Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	1	
	Group #	1	
	K/A #	APE008AK2.02	
	Importance Rating	2.7	2.7

Knowledge of the interrelations between the Pressurizer Vapor Space Accident and the following: Sensors and detectors

RO 1

Proposed Question

Unit 1 is at 45% power steady state. A leak on the upper instrument tap (reference leg) associated with the SELECTED “Pressurizer (Pzr) Level Transmitter”, LT-1110X occurs.

Assuming NO Operator actions, which ONE of the following would be the response of the Pressurizer Pressure Level Control System?

	Indicated Pzr Level	**Actual Pzr Level**
A.	lowers	rises
B.	rises	rises
C.	rises	lowers
D.	lowers	lowers

Proposed Answer: C

Explanation (Optional): A leak on the upper tap would be the reference leg. This will result in indicated Pzr level rising above pzr level programmed setpoint so letdown flow will increase and thus actual Pzr level lowers. ΔP=Pref-Pvar. As Pref lowers due to loss of level (leakage) then ΔP lowers to "0". This will cause indicated level to go high. If Pvar lowers, the ΔP rises to max and causes indicated level to lower.

A. Incorrect. Could be chosen by student if inaccurately recalls from GFES that a reference line break on a wet leg level detector will eventually fail the indicated reading high due to Pref dropping causing ΔP to decrease as seen by the detector.
B. Incorrect. Could be chosen if student misunderstands that the PPLCS responds to rising level with an increase in letdown flow.
C. Correct. See explanation.
D. Incorrect. Could be chosen by student if inaccurately recalls from GFES that a reference line break on a wet leg level detector will eventually fail the indicated reading high due to Pref dropping causing ΔP to decrease as seen by the detector.

Technical Reference(s): NUC-GFP-CMP-007, 0711206 (Attach if not previously provided)

Proposed references to be provided to applicants during examination: N/A

Learning Objective: 0702206-18 (As available)

Question Source: Bank # 3818
Modified Bank # ______ (Note changes or attach parent)
New ______

Question History: Last NRC Exam ______

Question Cognitive Level: Memory or Fundamental Knowledge ______
Comprehension or Analysis X

10 CFR Part 55 Content: 55.41 7
55.43 ______

Comments:

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	1	
	Group #	1	
	K/A #	EPE009EG2.4.50	
	Importance Rating	4.2	4.0

Small Break LOCA: Ability to verify system alarm setpoints and operate controls identified in the alarm response manual.

Proposed Question: RO 2

Given the following conditions on Unit 1:

- The reactor has been manually tripped and the crew has just EXITED 1-EOP-01.
- Pressurizer pressure is 1590 psia.
- Containment pressure is 5.5 psig
- The following annunciator has just alarmed.

SIAS CHANNEL A/B ACTUATION **R-5**

The BRCO reports the following:
"A" Train SIAS indicates; Green light ON, Red light OFF
"B" Train SIAS indicates; Red light ON, Green light OFF

IAW the guidance in 1-ARP-01-R5 and Operations Policy 521 "EOP Implementation", the crew should manually actuate __(1)__ train SIAS and secure__(2)__ .

A. 1) "A"
 2) ONE RCP in each loop

B. 1) "A"
 2) ALL four RCPs

C. 1) "B"
 2) ONE RCP in each loop

D. 1) "B"
 2) ALL four RCPs

Proposed Answer: B

Explanation (Optional): The red and green light indications are listed in R-6 for the RO to evaluate. The Operator actions of manually actuating SIAS are also listed in the ARP to perform if necessary. Per Ops Policy 521, if Cont Heat Removal SF is in the process of or has been evaluated in EOP-01, then if a valid SIAS signal has occurred secure all four RCP's (CCW to the RCP's gets isolated-and is not allowed to be restored). Since the SIAS actuated after EOP-01 had been exited, all 4 RCP's should be secured.

A. Incorrect. Part 1 correct. A green light on means that the SIAS signal did not actuate. Part 2 incorrect but plausible. If the SIAS would have occurred prior to the crew evaluating the Containment Heat Removal safety function (5^{th} SF evaluated) of EOP-01, then 2 RCP's should be secured as directed by the RCS Pressure Control SF (4^{th} SF evaluated). See explanation.
B. Correct. See explanation
C. Incorrect. See Explanation.
D. Incorrect. See "A" and Explanation. Part 2 correct.

Technical Reference(s): 1-ARP-01-R5 (Attach if not previously provided)
Ops Policy 521

Proposed references to be provided to applicants during examination: N/A

Learning Objective: 0702822-8&11 (As available)

Question Source: Bank # ____
Modified Bank # ____ (Note changes or attach parent)
New X

Question History: Last NRC Exam ____

Question Cognitive Level: Memory or Fundamental Knowledge ____
Comprehension or Analysis X

10 CFR Part 55 Content: 55.41 10
55.43 5

Comments:

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	1	
	Group #	1	
	K/A #	EPE011EA1.11	
	Importance Rating	4.2	4.2

Ability to operate and monitor the following as they apply to a Large Break LOCA: Long-term cooling of core

Proposed Question: RO 3

Given the following conditions on Unit 2:

- A Loss of Coolant Accident (LOCA) has occurred.
- Reactor Coolant System pressure is 75 psia.

