual control in accordance with AOP 2504D Loss of Vital Instrument Panel VA-20.

C. **Incorrect**: The first part of this answer choice is correct. Manual control of #2 Steam Generator FRV is not possible due to the loss of power supply VA-20.
Plausible: Applicant may manual control of the #2 Steam Generator FRV is possible. If power was available, this would be an acceptable method for controlling steam generator level.

D. **Incorrect:** Manual control of #2 Steam Generator FRV is not possible due to the loss of power supply VA-20. A transmitter failure does not exist based on the given conditions (green LEDs lit).
Plausible: Applicant may think manual control of the #2 Steam Generator FRV is possible. If power was available, this would be an acceptable method for controlling steam generator level. A transmitter failure could cause level in #2 Steam Generator to be out of band.

References: AOP 2504D Rev 03-009, AOP 2585 Rev 0, OP 2385 Rev 10-008, ARP 2590D-064 Rev 00-001 Student Ref: None

Learning Objective:

Question Source: New

Question History:

Cognitive Level: Memory/Fundamental Knowledge:
Comprehensive/Analysis: X

10CFR55: CFR 41.5, 43.5

Comments (Question 43):

QUESTION 44

Following a Loss of Main Feedwater, the plant is tripped and the Auxiliary Feedwater System automatically starts.

Which of the following describes an action or verification that must be performed IAW OP-2322, Auxiliary Feedwater System, prior to shifting #1 SG Auxiliary Feedwater Regulating Valve (AFRV) Controller, HIC-5276A, to Manual when establishing manual AFW flow control?

A. Place the AFRV RESET NORM OVRD switch in OVRD and allow it to return to NORM.

B. Place the AFRV RESET NORM OVRD switch in RESET and allow it to return to NORM.

C. Verify the AFRV RESET NORM OVRD switch is in NORM (do NOT first place in OVRD or RESET).

D. Verify the FAC 1 OVERRIDE/MANUAL START RELAY RESET, HS-4188C, is in PULL TO LOCK.

K&A Rating: 061 Auxiliary/Emergency Feedwater (AFW) (3.9, 3.9)

K&A Statement: A3.03 Ability to monitor automatic operation of the AFW, including: AFW S/G level control on automatic start

Key Answer: **A**

Justification (Question 44):

A. **Correct:** From OP2322 Section 4.7.5:

4.7.5 IF necessary to override automatic AFW initiation signal to 2-FW-43A, No. 1 AFW FRV, PERFORM applicable action:

a. IF operating from C-05, PERFORM the following:

1) PLACE Facility 1 "RESET NORM OVRD" switch to "OVRD" and RELEASE (C 05).
2) OBSERVE "AFW 2-FW-43A OVERRIDE," lit (C-04, window CB-23).
3) PLACE FW-43A, "AFW-FCV, HIC-5276A" controller to "M" (C-05).
4) As necessary, manually ADJUST AFW flow rate to No. 1 SG (C-05)

B. **Incorrect:** The switch is not placed in RESET.

C. **Incorrect**: The switch must be placed in OVRD.

D. **Incorrect:** In PTL, C-21, Hot Shutdown Panel remote level control is enabled.

References: OP 2322 Rev 027-003 Student Ref: None

Learning Objective: MB 05486

Question Source: Bank ID # 54976

Question History:

Cognitive Level: Memory/Fundamental Knowledge: X
Comprehensive/Analysis:

10CFR55: CFR 41.7

Comments (Question 44):

QUESTION 45

The BOP is preparing to synchronize the main generator to the offsite transmission network. The following conditions exist:

- Synchroscope is rotating SLOWLY in the SLOW direction.
- INCOMING voltage is slightly lower than the RUNNING voltage.

What adjustments must be made to the Main Generator to match voltages and establish proper synchroscope rotation in preparation for synchronization?

A. Lower voltage to match Running Voltage.
Raise speed.

B. Lower voltage to match Incoming Voltage.
Lower speed.

C. Raise voltage to match Incoming Voltage.
Lower speed.

D. Raise voltage to match Running Voltage.
Raise speed.

K&A Rating: 062 AC Electrical Distribution (AFW) (2.8, 2.9)

K&A Statement: A4.03 Ability to manually operate and/or monitor in the control room: Synchroscope, including an understanding of running and incoming voltages

Key Answer: **D**

Justification (Question 45):

A. **Incorrect**
B. **Incorrect**
C. **Incorrect**
D. **Correct:** When the Synchroscope is going in the SLOW direction, the generator is rotating too slowly and speed must be raised. When synchronizing the generator to the grid, the generator is the "incoming" machine and the grid is "running". In this case the "Incoming" (Main Generator) voltage must be raised to match the grid voltage.

References: OP2324A Rev 017-01
Student Ref: None

Learning Objective: MB 02087

Question Source: Bank ID # 85460

Question History:

Cognitive Level: Memory/Fundamental Knowledge: X
Comprehensive/Analysis:

10CFR55: CFR 41.7

Comments (Question 45):

QUESTION 46

The plant has tripped from 100% power due to a loss of Vital 125 VDC Bus 201B on a Battery bus breaker trip. On the trip, the "A" Main Steam header ruptured in containment.

The following additional conditions exist:

- Pressurizer pressure is 1700 psia
- Containment pressure is 4.44 psig
- Vital 4.16kV Bus 24C failed to transfer to the RSST and is being powered by the Emergency Diesel Generator.

All other components are functioning as designed based on the conditions. The crew is performing the actions of EOP 2525, Standard Post Trip Actions.

Which one of the following actions are required and why?

A. Trip the "B" AFW pump breaker to prevent feeding the affected Steam Generator.

B. Locally operate the Turbine Driven Auxiliary Feedwater Pump to control #2 SG level.

C. Operate the "B" Atmospheric Dump Valve remotely from Hot Shutdown Panel C-21 to control RCS temperature.

D. Cross-tie Station Air with Unit 3 to allow for remote ADV operation to control RCS temperature.

K&A Rating: 063 DC Electrical Distribution (2.9, 3.1)

K&A Statement: K2.01 Knowledge of bus power supplies to the following: Major DC loads

Key Answer: **D**

Justification (Question 46):

A. **Incorrect:** Although the #2 AFRV will fail open on loss of DC tripping the "B" AFW pump breaker locally is not necessary, the #1 AFRV can still be closed to prevent feeding the break. #1 Steam Generator is affected by the Main Steam rupture. Feed should be secured to #1 Steam Generator not #2 Steam Generator.
Plausible; Loss of 201B de-energizes half of the vital DC busses and if the "B" steam header ruptured the "B" AFW pump breaker would have to be tripped

B. **Incorrect:** Local operation of the TDAWP is not necessary because the BOP can swap control power for the TDAFP to DV-10 using the key switches on C05, and use it to supply AFW.
Plausible: DV-20, the normal supply to the TDAFP, was lost with the loss of 201B. Loss of control power would require use of a PEO to locally operate the TDAWP.

C. **Incorrect**: Control of the "B" ADV from C-05 was not lost because VR-21 is still energized by the new UPS, which is good for one to four hours.
Plausible: In the recent past, loss of 24D would cause a loss of VR-21. After about 10 minutes, the battery backup for Foxboro IA control signals (normally powered by VR-21) would deplete and prevent control of the "B" ADV from the control room.

D. **Correct:** The loss of DV-20 will cause Bus 24D to de-energize on the subsequent plant trip. The "D" Instrument Air Compressor lost power when 24C did not transfer to the RSST. On a Loss of Offsite Power (failure of 24C to transfer to the RSST) with a concurrent SIAS (caused by the ESD in Cntmt), the operators are not allowed to re-start the vital Instrument Air Compressor and are required to cross-tie air with Unit 3. Although their buses are reenergized by diesel generators after a LNP, the compressors do not restart without operator action. Procedures allow the compressors to be restarted only after an LNP without a SIAS signal. The diesel power is required for the additional components operating during a safety injection condition

References: AOP 2505B Rev 001-08, AOP 2504B Rev 004-01, ISA-00-C.R8C1 Student Ref: None

Learning Objective: MB 05615

Question Source:

Question History: NRC-2011

Cognitive Level: Memory/Fundamental Knowledge:
Comprehensive/Analysis:

10CFR55: CFR 41.7

Comments (Question 46):

QUESTION 47

Given the following conditions:

- A Loss of Offsite Power has occurred.
- EDGs have started and loaded.
- "480V BUS 22E TO B51, B52 BKR TRIP" annunciator lit
- B51 is de-energized due to a fault.

What is the effect on the "A" EDG due to the loss of this MCC and the required operator action?

A. EDG trip on over speed due to loss of the governor. Restart "A" EDG, manually control speed.

B. Inability to restart the EDG if it trips due to loss of start air compressors. Manually cross tie starting air to "B" EDG.

C. Loss of the EDG room vent fan, potential to exceed 120°F room temperature limit. Comply with Technical Specification LCO requirements.

D. Trip of the EDG due to low jacket water pressure. Start backup jacket water pump, restart the EDG.

K&A Rating: EDGA2.13

K&A Statement: Ability to (a) determine predict the impact of the following malfunctions or operations and (b) use procedures to correct, control, or mitigate the consequences: Consequences of opening aux feeder bus (EDG sub supply)

Key Answer: **C**

Justification (Question 47):

A. **Incorrect:** Governor unaffected.
Plausible: Applicant must know governor is not a 480v load.

B. **Incorrect:** Air compressors available, cross tie-able, not on this MCC
Plausible: Applicant must know air start system, which busses power compressors

C. **Correct**: This MCC powers the ventilation fan. Lack of fan will allow room to heat.

D. **Incorrect:** Jacket water OK
Plausible: Other MCCs power jacket water pumps.

References: EDG-00-C EDG LP pg 27
EDG Systems ppt/LP
AOP2503E

Student Ref: NONE

Learning Objective:

Question Source: new

Question History: new

Cognitive Level: Memory/Fundamental Knowledge: X
Comprehensive/Analysis:

10CFR55: CFR 41.8

Comments (Question 47):

QUESTION 48

The plant is in MODE 4, with 2 RCPs in operation at 290°F and 320 psia. Electrical buses are on the RSST, with Bus 24E powered from Bus 24D, when the "A" Service Water (SW) Pump breaker shorts internally, causing a fault on Bus 24C. RSS Supply Breaker 24C-2 (A302) AND RSS Feeder Breaker 24C/24D (A702) both trip open in response to the fault.

Which ONE of the following operator actions is required per EOP-2528, Loss Of Offsite Power/Loss of Forced Circulation to prevent damage to the "A" EDG?

A. Perform a normal shutdown of the "A" EDG.

B. Align the "B" Service Water header to the "A" EDG.

C. Depress the "A" EDG Emergency Shutdown pushbuttons.

D. Place the "B" SW pump handswitch in the START position.

K&A Rating: 064 Emergency Diesel Generator (ED/G) K3.03 (3.6)

K&A Statement: K3.03 Knowledge of the effect that a loss or malfunction of the ED/G system will have on the following: ED/G (manual loads)

Key Answer: **C**

Justification (Question 48):

A. **Incorrect:** EOP-2528 requires EDG shutdown. With LNP start signal, an emergency shutdown is required. Plausible because procedures and lesson material stress that normal shutdown generally preferable because less stressful to engine.

B. **Incorrect:** No procedural guidance provided to allow crosstie of Facility 2 RBCCW with Facility 1 EDG. Plausible because crosstie is physically possible.

C. **Correct:** The question describes a fault which trips the 24C-24G tie breaker and the feeder from the RSST to both 24C and 24D buses, divorcing both Bus 24C and 24D from their RSST source. Bus 24E fed from Facility 2 Bus 24D indicates that swing bus 24E is powered from Facility 2. "B" EDG should start and load Buses 24D and 24E. Since "A" EDG is running without any service water, it should be immediately tripped to prevent damaging the machine. The fault on Bus 24C will prevent the A EDG breaker from closing. The "B" SW pump is not aligned to Facility 1. EOP 2528, Loss Of Offsite Power/Loss of Forced Circulation, (Contingency Step 12.b.1) directs stopping the affected EDG. The "A" EDG emergency trip pushbuttons will be used because of the LNP auto start signal.

D. **Incorrect:** The "B" pumps are aligned to Facility 2. Plausible because start of a standby pump is a logical choice.

References: EOP-2528, Rev 019-00 (Contingency Step 12.b.1) Student Ref: NONE
OP-2260, Rev 010-00 (Step 1.3.1)

Learning Objective: MB 02449

Question Source: MS2 Bank# 53401

Question History: 2005 NRC Exam

Cognitive Level: Memory/Fundamental Knowledge:
Comprehensive/Analysis: X

10CFR55: CFR 41.7

Comments (Question 48):

QUESTION 49

The following conditions exist on Unit 2:

- "B" Steam Generator has a 10 gpm tube leak
- The crew is performing a rapid down power and is currently at 95% power
- The SJAE Rad Monitor RM-5099 is in ALERT

As the down power reaches 80%, the leak increases to 40 gpm and the SJAE Rad Monitor RM-5099 goes to HIGH alarm.

Which ONE of the following states the expected indication on the Steam Generator Blowdown Monitor RM-4262 as power continues to be reduced below 80%?

Blowdown activity on RM-4262 will:

A. DECREASE, and continue to DECREASE due to lowering power.

B. NOT change due to the monitored sample being in a stagnant fluid.

C. INCREASE, and continue to INCREASE due to the change in leak rate.

D. NOT be predictable due to lowering power offsetting the effect of rising leakage.

K&A Rating: 073 Process Radiation Monitoring (PRM) A1.01 (3.2)

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

Key Answer: **B**

Justification (Question 49):

A. **Incorrect:** Blowdown is isolated and therefore the rad monitor will not respond to changing plant conditions..

B. **Correct:** When the SJAE rad monitor goese into high alarm the SG blowdown valves 2-MS-220 A&B close, resulting in a stagnant sample line. The SG Blowdown rad monitor reading will no longer change.

C. **Incorrect:** Blowdown is isolated and therefore the rad monitor will not respond to changing plant conditions

D. **Incorrect:** The rad monitor will respond to tube leaks, however due to the low sensitivity it will take about 30 minutes to alarm and detect a tube leak, which will have been detected by other means.

References: NA Student Ref: NONE

Learning Objective: MB 00491

Question Source: New

Question History: New

Cognitive Level: Memory/Fundamental Knowledge:
Comprehensive/Analysis: X

10CFR55: CFR 41.10

Comments (Question 49):

QUESTION 50

Given the following conditions:

- Unit is at full power
- A small SGTR occurs in SG #2
- RM-4299C, Main Steam Line #2 radiation monitor is in alarm
- The crew trips the reactor and performs immediate actions of EOPs
- SG <u>Wide Range</u> levels are 50%

Which ONE of the following is true in regards to RM-4299C response following the trip?

A. Remains in alarm until SG 2 is isolated

B. Clears due to the effect of inserting all CEAs

C. Clears due to a lower primary to secondary d/p

D. Remains in alarm until SG 2 NR level rises to 45%

K&A Rating: 073 Process Radiation Monitoring (PRM) K5.01 (2.5)

K&A Statement: K5.01 Knowledge of the operational implications as they apply to concepts as they apply to the PRM system: Radiation theory, including sources, types, units, and effects

Key Answer: **B**

Justification (Question 50):

A. **Incorrect**: N-16 production will drop following reactor shutdown and before the SG is isolated. Isolating the S/G will not affect the reading on the radiation monitor.

B. **Correct:** MS Rad Monitor is used to detect N-16. N-16 is dependent on power level and goes away almost immediately following the reactor trip.

C. **Incorrect:** N-16 detectors are very sensitive and will detect any leak, the reduction in DP when SG pressure increases by 100 psia is insignificant.

D. **Incorrect:**:Raising level is used for iodine scrubbing and will not affect N-16 production.

References: PRM Lesson Plan   Student Ref: NONE

Learning Objective: MB 00491

Question Source: 2007 Palo Verde NRC Exam Q34

Question History: 2007 Palo Verde NRC Exam Q34

Cognitive Level: Memory/Fundamental Knowledge: X
Comprehensive/Analysis:

10CFR55: CFR 41.5

Comments (Question 50):

QUESTION 51

The plant is in normal operation at 100% power.

The "C" SW pump has been declared INOPERABLE

Which ONE of the following bus alignments is necessary to restore a Facility 2 SW pump to OPERABLE status?

A. Align Bus 24E to Bus 24D

B. Align Bus 24C to Bus 24D

C. Align Bus 24C to Bus 24E

D. Align Bus 24E to Bus 24A

K&A Rating: 076 Service Water (SWS) K2.01 (2.7)

K&A Statement: K2.01 Knowledge of bus power supplies to the following: Service water.

Key Answer: **A**

Justification (Question 51):

A. **Correct:** B pump is powered from 24E, which needs to be aligned to Facility 2 Bus 24D.

B. **Incorrect:** Bus 24C does not power the B SW pump and therefore this alignment would not make the B pump operable.

C. **Incorrect:** Bus 24C does not power the B SW pump and therefore this alignment would not make the B pump operable.

D. **Incorrect:** B pump is powered by 24E, however this alignment would not provide the B service water pump an independent EDG source of power.

References: NA Student Ref: NONE

Learning Objective: MB 03253

Question Source: MS2 Bank #55991

Question History: New

Cognitive Level: Memory/Fundamental Knowledge: X
Comprehensive/Analysis:

10CFR55: CFR 41.10

Comments (Question 51):

QUESTION 52

Technical Specification 3.7.4.1 states “two service water loops shall be operable.”

Which ONE of the following conditions of the Service Water (SW) system would NOT meet the LCO?

A. The "A" SW pump is operating on the "A" SW header and the "C" SW pump is operating on the “B” SW header. The "B" SW pump is shutdown.

B. The "A" SW header is supplying the "B" RBCCW HX and the "B" SW header is supplying the "C" RBCCW HX.

C. The “A” and “B” SW pumps are in service aligned to independent headers, and Annunciator A-5 "SERVICE WATER PUMP STRAINER POWER MISMATCH" is in alarm. The “B” SW strainer is powered from MCC B51 and "C" SW pump is shutdown.