Which ONE of the following is monitored or performed with regards to Short and Long Term Core Cooling given the above conditions?

	Short Term	Long Term
A.	Low Pressure Safety Injection operation/ Safety Injection Tanks discharge	Align Shutdown Cooling
B.	Low Pressure Safety Injection operation/ Safety Injection Tanks discharge	Align High Pressure Safety Injection hot and cold leg injection with a Recirculation Actuation Signal
C.	High Pressure Safety Injection operation/ Steam Generator steaming	Align Shutdown cooling
D.	High Pressure Safety Injection operation/ Steam Generator steaming	Align High Pressure Safety Injection hot and cold leg injection with a Recirculation Actuation Signal

Proposed Answer: B

Explanation (Optional): As stated in the PSTG for LOCA, SDC is long term cooling for Small Break LOCA's where inventory control is regained or the LOCA becomes isolated. For this question, a Large Break LOCA has occurred. With RCS pressure at 75 psia, the type of LOCA is Large Break.

A. Incorrect. Part 1correct. Part 2 incorrect. SDC is long term for a Small Break LOCA.
B. Correct. See explanation
C. Incorrect. Both parts incorrect. Plausible in that this condition satisfies the RCS Inventory Control and Pressure Control Safety Functions however this would not be satisfied for a large break loca since RAS is expected to actuate and Fig 2 is no longer valid.
D. Incorrect. Part 1 incorrect. Plausible in that this is a valid recovery bases action for a LOCA but it does not meet the definition of short term cooling for a LBLOCA.

Technical Reference(s): 1-EOP-03 PSTG (Attach if not previously provided)
0711824 LOCA

Proposed references to be provided to applicants during examination: N/A

Learning Objective: 0702824-13 (As available)

Question Source: Bank #
Modified Bank # 2140
New

Question History: Last NRC Exam

Question Cognitive Level: Memory or Fundamental Knowledge X
Comprehension or Analysis

10 CFR Part 55 Content: 55.41 7
55.43

Comments: The original KA (011EA1.09) was changed. Refer to ES 401-4 for comments on this question. The KA is met since HPSI discharge valves must be operated to align hot and cold leg injection following RAS. Monitoring occurs while SITs discharge due to low RCS pressure (passive system) and ensuring adequate hot and cold leg injection flow.

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	1	
	Group #	1	
	K/A #	APE015AA2.01	
	Importance Rating	3.0	3.5

Ability to determine and interpret the following as they apply to the Reactor Coolant Pump Malfunctions (Loss of RC Flow): Cause of RCP failure

Proposed Question: RO 4

Unit 2 is at 100% power

Given the following indications on the 2A1 Reactor Coolant Pump (RCP):

- Controlled Bleedoff (CBO) temperature is 225^{o}F
- CBO flow is 2.5 gpm
- Vapor Seal Cavity pressure is 80 psia
- Upper Seal Cavity pressure is 2235 psia
- Middle Seal Cavity pressure is 2235 psia

Which ONE of the following describes the status of the RCP seals?

A. ALL three RCP seals have failed.

B. ONLY the lower RCP seal has failed.

C. ONLY the middle RCP seal has failed.

D. BOTH the lower and middle seals have failed.

Proposed Answer: D

Explanation (Optional): Based on the indicated seal pressures, the lower and middle seals have failed. The only pressure breakdown was between the upper seal cavity and the Bleed Off seal cavity (which is the upper seal).

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

Technical Reference(s): 0711202, RCP (Attach if not previously provided)
1-AOP-01.09A1

Proposed references to be provided to applicants during examination: N/A

Learning Objective: 0702202-19.a (As available)

Question Source: Bank #
Modified Bank # 4338
New

Question History: Last NRC Exam

Question Cognitive Level: Memory or Fundamental Knowledge
Comprehension or Analysis X

10 CFR Part 55 Content: 55.41
55.43 5

Comments: Refer to ES 401-4 for comments on this question.

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	1	
	Group #	1	
	K/A #	APE 022AK3.07	
	Importance Rating	3.0	3.2

Knowledge of the reasons for the following responses as they apply to the Loss of Reactor Coolant Makeup: Isolating Charging

Proposed Question: RO 5

Unit 1 is operating at 100% power.

The SNPO reports that a break in the Charging header has occurred with the following indications noted on the RTGB:

- Charging Header pressure is 0 psig
- Charging Header flow is 0 gpm
- Reactor Cavity leakage is .1 gpm and steady

Complete the following statements:

Annunciator __(1)__ should be in alarm for this condition.

Due to the leak location, __(2)___ Charging pump(s) can be used when aligning "Alternate Charging Flow Path Through the Auxiliary HPSI Header" per 1-AOP-02.03.

(References Provided)

A. 1) M-7, "Regenerative Heat Exchanger Letdown ΔP High"
2) either the 1A, 1B OR 1C

B. 1) M-28, "Regenerative Heat Exchanger Outlet Temp High"
2) either the 1A, 1B OR 1C

C. 1) M-7, "Regenerative Heat Exchanger Letdown ΔP High"
2) ONLY the 1A

D. 1) M-28, "Regenerative Heat Exchanger Outlet Temp High"
2) ONLY the 1A

Proposed Answer: D

Explanation (Optional): The immediate operator actions for either a Letdown line break or Charging line break are the same: place all Chg pumps in Stop (Isolate Chg) and close the Letdown isolation valves. Isolating Charging would be a response to M-28 because it alarms due to a loss of Charging flow through the RGHX (this causes letdown temperature to rise out of the RGHX and eventually auto closes letdown isolation valve V2515).

This condition does not require the unit to be removed from service. Another reason for the response of isolating Charging is to align an alternate Charging flow path to the "Aux" HPSI header IAW the Chg & Letdown AOP (for a loss of Charging). After that, cycle ONLY the 1A Chg pp between 55-67% for breaks in the RAB upstream of V2429 (the 1A Chg pp has a dedicated line to the Aux HPSI header so it is used). The 1B and 1C Charging pumps must be maintained in "STOP" (isolated) in order for the break to remain isolated. It should be noted that if the leak was downstream of V2429, any three of the Chg pp's could be used to maintain pressurizer level via the Aux HPSI Header (V2429 would be closed). This is the reason for Isolating Chg (i.e. Maintain Pzr level and don't feed the break).

A. Incorrect. See explanation. Both parts wrong – M-7 is the alarm for a letdown line break. Using the 1A Chg pp specifically is directed in the attachment for placing an alternate Chg flow path in service (for a CHG header break upstream of the Containment Penetration V2429).
B. Incorrect. Part 1 correct. Part 2 incorrect. See explanation and "A"
C. Incorrect. See explanation. Part 1 wrong- M-28 is indicative of loss of Chg. Part 2 correct.
D. Correct. See explanation.

Technical Reference(s): 1-AOP-02.03, Charging and Letdown (Attach if not previously provided)
0711205, CVCS

Proposed references to be provided to applicants during examination: CVCS drawing

Learning Objective: 0702205-7 (As available)

Question Source: Bank #
Modified Bank # (Note changes or attach parent)
New X

Question History: Last NRC Exam

Question Cognitive Level: Memory or Fundamental Knowledge
Comprehension or Analysis X

10 CFR Part 55 Content: 55.41 5,10
55.43

Comments:

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	1	
	Group #	1	
	K/A #	APE025AK1.01	
	Importance Rating	3.9	4.3

Knowledge of the operational implications of the following concepts as they apply to Loss of Residual Heat Removal System: Loss of RHRS during all modes of operation

Proposed Question: RO 6

Given the following conditions on Unit 1:

- The unit is currently shutdown for a refueling outage.
- The Reactor Head is being removed.
- The RCS level 35 feet.
- Time since reactor shutdown is 250 hrs.
- Reactor Coolant System (RCS) temperature is 95º F.
  .

If all SDC was lost, with the conditions given above, the Time to Boil is approximately____ minutes.

(References Provided)

A. 28

B. 30

C. 37

D. 40

Proposed Answer: B

Explanation (Optional): 30 minutes is the correct time to boil – core reload not done (40 minute TTB if candidate includes in the calculation that core reload complete).

A. Incorrect. Correct for Unit 1
B. Correct.
C. Incorrect. This would be the TTB if candidate includes in the calculation that core reload complete for Unit 1.
D. Incorrect. See explanation.

Technical Reference(s): 1-AOP-03.02, SDC Abnormal Ops (Attach if not previously provided)

Proposed references to be provided to applicants during examination: 1-AOP-03.02 Attachment 1

Learning Objective: 07022717-18&19 (As available)

Question Source: Bank # ______

Modified Bank # ______ (Note changes or attach parent)

New X

Question History: Last NRC Exam ______

Question Cognitive Level: Memory or Fundamental Knowledge ______

Comprehension or Analysis X

10 CFR Part 55 Content: 55.41 8,10

55.43 ______

Comments:

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	1	
	Group #	1	
	K/A #	APE026 AK3.02	
	Importance Rating	3.6	3.9

Knowledge of the reasons for the following responses as they apply to the Loss of Component Cooling Water: The automatic actions (alignments) within the CCWS resulting from the actuation of the ESFAS

Proposed Question: RO 7

Given the following conditions on Unit 1:

- The 1A and 1B Component Cooling Water (CCW) pumps are running.
- The 1C CCW pump is in standby in accordance with 1-NOP-14.02, “CCW System Operation”, and is aligned to the “B” train electrically and mechanically.
- A Loss of Offsite Power (LOOP) has just occurred.
- The 1B CCW pump failed to start following the LOOP.
- 1 minute later, a Loss of Coolant Accident (LOCA) with SIAS and CIAS actuation occurred.