D. The “A” and “B” SW pumps are running on the same bus and Annunciator AA-19 “SW PUMP B SIAS/LNP START MANUALLY BLOCKED” is in alarm. “C” SW pump is running on an independent bus.

K&A Rating: 076 Service Water (SWS) 2.2.22 (4.0)

K&A Statement: 2.2.22 Knowledge of limiting conditions for operations and safety limits

Key Answer: **C**

Justification (Question 52):

A. **Incorrect:** This configuration will have 2 independent headers so it is allowed.

B. **Incorrect:** This configuration will have 2 independent headers so it is allowed.

C. **Correct:** The "B" SW Pump and the "B" SW Strainer must always be powered by the same ESF emergency power supply train. In this configuration a single failure could cause a failure of both strainers and inop both pumps.

D. **Incorrect**: The "B" swing pump is running but the alarm means that on a SIAS signal the "B" pump will be blocked from starting, therefore only 2 pumps will start, preventing overload of an EDG.

References: SWS LP, RBCCW LP Student Ref: NONE

Learning Objective: MB 03265

Question Source: New

Question History: New

Cognitive Level: Memory/Fundamental Knowledge: X
Comprehensive/Analysis:

10CFR55: CFR 41.10

Comments (Question 52):

QUESTION 53

The unit is shutdown in MODE 5 preparing to fully depressurize for a refueling outage. RCS pressure is being maintained at 45 psia. The pressurizer is being filled using 1 charging pump and aux spray per OP-2207, Plant Cooldown, Section 4.22, "Fully Depressurizing the RCS", when Containment Instrument Air Isolation IA-27.1 fails closed due to an apparent control system malfunction.

Without operator action, which ONE of the following plant responses would be expected?

A. RCS pressure will rise.

B. Letdown flow will lower.

C. Shutdown cooling flow will lower.

D. Containment temperature will rise.

K&A Rating: 078 Instrument Air System (IAS) K3.01 (3.1)

K&A Statement: K3.01 Knowledge of the effect that a loss or malfunction of the IAS will have on the following: Containment Air System.

Key Answer: **B**

Justification (Question 53):

A. **Incorrect:** RCS temperature is being controlled with SDC. Pressurizer heaters are off. With no sprays and no letdown, pressure will either remain relatively steady or slowly decrease due to ambient heat loss from the pressurizer steam space.

B. **Correct:** Letdown Isolation Valve 2-CH-515 will fail closed on loss of containment instrument air. Letdown flow will lower to 0 gpm.

C. **Incorrect:** Shutdown cooling flow control valves receive control air from outside containment and are therefore unaffected by the failure.

D. **Incorrect:** Containment air recirculation cooler RBCCW valves fail open on loss of containment instrument air, resulting in the same or more containment cooling, depending on the number of coolers initially in operation. Containment temperature will either remain constant or lower.

References: AOP 2563 Rev 009-07, Dwg 25203-26017 Shts 1-3 Student Ref: NONE
OP-2207 Rev 029-04

Learning Objective: MB 02395

Question Source: New

Question History: New

Cognitive Level: Memory/Fundamental Knowledge: X
Comprehensive/Analysis:

10CFR55: CFR 41.10

Comments (Question 53):

QUESTION 54

The unit is in Hot Standby with Reactor Coolant System average temperature at 532°F and Pressurizer pressure at 2250 psia.

The Instrument Air System has been completely depressurized as the result of a system rupture.

What is the flow path for the Reactor Coolant Pump seal bleed-off? (Assume that no operator action has been taken to realign the seal bleed-off flow path from the normal full power alignment.)

A. Via 2-CH-507, RCP CNTL BLEED OFF HDR REL ISO, and 2-CH-199, RCP CNTL BLEED OFF HDR REL, to the Primary Drain Tank

B. Via 2-CH-507, RCP CNTL BLEED OFF HDR REL ISO, and 2-CH-199, RCP CNTL BLEED OFF HDR REL, to the Quench Tank

C. Via 2-CH-506, RCP CNTL BLEED OFF INSIDE CTMT, and 2-CH-505, RCP CNTL BLEED OFF TO EDST, to the Equipment Drain Sump Tank

D. Via 2-CH-506, RCP CNTL BLEED OFF INSIDE CTMT, and 2-CH-198, RCP BLEED OFF TO VCT, to the Volume Control Tank

K&A Rating: 078 Instrument Air System (IAS) K3.02 (3.4)

K&A Statement: K3.02 Knowledge of the effect that a loss or malfunction of the IAS will have on the following: Systems having pneumatic valves and controls. .

Key Answer: **A**

Justification (Question 54):

A. **Correct:** Normal flow path is isolated due to valves failing shut on the loss of IA. Therefore flow path is to the Primary Drain Tank via the relief valve.

B. **Incorrect:** The flow path is not to the quench tank.

C. **Incorrect:** The flow path is not to the equipment drain sump.

D. **Incorrect:** The flow path is not to the VCT.

References: P&ID 25203-26017 Sh. 2 and -26024 Sh. 1 Student Ref: NONE

Learning Objective: MB 02395

Question Source: MS2 Bank #53417

Question History: None

Cognitive Level: Memory/Fundamental Knowledge: X
Comprehensive/Analysis:

10CFR55: CFR 41.10

Comments (Question 54):

QUESTION 55

Select the choice below that describes equipment actuations that are expected to result from depressing BOTH Containment Isolation Actuation Signal pushbuttons on C-01.

A. STOP: F23 Containment Purge Supply Fan
   CLOSE: 2-CH-089 Regen HX Disch to Letdown HX and 2-RB-402 L/D HX RBCCW TCV

B. CLOSE: 2-CH-551 Reactor Coolant Letdown Valve
   START: F25A/B Enclosure Building Filtration Fans
   OPEN: 2-EB-52 & 42 Enclosure Bldg Fans 25A & B Disch Dampers
   CLOSE: RCP Controlled Bleed Off Isolation Valves, 2-CH-505, 2-CH-506 and 2-CH-198.

C. CLOSE: 2-CH-515 Letdown Isolation, 2-CH-501 VCT Outlet Valve
   START: Boric Acid Pumps P19A and P19B
   CLOSE: 2-CH-089 Regen HX Disch to Letdown HX and 2-RB-402 L/D HX RBCCW TCV

D. CLOSE: 2-MS-64A/B MSIVs 1&2 and 2-MS-65A/B MSIV Bypasses 1&2
   CLOSE: 2-FW-42A/B SG 1&2 Feedwater Block Valves

K&A Rating: 103 Containment (3.9, 4.2)

K&A Statement: A3.01 Ability to monitor automatic operation of the containment system, including: Containment isolation

Key Answer: **A**

Justification (Question 55):

A. **Correct:** Manual activation of CIAS from the control room causes these equipment actuations.

B. **Incorrect:** Manual actuation of CIAS does not activate SIAS and EBFAS. SIAS closes CH-551 Reactor Coolant Letdown valve, EBFAS starts F25A/B Enclosure Building Filtration Fans and opens 2-EB-42. CIAS does close RCP Controlled Bleed Off Isolation Valves, 2-CH-505, 2-CH-506 and 2-CH-198.
Plausible: Because automatic actuation of SIAS causes a EBFAS and CIAS, applicant may believe that manual actuation of CIAS will cause a SIAS and EBFAS.

C. **Incorrect**: SIAS closes CH-515 Reactor Coolant Letdown, CH-501 VCT Outlet Valve and starts Boric Acid Pumps P19A and P19B. CIAS closes 2-CH-089 Regenerative Heat Exchanger Discharge to Letdown HX and 2-RB-402 Letdown Heat Exchanger RBCCW TCV.
Plausible: Applicant may believe that manual initiation of CIAS also initiates SIAS because automatic initiation of SIAS initiates CIAS.

D. **Incorrect:** All of these components are activated by a MSI.
Plausible: MSI and CIAS have the same Containment Pressure setpoint of 4.42 psig. Applicant may believe that CIAS also isolates these valves because they allow steam to exit containment.

References: ESA-01-C.R3C6
Student Ref: None

Learning Objective: MB-02476

Question Source:

Question History:
Cognitive Level: Memory/Fundamental Knowledge: X
Comprehensive/Analysis:

10CFR55: CFR 41.7

Comments (Question 55):

QUESTION 56

The plant is at 25% power and all systems are aligned normally. The RCS Loop 2 Thot control RTD signal from TE-121X, fails to 520°F.

Which one of the following describes an effect of this failure?

A. ADVs will NOT modulate open on a plant trip.

B. Letdown flow will increase to maximum.

C. Proportional heaters will go to maximum output.

D. Backup heater breakers will immediately trip.

K&A Rating: 011 Pressurizer Level Control (PZR LCS) (2.9, 3.3)

K&A Statement: K6.03 Knowledge of the effect of a loss or malfunction on the following will have on the PZR LCS: Relationship between PZR level and PZR heater control circuit.

Key Answer: **C**

Justification (Question 56):

A. **Incorrect:** The Atmospheric Dump valves will still modulate open on plant trip. The pressure controls for the ADVs are not affected by the Thot instrument failure.
Plausible: Reactor Regulating System uses Tavg to enable the Quick Open solenoids for all six dump/bypass valves. The quick open solenoids are enabled as long as Tavg is above 554°F. The applicant may believe that the ADVs would not open on a reactor trip because the quick open solenoids are disabled. The quick open solenoids ARE affected by this failure however, steam generator pressure will still rise on the trip and the ADVs will open.

B. **Incorrect:** Pressurizer level control system causes letdown flow to go to maximum when pressurizer level is 9% above pressurizer level setpoint. The Thot failure results in a Tavg of ~535°F, which changes pressurizer level setpoint from ~44% prior to the failure to the minimum capped value of 40%. With indicated level 4% greater than calculated setpoint, letdown will rise but will not be at maximum.
Plausible: Applicant may guess that the level deviation is sufficient to increase letdown to maximum.

C. **Correct:** The proportional heaters are turned on maximum output on a high pressurizer level deviation signal +3.6%. At 25% power, Tc is normally 536.25°F and Th is 548°F. Tavg with this failure would be (520°F + 548°F + 536.25°F + 536.25°F) / 4 = ~535°F. The pressurizer level setpoint is capped on the low end at 40% for Tavg $\leq$ 538°F. Therefore the failure will reduce the level setpoint to 40%. Prior to the failure, at 25% power, the pressurizer level setpoint was ~44%, greater than the +3.6% level deviation necessary to fully energize the proportional heaters.

D. **Incorrect:** Backup heaters are not affected by this failure.
Plausible: Applicant may believe that this failure causes pressurizer level to drop to 20%, which would cause backup heater breakers to open.

References: OP2204 Rev 025-06, RRS-01-C.R4, MSS-00-C.R7c1 — Student Ref: None

Learning Objective: MB-02985

Question Source: Modified Bank ID #53575

Question History:

Cognitive Level: Memory/Fundamental Knowledge:

Comprehensive/Analysis: X

10CFR55: CFR 41.7

Comments (Question 56): Bank Q setup changed from 100% power to 25% power. Proportional heater choice changed from minimum to maximum. Correct answer changed from maximum letdown to maximum proportional heaters.

QUESTION 57

A plant down power is in progress with present power level at ~12% and dropping slowly. Three of the four RPS Linear Power Range bistables have been reset (LEDs have gone out).

However, the Channel "D" power range bistable will NOT reset (the LED remains lit and is not blinking).

I&C investigation reveals the RPS Channel "D" Level 1 bistable is failed in the "armed" state, but all other components of Channel "D" are operating normally and are expected to continue functioning as designed.

Which ONE of the following describes the effect of the Channel "D" RPS Level 1 bistable failure?

A. The Channel "D" trip signal to the 15G-8T-2 and 9T-2 is blocked.

B. One of the four CEDS Bus Undervoltage Relays is failed or tripped.

C. Tripping the Main Turbine for the plant shutdown will trip the reactor.

D. The Local Power Density trip on RPS Channel "D" is still armed.

K&A Rating: 015 Nuclear Instrumentation (NIS) K6.04 (3.1)

K&A Statement: K6.04 04 Knowledge of the effect of a loss or malfunction on the following will have on the NIS: Bistables and logic circuits.

Key Answer: D

Justification (Question 57):

A. **Incorrect:** The RPS channels sense closure the main turbine "control" valves, NOT the stop valves. It is a failure of the "stop" valve close signal that would prevent the 8T & 9T from getting a trip signal.

B. **Incorrect:** CEDS undervoltage relays have no direct input to RPS. When RPS trips the reactor, the CEDS UV relays deenergize and send a signal to the turbine control system to trip the turbine.

C. **Incorrect:** RPS channel "D" will process the turbine trip and trigger. However, because of the 2/4 logic, the reactor will NOT trip.

D. **Correct:** Level 1 Bistables will "reset" below 15% NI power as sensed by the Linear channels to bypass the turbine trip and LDP trip for that channel of RPS. Therefore, they are still armed for this channel.

References: Student Ref: NONE

Learning Objective: NA

Question Source: MS2 Bank #8064354

Question History: 2009 MS2 NRC Exam (Q#58)

Cognitive Level: Memory/Fundamental Knowledge:
Comprehensive/Analysis: X

10CFR55: CFR 41.7

Comments (Question 57):

QUESTION 58

The enclosure building filtration region system charcoal filters are designed to remove ________ from the enclosure building atmosphere.

A. Iodine

B. Chlorine

C. Particulate

D. Xenon

K&A Rating: 027 Containment Iodine Removal (CIRS) K5.01 (3.1)

K&A Statement: K5.01 Knowledge of the operational implications of the following concepts as they apply to the CIRS: K5.01 Purpose of charcoal filters

Key Answer: **A**

Justification (Question 58):

A. **Correct:** Per the design basis the charcoal filters can remove 90% of the Iodine released.

B. **Incorrect:** Charcoal can filter Chlorine, however this is not the concern that the charcoal filters are designed to remove.

C. **Incorrect:** The pre filters and HEPA filters are designed to remove the particulates.

D. **Incorrect:** Xenon is a fission product, but is not the major isotope concerned with off site dose rates.

References: Containment Lesson Plan Student Ref: NONE

Learning Objective: NA

Question Source: Fort Calhoun 2014 Exam Q59

Question History: Fort Calhoun 2014 Exam Q59

Cognitive Level: Memory/Fundamental Knowledge: X
Comprehensive/Analysis:

10CFR55: CFR 41.7

Comments (Question 58):

QUESTION 59

Which ONE of the following CEDS interlocks or design features will be affected by the loss of the Plant Process Computer?

A. Group Deviation Backup

B. Upper Electrical Limit

C. Sequential Permissive

D. CEA Motion Inhibit

K&A Rating: 014 Rod Position Indication K4.06 (3.4)

K&A Statement: K4.06 Knowledge of RPS design features and/or interlocks which provide for the following: individual and group misalignment

Key Answer: **C**

Justification (Question 59):

A. **Incorrect:** Although the PPC generates two different Group Deviation alarms, the CEDS interlock on Group Deviation is generated by CEAPDS (RPIS). Therefore, if the PPC is lost, the alarms are affected but the INTERLOCK is not.

B. **Incorrect:** The Upper Electrical Limit is driven by a separate set of reed switches that also feed the core mimic, NOT the PPC. The Upper Core Stop (sometimes confused with the UEL) is the CEDS interlock that is controlled by the PPC.

C. **Correct:** The Sequential Permissive is generated by the PPC to allow withdrawal of the next group of CEAs when its preceding group withdraws above its Upper Sequential Permissive. Without the PPC, this signal is unavailable and CEA groups must be withdrawn in individual mode only.

D. **Incorrect:** The CMI is a function of CEAPDS

References: CED-01-C, Rev. 4, Control Element Drive System; Table 5 - Interlocks and Alarms, [or Table 6 - Steps vs Functions table (end of the document) Student Ref: NONE

Learning Objective:

Question Source: Bank

Question History: 2006 Millstone NRC Exam Q#58

Cognitive Level: Memory/Fundamental Knowledge: X
Comprehensive/Analysis:

10CFR55: CFR 41.5

Comments (Question 59):

QUESTION 60

The SFP Cooling system is in a normal lineup, when the following Control Room overhead annunciators are received:

- SFP CLG PUMP SUCTION FLOW LO
- SFP LEVEL LO
- SFP PUMPS OVERLOAD/TRIP

The cause of the alarms is determined to be a leak between the SFPC Pumps and the SFPC heat exchangers (assume that check valves operate with no leakage).

With no operator action, SFP level will lower until water level reaches:

A. the bottom of the low suction

B. 12 ‘6” above the storage racks

C. the suction line siphon breaker

D. the discharge line siphon breaker

K&A Rating: 033 Spent Fuel Pool Cooling (SFPCS) K4.01 (2.9)

K&A Statement: K4.01 Knowledge of design feature(s) and/or interlock(s) which provide for the following: Maintenance of spent fuel level

Key Answer: **C**

Justification (Question 60):

A. **Incorrect:** The low or "deep" suction is lower than the suction line siphon break and therefore will not be uncovered.

B. **Incorrect:** The fuel pool will not drain to this level. Per the SFPC lesson plan, *the pool is designed and maintained to prevent inadvertent draining of the pool below a level of 22'6"*.

C. **Correct:** The leak is on the suction line and will be stopped by the suction line siphon breaker. The question stem states the examinee is to assume check valves operate with no leakage.

D. **Incorrect:** The question stem states the examinee is to assume check valves operate with no leakage. Given the leak location between SFP Cooling Pumps discharge and the SFP Cooling Heat Exchangers, the Downstream Check Valves 2-RW-8 and 2-RW-10 would prevent any back-leakage from the pool through the discharge line, without reliance on the discharge line siphon breaker.

References: LP SFP-00-C.docx
Dwg 25203-26023 Sheet 2

Student Ref: NONE

Learning Objective: MB 00088

Question Source: Bank Q ID 55162

Question History: None

Cognitive Level: Memory/Fundamental Knowledge: X
Comprehensive/Analysis:

10CFR55: CFR 41.7

Comments (Question 60):

QUESTION 61

The plant has tripped from 100% power and the Quick Open circuit has failed in the "active", energized state. All steam dump to condenser valves have fully opened.

Which ONE of the following describes (1) the position of the Atmospheric Dump Valves (ADVs) and (2) the actions that must be taken to terminate the event?

A. (1) CLOSED
   (2) Shift all steam dump controllers on C05 to Manual with a zero output signal.

B. (1) OPEN
   (2) Shift the Quick Open Permissive switch on C05 to "OFF" AND close both MSIVs.

C. (1) CLOSED
   (2) Shift all steam dump controls to Foxboro IA control with a zero output signal.

D. (1) OPEN
   (2) Shift the RCS Tavg controller on C05 to Manual AND close both MSIVs.

K&A Rating: 041 Steam Dump System (SDS) and Turbine Bypass Control. A2.02 (3.6)

K&A Statement: A2.02 Ability to (a) predict the impacts of the following malfunctions or operations on the SDS: and (b)) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations of those malfunctions or operations: Steam valve stuck open.

Key Answer: **B**

Justification (Question 61):

A. **Incorrect:** The quick open signal goes to all steam dump valves (4 steam dumps to condenser and 2 ADVs) and therefore they are all open. Also, the action in this choice will not prevent the Quick Open signal from keeping the ADVs open, as the Quick Open signal is not affected by the valve controllers.

B. **Correct:** The lesson plan explains the quick open permissive defeats the quick open signal to the ADVs but does not affect the quick open signal to the steam dumps to the condenser. The switch is referred to in OP-2316A as "ATMOS STM DUMP QUICK OPEN PERMISSIVE." Closing the MSIVs isolates the failed open condenser steam dump valves.

C. **Incorrect:** The quick open signal goes to all steam dump valves (4 steam dumps to condenser and 2 ADVs) and therefore they are all open. Also the action in this choice has no effect on the Quick Open signal as Foxboro should have already tried to stop it.

D. **Incorrect:** Shifting the Tavg controller to Manual will not affect the open ADVs.

References: LP RRS-01-C.R4.doc, EOP 2525, OP-2316A Rev 034-01

Student Ref: NONE

Learning Objective: MB 03167

Question Source: New

Question History: New

Cognitive Level: Memory/Fundamental Knowledge:
Comprehensive/Analysis: X

10CFR55: CFR 41.7

Comments (Question 61):

QUESTION 62

A normal plant shutdown is in progress with the following conditions:

- Reactor power at 12% and slowly lowering
- Turbine generator load has been transferred to the "A" steam dump bypass valve
- Tavg is approximately 536°F
- Feedwater Regulating Valves are closed
- Feedwater Regulating Bypass Valves are in automatic and modulating

When the second generator output breaker is opened, a control valve sticks partially open and the turbine receives an overspeed trip. All other plant components respond as expected.

Which ONE of the choices below correctly completes the following statement regarding the plant response to the turbine trip?

The reactor __(1)__ and the generator protective lockout relays trip due to turbine trip with ______(2)______ .

A. (1) trips
   (2) reverse power

B. (1) does NOT trip
   (2) reverse power

C. (1) trips
   (2) 345kV Disconnect 15G-2X1-4 MOD closed

D. (1) does NOT trip
   (2) 345kV Disconnect 15G-2X1-4 MOD closed

K&A Rating: 045 Main Turbine Generator (MT/G) (3.6, 3.9)

K&A Statement: K4.11 Knowledge of MT/G system design feature(s) and/or interlock(s) which provide for the following: T/G reactor trip

Key Answer: **D**

Justification (Question 62):

A. **Incorrect:** The reactor does not trip on turbine trip below 15% linear range power. **Plausible:** RPS does initiate a reactor trip on a turbine trip when above 15% reactor power.

B. **Incorrect:** The generator protective relays do not trip on reverse power for this event since they trip first on the turbine trip with disconnect closed interlock. **Plausible**: The generator does have a reverse power trip relay and the generator would trip on reverse power following a turbine trip if the generator wasn't already tripped by the turbine trip with disconnect closed interlock.

C. **Incorrect:** The reactor does not trip on turbine trip below 15% linear range power. **Plausible:** RPS does initiate a reactor trip on a turbine trip when above 15% reactor power.

D. **Correct:** The reactor does not trip because turbine trip-reactor trip is automatically bypassed below 15% linear range power. The generator protective lockout relays (86G1A/B & 86G1A/B) trip when the turbine trips due to 15G-2X1-4 being closed.

References: OP2205 Rev 016-02, MGS-00-C.R5C5 Student Ref: NONE

Learning Objective: MB 02793

Question Source: Based on Bank ID # 79977 (found several errors in bank question)

Question History:

Cognitive Level: Memory/Fundamental Knowledge:
Comprehensive/Analysis: X

10CFR55: CFR 41.5

Comments (Question 62):

QUESTION 63

AOP 2569 Steam Generator Tube Leak, directs verification of automatic actions if Steam Jet Air Ejector Discharge Rad Monitor RM 5099 or Steam Generator Blowdown Rad Monitor RM-4262 alarms.

Which of the following is an automatic action that must be verified?

A. S/G Blowdown Sample valves, 2-MS-191A and 2-MS-191B, close

B. Blowdown Tank Discharge Isolation valve, 2-MS-15, closes

C. Atmospheric Drain Collection Tank Drain to Long Island Sound valve, 2-CN-334, closes

D. Condenser Air Removal to Unit 2 Stack valve, 2-EB-57, closes

K&A Rating: 055 Condenser Air Removal (CARS) (2.6, 2.6)

K&A Statement: K1.06 Knowledge of the physical connections and/or cause effect relationships between the CARS and the following systems: PRM system

Key Answer: **B**

Justification (Question 63):

A. **Incorrect:** These valves do not close on a SJAE or SGBD radmonitor alarm.
Plausible: These valves do close on a CIAS.

B. **Correct**: For SJAE RM-5099, if a high radiation alarm or instrument failure occurs the following valves automatically close (if open) (same functions as SGBD RM-4262):

- 2-MS-220A (#1 SG blowdown isolation)
- 2-MS-220B (#2 SG blowdown isolation)
- 2-MS-15 (blowdown tank discharge to CW)
- 2-MS-135 (blowdown quench tank discharge to CW)
- 2-S-537 (#1 SG blowdown sample to secondary sample sink)
- 2-S-538 (#2 SG blowdown sample to secondary sample sink)

C. **Incorrect:** Atmospheric Drain Collection Tank Drain to Long Island Sound valve, 2-CN-334, does not close automatically as a result of a SJAE or SGBD radmonitor alarm.
Plausible: This valve is manually closed later on in AOP 2569 Steam Generator Tube Leak during actions to minimize unmonitored releases.

D. **Incorrect:** Condenser Air Removal to Unit 2 Stack valve, 2-EB-57, does not close automatically as a result of a SJAE or SGBD radmonitor alarm. This valve is normally closed during operation and does not receive any automatic signals.
Plausible: Applicant may think that this sounds like a valve that should be closed if there is a potential for a release.

References: AOP 2569 Rev 009-07, RMS-00-C.R7c5 Student Ref: NONE

Learning Objective: MB 2903

Question Source: Millstone Bank ID #55424

Question History:

Cognitive Level: Memory/Fundamental Knowledge: X

Comprehensive/Analysis:

10CFR55: CFR 41.2 - 41.9

Comments (Question 63):

QUESTION 64

The plant is at 100% power and a discharge of the "A" Waste Gas Decay Tank is in progress. A control room operator has just noted the link between the Met Tower and the Plant Process Computer is NOT working (the Met Tower is off-line).

Which ONE of the following actions is required per SP2617BA, “A” WGDT Gaseous Waste Discharge?

A. Solicit required weather parameters from CONVEX and document every 15 minutes for the duration of the discharge.

B. Terminate the discharge and log the termination due to loss of the link between the Met Tower and the Plant Process Computer.

C. Document weather parameters from the Bridgeport weather facility at Sikorsky Airport every 15 minutes for the duration of the discharge.

D. Lower the Discharge Controller PIC-9099 setpoint to 2 psig for the duration of the discharge and document the new flowrate on Form SP2617BA-001.

K&A Rating: 071 Waste Gas Disposal (WGDS) A4.26 (3.1)

K&A Statement: Ability to manually operate and/or monitor in the control room: Authorized waste gas release, conducted in compliance with radioactive gas discharge permit.

Key Answer: **B**

Justification (Question 64):

A. **Incorrect:** Not per SP 2617BA
Plausible: Control room in frequent with CONVEX regarding weather threats to the grid.

B. **Correct:** Per SP 2617BA, Precaution 3.4, "*discharge must be terminated [if...] any Meteorological monitoring instrumentation listed in step 4.1.3 is not FUNCTIONAL.*" Met tower wind speed, wind direction and differential temperatures are listed in Step 4.1.3. Procedure Step 4.1.30 contains the same termination criterion and is applicable throughout the discharge.

C. **Incorrect:** Not per SP 2617BA
Plausible: Unit 3 FSAR Section 2.3 describes use of long term data from the Bridgeport weather facility at Sikorsky Airport in initial site studies.

D. **Incorrect:** Not per SP 2617BA
Plausible: SP 2617BA Step 4.1.39 lists conditions (elevated RM readings, reduced dilution flow) under which the setpoint must be reduced to 2 psig.

References: SP2617BA Rev 001-04 Student Ref: NONE

Learning Objective: NA

Question Source: MS Bank #155013

Question History: 2000 MS2 NRC exam

Cognitive Level: Memory/Fundamental Knowledge: X
Comprehensive/Analysis:

10CFR55: CFR 41.10

Comments (Question 64): Minor modifications to the bank question to adjust for procedure changes and to improve distractor plausibility and psychometrics of the choices.

QUESTION 65

Given the following conditions:

- "A" Service water pump is tagged out for maintenance

Then a Station Blackout event occurs::

.

- EOP 2530 is being implemented.
- Millstone Unit 3 SBO EDG is being aligned to supply power to Unit 2.

Which bus should be energized per EOP 2530 so that Service Water can be restored?

A. 24D

B. 24B

C. 24E

D. 24C

K&A Rating: 075K2.03 (2.6)

K&A Statement: Knowledge of bus power supplies to the following: emergency/essential SWS pumps

Key Answer: **A**

Justification (Question 65):

A. **Correct:** Energizing 24D will allow the C SW pump to be started.

B. **Incorrect:** No service water pumps are powered from 24B.

C. **Incorrect:** 24E is not energized by EOP 2530.

D. **Incorrect:** 24C powers the A SW pump and it is OOS.

References: EOP 2530 Station Blackout Student Ref: NONE

Learning Objective:

Question Source: New

Question History: New

Cognitive Level: Memory/Fundamental Knowledge:
Comprehensive/Analysis: X

10CFR55: CFR 41.10

Comments (Question 65):

QUESTION 66

The plant tripped from 100% power due to a LOCA. EOP 2525, Standard Post Trip Actions were taken and the crew transitioned to EOP 2532, Loss of Coolant Accident.

The following conditions exist 2 hours after entry into EOP 2532:

- SIAS, CIAS, and CSAS were verified in EOP 2525 Standard Post Trip Actions
- SRAS has actuated and been verified
- Containment pressure is 19.0 PSIG and slowly lowering
- CAR fans A, B, C, and D are running in slow speed
- RCS pressure is 360 psia and slowly lowering
- RCS subcooling is 0°F
- RVLMS indicates 80% on both channels and steady
- Containment Normal Sump level is 60% and steady
- Both Containment Spray Pumps are running normally
- HPSI flow is throttled to meet the minimum allowed per EOP 2541 Standard Appendices, Appendix 2 Figure 5, Minimum ECCS Flow Requirements for Decay Heat Removal
- HPSI Pumps P41B and P41C current and flow are fluctuating

Per EOP 2532, which ONE of the following actions must be taken to stabilize HPSI flow?

A. Secure BOTH Containment Spray Pumps.

B. Start HPSI Pump P41A <u>and</u> secure <u>either</u> HPSI P41B <u>or</u> P41C.

C. Secure ONLY one Containment Spray Pump.

D. Secure one HPSI Pump <u>and</u> readjust HPSI flow to minimum allowed.

K&A Rating: Generic, Conduct of Operations (4.3, 4.4)

K&A Statement: 2.1.23 Ability to perform specific system and integrated plant procedures during all modes of plant operation

Key Answer: **A**

Justification (Question 66):

A. **Correct:** The conditions given imply that HPSI pump performance degradation is due to containment sump clogging (suction problem). Since HPSI flow is at the minimum, EOP 2532 Step 50.2 directs stopping Containment Spray pumps as long as containment pressure can be maintained less than 54 psig and at least one complete facility of CAR fans is operating.

B. **Incorrect** –The procedure does not allow for starting a third HPSI pump. Furthermore, these conditions indicate a clogged suction not a failed HPSI pump.
Plausible: Candidate may believe that there is a problem with both HPSI pumps and that starting the 3rd HPSI pump will alleviate the problem.

C. **Incorrect** -Securing only one Containment Spray pump does provide relief for HPSI pumps; Containment sump level is adequate and NOT the cause of cavitation. The problem is containment sump clogging.
Plausible: EOP 2532 Step 50.1 directs securing one HPSI pump if unable to maintain HPSI flow due to high RCS pressure.

D. **Incorrect** -Securing a HPSI pump would significantly reduce the flow to the vessel and since spray pumps are still operating, it would be more appropriate to secure both Containment Spray pumps before stopping a HPSI pump.
Plausible: EOP 2532 Step 50.1 directs securing one HPSI pump if unable to maintain HPSI flow due to high RCS pressure.

References: EOP 2532 Rev 030-00, EOP 2541 Appendix 2 Rev 002-00 Student Ref: NONE

Learning Objective:

Question Source: Based on Calvert Cliffs 2012 Written exam #67

Question History:

Cognitive Level: Memory/Fundamental Knowledge:
Comprehensive/Analysis: X

10CFR55: CFR 41.10, 43.5

Comments (Question 66):

QUESTION 67

For which ONE of the following evolutions does OP-AP-300, Reactivity Management, require the crew ensures power is reduced to maintain margin to less than 100.0 percent before conducting the evolution?

A. Lowering steam generator blowdown rate

B. Stopping a circ water pump and isolating its associated waterbox

C. Increasing the temperature of letdown

D. Overspeed test of the aux feedwater turbine for a surveillance

K&A Rating: Generic, Conduct of Operations, 2.1.37 (4.3, 4.6)

K&A Statement: 2.1.37: Knowledge of procedures, guidelines, or limitations associated with reactivity management

Key Answer: **D**

Justification (Question 67):

A. **Incorrect:** Lowering steam generator blowdown rate does not add positive reactivity.
Plausible: Applicant may confuse this with RAISING steam generator blowdown rate which adds positive reactivity.

B. **Incorrect:** Stopping the a circ water pump and isolating a water box does not add positive reactivity.
Plausible: OP2325A Circulating Water System directs lowering power if condenser backpressure is hard to maintain when stopping a circulating water pump and cross-tying water boxes.

C. **Incorrect:** Raising letdown temperature adds negative reactivity (boron release from resin).
Plausible: Applicant may confuse reactivity effect of raising letdown temperature with lowering letdown temperature which DOES add positive reactivity and requires a power reduction beforehand in accordance with OP-AP-300 Reactivity Management.

D. **Correct:** The overspeed trip test of the AFW pump turbine adds positive reactivity. Steam is admitted to the turbine to perform this test in accordance with SP-2660. OP-AP-300 Attachment 2 states, "ENSURE power is reduced to maintain margin to less than 100.0 percent before conducting evolutions that are known to add positive reactivity....for example...operating steam-driven auxiliary feed water pump turbines."

References: OP-AP-300 Rev 017-00 Attachment 2, SP-2660 Rev 007-09, OP2325A Rev 032-00 Student Ref: NONE

Learning Objective:

Question Source: Modified Bank ID 80609

Question History:

Cognitive Level: Memory/Fundamental Knowledge: X
Comprehensive/Analysis:

10CFR55: CFR 41.1, 43.6

Comments (Question 67):

QUESTION 68

SP 2613H, Integrated Test of Facility 2 Components, is in use when it is discovered that a section of the procedure needs three steps re-sequenced.

A Field Change procedure modification is being processed to correct the error.

In addition to a Technical Independent and SQR Program review, which of the following includes ALL of the remaining reviews and/or approvals required for this procedure modification?

A. 50.59 Applicability Screen
   Operations Manager

B. Environmental Screen
   Regulatory Compliance Department

C. Environmental Services Department
   Regulatory Compliance Department
   Shift Manager

D. Environmental Screen
   50.59 Applicability Screen
   Shift Manager

K&A Rating: Generic, Equipment Control, 2.2.6 (3.0, 3.6)

K&A Statement: 2.2.6 Knowledge of the process for making changes to procedures.

Key Answer: **D**

Justification (Question 68):

A. **Incorrect:** Operations Manager approval is not required. The correct answer is: Environmental Screen, 50.59 Applicability Screen, and Shift Manager.
Plausible: Applicant may not know that an Environmental Screen is required for a field change to a Surveillance Procedure. Distractor: Operations Manager

B. **Incorrect:** The correct answer is: Environmental Screen, 50.59 Applicability Screen, and Shift Manager.
Plausible: Applicant may not know that a 50.59 screen is required for a field change to a surveillance procedure.

C. **Incorrect:** Answer is missing 50.59 Screen and Environmental Screen.
Plausible: Environmental Services Department and Regulatory Compliance Department. Applicant may believe that a review/approval by the Regulatory Compliance Department would cover the 50.59 screen for applicability.

D. **Correct:** This is the correct list of the remaining required reviews and approvals from MP-05-SAP01-005 form. All are required for a Field Change.