Which ONE of the following describes the configuration of the CCW system at this time? (Assume no operator actions)

A. ONLY 1 CCW pump supplying all CCW loads.

B. Two CCW pumps supplying all CCW loads due to SIAS start of the “1C” CCW pump.

C. ONLY 1 CCW pump supplying its own safety header due to ESFAS isolation of the Non-Essential header.

D. Two CCW pumps supplying all CCW loads due to SIAS start of the “1C” CCW pump until the Non-Essential header isolates on a loss of instrument air.

Proposed Answer: C

Explanation (Optional): The “A” and “B” CCW are cross-tied via the “N” header valves. These valves get a close signal on SIAS to isolate the non-essential header. With the 1B CCW pump tripped and its switch is not in pull to lock, the 1C CCW pump start interlock is not made up.

A. Incorrect. Partly correct since only 1 CCW pump would be running due to the “C” CCW pp auto start interlock not made up (See “C”) but the N-Header valves isolate on SIAS so only the safety header would be supplied with CCW.
B. Incorrect. 1C CCW not running due to the auto start interlocks not made up. Plausible if the candidate forgets about the N-header valves closing on SIAS.
C. Correct. See explanation.
D. Incorrect. 1C CCW pump not running – auto start interlock not made up. Plausible if the candidate forgets about the N-header valves closing on SIAS. This is plausible because the N-header valves do fail close on a loss of air (which occurs due to the LOOP).

Technical Reference(s): 1-NOP-14.02, CCW Ops (Attach if not previously provided)
0711209, CCW

Proposed references to be provided to applicants during examination: N/A

Learning Objective: 0702829-03a, 0702209-4.a&c (As available)

Question Source: Bank # ____
Modified Bank # 1962 (Note changes or attach parent)
New ____

Question History: Last NRC Exam ____

Question Cognitive Level: Memory or Fundamental Knowledge ____
Comprehension or Analysis X

10 CFR Part 55 Content: 55.41 5,10
55.43 ____

Comments:

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	1	
	Group #	1	
	K/A #	APE027AA2.15	
	Importance Rating	3.7	4.0

Ability to determine and interpret the following as they apply to the Pressurizer Pressure Control Malfunctions: Actions to be taken if PZR pressure instrument fails high.

Proposed Question: RO 8

Given the following conditions on Unit 1:

- The unit is operating at 100% power.
- PIC-1110X, “Pressurizer (Pzr) pressure controller” is selected.
- Pzr pressure is being maintained at 2250 psia with Pzr Backup Heaters B1, B2, and B5 ON with a 10% output to the Pzr Proportional Heaters.
- PT-1110Y is out of service for I&C calibration

PT-1110X begins to slowly fail high.

IAW 1-AOP-01.10 “Pressurizer Pressure and Level”, the operator is directed to take manual control of HIC-1100, “Spray Valve controller” and __(1)__ its output in order to __(2)__ actual Pzr Pressure.

A. 1) lower
   2) lower

B. 1) lower
   2) raise

C. 1) raise
   2) raise

D. 1) raise
   2) lower

Proposed Answer: B

Explanation (Optional): Applicant is required to know response of Pressurizer pressure controller output to sensor malfunctions including other controllers that receive output from them (namely Main Spray controller HIC-1100). IAW AOP-01.10. Output must be lowered to stop actual pressure from lowering.

A. Incorrect. 1st part is right but second part is wrong. Heaters go to minimum and de-energize while sprays open causing actual pressure to lower.
B. Correct. As PIC-1110X drifts high, HIC-1100 output increases (proportional heater output goes to minimum and sprays eventually begin to open). Because sprays open, actual pressure lowers. See explanation.
C. Incorrect. 1st part wrong. 2nd part right (see A).
D. Incorrect. Both parts wrong (output increases and pressure lowers).

Technical Reference(s): 0711206, Pressurizer Pressure and Level (Attach if not previously provided)
1-AOP-01.10

Proposed references to be provided to applicants during examination: N/A

Learning Objective: 0702206-18 (As available)

Question Source: Bank #
Modified Bank # 1834 (Note changes or attach parent)
New

Question History: Last NRC Exam

Question Cognitive Level: Memory or Fundamental Knowledge
Comprehension or Analysis X

10 CFR Part 55 Content: 55.41
55.43 5

Comments:

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	1	
	Group #	1	
	K/A #	APE029EK1.01	
	Importance Rating	2.8	3.1

Knowledge of the operational implications of the following concepts as they apply to the ATWS: Reactor nucleonics and thermo-hydraulics behavior

Proposed Question: RO 9

Given the following conditions on Unit 1:

- Reactor power is 100%.
- A total loss of feedwater event occurred.
- The reactor DID NOT TRIP On Low Steam Generator water level when trip conditions were present.
- No operator actions have been taken.