References: MP-05-DC-SAP01 Rev 009-01
Note at Section 2.2 Field Change,
MP-05-SAP01-005 Rev 003

Student Ref: NONE

Learning Objective: MB 06343

Question Source: Millstone Bank ID 86487

Question History:

Cognitive Level: Memory/Fundamental Knowledge: X
Comprehensive/Analysis:

10CFR55: CFR 41.10, 43.3

Comments (Question 68):

QUESTION 69

The Letdown Strainer is being isolated for maintenance. The Work Order requires isolating the letdown strainer by closing Letdown Strainer Inlet Valve CH-017 and Letdown Strainer Outlet Valve CH-018 and opening Letdown Strainer Bypass Valve CH-022. These valves have reachrods connected to their handwheels for operation.

As regards safety tagging requirements, what action, if any, is required
(1) for the reachrods, and
(2) for the valve handwheel, to which the reachrod is connected?

	(1)	(2)
A.	danger tag	no action required
B.	caution tag	danger tag
C.	no action required	danger tag
D.	disconnect	danger tag

K&A Rating: Generic, Conduct of Operations, 2.2.13 (4.1, 4.3)

K&A Statement: 2.2.13: Knowledge of tagging and clearance procedures.

Key Answer: **A**

Justification (Question 69):

A. **Correct:** When tagging valves with reachrods, place the danger tag on the reach rod handwheel. An additional danger tag may be hung on the valve, if desired. If the reachrod is disconnected or broken, and then hang the danger tag on the valve and hang a caution tag on the reach rod handwheel indicating the reach rod is broken.

B. **Incorrect:** The reachrod handwheel must be danger tagged, not caution tagged. **Plausible:** Applicant may think that a caution tag on the reachrod is suffice since it is not really part of the valve and that the valve should be danger tagged.

C. **Incorrect:** The reachrod handwheel must be danger tagged if it is connected to the valve. **Plausible:** Applicant may believe that the reachrod doesn't require a danger tag because it is not actually part of the valve. A danger tag on the valve would be suffice.

D. **Incorrect:** Reach rod is not required to be disconnected. **Plausible:** Applicant may believe that it would be safer to remove the reachrod and danger tag the valve directly.

References: OP-AA-200 Rev 019-00 (Step 3.4.1.f) Student Ref: NONE

Learning Objective:

Question Source: New

Question History:

Cognitive Level: Memory/Fundamental Knowledge: X
Comprehensive/Analysis:

10CFR55: CFR 41.10

Comments (Question 69):

QUESTION 70

Emergency Core Cooling Systems Technical Specification Limiting Condition for Operation 3.5.2 states that two ECCS subsystems shall be OPERABLE.

Which of the following correctly identifies the complete set of MODES and, if applicable, other conditions under which this LCO is applicable?

A. MODES 1, 2 and 3

B. MODES 1, 2, 3 and 4

C. MODES 1, 2 and 3 with Tavg $\geq$ 515°F

D. MODES 1, 2 and 3 with Pressurizer pressure $\geq$ 1750 psia

K&A Rating: Generic, Equipment Control, 2.2.22 (4.0, 4.7)

K&A Statement: 2.2.22: Knowledge of limiting conditions for operations and safety limits.

Key Answer: **D**

Justification (Question 70):

A. **Incorrect:** Only required in MODE 3 if Pressurizer pressure is $\geq$ 1750 psia.
Plausible: PORVs are required to be operable in Modes 1, 2 and 3.

B. **Incorrect:** Only required in MODE 3 if Pressurizer pressure is $\geq$ 1750 psia.
Plausible: Reasonable that ECCS subsystems would be required any time an RCS break could result in coolant flashing to steam out the break.

C. **Incorrect:** Only required in MODE 3 if Pressurizer pressure is $\geq$ 1750 psia.
Plausible: 515°F is TS minimum temperature for criticality. Reasonable to think 2 subsystems required only when approaching possibility of an at-power loss of coolant accident that could challenge fuel integrity

D. **Correct:** Per Technical Specification 3.5.2.

References: Unit 2 TS LCO 3.5.2 9/9/2004 Amend 283 Student Ref: NONE

Learning Objective:

Question Source: NEW

Question History:

Cognitive Level: Memory/Fundamental Knowledge: X
Comprehensive/Analysis:

10CFR55: CFR 41.7, 41.10, 43.2

Comments (Question 70):

QUESTION 71

The Unit 2 Control Room has been evacuated due to a fire, with the following:

- Operators are required to enter a radiologically posted area in order to manually close Containment Isolation Valves
- The highest dose rate in the area is 1500 mR/hr

Which ONE of the following describes the radiological requirements for the area and the entry?

This area is required to be posted as a ___(1)___ and personnel entering the area are required to maintain each entrance closed and locked except _______(2)_______.

A. (1) High Radiation Area
(2) when inside the area so personnel are not prevented from leaving the area

B. (1) Locked High Radiation Area
(2) when inside the area so personnel are not prevented from leaving the area

C. (1) High Radiation Area
(2) for periods of ingress or egress, unless guarded to prevent unauthorized entry

D. (1) Locked High Radiation Area
(2) for periods of ingress or egress, unless guarded to prevent unauthorized entry

K&A Rating: Generic, 2.3.12 (3.2)

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

Key Answer: **C**

Justification (Question 71):

A. **Incorrect:** The area radiation reading is greater than the threshold for a high radiation area but is also above the locked high radiation area limit so posting at the lower level would be incorrect.

B. **Incorrect:** The area radiation reading >1000 mR/hr require posting this area as a locked high radiation area. The entrance to each locked high radiation area must remain closed and locked except periods of ingress and egress unless the entrance is guarded to prevent unauthorized entry.
Plausible: Although barriers must be designed to ensure personnel are not prevented from leaving the area; this does not mean that they are to be left unlocked to achieve this goal. An applicant may misinterpret the requirement to not restrict egress from the area as the ability to maintain the opening unlocked.

C. **Correct:** The area radiation reading >1000 mR/hr require posting this area as a locked high radiation area. The entrance to each locked high radiation area must remain closed and locked except periods of ingress and egress unless the entrance is guarded to prevent unauthorized entry.

D. **Incorrect:** The area radiation readings do not require posting as a Very High Radiation Area (500 R/hr at one meter).
Plausible: The controls in Item 2 are correct in this answer. This is a plausible answer for a candidate that incorrectly classifies the radiation area classification required at the specified dose rate.

References: **NEED THE SITE-SPECIFIC REFERENCE** Student Ref: NONE

Learning Objective:

Question Source: Bank

Question History: NMP1 2009 NRC Exam

Cognitive Level: Memory/Fundamental Knowledge: X
Comprehensive/Analysis:

10CFR55: CFR 41.12

Comments (Question 71):

QUESTION 72

Refueling operations have just commenced. A fuel bundle has been dropped in the refueling cavity due to grapple failure and appears to be damaged. What is the design basis potential radiological hazard, if any, from this event?

A. Negligible hazard. The basis for minimum cavity level is to provide for radiological scrubbing for exactly this event.

B. Potential for several hundred millirem thyroid dose and several millirem whole body dose to personnel in containment, but offsite doses will be less than one millirem.

C. Potential for >1R thyroid dose and several millirem whole body dose in the containment and at the site boundary.

D. Potential internal dose >5R whole body equivalent for personnel in containment and offsite doses may exceed 10CFR100 limits.

K&A Rating: 2.3.14 (3.4)

K&A Statement: Knowledge of radiation hazards that may arise during normal, abnormal, or emergency conditions or activities.

Key Answer: **C**

Justification (Question 72):

A. **Incorrect:** Significant hazard.
Plausible: A water level is maintained for shielding and scrubbing, but doesn't eliminate hazard.

B. **Incorrect:** 1.6 R thyroid, 6 mR whole body at site boundary.
Plausible: Applicant may think vent filters, isolation fix problem w/o considering accident assumptions.

C. **Correct:** 1.6 R thyroid, 6 mR whole body at site boundary.

D. **Incorrect:** Offsite doses will remain within 10CFR100 limits.
Plausible: Applicant must know what "10CFR100 limits" means

Note: Procedure and LP do not discuss doses *in containment* at all. Clearly doses in containment are going to be at least what reaches the site boundary, which is why the distractors are worded as they are.

References: AOP 2577
A77-01-C AOP 2577 LP

Student Ref: NONE

Learning Objective:

Question Source: New

Question History: New

Cognitive Level: Memory/Fundamental Knowledge: X
Comprehensive/Analysis:

10CFR55: CFR 41.9,10,12

Comments (Question 72):

QUESTION 73

The crew has just entered MODE 4 and is making preparations to place SDC in service. Suddenly, numerous annunciators alarm, several Facility 1 components change position, and several Facility 1 indicators are deenergized.

Within 5 minutes after the initial event, the following plant conditions exist:

- The "A" RBCCW Heat Exchanger indicates 9,000 gpm Service Water flow.
- Letdown indicates '0' flow.
- "A" ESF Room Cooler indicates 60 gpm flow.
- "A" SDC Heat Exchanger indicates 2,000 gpm RBCCW flow.
- The SFP Cooling Low Flow annunciator is in alarm.
- #1 S/G level indicates 65% and is slowly rising.
- #2 S/G level indicates 65% and is stable.
- Indicating lights for all Bus 24C breakers are out.

Which ONE of the following is the appropriate procedure to enter for this event?

A. Loss of 125 VDC Instrument Panel, D-11, AOP 2507A

B. Loss of 125 VDC Instrument Panel, DV-10, AOP 2506A

C. Restoring DC and Vital Instrument AC Buses, EOP 2541, Appendix 29.

D. Loss of 125 VDC Bus 201D, AOP 2505C

K&A Rating: 2.4.4 (4.5)

K&A Statement: Ability to recognize abnormal indications for system operating parameters that are entry-level conditions for emergency and abnormal operating procedures.

Key Answer: **B**

Justification:

A. **Incorrect:** Indications are not consistent with the loss of D-11.

B. **Correct**: The above indications are associated with a loss of either Vital Bus 201A of Vital DC Panel, DV-10. The appropriate AOPs may be used while in lower modes; EOPs cannot be used from lower modes

C. **Incorrect:** Appendix 29 only provides actions for energizing Bus 201A from Battery 201A. Additionally, it would be inappropriate to enter Appendix 29 directly while in MODE 5

D. **Incorrect:** Indications are not consistent with the loss of Bus 201D.

References: AOP-2506A, DV-10 Load List Student Ref: NONE

Learning Objective: NA

Question Source: Bank #8000037

Question History: 2009 MS2 NRC Exam (Q#89)

Cognitive Level: Memory/Fundamental Knowledge:
Comprehensive/Analysis: X

10CFR55: CFR 41.10

Comments:

QUESTION 74

The plant is operating at 100% power, MOL, when a VCT low level alarm is annunciated.

The US directs the PPO to make up to the VCT using the appropriate blend. During the blend, the PPO is momentarily distracted by a fire panel trouble alarm. As the PPO is addressing the fire alarm, a PMW FLOW HI/LO annunciator is received on C-04 and inadvertently acknowledged by the SPO.

A few minutes later, the PPO notices reactor power slowly lowering.

Which ONE of the following could have caused this condition?

A. The PMW flow controller failed high resulting in an automatic isolation of PMW.

B. A high level in the VCT automatically isolated makeup from the PMW Storage Tank.

C. The Boric Acid flow controller failed low automatically causing makeup to be from the RWST.

D. PMW flow was stopped or lowered resulting in too much Boric Acid being added to the VCT.

K&A Rating: 2.4.46 (4.2)

K&A Statement: Ability to verify that the alarms are consistent with the plant conditions

Key Answer: **D**

Justification:

A. **Incorrect:** because a failure of the PMW controller will NOT automatically isolate flow. This is credible if the student believes that PMW is automatically isolated by a controller failure.

B. **Incorrect:** because a high level in the VCT will automatically stop PMW AND Boric Acid if the controls are in "AUTO". This is credible if the student thinks that only PMW is isolated on a high level to prevent a dilution event.

C. **Incorrect:** because a failure of the Boric Acid controller will NOT automatically swap makeup to the RWST. This is credible if the student believes that makeup flow will be diverted to the RWST on a Boric Acid controller failure to prevent losing Boric Acid makeup capabilities.

D. **Correct:** PMW flow was somehow decreased to less than 10 gpm (alarm setpoint) by an unspecified failure which resulted in only Boric Acid being injected to the VCT. After a short duration, the VCT Boron concentration increased which caused a power reduction.

References: NA Student Ref: NONE

Learning Objective: NA

Question Source: Bank #1000105

Question History: MP2 2002 NRC Exam Q22

Cognitive Level: Memory/Fundamental Knowledge:
Comprehensive/Analysis: X

10CFR55: CFR 41.10

Comments:

QUESTION 75

EOP 2534 Steam Generator Tube Rupture requires that the plant be cooled down to 515°F Thot in both loops before shutting the MSIV on the affected SG. What is the basis for this requirement?

A. Steaming both SGs removes mass from the ruptured SG thereby delaying the potential overfill of the ruptured SG due to break flow.

B. The cooldown prevents potentially lifting a safety on the ruptured SG. Controlled steaming can be secured when desired; a safety may fail to close.

C. Cooldown with only one SG will not allow SI termination within the time frame assumed for the FSAR accident analysis.

D. Rapid cooldown with both SGs minimizes exposure to the potential for a loss of offsite power and increased release due to slow natural circulation cooldown.

K&A Rating: 2.4.18 (3.3)

K&A Statement: Knowledge of the specific bases for EOPs.

Key Answer: **B**

Justification:

A. **Incorrect:** Not the purpose of the requirement.
Plausible: This is a physical effect.

B. **Correct:** Correct. If affected loop RCPs are secured and the MSIV closed, Th=Th=Psat will lift a safety.

C. **Incorrect**: Single SG can remove decay heat and cooldown.
Plausible: Applicant may think about single ADV cooldown, reduced of HR capacity.

D. **Incorrect:** Not the reason.
Plausible: LOOP is part of DBA basis; statement is factual, just not the actual basis

References: EOP2534 LP
EOP2534 bases

Student Ref: NONE

Learning Objective:

Question Source: New

Question History: New

Cognitive Level: Memory/Fundamental Knowledge: X
Comprehensive/Analysis:

10CFR55: CFR 41.8

Comments:

QUESTION 76

Given the following conditions:

- The plant is at 100% power
- Pressurizer level channel X indicates pegged high
- Pressurizer level channel Y (controlling) shows a down trend
- The standby charging pump starts; level stabilizes on channel Y
- Containment humidity is trending up

Which ONE of the following identifies the leaking Channel X instrument line and, based on that leak location, the action required per AOP 2568 RCS Leak?

A. variable leg
Trip the reactor and go to EOP 2525 Standard Post Trip Actions.

B. reference leg
Initiate shutdown per either OP 2204 Load Changes or AOP 2575, Rapid Downpower.

C. variable leg
Initiate shutdown per either OP 2204 Load Changes or AOP 2575, Rapid Downpower.

D. reference leg
Trip the reactor and go to EOP 2525 Standard Post Trip Actions.

K&A Rating: 000009SBLOCA EA2.02 (3.8)

K&A Statement: Ability to determine and/or interpret the following as they apply to a small break LOCA: possible leak paths

Key Answer: **B**

Justification:

A. **Incorrect:** Variable leg causes low failure.
Plausible: Applicant has to understand instrument.

B. **Correct:** Reference leg break fails indication high, and it's an RCS leak.PER AOP 2568 RCS Leak, step 4.4.c if pressure boundary leak shutdown to mode 5. From indications in stem this is pressure boundary leakage.

C. **Incorrect**: Variable leg causes low failure
Plausible: Applicant has to understand instrument.

D. **Incorrect**: Indications do not require trip.
Plausible: Applicant has to understand trip criteria. Per AOP 2568 step 4.1 if leak exceeds charging capacity then trip reactor. From stem second charging pump stabilized level.

SRO Only Justification: This question is SRO only as it requires assessing plant conditions and then selecting a procedure or section of a procedure to mitigate, recover or with which to proceed. The question cannot be answered by solely knowing systems knowledge, immediate operator actions, AOP or EOP entry conditions, or the purpose, overall sequence of events, or overall mitigative strategy of a procedure.

References: PZR LVL & Press LP   Student Ref: NONE

Learning Objective:

Question Source: New

Question History: New

Cognitive Level: Memory/Fundamental Knowledge:
Comprehensive/Analysis: X

10CFR55: 43(b) (5) Assessment of facility conditions and selection of appropriate procedures during normal, abnormal, and emergency situations

Comments:

QUESTION 77

Given the following conditions:

- Unit is at 100% power
- "RCP A ANTIREV ROT FLOW LO" alarms on Panel C02.
- The anti-reverse bearing is 195° and rising very slowly.

Based on these indications, which ONE of the following describes required (1) procedural guidance and (2) actions?

A. (1) OP 2301C Reactor Coolant Pump Operation
(2) Trip the reactor, stop the 'A' RCP, and carry out EOP 2525.

B. (1) RCP A ANTIREV BRG TEMP HI ARP 2590B-081
(2) Inform the Duty Officer, Commence a down power, monitor temperature, trip the reactor and stop the 'A' RCP at 250°F degrees.

C. (1) OP 2301C Reactor Coolant Pump Operation
(2) Start the lift pump, monitor temperature and vibration, trip the reactor and stop the 'A' RCP if temperature at 221°F degrees or vibration exceeds 11 mils.

D. (1) RCP A ANTIREV BRG TEMP HI ARP 2590B-081
(2) Inform the Duty Officer, start the lift pump, monitor temperature, commence down power at 221°F degrees, trip reactor and stop 'A' RCP at 250 F degrees.