Which ONE of the following describes the expected reactivity change AND the impact on the Reactor Coolant System (RCS) Pressure from this event?

Over the next 5 minutes, reactor power will:

A. Stay the same; an RCS over pressure condition will be prevented due to the event being within the design bases of the Pressurizer Safety valves.

B. Stay the same; an RCS pressure excursion that could potentially challenge the RCS pressure boundary integrity will be prevented by the Diverse Scram System.

C. Lower; an RCS over pressure condition will be prevented due to the event being within the design bases of the Pressurizer Safety valves.

D. Lower; an RCS pressure excursion that could potentially challenge the RCS pressure boundary integrity will be prevented by the Diverse Scram System.

Proposed Answer: D

Explanation (Optional): Reactor Power will lower due to the negative MTC feedback caused by the increasing RCS temperature and significant decrease in moderator density. IAW the FSAR, it was determined that a complete loss of feedwater combined with a failure of the reactor to trip would result in a primary coolant system pressure excursion well above the Rx Vessel service level C limits and potentially challenge the integrity of the RCS pressure boundary. The Diverse Scram system had to be installed to prevent the RCS pressure boundary limits from being exceeded (by tripping the reactor independent from the RPS). The bases of the Pzr safeties is to prevent the RCS from being pressurized above the safety limit of 2750 psia. This RCS over pressure condition assumes that a loss of load occurs at power and the reactor does not trip until the High RCS Pressure trip setpoint is exceeded. The ATWAS event, on the other hand, is an event where a loss of Feedwater occurs and the RPS fails to trip the reactor and a RCS pressure excursion will occur.

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

Technical Reference(s): FSAR section 7.6.1.4 (Attach if not previously provided)

Proposed references to be provided to applicants during examination: N/A

Learning Objective: 0702828-6, 0702822-12 (As available)

Question Source: Bank # ____
Modified Bank # ____ (Note changes or attach parent)
New X

Question History: Last NRC Exam ____

Question Cognitive Level: Memory or Fundamental Knowledge ____
Comprehension or Analysis X

10 CFR Part 55 Content: 55.41 8,10
55.43 ____

Comments: Refer to ES 401-4 for comments on this question.

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	1	
	Group #	1	
	K/A #	EPE038EG2.4.20	
	Importance Rating	3.8	4.3

SGTR: Knowledge of the operational implications of EOP warnings, cautions, and notes.

Proposed Question: RO 10

Given the following conditions on Unit 1:

- The unit was operating at 100% power.
- A Steam Generator Tube Rupture (SGTR) occurs
- 1-EOP-04, “SGTR” is being implemented.
- SIAS actuation has occurred.
- A Reactor Coolant System (RCS) cool down and depressurization is in progress.

The crew is evaluating the step “RCS Void Elimination”.
This step references 1-EOP-99, Appendix K, “RCS Fill and Drain Method of Void Elimination”.

A NOTE that appears in Appendix K lists indications that may be evident if voids in the Reactor (Rx) Vessel Head were present.

IAW with this note, which ONE of the following is an indication of voids present in the Reactor Vessel Head?

A. RVLMS indicates segments voided.

B. Pressurizer Level lowering while spraying.

C. Pressurizer level rising while charging to the RCS.

D. The saturation temperature of the RCS is higher than the temperature in the upper Rx Head region.

Proposed Answer: A

Explanation (Optional): See the caution from Appdx K in the comments section below. If an SIAS actuation occurs, the RCP's are procedurally required to be secured. "A" could be incorrect if RCPs were running because the RVLMS would indicate an inaccurate lower level due to the vortex affect created by RCS flow from the RCPs.

A. Correct. See caution. No RCPs running due to SIAS.

B. Incorrect. See Caution. This is opposite of what the caution lists

C. Incorrect. See Caution. This is opposite of what the caution lists

D. Incorrect. This indication is not listed in the note however it is plausible because the actual cause of a void in the Rx Head is that the temperature in the upper Rx Head becomes higher (due to no RCS flow mixing into that area) than the saturation temperature of the RCS (due to the cooldown & depressurization of the RCS).This tests the candidate's understanding of the thermodynamics involved in the creation of a bubble in the Rx Head. The conditions stated in this distractor would ensure that a void in the Rx head would NOT occur.

Technical Reference(s): EOP-99 Appdx K Caution (Attach if not previously provided)

EOP-4 & PSTG, CEN152, 0702835 , LOOP/Loss of Forced Circulation

Proposed references to be provided to applicants during examination: N/A

Learning Objective: 0702825-12, 0702835-12 (As available)

Question Source: Bank # ___

Modified Bank # ___ (Note changes or attach parent)

New X

Question History: Last NRC Exam ___

Question Cognitive Level: Memory or Fundamental Knowledge ___

Comprehension or Analysis X

10 CFR Part 55 Content: 55.41 10

55.43 5

Comments:

Indications of a void in the Reactor Vessel Head may be evident by **ANY** of the following:

- RVLMS indicates segments voided
- Pressurizer Level rising while spraying
- Pressurizer level lowering while charging to the RCS

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	1	
	Group #	1	
	K/A #	054AK3.0.3	
	Importance Rating	3.8	4.1

Knowledge of the operational implications of the following concepts as they apply to the Loss of Main Feedwater (MFW): Manual control of AFW flow control valves.