K&A Rating: 015/17 AA2.10 (3.7) RCP Malfunctions

K&A Statement: Ability to determine and interpret the following as they apply to the Reactor Coolant Pump Malfunctions (Loss of RC Flow): When to secure RCPs on loss of cooling or seal injection

Key Answer: **D**

Justification (Question 77):

A. **Incorrect:** Plausible because the operating procedure has guidance, however the steps are incorrect.

B. **Incorrect:** Plausible that ARP would have guidance however is incorrect.

C. **Incorrect:** Plausible because the operating procedure has guidance, however the steps are incorrect.

D. **Correct:** These are the actions for this alarm response procedure.

SRO Only Justification: This question is SRO only as it requires assessing plant conditions and then selecting a procedure or section of a procedure to mitigate, recover or with which to proceed. The question cannot be answered by solely knowing systems knowledge, immediate operator actions, AOP or EOP entry conditions, or the purpose, overall sequence of events, or overall mitigative strategy of a procedure.

References: ARP 2590B-081 Rev 000-00 Student Ref: NONE

Learning Objective: NA

Question Source: Bank #1000014

Question History: MS2 2002 ILT Audit

Cognitive Level: Memory/Fundamental Knowledge: X
Comprehensive/Analysis:

10CFR55: CFR 43.5

Comments (Question 77):

QUESTION 78

The following conditions exist:

- The unit was at 100% power when a large break LOCA occurred on Loop 2 hot leg
- RCS pressure almost immediately lowered to about 30 psia
- Approximately 9 hours have elapsed since the event initiation
- A sample taken 4 hours ago indicated RCS boron concentration at 1945 ppm
- Chemistry reports the current RCS boron concentration at 1500 ppm
- 'B' and 'C' HPSI pumps are NOT available
- 'A' LPSI Pump is NOT available
- All other conditions are as expected for this event

Which ONE of the following is the alignment that must be directed per EOP 2541 Attachment 18, Simultaneous Hot and Cold Leg Injection?

A. 'B' LPSI pump injecting into the SDC suction line and charging pumps injecting into loops.

B. 'B' LPSI' pump injecting to the SDC suction line and 'A' HPSI pump injecting into loops.

C. 'B' LPSI' pump injecting into loops and 'A' HPSI pump injecting through auxiliary spray line.

D. 'B' LPSI pump shutdown and 'A' HPSI pump injecting through the auxiliary spray line.

K&A Rating: 011 2.4.6 (4.7) Large Break LOCA

K&A Statement: 2.4.6 Knowledge of EOP Mitigation Strategies.

Key Answer: **D**

Justification:

A. **Incorrect:** LPSI is capable of injecting via SDC but this alignment is not directed with the given conditions.

B. **Incorrect:** This alignment is not procedurally directed.

C. **Incorrect:** This alignment is reasonable and possible but not driven by the procedures.

D. **Correct:** Attachment 18A is utilized when Facility 2 power is available to align for SDC injection. But the lack of a Facility 2 HPSI pump requires a contingency action to go to Attachment 18B to align pressurizer spray injection.

SRO Only Justification: This question is SRO only as it requires assessing plant conditions and then selecting a procedure or section of a procedure to mitigate, recover or with which to proceed. The question cannot be answered by solely knowing systems knowledge, immediate operator actions, AOP or EOP entry conditions, or the purpose, overall sequence of events, or overall mitigative strategy of a procedure.

References: EOP 2541 Attachment 18 Student Ref: NONE

Learning Objective: NA

Question Source: Bank #54119 Modified

Question History: MS2 2009 NRC Exam Q79

Cognitive Level: Memory/Fundamental Knowledge:
Comprehensive/Analysis: X

10CFR55: CFR 43.5

Comments (Question 78): Modified stem conditions and all choices. The key answer actions are driven by a different flowpath through the Attachments.

QUESTION 79

Given the following conditions:

- The unit is at 100% power.
- RBCCW Pump "A" is tagged out for maintenance
- RBCCW Pump "B" is supplying the "A" Header via the "B" RBCCW HX
- RBCCW Pump "C" is supplying the "B" Header via the "C" RBCCW HX
- RBCCW PUMP HDR B PRESS LO alarm on C-06/7
- RBCCW PUMP C OVERLOAD/TRIP alarm on C-06/7
- RCP B LOWER SEAL TEMP HI alarm on C-02/3
- RCP D LOWER SEAL TEMP HI alarm on C-02/3

Which ONE of the following identifies (1) actions are that required and (2) how soon would the NRC need to be notified per 10CFR50.72 **IF** the reactor was tripped?

A. (1) Trip the reactor, secure "B" and "D" RCPs and perform EOP 2525 Standard Post Trip Actions.
(2) Within 4 hours IF the reactor was tripped.

B. (1)Place RBCCW Pump "C" in Pull-To-Lock, open Pump Discharge Header B/C Cross-tie valve RB-251B, monitor temperatures of RBCCW cooled components.
(2) Within 1 hour IF the reactor was tripped.

C. (1) Get Shift Manager's permission to reset and attempt one restart of RBCCW Pump "C". If RBCCW Pump "C" fails to restart, trip the reactor, secure "B" or "D" RCPs and perform EOP 2525 Standard Post Trip Actions.
(2) Within 2 hours IF the reactor was tripped.

D. (1) Monitor RCP temperatures. If RBCCW flow cannot be restored within 5 minutes or lower seal temperature rapidly rises greater than 170°F on either "B" or "D" RCP, trip the reactor, stop both RCPs and perform EOP 2525 Standard Post Trip Actions.
(2) Within 1 hour IF the reactor was tripped.

K&A Rating: 000026 Loss of Component Cooling Water (4.4)

K&A Statement: 2.4.49 Ability to perform without reference to procedures those actions that require immediate operation of system components and controls.

Key Answer: **A**

Justification (Question 79):

A. **Correct:** From AOP 2585 Loss of RBCCW Pump Immediate Actions. This section is to be performed from memory. RBCCW Pump "A" is not available and RBCCW Pump "C" cannot be restarted because it tripped on overload. 10CFR50.72 requires a 4 hour report for any condition that results in actuation of the reactor protection system and also for initiation of any shutdown required by Tech Specs.

B. **Incorrect:** Reactor trip criteria met because flow cannot be restored to the "C" header. **Plausible:** Physically, it is possible to cross-tie RBCCW between facilities but this is not procedurally allowed in Mode 1. This can only be performed in Modes 5,6 or defueled. Ref RBC-00-C.R7c1 or see AOP 2564 subsection for doing this. 10CFR50.72 requires a 4 hour report for any condition that results in actuation of the reactor protection system and also for initiation of any shutdown required by Tech Specs.

C. **Incorrect:** RBCCW Pump "C" tripped on Overload and thus cannot be restarted. **Plausible:** Distractor, applicant may believe that one restart is possible. AOP 2585 Immediate Operator Actions directs a restart for a Loss of RBCCW Pump if the RBCCW Pump Overload/Trip annunciator is not lit.

D. **Incorrect:** Reactor trip criteria met because flow cannot be restored to the "C" header. **Plausible:** Distractor, ARP for RCP B LOWER SEAL TEMP HI annunciator directs reactor trip after RCP lower seal temperatures to rise above 170°F. 10CFR50.72 requires a 4 hour report for any condition that results in actuation of the reactor protection system and also for initiation of any shutdown required by Tech Specs.

<u>SRO Only Justification</u>: This question is SRO only as it requires assessing plant conditions and then selecting the appropriate procedure and immediate actions to take to mitigate plant conditions and place the plant in a safe condition.

References: AOP 2585 Rev 0, AOP 2564 Rev 004-05, RBC-00-C.R7c1, ARP 2590B-079 Rev 000-00
Student Ref: NONE

Learning Objective:

Question Source: New

Question History:

Cognitive Level: Memory/Fundamental Knowledge:

Comprehensive/Analysis: X

10CFR55: 43.5

Comments (Question 79):

QUESTION 80

The plant is operating in MODE 1, 100% power when a fault in the Millstone 345KV Switchyard causes the loss of the North Bus. All equipment actuates as expected with the exception of the following:

- "A" Diesel Generator trips on start and cannot be reset.

The crew performs SPTAs and enters EOP 2528 Loss of Offsite Power. The crew is performing steps in EOP 2528 when the following occurs:

- Annunciator DIESEL GEN 13U BKR TRIP lit on C-08
- Annunciator DIESEL GEN 13U BKR CLOSING CKT BLOCKED lit on C-08
- Annunciator 4KV BUS 24B/D TIE BKR A410 TRIP lit on C-08
- A report from the field indicates Bus 24B is faulted

Unit 3 energizes Vital 4kV Bus 24E. Based on these conditions, which of the following identifies the required procedure and steps to close A305, 24C/24E Tie Breaker and energize Vital 4kV Bus 24C, assuming NO fault on the bus?

A. Per EOP 2540B, Functional Recover of Vital Auxiliaries (AC and DC Power), reset the Sequencer on Actuation Cabinet 5.

B. Per EOP 2541, Appendix 23, Restoring Electrical Power, place all four UV BUS A3 keys in INHIBIT and reset the ESAS UV signal.

C. Per AOP 2583 Loss of All AC Power During Shutdown Conditions, place all four UV BUS A3 keys in INHIBIT and reset the ESAS UV signal.

D. Per EOP 2541, Appendix 23, Restoring Electrical Power, reset the Sequencer on Actuation Cabinet 5.

K&A Rating: 000055 Station Blackout (4.1)

K&A Statement: EA2.06 Ability to determine or interpret the following as they apply to a Station Blackout: Faults and lockouts that must be cleared prior to re-energizing buses

Key Answer: **B**

Justification (Question 80):

A. **Incorrect:** The Functional Recovery would not be entered because EOP 2530 Station Blackout assumes a Loss of Offsite Power. Furthermore, resetting the Sequencer on Actuation Cabinet 5 is NOT adequate to allow energizing Bus 24C from Bus 24E.
Plausible: Distractor. Applicant may think that the crew should enter the Functional Recovery because there are two events in progress: Loss of Offsite Power and Station Blackout. The applicant may believe that the Sequencer failed to actuate because the DG output breaker failed to close. However, because the "A" DG started, the Sequencer fired. Additionally, the examinee may think that the UV may be reset without bypassing all four UV channels

B. **Correct:** To allow closing A305, 24C/24E Tie Breaker, the four channels of UV for Bus 24C must be bypassed, then the UV actuation signal on Facility 1 (Bus A3) must be reset prior to energizing Bus 24C. EOP 2541 Appendix 23, Restoring Electrical Power would be chosen because the crew was in EOP 2530 SBO which directs it.

C. **Incorrect:** AOP 2583 would not be entered from EOP 2530 SBO. AOP 2583 entry occurs from Mode 5, 6 or defueled.
Plausible: Applicant may believe that AOP 2583 is appropriate because the loss of the second vital 4kV bus didn't occur until later on while the crew was taking actions in EOP 2528 Loss of Offsite Power.

D. **Incorrect:** Resetting the Sequencer on Actuation Cabinet 5 is NOT adequate to allow energizing Bus 24C from Bus 24E. Because the "A" DG started, the Sequencer fired and does not require a reset. The UV must be reset to restore power to the bus.
Plausible: Appendix 23 is the correct procedure to use. The applicant may believe that the Sequencer failed to actuate because the DG output breaker failed to close. Additionally, the examinee may think that the UV may be reset without bypassing all four UV channels

SRO Only Justification: This question is SRO only as it requires assessing plant conditions and then selecting a procedure or section of a procedure to mitigate, recover or with which to proceed. The question also requires knowledge of when to implement attachments and appendices, including how to transition to event specific emergency contingency procedures. The question cannot be answered by solely knowing systems knowledge, immediate operator actions, AOP or EOP entry conditions, or the purpose, overall sequence of events, or overall mitigative strategy of a procedure.

References: AOP 2583 Rev 002-07, EOP 2530 Rev 012-00
ARP 2590F-033 Rev 000-00, IHE-00-C.R9c3
OP 2343 Rev 021-11, EOP 2541-App 23 Rev 000-01

Student Ref: NONE

Learning Objective:

Question Source: Modified Millstone Bank ID 1154565

Question History: Millstone Bank ID 1154565 used on NRC 2011 Exam

Cognitive Level: Memory/Fundamental Knowledge:
Comprehensive/Analysis: X

10CFR55: 43(b)(2) Facility operating limitations in the technical specifications and their bases

Comments (Question 80):

QUESTION 81

Given the following conditions:

- The plant is in MODE 6 for a refueling outage.
- 0900: Vital 125VDC Bus 201B is de-energized and tagged-out for repairs
- 1200: 125 VDC LOAD CENTER 201A TROUBLE annunciator actuates on C-08
- 1201: PEO sent to East DC Switchgear room to investigate loss of Vital 125 VDC Bus 201A
- 1215: Voltage meter on Bus 201A reads 0 Volts

Which ONE of the following is correct regarding the event, including the LATEST time(s) allowed for taking the stated action(s)?

A. 1215: Event classification and declaration
1230: Report to Conn State, Dept of Energy and Environ Protection and local officials
1315: Report to NRC

B. 1230: Event classification and declaration
1245: Report to Conn State, Dept of Energy and Environ Protection and local officials
1330: Report to NRC

C. 1245: Event classification and declaration
1300: Report to Conn State, Dept of Energy and Environ Protection and local officials
1345: Report to NRC

D. An emergency action level threshold has not been met. At 1215, immediately suspend all core alterations and movement of irradiated fuel in accordance with Technical Specification Action Statement 3.8.2.4 D.C. Distribution- Shutdown.

K&A Rating: 000058 Loss of DC Power (4.1)

K&A Statement: 2.4.30 Knowledge of events related to system operation/status that must be reported to internal organizations or external agencies, such as the State, the NRC, or the transmission system operator.

Key Answer: **C**

Justification (Question 81):

A. **Incorrect:** Initiating condition for NOUE occurs at 1230 when both DC buses are without power for more than 15 minutes. NRC notification is due within 60 minutes of event declaration and made after notifying local officials and CT State DEEP.
Plausible: Applicant may assume that needs to immediately declare and 15 minute wait for loss of DC buses is not necessary.

B. **Incorrect:** Initiating condition for NOUE occurs at 1230 when both DC buses are without power for more than 15 minutes.
Plausible: Applicant may assume that 15 minute wait for loss of DC buses is not necessary and the event should be classified and declared within 15 minutes of the initial loss of Vital 125VDC Bus 201A.

C. **Correct:** Event classification/declaration must be made within 15 minutes from the event initiation. After the event has been classified, regulations require the prompt notification of off-site authorities within 15 minutes. NRC regulations require the licensee to notify the NRC immediately after notification of state and local agencies, but not later than one hour after declaration of an emergency classification. (Ref: MP-26-EPI-FAP07 and MP-26-EPI-FAP06-002). Initiating event occurs at time 1230 when Unusual Event (D-2, PU2) met for Loss of Voltage on DC Buses 201A AND 201B > 15 Minutes. Therefore have 15 minutes until 1245 to declare the event and another 15 minutes to make notifications.

D. **Incorrect:** Unusual Event met for Loss of Voltage on DC Buses 201A AND 201B > 15 Minutes.
Plausible: Technical Specification Action Statement 3.8.2.4 D.C. Distribution- Shutdown is applicable because of NO operable Vital 125VDC buses.

<u>SRO Only Justification</u>: This question is SRO only as it requires knowledge of Emergency Action Levels and required reports to external agencies and local officials as depicted administrative procedures.

References: MP-26-EPI-FAP06-002 Rev 009, Student Ref: NONE
MP-26-EPI-FAP07 Rev 018-01 Section 1.4.2
MP-26-EPI-FAP01-001 Rev. 010-01, Unit 2 TS 3.8.2.4 Amend 305.

Learning Objective:

Question Source: New

Question History:

Cognitive Level:	Memory/Fundamental Knowledge:	
	Comprehensive/Analysis:	X
10CFR55:	CFR 41.10, 43.5	

Comments (Question 81):

QUESTION 82

The plant is in a normal 100% power lineup, when a Steam Generator tube leak develops.

Present plant conditions are as follows:

- Letdown has lowered to 32 gpm and stabilized
- No backup charging pumps are running
- Pressurizer level is 64% and stable

The crew then takes the applicable actions to begin a plant shutdown.

Which one of the following conditions would indicate that the Steam Generator tube leak rate is rising and when is the plant required to be in HOT STANDBY per the TS?

A. After starting the second charging pump, the PPO adjusts letdown flow until pressurizer level stabilizes at 65%. Letdown flow rises to 70 gpm and stabilizes.
Be In HOT STANDBY within 4 hours.

B. After starting the second charging pump, the PPO adjusts letdown flow to 84 gpm. Pressurizer level then lowers to 63.5% and letdown flow lowers to 76 gpm before both stabilize.
Be In HOT STANDBY within 4 hours.

C. After starting the second charging pump, the PPO adjusts letdown flow until pressurizer level stabilizes at 65%. Letdown flow rises to 70 gpm and stabilizes.
Be In HOT STANDBY within 6 hours.

D. After starting the second charging pump, the PPO adjusts letdown flow to 84 gpm. Pressurizer level then lowers to 63.5% and letdown flow lowers to 76 gpm before both stabilize.
Be In HOT STANDBY within 6 hours.

K&A Rating: 000037 Steam Generator Tube Leak (4.1)

K&A Statement: AA2.12 Ability to determine and interpret the following as they apply to the Steam Generator Tube Leak: Flow rate of leak

Key Answer: **C**

Justification (Question 82):

A. **Incorrect:** TS 3.4.6.2 Action B requires to be in hot standby in 6 hours.

B. **Incorrect:** Initial leak rate from conditions given is 8 gpm based on Charging/Letdown mismatch with 4gpm RCP bleed off flow. Manually raising letdown flow to match the new charging flow will force the pressurizer level control system to readjust letdown flow to account for the 8 gpm leak. Leak rate is still 8 gpm in the answer choice.TS 3.4.6.2 action B requires to be in hot standby in 6 hours.

C. **Correct:** PZR level stabilizes with the new charging flow (88gpm). Letdown flow stabilizes more than 8 gpm below the expected charging flow for two pumps. Based on Charging/Letdown mismatch, the leak rate has gone from 8 gpm to 14 gpm. TS 3.4.6.2 action B requires to be in hot standby in 6 hours.

D. **Incorrect:** Initial leak rate from conditions given is 8 gpm based on Charging/Letdown mismatch with 4gpm RCP bleed off flow. Manually raising letdown flow to match the new charging flow will force the pressurizer level control system to readjust letdown flow to account for the 8 gpm leak. Leak rate is still 8 gpm in the answer choice.

SRO Only Justification: This question is SRO only as it requires assessing plant conditions and determining how conditions are changing and applying TS knowledge of > 1 hour action requirements. The question cannot be answered by solely knowing systems knowledge, immediate operator actions, AOP or EOP entry conditions, or the purpose, overall sequence of events, or overall mitigative strategy of a procedure.

References: A68-01-C Rev 2 Student Ref: NONE

Learning Objective:

Question Source: Bank ID #1000038

Question History: 2001 Audit exam

Cognitive Level: Memory/Fundamental Knowledge:
Comprehensive/Analysis: X

10CFR55: 43(b)(5) Assessment of facility conditions and selection of appropriate procedures during normal, abnormal, and emergency situations

Comments (Question 82):

QUESTION 83

Clean Waste Discharge Activity Rad Monitor RM-9049 is INOPERABLE due to failed flow switch FS-9049. A spare flow switch has been ordered.

Which of the following statements is true regarding the performance of a Radioactive Liquid Waste discharge from the Clean Liquid Radwaste (CLRW) System?

A. A discharge is permitted as long as two independent samples are analyzed in accordance with the Sample Program and the original release rate calculations and discharge valving are independently verified. Discharge isolation valves are overridden open and will close if sample flush valves are opened.

B. A discharge is permitted as long as two independent samples are analyzed in accordance with the Sample Program and the original release rate calculations and discharge valving are independently verified. Discharge Isolation valves are overridden open and will close if CLEAN LIQUID RADWASTE EFFL RAD HI actuates on panel C-63.

C. A discharge is permitted as long as two independent samples are analyzed in accordance with the Sample Program and the original release rate calculations and discharge valving are independently verified. Discharge isolation valves are overridden open and all automatic discharge isolation is disabled.

D. A discharge is NOT permitted when discharge rad monitor is INOPERABLE per REMODCM IV.C.1 Radioactive Liquid Effluent Monitoring Instrumentation.

K&A Rating: 000059 Accidental Liquid Rad Waste Rel 2.2.38. (4.5)

K&A Statement: 2.2.38 Knowledge of conditions and limitations in the facility license.

Key Answer: **A**

Justification (Question 83):

A. **Correct:** REMODCM specifies that discharge may occur if CLRW Radmonitor RM-9049 is not operable as long as IV.C-1 Action A requirements met. Discharge isolation valves, 2LRR-32.1/32.2 will still automatically close if flush valves are opened.

B. **Incorrect:** RM-9049 discharge isolation valves will only automatically close if overridden and flush valves are opened.
Plausible: Distractor: Because RM-9049 has not failed and is not operable as a result of a system sample line flow instrument; the applicant may believe that a High Radiation alarm will still automatically close the discharge isolation valves.

C. **Incorrect:** Discharge isolation valves, 2LRR-32.1/32.2 will still automatically close if flush valves are opened
Plausible: Applicant may believe that once overridden, the discharge isolation valves will no longer automatically close.

D. **Incorrect:** Discharge is permitted with a RM-9049 not operable as long as action requirements in REODCM IV.C-1 are met.
Plausible: Applicant may assume that with a radiation monitor that is not operable, discharge is prohibited.

SRO Only Justification: This question is SRO only as it knowledge and application of REMODCM requirements for a Clean Radwaste Discharge and actions if RM-9049 is not operable.

References: REMODCM Rev 027-00 Section IV.C.
RLD-04-C.R1c2, RM datasheet table

Student Ref: NONE

Learning Objective:

Question Source: New

Question History:

Cognitive Level: Memory/Fundamental Knowledge:
Comprehensive/Analysis: X

10CFR55: 43.b.(2) Facility operating limitations in the technical specifications and their bases.

Comments (Question 83):

QUESTION 84

Plant is stable at 100% power with no activities in progress and no equipment out of service when the FIRE SYSTEM TROUBLE (AB-19, C-06/7) and the `A' DIESEL ROOM (Zone 12, C-26) alarms are received.

- Approximately 1 minute later the following conditions are confirmed:
- U3 Electric Fire Pump is stopped in standby
- U3 Diesel Fire Pump is stopped in standby
- U2 Electric Fire Pump is stopped in standby
- Jockey Fire Pump is running
- Panel C-26H ('A' DG local fire panel) alarm light lit
- Panel C-26H one heat detector light lit
- Panel C-26H audible alarm horn actuated
- Other Panel C-26H indications are normal
- No other control room alarms have actuated
- The AB PEO has not entered the DG room.

Which ONE of the following statements describes the situation and the procedure required to address the event?

A. Fire in the diesel generator room; go to AOP-2559, "Fire".

B. Melted fusible link in deluge system, go to RP-16, "Trouble Reporting".

C. Failure of the heat detector, go to ARP-2590I, "C-26 Alarm Response".

D. Loss of ventilation, go to OP-2315E, "Diesel Generator Ventilation System".

K&A Rating: 067 Plant Fire On-site 2.2.37 (4.6)

K&A Statement: 2.2.37 Ability to determine operability and/or availability of safety related equipment.

Key Answer: **C**

Justification (Question 84):

A. **Incorrect:** Fire would open deluge valve, resulting in additional alarms.

B. **Incorrect:** Melted fusible link would initiate spray flow, actuating deluge valve opening alarm. VALID DISTRACTOR: Plausible that alarm caused by melted link.

C. **Correct:** YES Actual fire would melt fusible link, causing supervisory air low pressure alarm.

D. **Incorrect:** Temperature Switch TS-8435 provides a Diesel Gen 12U Room Temp Hi/Lo alarm on C-08 at 110°F. VALID DISTRACTOR: Plausible that room temperature increase has caused the alarm

SRO Only Justification: This question is SRO only as it requires assessing plant conditions and selection of appropriate procedures during an abnormal event. The question cannot be answered by solely knowing systems knowledge, or LCO information listed in the LCO statement.

References: Fire TRM Student Ref: NONE

Learning Objective: NA

Question Source: MS2 Exam Bank #5000048

Question History: 2005 MS2 NRC Exam Q91

Cognitive Level: Memory/Fundamental Knowledge:
Comprehensive/Analysis: X

10CFR55: 43(b) (5) Assessment of facility conditions and selection of appropriate procedures during normal, abnormal, and emergency situations

Comments (Question 84):

QUESTION 85

Given the following conditions:

- The unit was shutdown for refueling 7 days ago
- Fuel movement is in progress
- One EDG is OOS for maintenance
- A Loss of Offsite Power has just occurred
- The remaining EDG has failed but is NOT connected to the bus

Which ONE of the following is the correct procedural sequence and action?

A. Enter EOP 2540 Functional Recovery; prioritize safety functions in accordance with the Safety Function Status Checklist.

B. Enter EOP 2530 Station Blackout, attempt power restoration; if unsuccessful, then enter EOP 2540 "Functional Recovery" and prioritize safety functions.

C. Enter AOP 2583 Loss of All AC During Shutdown Conditions; evacuate containment, then attempt power restoration.

D. Enter AOP 2583 Loss of All AC During Shutdown Conditions, attempt power restoration, if unsuccessful then evacuate containment.

K&A Rating: EA2.1 (4.4)

K&A Statement: Ability to determine and/or interpret the following as they apply to FUNCTIONAL RECOVERY: Facility conditions and selection of appropriate procedures during abnormal and emergency operations CE/E09 Functional Recovery

Key Answer: **C**

Justification:

A. **Incorrect:** EOP 2540 would be used following a trip from power.
Plausible: This is the procedure normally used in any significant event.

B. **Incorrect:** EOP 2530 would be the correct procedure for an at-power SBO
Plausible: EOP 2530 would be correct for an at-power SBO

C. **Correct:**

D. **Incorrect:** Omits evacuation, power restoration before other actions.
Plausible: All procedures are correct for this event

SRO Only Justification: This question is SRO only as it requires assessing plant conditions and then selecting a procedure or section of a procedure to mitigate, recover or with which to proceed. The question cannot be answered by solely knowing systems knowledge, immediate operator actions, AOP or EOP entry conditions, or the purpose, overall sequence of events, or overall mitigative strategy of a procedure.

References: AOP 2583 Student Ref: NONE

Learning Objective:

Question Source: New

Question History: New

Cognitive Level: Memory/Fundamental Knowledge:
Comprehensive/Analysis: X

10CFR55: CFR 43.5

Comments:

QUESTION 86

The unit is operating at 50% power.

The following conditions exist:

- RCP B bleedoff flow steady at 3 gpm
- RCP B bleedoff temperature steady at 180°F
- RCP seal header pressure steady at 20 psig
- RCP B vapor seal pressure steady at 75 psig

Which of the following identifies a required action and the procedure directing that action?

A. Adjust seal header pressure on C-02 per RCP B BLEED-OFF FLOW HI ARP.

B. Commence controlled plant shutdown per RCP B BLEED-OFF TEMP HI ARP.

C. Trip the reactor and stop the B RCP per RCP B VAPOR SEAL PRES HI ARP.

D. Commence controlled plant shutdown per RCP B BLEED-OFF FLOW HI ARP.

K&A Rating: 003 Reactor Coolant Pump (RCPS) (3.9)

K&A Statement: A2.01 Ability to (a) predict the impacts of the following malfunctions or operations on the RCPS; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: Problems with RCP seals, especially rates of seal leak-off

Key Answer: **A**

Justification (Question #86):

A. **Correct:** Increased bleedoff could be caused by low leakoff backpressure. The ARP directs action to control backpressure between 40 psig and 75 psig.

B. **Incorrect:** A controlled shutdown is not required unless temperature is rising and approaching 195°F.
Plausible: The temperature is elevated to the alarm setpoint and the ARP does direct a controlled shutdown under specific conditions, not met in this question.

C. **Incorrect:** Vapor seal pressure is not high enough to warrant tripping the reactor.
Plausible: Vapor seal pressure is normally approximately 60 psig or less. The pressure given in the stem is elevated. The high pressure alarm actuates at 250 psig and directs a reactor trip if bleedoff flow is isolated, a condition indicated by high vapor seal pressure.

D. **Incorrect:** The high bleedoff flow ARP does not direct a controlled shutdown
Plausible: The applicant may make a reasonable assumption that the ARP directs a controlled shutdown.

SRO Only Justification: This question is SRO only as it requires assessing plant conditions and then selecting the appropriate procedure to mitigate plant conditions and place the plant in a safe condition.

References: ARP-2590B-100, 102, 112 Student Ref: NONE

Learning Objective:

Question Source: New

Question History:

Cognitive Level: Memory/Fundamental Knowledge:
Comprehensive/Analysis: X

10CFR55: 43(b)(5) Assessment of facility conditions and selection of appropriate procedures during normal, abnormal, and emergency situations

Comments (Question #86):

QUESTION 87

Given the following conditions:

- The plant is recovering from a reactor trip
- Burnup is 800 MWD/MTU
- Boron concentration 2 hours ago, prior to commencing the startup was 1300 ppm

An auto VCT makeup initiates. Boron flow is inadvertently set to zero. PW flow is 100 gpm. The crew is distracted and does not notice the dilution in progress. CEAs have just been withdrawn to a position that is at 0.07% $\Delta\rho$ less than the position predicted on the ECP when criticality is declared at a SUR of 0.3 dpm with no rod motion.

Approximately how much time elapsed from the initiation of auto makeup until criticality AND what action is required, if any, per OP 2202 Reactor Startup ICCE, Attachment 5, Conditional Actions?

A. 4 minutes. No action is required per OP 2202 Attachment 5.

B. 8 minutes. No action is required per OP 2202 Attachment 5.

C. 4 minutes. ICCE termination criteria are met. De-energize CEDMs.

D. 8 minutes. ICCE termination criteria are met. De-energize CEDMs.

K&A Rating: 004A2.10 (4.2)

K&A Statement: Ability to predict the impact of the following malf and use procedures to mitigate: Inadvertent boration/dilution.

Key Answer: **A**

Justification (Question 87):

A. **Correct:**
(1) The boron concentration at criticality is equal to sample concentration (1300 ppm) plus the product of the given reactivity offset (-0.07% $\Delta\rho$) and the inverse boron worth (~119 ppm/%$\Delta\rho$). [Crit Boron (**1291.7**) = Sample Boron (1300) + (Offset of negative 0.07%$\Delta\rho$ * IBW 119ppm/%$\Delta\rho$)].
(2) The quantity of water to effect the concentration change is given by OP 2208 formula, VOL = 62,490 * Ln(Ci/Cf). [62,490 * Ln(1300/1291.7) = **402 gallons**].
(3) The time to effect the necessary concentration change is given by dividing the volume of water by the volumetric flow rate of water addition. [402 gals / 100 gals/min = **4 min**].
None of the actions in OP 2202 Attachment 5 Conditional Actions are required. Criticality occurred well within the $\pm$ 0.5% $\Delta\rho$ band. This is not a direct lookup. The calculations require use of multiple references and the calculation methodology is not provided in the references. While an inadvertent dilution during startup is a serious reactivity management concern, it does not meet criteria for ICCE termination as listed in OP 2202 Attachment 8.

B. **Incorrect:** Wrong time.
Plausible: Applicant may make a calculation error.

C. **Incorrect:** Wrong action. The action listed is not consistent with that associated with meeting ICCE termination criteria.
Plausible: Applicant may think ICCE criteria are met and that the given action is required.

D. **Incorrect:** Wrong time, wrong action. The action listed is not consistent with that associated with meeting ICCE termination criteria.
Plausible: Applicant may make a calculation error. Applicant may think ICCE criteria are met and that the given action is required.

<u>SRO Only Justification</u>: This question is SRO only as it requires assessing plant conditions and then selecting a procedure or section of a procedure to mitigate, recover or with which to proceed. The question cannot be answered by solely knowing systems knowledge, immediate operator actions, AOP or EOP entry conditions, or the purpose, overall sequence of events, or overall mitigative strategy of a procedure.

References: OP2202 Rev 022-01 Att 5
OP2208 Rev 015-01Att 4
RE Curve Book Cycle 23 Rev 000

Student Ref: OP2208 Attachment 4
RE Curve Book RE-F-02 (Pg 41 of 42 only)

Learning Objective:

Question Source: New

Question History: New

Cognitive Level: Memory/Fundamental Knowledge:
Comprehensive/Analysis: X

10CFR55: 43(b)(6) Procedures and limitations involved in initial core loading, alterations in core configuration, control rod programming, and determination of various internal and external effects on core reactivity

Comments (Question 87):

QUESTION 88

An automatic reactor trip and SIAS have occurred while operating at power.

30 minutes into the event, the following conditions exist:

- SIAS, CIAS, EBFAS, MSI and CSAS have actuated
- The crew is performing EOP-2532 "Loss of Coolant Accident"
- CET temp 320°F and lowering slowly
- Pressurizer pressure 28 psia and steady
- Containment pressure 9 psig and lowering slowly
- RWST level is 8% and lowering
- SRAS Manual Initiation pushbuttons on C01 have been depressed
- 2 LPSI , 2 HPSI and 2 Charging Pumps are running

Which One of the following is the NEXT correct action per EOP-2532?

A. Manually stop both Containment Spray pumps.

B. Manually close both RWST Header Isolation Valves (CS-13.1A and B).

C. Manually stop both Low Pressure Safety Injection pumps.

D. Manually close 3 LPSI Injection Valves (SI-635 and any 2 of 3 others).

K&A Rating: 026 A2.02 (4.2)

K&A Statement: Ability to (a) predict the impacts of the following malfunctions or operations on the CSS; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: Failure of automatic recirculation transfer.

Key Answer: **C**

Justification:

A. **Incorrect:** Even though RWST level is low and containment spray is running at this time, there is no procedural direction to stop the spray pumps at this time.

B. **Incorrect:** The correct action is to stop LPSI pumps
Plausible: This contingency action is directed per Step 48 if the LPSI pumps cannot be stopped.

C. **Correct:** Must determine that SRAS should have actuated and has not which puts you at Step 48 of EOP-2532. Step 48 directs the action in this answer.

D. **Incorrect:** The correct action is to stop LPSI pumps
Plausible: This contingency action is directed per Step 48 if the LPSI pumps cannot be stopped.

<u>SRO Only Justification</u>: This question is SRO only as it requires assessing plant conditions and then selecting a procedure or section of a procedure to mitigate, recover or with which to proceed. The question cannot be answered by solely knowing systems knowledge, immediate operator actions, AOP or EOP entry conditions, or the purpose, overall sequence of events, or overall mitigative strategy of a procedure.

References: EOP-2532 Student Ref: None

Learning Objective: NA

Question Source: MS2 Bank # 5000052 (Q#95)

Question History: 2005 NRC Exam

Cognitive Level: Memory/Fundamental Knowledge:
Comprehensive/Analysis: X

10CFR55: CFR 43.5

Comments:

QUESTION 89

The plant is at 100% power and stable when the "PZR Pressure Selected Channel Deviation HI/LO" alarm is received.

The following plant conditions are noted:

- Pressurizer pressure is at 2225 psia and slowly lowering
- Both Pressurizer pressure controllers are in AUTO mode with setpoints at 2250 psia
- Both Pressurizer pressure controllers indicate 0% output
- Facility 1 Proportional Heater amp meter averages – 0 amps
- Facility 2 Proportional Heater amp meter averages – 170 amps
- All other control room indications are unchanged from pre-event values

Which ONE of the following describes an additional required action and the administrative impact of the situation?

A. Energize Pressurizer Backup Heaters as necessary to maintain pressure at 2250 psia. Pressurizer pressure is below the value assumed in the FSAR, such that if the design basis accident were to happen now, fuel centerline melt would occur.