Proposed Question: RO 11

Given the following:

- The Unit 1 reactor tripped from 100% power 15 minutes ago.
- The 1A and 1B Auxiliary Feedwater (AFW) pump's header flow control valves have been throttled to the desired flow rate for BOTH SGs.
- The 1C AFW pump header flow control valves were closed.
- The 1A and 1B Steam Generator (SG) Narrow Range levels are 10% and slowly rising.
- A Loss of Offsite Power (LOOP) has just occurred and BOTH Emergency Diesel Generators (EDGs) are supplying power to their respective 4.16kVAC busses.

Which ONE of the following describes the manual operator action, at the RTGB, that must be taken on the AFW header flow control valves in response to the LOOP to maintain Reactor Coolant System temperature stable?

A. ONLY the 1A and 1B AFW pump header flow control valves must be throttled in the OPEN direction.

B. ONLY the 1A and 1B AFW pump header flow control valves must be throttled in the OPEN direction 15 seconds after the EDG output breaker closes.

C. ONLY the 1A and 1B AFW pump header flow control valves must be throttled in the CLOSED direction.

D. The 1A and 1B pump header flow control valves must be throttled in the CLOSED direction. The 1C AFW pump header flow control valves must be RE-CLOSED.

Proposed Answer: C

Explanation (Optional): On a LOOP, both Main Feedwater pumps lose power (6.9kVAC). Also, after power from the EDG's is restored to the 4.16kVAC busses, the motor driven AFW pump breakers will open (load shed) and then close 15 seconds after the EDG output breaker closes. However, when the MD AFW pump header flow control valves are re-energized, they immediately begin to stroke OPEN (AFAS resets on the power loss and with SG level below the AFAS actuation setpoint, they re-open fully). These valves are AC powered. The 1C AFW pump header flow control valves are DC powered and DC was never lost so they don't change position.

A. Incorrect. Plausible if candidate mistakes the 1A &1B AFW valves stroke closed after power is restored to them.
B. Incorrect. Plausible if candidate fails to recall that 15 second time delay only applies to the MD pump. The 1A &1B AFW valves stroke closed after power is restored to them.
C. Correct. See explanation.
D. Incorrect. Plausible if candidate fails to recall the power supply differences of AFW header control valves ("C" train valves are DC powered so they remain closed).

Technical Reference(s): 0711412, AFW&AFAS (Attach if not previously provided)

Proposed references to be provided to applicants during examination: N/A

Learning Objective: 0702412-11 (As available)

Question Source: Bank #
Modified Bank # (Note changes or attach parent)
New X

Question History: Last NRC Exam

Question Cognitive Level: Memory or Fundamental Knowledge X
Comprehension or Analysis

10 CFR Part 55 Content: 55.41 7
55.43

Comments:

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	1	
	Group #	1	
	K/A #	EPE055 EK1.02	
	Importance Rating	4.1	4.4

Knowledge of the operational implications of the following concepts as they apply to the Station Blackout : Natural circulation cooling

Proposed Question: RO 12

Given the following conditions on Unit 1:

A Station Blackout has occurred and 1-EOP-10, "Station Blackout" is being implemented.

While verifying Single Phase Natural Circulation, what would be the operational implications if the temperature difference between Thot and REP CET exceeds the Natural Circulation criteria limits?

AND

Which ONE of the following describes the contingency action, in 1-EOP-10, that is to be taken if Single Phase Natural Circulation criteria is **NOT** satisfied?

A. The Reactor Coolant System in the Hot Legs is becoming hydraulically uncoupled from the Reactor Coolant System exiting the core; ensure Two Phase Natural Circulation CRITERIA exists.

B. The Reactor Coolant System is approaching saturated conditions; ensure Two Phase Natural Circulation CRITERIA exists.

C. The Reactor Coolant System in the Hot Legs is becoming hydraulically uncoupled from the Reactor Coolant System exiting the core; ensure proper control of Steam Generator feeding and steaming.

D. The Reactor Coolant System is approaching saturated conditions; ensure proper control of Steam Generator feeding and steaming.

Proposed Answer: C

Explanation (Optional): As stated in the CEN-152 bases document for Station Blackout, no abnormal difference between Thot and REP CET implies that approximately the same temperature fluid is moving from the core to the Hot Leg. An abnormal difference between the two temps would indicate possible blockage in the RCS loop or uncoupling of the core and the loops. Even though two-phase natural circulation is a form of natural circulation, in EOP-10, there is no mention of two-phase natural circulation characteristics being present as an action or contingency (in an SBO, there is no AC power so 2-Phase NC criteria can't be confirmed (e.g. No power to operate the HPSI pp's so adequate ECCS flow doesn't exist). This verification exists as a procedure step for EOP's where RCS leakage is present (i.e. LOCA). The analysis for SBO doesn't consider any other event occurring concurrently. Ensure proper control of Steam Generator feeding and steaming is the exact contingency listed in EOP-10.