B. Raise the output of the in-service pressure controller to maximize Proportional Heater output and maintain pressure at 2250 psia. Pressurizer pressure must remain above 2225 psia to ensure the specified limits for the accident and transient analysis remain valid.

C. Energize Pressurizer Backup Heaters as necessary to maintain pressure at 2250 psia. Pressurizer heater output is below the administrative limit needed to enhance the capability to control Pressurizer pressure for natural circulation.

D. Place the in-service pressure controller in manual and energize all available Pressurizer Backup Heaters to force Pressurizer Sprays. The loss of automatic Pressurizer pressure control would result in exceeding an LSSS setpoint if power were to drop 10% or >/= 5% per minute.

K&A Rating: 010 Pressurizer Pressure Control (PZR PCS) (4.2)

K&A Statement: 2.2.25 Knowledge of the bases in Technical Specifications for limiting conditions for operations and safety limits.

Key Answer: **C**

Justification (Question 89):

A. **Incorrect**: 2225 psia is the limit for the DNB TS, however fuel centerline melt is not based on the DNBR limit.

B. **Incorrect:** Proportional heaters are already putting out max output. Raising the output will not give desired result.

C. **Correct:** Facility 1 proportional heaters are lost, which equates to half of the required TS heaters. The bases stated in the spec can no longer be met. .

D. **Incorrect:** Auto pressurizer pressure control has not been lost. Heaters should not be taken to manual.

SRO Only Justification: This question is SRO only as it requires assessing plant conditions and making a decision based on knowledge of the Technical Specification bases.

References: TS Bases 3.4.4, ARP 2590B-212 Rev 000-00 Student Ref: NONE

Learning Objective:

Question Source: Millstone Bank Q 8000062

Question History: Millstone 2009 NRC Exam Q88

Cognitive Level: Memory/Fundamental Knowledge:
Comprehensive/Analysis: X

10CFR55: 43(b)(2) Facility operating limitations in the technical specifications and their bases

Comments (Question 89):

QUESTION 90

The unit is in MODE 1.

The Manual Bypass Switch on Static Switch "VS-1" is placed in the "INV" position

Which ONE of the following describes the operability of INV-5 and VA-10 and the required Technical Specification Limiting Condition(s) for Operation to enter, if any?

A. INV-5 AND VA-10 are BOTH OPERABLE. No LCO action statement is required.

B. INV-5 AND VA-10 are INOPERABLE. Enter the LCO for INV-5 (LCO 3.8.2.1A) and the LCO for AC electrical busses (LCO 3.8.2.1).

C. INV 5 is OPERABLE, VA-10 is INOPERABLE. Enter the LCO for AC electrical busses (T.S. 3.8.2.1).

D. INV 5 is INOPERABLE, VA-10 is OPERABLE. Enter the LCO for INV-5 and INV-6 (T.S. 3.8.2.1A).

K&A Rating: 062 AC Electrical Distribution 2.2.40 (4.7)

K&A Statement: 2.2.40 Ability to apply Technical Specifications for a system.

Key Answer: **D**

Justification (Question 90):

A. **Incorrect:** INV-5 is inoperable.

B. **Incorrect:** VA-10 is operable.

C. **Incorrect:** INV-5 is inoperable and VA-10 is inoperable.

D. **Correct:** Static Switch VS1 is designed, when in AUTO, to automatically swap power sources to the VA panel as needed. In any other position the static switch has no automatic function. In the INV position, the VA panel is connected directly to its normal source, 2-INV-1 Inverter and will not automatically transfer to the backup 2-INV-5 power source. The capability for automatic swapover is associated with the LCO for the backup power source and not for the VA panel. The TS surveillance requirement for INV-5 and INV-6 requires that VA-10 and VA-20 automatically transfer to their alternate sources. Placing the Manual Bypass Switch on VS1 in the "INV" position locks out the transfer capability of the static switch, making INV 5 inoperable. VA-10 is operable when the Panel is energized from a source other than the diesel generator.

SRO Only Justification: This question is SRO only as it requires applying technical specifications.

References: TS, OP2345B Rev 017-08, LP LVD-00.C.R6

Student ref: TS 3.8.2.1, TS 3.8.2.1A

Learning Objective: MB-04877

Question Source: New

Question History:

Cognitive Level: Memory/Fundamental Knowledge:
Comprehensive/Analysis: X

10CFR55: 43(b)(2) Facility operating limitations in the technical specifications and their bases

Comments (Question 90):

QUESTION 91

Given the following conditions:

- Unit tripped from 100% power on Thermal Margin/Low Pressure
- SIAS/CIAS/EBFAS have actuated
- Containment pressure is 2.5 psig and slowly rising
- The Unit Supervisor has implemented EOP 2532, Loss of Coolant Accident
- RCPs "A" and "C" are running
- RVLMS readings have been erratic
- RCS T-cold is 560°F and stable
- RCS Pressure is 1800 psia and stable
- Pressurizer Level is 33% and stable
- HPSI throttle/stop criteria has been met
- The ATC operator has closed the Train "A" HPSI injection valves
- The BOP operator has initiated a 50°F/hr cooldown
- The ATC operator has initiated RCS de-pressurization

30 minutes later:

- Reactor power is slowly rising on all 4 Wide Range Monitor safety channels
- RCS T-cold is 540°F and lowering
- RCS pressure is 1790 psia and stable
- Pressurizer level is 55% and rising
- Reactor Vessel Level indication is fluctuating between 29% and 43%

Which ONE of the following is the correct diagnosis and mitigation strategy for the conditions above?

A. Reactivity Control Safety Function is not met; Perform EOP 2540A Function Recovery of Reactivity Control, Success Path RC-3, Boration Using SI.

B. Safety injection flow is not adequate; Restore safety injection flow within requirements of EOP 2541 Appendix 2 Figures.

C. A void has formed in the Reactor Vessel; Perform void elimination actions in Appendix 24 Void Elimination.

D. Shutdown margin is not met; Perform EOP 2541 Appendix 3 Emergency Boration.

K&A Rating: 015 Nuclear Instrumentation (NIS) (3.8)

K&A Statement: A2.05 Ability to (a) predict the impacts of the following malfunctions or operations on the NIS; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: Core void formation

Key Answer: **C**

Justification (Question 91):

A. **Incorrect:** Reactor power rise is a consequence of core voiding and does NOT indicate an actual change in core power levels. Reactivity Control Safety Function is met.
Plausible: Applicant may think that the Reactivity Control is not met because of the rise in WRNI power level.

B. **Incorrect:** Safety injection flow is adequate.
Plausible: Applicant may believe that safety injection flow is not adequate and the core is uncovering which is indicated by low RVLMS levels.

C. **Correct:** These are indications of core voiding. EOP 2532 LOCA Step 85 directs use of Appendix 24 Void Elimination if RCS fails to depressurize and core voiding is suspected.

D. **Incorrect:** Reactor power rise is a consequence of core voiding and does NOT indicate that Shutdown Margin is not met
Plausible: Applicant may believe that shutdown margin has deteriorated because of the LOCA and rise in WRNI power level.

<u>SRO Only Justification</u>: This question is SRO only as it requires assessing plant conditions and then selecting a procedure or section of a procedure to mitigate, recover or with which to proceed. The question cannot be answered by solely knowing systems knowledge, immediate operator actions, AOP or EOP entry conditions, or the purpose, overall sequence of events, or overall mitigation strategy of a procedure.

References: EOP 2532 Rev 030-00, ICC-00-C.r2 Student Ref: NONE

Learning Objective: MB 05940

Question Source: Palo Verde Written Exam 2012 Q44063

Question History:

Cognitive Level: Memory/Fundamental Knowledge:
Comprehensive/Analysis: X

10CFR55: 43(b)(5) Assessment of facility conditions and selection of appropriate procedures during normal, abnormal, and emergency situations

Comments (Question 91):

QUESTION 92

Given the following conditions:

- The plant is in MODE 6
- Full core offload is in progress
- The upender is in VERTICAL position in the RFP
- An irradiated fuel assembly is in the refuel machine
- The refuel machine is near the upender
- The following alarms have been received at C-06/7:
  - SFP CLG PUMP SUCTION FLOW LO
  - SFP LEVEL LO
- SFP level is lowering at approximately 1 inch per minute

The Refueling SRO, in accordance with AOP-2578, Loss of Refuel Pool and Spent Fuel Pool Level, will direct which of the following?

A. Lower the fuel assembly into an open core location and close the Transfer Tube Isolation Valve.

B. Lower the fuel assembly into the south saddle and place the upender in HORIZONTAL. Do NOT close the Transfer Tube Isolation Valve.

C. Place the fuel assembly in the upender and place upender in HORIZONTAL. Do NOT close the Transfer Tube Isolation Valve.

D. Place the fuel assembly in the upender and transfer fuel to SFP, then close the Transfer Tube Isolation Valve.

K&A Rating: 033 A2.03

K&A Statement: Ability to (a) predict the impacts of the following malfunctions or operations on the Spent Fuel Pool Cooling System; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: Abnormal spent fuel pool water level or loss of water level

Key Answer: **D**

Justification (Question 92):

A. **Incorrect:** Per Step 4.1.11 the fuel assembly will be transferred to the SFP. The Transfer Tube Isolation Valve would not be closed with the upender in containment.
Plausible: The core is listed as a safe location in the note preceding Step 4.1.11. The note does not list the upender as a possible transfer location. Applicant may select this answer if he/she knows the guidance in the note regarding Refueling SRO tasks but does not know the procedural guidance that follows the note.

B. **Incorrect:** Closing the transfer tube isolation valve is a priority to limit the loss of level to the affected pool. Step 4.1.11 directs transfer to the SFP.
Plausible: Applicant may reason that leaving the transfer tube gate open is preferable because the rate of SFP level drop will significantly increase with the gate closed and closing the gate limits capability for maintaining SFP level through use of LPSI injection into the core.

C. **Incorrect:** Leaving the assembly in the upender, even in HORIZONTAL is not a designated safe storage location. Closing the transfer tube isolation valve is a priority to limit the loss of level to the affected pool.
Plausible: Applicant may reason that leaving the transfer tube gate open is preferable because the rate of SFP level drop will significantly increase with the gate closed and closing the gate limits capability for maintaining SFP level through use of LPSI injection into the core.

D. **Correct:** AOP-2578 Step 4.1.11 directs placing fuel in upender, positioning to HORIZONTAL, transferring to SFP and then closing Transfer Tube Isolation Valve.

SRO Only Justification: This question is SRO only as it requires assessing plant conditions (rate of RFP level decrease, location of leak in SFP) and then selecting a procedure or section of a procedure to mitigate, recover or with which to proceed. The question relates to duties of the Refueling SRO and cannot be answered by solely knowing systems knowledge, immediate operator actions, AOP or EOP entry conditions, or the purpose, overall sequence of events, or overall mitigative strategy of a procedure.

References: AOP 2578 Rev 006-04 Student Ref: NONE

Learning Objective:

Question Source: Modified Bank

Question History: Waterford 2012 NRC Exam

Cognitive Level: Memory/Fundamental Knowledge:
Comprehensive/Analysis: X

10CFR55: 43(b)(2) Facility operating limitations in the technical specifications and their bases

10CFR55: 43(b)(7) Fuel handling facilities and procedures

Comments (Question 92):

QUESTION 93

Refueling operations are in progress.

Which ONE of the following is PREVENTED by refueling equipment interlocks or design features when in the Manual mode of operations?

A. Fast speed raise after a fuel bundle has begun retracting into the hoist box

B. Raising fuel plus CEA in the fuel only region with 1439 lbs on the load cell

C. Fast speed bridge movement when located over the center of the core

D. Ungrappling a fuel assembly with 189 lbs indicated on the load cell

K&A Rating: 034K4.02 (3.3)

K&A Statement: Knowledge of design features and/or interlocks which provide for the following: fuel movement.

Key Answer: **A**

Justification (Question 93):

A. **Correct:** There is an interlock to ensure slow speed, except when fuel bundle is fully retracted into hoist box.

B. **Incorrect:** Per FH-215 Attachment 9, this is the expected weight of the fuel plus CEA in the fuel only region.
Plausible: Hoist overload interlock exists.

C. **Incorrect**: Fast speed operation is not prevented when in the Core Clear Zone. Per FH-215 Attachment 2, this is an area away from the core periphery and toward the center of the core.
Plausible: A fast speed interlock exists for when not in the Core Clear Zone.

D. **Incorrect:** There is no grapple interlock related to load.
Plausible: A down motion interlock exists if the hoist is unloaded or the cable is slack. FH-215 has precaution against ungrappling with cable slack.

SRO Justification: This is a system question concerning refueling systems, which are SRO only systems. This question requires the SRO applicant to recognize a condition that should be prevented by interlock.

References: REF-04-C.R3, Refueling Equipment — Student Ref: NONE
FH-215, Refueling Machine Operation (Attachments 2, 3, and 9)

Learning Objective:

Question Source: New

Question History: New

Cognitive Level: Memory/Fundamental Knowledge: X
Comprehensive/Analysis:

10CFR55: 43(b)(7) Fuel handling facilities and procedures

Comments (Question 93):

QUESTION 94

Given:

- Unit 2 has been shutdown to replace a pressurizer PORV
- All CEAs are fully inserted
- RCS Boron concentration is 2100 ppm
- Keff is 0.945
- RCS temperature is 195°F

Which ONE of the following meets (and does NOT exceed) the MINIMUM required shift staffing on Unit 2 in accordance with Tech Spec 6.2.2?

A. 1 SM, 1 RO, and 1 NLO

B. 1 SM, 1 US, 1 RO and 1 NLO

C. 1 SM, 1 US, 2 ROs and 2 NLOs

D. 1 SM, 1 US, 2 ROs, 1 STA and 2 NLOs

K&A Rating: 2.1.5 (3.9)

K&A Statement: 2.1.5 Ability to use procedures related to shift staffing, such as minimum crew complement, overtime limitations, etc.

Key Answer: **A**

Justification (Question 94):

A. **Correct:** This crew composition meets the requirement of T.S. 6.2.2, Table 6.2-1 for MODE 5, which requires 1 SRO, 1 RO, and 1 NLO.

B. **Correct:** This crew composition exceeds the requirement of T.S. 6.2.2, Table 6.2-1 for MODE 5

C. **Incorrect:** This crew composition exceeds the requirement of T.S. 6.2.2, Table 6.2-1 for MODE 5.

D. **Incorrect:** This crew composition exceeds the requirement of T.S. 6.2.2, Table 6.2-1 for MODE 5.

SRO Justification: Requires knowledge of Technical Specifications.

References: TS 6.2.2 Student Ref: NONE

Learning Objective: NA

Question Source: New

Question History: New

Cognitive Level: Memory/Fundamental Knowledge: X
Comprehensive/Analysis:

10CFR55: 43(b)(2) Facility operating limitations in the technical specifications and their bases

Comments (Question 94):

QUESTION 95

The RO is directed to perform Section 4.1 of a Continuous Use level system operating procedure. One of the procedure's prerequisites requires that a specific MCC be energized. It is NOT met. The MCC is de-energized.

The RO reviews Section 4.1 and determines only one step is affected by the de-energized MCC. The affected step directs the operator to manipulate a control board hand switch to close a motor operated valve (MOV) that is powered from the de-energized MCC and to verify, by control board lights, that the MOV is closed.

The affected procedure step:

4.1.4 Close MOV "X" by placing the MOV hand switch in "CLOSE" and observing the red position indicating light OFF and the green indicating light ON.

Because of the current plant operating condition, the MOV is already closed, a fact confirmed by alternate means (redundant indication and local field observation).

The RO determines:

- the work scope is more limited that the procedure was written to accomplish in that the valve is closed in the current plant configuration, such that the step does NOT apply
- the objective of the step does NOT change
- an unsafe condition is NOT created
- the initial conditions, precautions and limitations are NOT violated

Per AD-AA-102, Procedure Use and Adherence, Section 3.10, Use of N/A in Technical Procedures, which ONE of the choices contains ALL of the actions from the list below that are required?

1. Obtain concurrence from cognizant supervision prior to marking N/A
2. Document explanation and justification for N/A'ing the step
3. Document cognizant supervision concurrence
4. Initiate a procedure revision/change or administrative correction

A. 1 and 2 ONLY

B. 1, 2 and 3 ONLY

C. 3 and 4 ONLY

D. 4 ONLY

K&A Rating: 2.1.23 (4.4)

K&A Statement: Ability to perform specific system and integrated plant procedures during all modes of plant operation.

Key Answer: **D**

Justification (Question 95):

A. **Incorrect:** A prerequisite is violated. Therefore criteria of AD-AA-102, Step 3.10.5.a is not satisfied and a procedure revision/change or administrative correction is required. **Plausible:** The applicant may decide that the step may be N/A'd. This choice contains actions that would reasonably be required if N/A were permissible.

B. **Incorrect:** A prerequisite is violated. Therefore criteria of AD-AA-102, Step 3.10.5.a is not satisfied and a procedure revision/change or administrative correction is required. **Plausible:** The applicant may decide that the step may be N/A'd. This choice would be correct if N/A were permissible.

C. **Incorrect:** A prerequisite is violated. Therefore criteria of AD-AA-102, Step 3.10.5.a is not satisfied and a procedure revision/change or administrative correction is required. **Plausible:** The applicant may recognize that a procedure change is required but may think cognizant supervision concurrence must be documented.

D. **Correct:** A prerequisite is violated. Therefore criteria of AD-AA-102, Step 3.10.5.a is not satisfied and a procedure revision/change or administrative correction is required.

SRO Only Justification: This question is SRO only as it requires knowledge of procedures required to obtain authority for operating changes in the facility. The question cannot be answered by solely knowing systems knowledge, immediate operator actions, AOP or EOP entry conditions, or the purpose, overall sequence of events, or overall mitigative strategy of a procedure.

References: AD-AA-102 Rev 9 (Steps 3.10.5 and 3.10.6) Student Ref: NONE

Learning Objective:

Question Source: New

Question History: New

Cognitive Level: Memory/Fundamental Knowledge: X
Comprehensive/Analysis:

10CFR55: 43(b)(3) Facility licensee procedures required to obtain authority for design and operating changes in the facility

Comments (Question 95):

QUESTION 96

Given the following conditions:

- Unit is in MODE 3 and performing a plant heat-up in accordance with OP 2201 following a refueling outage
- 3 RCPs are running ("A," "B," and "C")
- RCS temperature is 505°F and slowly rising
- RCS Pressure is 2250 psia and pressure control is in automatic

The crew is making preparations to energize Control Rod Drive Mechanisms (CEDMs) per OP-2201, Plant Heatup, to support I&C testing.

Given the above conditions, select the choice which identifies (1) the plant condition under which the CEDMs may be energized and (2) the reason.

	(1)	(2)
A.	High Power Trip is operable	The consequences of a CEA withdraw with a subcritical core will stay within acceptable safety analysis levels.
B.	RCS Boron concentration is greater than 1720 ppm	Adequate Shutdown Margin is maintained even if all CEAs are withdrawn from the core.
C.	A boron dilution is NOT in progress	Lowers possibility of two consecutive positive reactivity additions.
D.	Local Power Density Trip is operable	The consequences of a CEA withdraw with a subcritical core will stay within acceptable safety analysis levels.

K&A Rating: Generic, Equipment Control 2.2.1 (4.4)

K&A Statement: 2.2.1 Ability to perform pre-startup procedures for the facility, including operating those controls associated with plant equipment that could affect reactivity.

Key Answer: **B**

Justification (Question 96):

A. **Incorrect:** Because 4 Reactor Coolant Pumps are not running, the MODE 3 conditions to energize CEDMs are still not met.
Plausible: TS 3.1.3.7 bases provides this as the reason for allowing CEDMs to be energized with 4 RCPs running, PZR pressure >2000 psia, RCS temperature > 500°F and the High Power Trip operable, the plant is within the bounds of the safety analysis for a CEA withdraw accident from subcritical core.

B. **Correct:** TS 3.1.3.7 states that the control rod drive mechanisms shall be de-energized in MODES 3*, 4, 5 and 6, whenever the RCS boron concentration is less than refueling concentration of Spec 3.9.1. TS 3.9.1 states that refueling boron concentration is $\geq$ 1720 ppm. The note for MODE 3* states that the control rod drive mechanisms may be energized for MODE 3 as long as 4 reactor coolant pumps are OPERATING, the reactor coolant system temperature is greater than 500°F, pressurizer pressure is > 2000 psia and the high power trip is OPERABLE. Since only 3 RCPs are running, this note does not apply; however, if RCS Boron concentration is greater than 1720 ppm then CEDMs may be energized. OP 2201 step 4.10.4 which directs that if any of the conditions listed in step 4.10.2 do NOT exist (4 RCPS running, RCS Temp > 500°F, Pressurizer Pressure > 2000 psia and High Power Trip Operable) <u>AND</u> RCS boron concentration is less than refueling boron concentration, VERIFY CEDMS de-energized. From the bases for TS 3.1.3.7, the drive mechanisms may be energized with the boron concentration greater than or equal to the refueling concentration since, under these conditions, adequate SHUTDOWN MARGIN is maintained, even if all CEAs are fully withdrawn from the core.

C. **Incorrect:** This does not satisfy the Technical Specification requirement for energizing CEDMs in MODE 3.
Plausible: Preventing situations that cause two consecutive positive reactivity additions is a common reactivity management principle.

D. **Incorrect:** This does not satisfy the Technical Specification requirements for energizing CEDMs in MODE 3.
Plausible: Applicant may confuse the High Power Trip operability requirement with the Local Power Density Trip.

<u>SRO Only Justification</u>: This question is SRO only as it requires assessing plant conditions and applying knowledge of Technical Specification bases to analyze TS required actions. The question cannot be answered by solely knowing systems knowledge, or LCO information listed in the LCO statement.

References: OP 2201 Rev 033-03, TS 3.1.3.7 03/16/2006 Amend 291 and Bases, LP CED-01-C

Student Ref: NONE

Learning Objective: MB-02256

Question Source: New

Question History: New

Cognitive Level: Memory/Fundamental Knowledge:
Comprehensive/Analysis: X

10CFR55: 43(b)(2) Facility operating limitations in the technical specifications and their bases

Comments (Question 96):

QUESTION 97

The plant is at 100% power when the Unit Supervisor discovers that SP 2611G, "A" RBCCW Pump Tests, was performed 95 days ago. This is a quarterly surveillance (every 92 days). Which of the following correctly completes the following statement to describe the operability of the pump?

"A" RBCCW Pump ___________________________

A. must be considered NOT OPERABLE from the time of discovery, and will remain NOT OPERABLE until the required surveillance is successfully completed.

B. must be considered NOT OPERABLE if both the missed surveillance and a risk evaluation are NOT performed within 24 hours from the time of discovery.

C. may be considered OPERABLE for an additional 25% of the required surveillance time interval provided the surveillance is successfully completed within the additional time.

D. may be considered OPERABLE only as long as missed surveillance is performed within the next three months, with a risk evaluation if delayed greater than 24 hours.

K&A Rating: Generic, Equipment Control 2.2.37 (4.6)

K&A Statement: 2.2.37 Ability to determine operability and/or availability of safety related equipment.

Key Answer: **C**

Justification (Question 97):

A. **Incorrect:** The pump is still operable. LCO 4.0.2 allows a maximum allowable extension not to exceed 25% of the surveillance time interval. 25% of 92 days (quarterly) is 115 days.
Plausible: Applicant may believe that failing to meet the surveillance frequency requirement deems the pump inoperable. This would be the case if the pump failed the surveillance.

B. **Incorrect**: The surveillance must be performed but 24 hours is not the limit. LCO 4.0.2 allows a maximum allowable extension not to exceed 25% of the surveillance time interval. 25% of 92 days (quarterly) is 115 days.
Plausible: Distractor, LCO 4.0.3 states that if it is discovered that Surveillance was not performed within its specified surveillance interval, then compliance with the requirement to declare the Limiting Condition for Operation not met may be delayed, from the time of discovery, up to 24 hours or up to the limit of the specified surveillance interval, whichever is greater. The applicant may only remember the 24 hour extension.

C. **Correct:** In accordance with LCO 4.0.2, a maximum allowable extension not to exceed 25% of the surveillance time interval. 25% of 92 days (quarterly) is 115 days.

D. **Incorrect:** LCO 4.0.3 does not yet require action under the RBCCW LCO because there is still 115-92 = 23 days left to perform the surveillance under the 25% extension allowed by LCO 4.0.2. Furthermore, the risk evaluation within 24 hours is not required.
Plausible: Applicant may confuse the use of LCO 4.0.2 with LCO 4.0.3.

<u>SRO Only Justification</u>: This question is SRO only as it requires assessing plant conditions and applying knowledge of generic LCO requirements (SR 4.0.2, SR 4.0.3 and SR 4.0.5). The question cannot be answered by solely knowing systems knowledge, or LCO information listed in the LCO statement.

References: TS 10/15/2002 Amend 271 (SR 4.0.2, and 4.0.3) and 07/31/2008 Amend 304 (SR 4.0.5)   Student Ref: NONE

Learning Objective: MB 01864

Question Source: Modified Millstone Bank ID 86709

Question History: Original question was a LCO 4.0.3 question. This modification tests LCO 4.0.2 applicability.

Cognitive Level: Memory/Fundamental Knowledge:

Comprehensive/Analysis: X

10CFR55: 43(b)(2) Facility operating limitations in the technical specifications and their bases

Comments (Question 97):

QUESTION 98

While operating at 100% power, a Steam Generator Tube Rupture occurred in #1 Steam Generator. The Reactor was manually tripped and all appropriate actions were performed up to isolation of the affected Steam Generator.

Forty minutes has elapsed since the trip. It has been determined that reactor coolant activity levels are significantly above normal levels. The Shift Manager has just upgraded to a General Emergency, Alpha, due to a partially stuck open Atmospheric Dump Valve and the associated high radiation levels. All personnel have evacuated the Auxiliary and Enclosure Buildings. A site evacuation has begun. The control room crew has determined that the #1 Atmospheric Dump Valve must be manually isolated locally; however, the dose rate in the general area is 5 REM per hour.

Based on the present radiological conditions at the #1 ADV and station administrative limits, what is the maximum stay time WITHOUT obtaining any special authorization for an operator with NO exposure for the present year?

A. 54 minutes

B. 22 minutes

C. 5 hours

D. 2 hours

K&A Rating: Generic, Radiation Control 2.3.4 (3.7)

K&A Statement: 2.3.4 Knowledge of radiation exposure limits under normal or emergency conditions.

Key Answer: **A**

Justification (Question 98):

A. **Correct:** 4.5 REM / 5 REM/hr = 54 minutes. When an Alert or higher classification has been declared, exposures up to a Total Effective Dose Equivalent (TEDE) of 4.5 Rem per year (inclusive of year-to-date exposures) are automatically authorized within the 10 CFR 20 limit of 5 Rem. Emergency exposures are exposures which may be authorized above 10 CFR 20 limits to enable SERO personnel to operate the plant and take actions to mitigate the effect of the emergency to plant systems and the public.

B. **Incorrect:** Correct answer is based on a 4.5 Rem administrative limit.
Plausible: If the examinee assumes a normal administrative limit of 1900 mr, then 1900 mr / 5 REM/hr = 0.38 hours x 60 minutes/hr = 22.8 minutes.

C. **Incorrect:** Correct answer is based on 4.5 REM administrative limit.
Plausible: If the examinee assumes a limit of 25 REM, then 25 REM / 5 REM/hr = 5.0 hours. 25 REM is authorized for life saving.

D. **Incorrect:** Correct answer is based on a 4.5 Rem administrative limit.
Plausible: If the examinee assumes a limit of 10 REM, then 10 REM / 5 REM/hr = 2.0 hours.

<u>SRO Only Justification</u>: This question is SRO only as it requires assessing plant conditions and applying knowledge of ODCM requirements and station administrative controls. The question cannot be answered by solely knowing systems knowledge, Technical Specification Safety Limits or LCO information listed in the LCO statement.

References: MP-26-EPI-FAP09 Rev 004 Section 1.4.1 Student Ref: NONE

Learning Objective: MB-02634

Question Source: Millstone Bank ID 83766

Question History:

Cognitive Level: Memory/Fundamental Knowledge:
Comprehensive/Analysis: X

10CFR55: 43(b)(4) Radiation hazards that may arise during normal and abnormal situations, including maintenance activities and various contamination conditions.

Comments (Question 98):

QUESTION 99

While in EOPs, maintaining the Safety Function is of a higher priority than maintaining Technical Specification (TS) compliance for the following reason:

A. Technical Specifications are limits intended to ensure that plant configuration at the start of an accident is consistent with Design Basis Accident assumptions. Safety functions ensure that acceptable fuel design limits are not exceeded during implementation of EOPs.

B. Technical Specifications are limits only during plant operation and are not applicable during an accident. Safety functions ensure that acceptable fuel design limits are not exceeded during implementation of EOPs.

C. Technical Specifications are limits only during plant operation and are not applicable during an accident. Safety functions prevent core damage or minimize radiation releases to the general public during an accident.

D. Technical Specifications are limits intended to ensure that plant configuration at the start of an accident is consistent with Design Basis Accident assumptions. Safety functions prevent core damage or minimize radiation releases to the general public.

K&A Rating: Generic, Emergency Procedures, Plan 2.4.22 (4.4)

K&A Statement: 2.4.22 Knowledge of the bases for prioritizing safety functions during abnormal/emergency operations.

Key Answer: **D**

Justification (Question 99):

A. **Incorrect:** GDC 20, Protection System Functions are designed to ensure acceptable fuel design limits are not exceeded as a result of anticipated operational occurrences. The purpose of Safety Functions is to provide a set of conditions or actions needed to prevent core damage or minimize radiation releases to the general public. Depending on the accident sequence and whether or not it is beyond design basis will determine whether or not fuel limits are exceeded. The safety functions do not by themselves ensure fuel limits are maintained.
Plausible: The applicant may know the purpose of Technical Specifications but not understand the purpose of Safety Functions.

B. **Incorrect**: Technical Specifications do not only apply during plant operation. During an emergency, the crew's attention has to be directed to completing the procedure to mitigate the event, and not be distracted by documenting T/S LCO Action Statements. Documentation of TSAS entered can be reconstructed later from procedures and rough logs.
Plausible: Applicant may believe that Technical Specifications do not apply during an accident.

C. **Incorrect:** Technical Specifications do not only apply during plant operation. During an emergency, the crew's attention has to be directed to completing the procedure to mitigate the event, and not be distracted by documenting T/S LCO Action Statements. Documentation of TSAS entered can be reconstructed later from procedures and rough logs.
Plausible: Applicant may believe that Technical Specifications do not apply during an accident.

D. **Correct:** This is the basis for prioritizing Safety Functions over Technical Specifications during EOP usage from the definition of Safety Function and Section 1.5 Technical Specifications in OP 2260 EOP User Guide.

<u>SRO Only Justification</u>: This question is SRO only as it requires knowledge of administrative procedures that specify hierarchy, implementation, and/or coordination of plant normal, abnormal, and emergency procedures. The question cannot be answered by solely knowing systems knowledge, Technical Specification Safety Limits or LCO information listed in the LCO statement.

References: OP 2260 Rev 010-00 Student Ref: NONE

Learning Objective: MB-05969

Question Source: New

Question History: New

Cognitive Level: Memory/Fundamental Knowledge: X
Comprehensive/Analysis:

10CFR55: 43(b)(2) Facility operating limitations in the technical specifications and their bases

Comments (Question 99):

QUESTION 100

A General Emergency has been declared at Millstone Unit 2 and the SERO is fully manned. The dose projection at the site boundary is expected to be greater than 5 REM Thyroid (CDE).

Which ONE of the following explains how Potassium Iodide (KI) is authorized for issue?

A. Only the Director of Station Emergency Operations (DSEO) can authorize KI issuance to onsite and offsite SERO workers. Connecticut State Officials automatically implement the KI Strategy for the General Public when a General Emergency is declared.

B. The Manager of Radiological Consequences Assessment (MRCA) can authorize KI issuance to onsite SERO workers. The Manager of Radiological Dose Assessment (MRDA) can authorize KI issuance to offsite SERO workers. Connecticut State Officials automatically implement KI Strategy for the General Public when a General Emergency is declared.

C. The Assistant Director Technical Support (ADTS) can authorize KI issuance to onsite SERO workers. Only the Director of Station Emergency Operations (DSEO) can authorize KI issuance to offsite SERO workers. The DSEO recommends that Connecticut State Officials implement the KI strategy for the general public.

D. The Assistant Director Technical Support (ADTS) can authorize KI issuance to onsite SERO workers. The Assistant Director Emergency Operations Facility (ADEOF) can authorize KI issuance to offsite SERO workers. The Director of Station Emergency Operations (DSEO) recommends that the Connecticut State Officials implement the KI strategy for the general public.

K&A Rating: Generic, Emergency Procedures/Plan 2.4.37 (4.1)

K&A Statement: 2.4.37 Knowledge of the lines of authority during implementation of the emergency plan.

Key Answer: **D**

Justification (Question 100):

A. **Incorrect:** DSEO authorization is not required for issuing KI to onsite and offsite SERO workers. The ADTS and ADEOF, respectively, can authorize KI issuance to these groups of SERO workers. The State of CT does not automatically implement the KI Strategy for the General Public when a General Emergency is declared.
Plausible: The applicant may believe that DSEO authorization is required because the DSEO has the most authority during an emergency event at the station. Furthermore, a General Emergency implies that a release can be reasonably expected to exceed EPA Protective Action Guideline exposure levels offsite for more than the immediate site area and the applicant may believe that CT State would want to have KI issued to those most impacted by a release.

B. **Incorrect**: The ADTS and ADEOF, respectively, authorize KI issuance to these groups of SERO workers. The MRCA and MRDA cannot authorize KI issuance. The State of CT does not automatically implement the KI Strategy for the General Public when an General Emergency is declared.
Plausible: The MRCA recommends KI issuance for onsite SERO workers to the ADTS. The MRDA recommends KI issuance to offsite SERO workers to the ADEOF. The State of CT does not automatically implement the KI Strategy for the General Public when an General Emergency is declared.

C. **Incorrect:** DSEO authorization is not required for offsite SERO workers.
Plausible: Distractor. The applicant may mix up these requirements with the requirements for emergency exposure upgrades and extensions which require ADTS and DSEO authorization respectively.

D. **Correct:** The Assistant Director, Technical Support (ADTS) is responsible for approving the Manager of Radiological Consequences Assessment's (MRCA) recommendations for emergency exposure upgrades up to 25 Rem and for authorizing KI issuance for SERO emergency workers within the protected area fence. The Assistant Director, Emergency Operations Facility (ADEOF) is responsible for approving the Manager of Radiological Dose Assessment's (MRDA) recommendations for emergency exposure upgrades up to 25 Rem and for authorizing KI issuance for SERO emergency workers outside the protected area fence. The DSEO is responsible for all general public PARs to offsite officials.

SRO Only Justification: This question is SRO only as it requires assessing plant conditions and applying knowledge of several Emergency Plan Implementation Procedures (EPIPs). The question cannot be answered by solely knowing systems knowledge, immediate actions, Technical Specification Safety Limits or LCO information listed in the LCO statement.

References: MP-26-EPI-FAP04 Rev 006 Att 2, Student Ref: NONE

MP-26-EPI-FAP02 Rev. 007-01 Att 2, MP-26-EPI-FAP06-002 Rev 009, MP-26-EPI-FAP06-005 Rev 004 Section A

Learning Objective:

Question Source: New

Question History: New

Cognitive Level: Memory/Fundamental Knowledge: X
Comprehensive/Analysis:

10CFR55: 43(b)(4) Radiation hazards that may arise during normal and abnormal situations, including maintenance activities and various contamination conditions.

Comments (Question 100):