A. Incorrect. Partially correct (part 1). See explanation. Part 2 is plausible – refer to EOP-03 where there is an action step to verify two-phase natural circulation. See explanation.
B. Incorrect. REP CET is used to determine if Minimum subcooling is being adequately maintained (using 1-EOP-99 Fig 1A). Any abnormal differences between Thot and REP CET is irrelevant with regards to the status of SUBCOOLING.
C. Correct. See explanation.
D. Incorrect. Part 2 is correct. Part 1 is not (see selection "B")

Technical Reference(s): 0711830 (Attach if not previously provided)
1-EOP-10 and CEN-152 SBO bases

Proposed references to be provided to applicants during examination: N/A

Learning Objective: 0702830-5 (As available)

Question Source: Bank #
Modified Bank # (Note changes or attach parent)
New X

Question History: Last NRC Exam

Question Cognitive Level: Memory or Fundamental Knowledge X
Comprehension or Analysis

10 CFR Part 55 Content: 55.41 8,10
55.43

Comments: The KA is met by ensuring the conditions associated with meeting Single Phase Natural Circulation are satisfied. The question asks what would be an indication of the LOSS of Single Phase Nat. Circ.

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	1	
	Group #	1	
	K/A #	APE056AA1.18	
	Importance Rating	3.2	3.2

Ability to operate and / or monitor the following as they apply to the Loss of Offsite Power: Control room normal vent supply fan.

Proposed Question: RO 13

Given the following conditions for Unit 2:

- The unit is operating at 100% power.
- The 2AB 4.16kVAC bus is aligned to the 2B3 4.16kVAC bus.
- HVA/ACC-3C is the running air conditioning unit.
- HVA/ACC-3A and HVA/ACC-3B control switches are aligned as required per 2-NOP-25.07, “Control Room Ventilation System”.
- A Loss of Offsite Power (LOOP) has occurred.
- Both Emergency Diesel Generators (EDG’s) started and loaded onto their respective busses.

Which ONE of the following describes the final configuration of HVA/ACC-3A and HVA/ACC-3B Air Conditioning units after the EDG loading sequence is complete?

HVA/ACC-3A is __(1)__.

HVA/ACC-3B is __(2)__.

A. 1) running
   2) not running

B. 1) not running
   2) not running

C. 1) not running
   2) running

D. 1) running
   2) running

Proposed Answer: A

Explanation (Optional): IAW the NOP, only one AC unit is normally running. Its control switch will be in run. Due to the AB bus electrical alignment, the "A" AC unit control switch will be in auto. The remaining AC units control switch must be in OFF due to EDG load concerns. Following a LOOP with Both EDG's running, the AC unit in run and or auto will start following the load sequence timer. The "C" AC unit control switch is a two position switch – off or run.

A. Correct. See explanation
B. Incorrect. Part 1 is incorrect. Part 2 is incorrect
C. Incorrect. Part 1 is incorrect. Part 2 is correct.
D. Incorrect. Part 1 is correct. Part 2 is incorrect

Technical Reference(s): 0711601, Aux Bldg Ventilation Power Point (Attach if not previously provided)

2-NOP-25.07, CR Ventilation

Proposed references to be provided to applicants during examination: N/A

Learning Objective: 0702601-10 (As available)

Question Source: Bank # ______

Modified Bank # ______ (Note changes or attach parent)

New X

Question History: Last NRC Exam ______

Question Cognitive Level: Memory or Fundamental Knowledge X

Comprehension or Analysis ______

10 CFR Part 55 Content: 55.41 7

55.43 ______

Comments:

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	1	
	Group #	1	
	K/A #	APE057AA2.05	
	Importance Rating	3.5	3.8

Ability to determine and interpret the following as they apply to the Loss of Vital AC Instrument Bus: S/G pressure and level meters

Proposed Question: RO 14

Given the following conditions on Unit 1:

- The unit is operating at 100% power.
- A loss of the 1MB 120VAC Vital Instrument Inverter occurs.

The “B” Channel Steam Generator (SG) Pressure and Level Safety channel indication will be affected on the __(1)__ . The Reactor Protection System coincidence for a reactor trip will now be __(2)__ on Low SG Pressure or Level.

A. 1) “A” and “B” SGs
2) 1 out of 3

B. 1) “A” and “B” SGs
2) 2 out of 3

C. 1) “B” SG ONLY
2) 1 out of 3

D. 1) “B” SG ONLY
2) 2 out of 3

Proposed Answer: A

Explanation (Optional): A bistable trip signal is generated on both SG's (A & B) pressure and level since they are BOTH "B" Channel inputs and are powered from the 1MB Instrument Inverter. Rx trip logic goes to 1 out of 3 (bistables are de-energized to actuate). If the inverter fails, the bus de-energizes and the above mentioned instrumentation indication also loses power.

A. Correct. See explanation.
B. Incorrect. Part 1 correct. Part 2 incorrect.
C. Incorrect. Part 1 incorrect. Part 2 correct.
D. Incorrect. Both parts incorrect. Plausible if the candidate doesn't know indication power supply and misapplies RPS trip logic for these particular parameters. 2 out of 3 trip logic applies to trips that are energized to actuate.

Technical Reference(s): 0711404, RPS (Attach if not previously provided)
1-aop-49.02 120VAC Instr AC System

Proposed references to be provided to applicants during examination: N/A

Learning Objective: 0702404-6,17.a (As available)

Question Source: Bank # ______
Modified Bank # ______ (Note changes or attach parent)
New X

Question History: Last NRC Exam ______

Question Cognitive Level: Memory or Fundamental Knowledge X
Comprehension or Analysis ______

10 CFR Part 55 Content: 55.41 ______
55.43 5

Comments:

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	1	
	Group #	1	
	K/A #	APE058AA1.01	
	Importance Rating	3.4	3.5

Ability to operate and / or monitor the following as they apply to the Loss of DC Power: Cross-tie of the affected dc bus with the alternate supply

Proposed Question: RO 15

Given the following conditions on Unit 1

- Unit 1 was operating at 100% power
- The 1AB busses are aligned to the “A” train
- The unit tripped and the crew is carrying out actions of EOP-01
- During the Maintenance of Vital Auxiliaries Safety Function, the DRCO reports that the 1AB DC bus is de-energized.

Which ONE of the following actions are required in accordance with EOP-01 AND also satisfy the design basis:

No later than ______ , re-energize the 1AB DC bus from the ________.

A. 10 minutes; 1AB Battery Charger

B. 10 minutes; 1B DC bus

C. 2 hours; 1AB Battery Charger

D. 2 hours; 1B DC bus

Proposed Answer: B

Explanation (Optional): 1-EOP-01 PSTG states this action is required to be completed within 10 minutes to ensure adequate AFW flow (1C AFW pump & associated valves). 1-EOP-01 safety function Maintenance of Vital Auxiliaries contingency states that the AB DC Bus must be aligned to a DC bus and not the 1AB Battery Charger since it requires field operator action to align it to the AB DC bus. 2 hours is plausible in that 1AB DC bus is considered a Tech Spec DC bus since it powers the 1C AFW pp. and the TSAS for an inoperable DC bus or Charger is 2 hrs.

A. Wrong. See explanation
B. Correct. See explanation
C. Wrong. See explanation
D. Wrong. See explanation

Technical Reference(s): FSAR Sect 10.5.3, 1-EOP-01 PSTG MVA contingency (Attach if not previously provided)
DBD for Unit 1 SBO event, 1-AOP-50.07A, 1-NOP-50.01AB

Proposed references to be provided to applicants during examination: N/A

Learning Objective: 0702503-7b & 6a (As available)

Question Source: Bank # ______
Modified Bank # ______ (Note changes or attach parent)
New X

Question History: Last NRC Exam ______

Question Cognitive Level: Memory or Fundamental Knowledge X
Comprehension or Analysis ______

10 CFR Part 55 Content: 55.41 7
55.43 ______

Comments:

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Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	1	
	Group #	1	
	K/A #	APE062AG2.1.23	
	Importance Rating	4.3	4.4

Ability to perform specific system and integrated plant procedures during all modes of plant operation. Loss of Nuclear Service Water.

Proposed Question: RO 16

Given the following:

- Unit 2 is operating at 100% power.
- The 2B3 4.16kVAC bus has been de-energized due to a differential current lockout.
- The 2AB 4.16kVAC bus is aligned to the “A” train.
- The crew was UNSUCCESSFUL in resetting the differential current lockout relay.
- The US directed that the 2B Intake Cooling Water (ICW) pump control switch be placed in “Pull-to-Lock” AND the 2C ICW pump mechanically aligned to the “B” train.
- The 2C ICW pump was started IAW 2-NOP-21.03C,“2C Intake Cooling Water” (starting on a de-pressurized header) as directed by 2-AOP-47.01B, “Loss of a Safety Related AC Bus-Train B”.

Which ONE of the following statements describes a consequence associated with performing the action of starting the 2C ICW pump?

A. Offsite Power Operability; with two ICW pumps running on the same electrical bus the “A” Offsite Power circuit must be declared inoperable.

B. ICW piping protection considerations; water hammer could occur when the 2C ICW pump is started on a de-pressurized “B” header.

C. ICW run out flow considerations; the ICW header outlet temperature control valve, TCV-14-4B, is fully open due to loss of ICW cooling to the Component Cooling Water Heat Exchanger.

D. “A” Train Emergency Diesel Generator loading; two ICW pumps running on the same electrical bus with a concurrent Loss of Offsite Power.

Proposed Answer: A

Explanation (Optional): See comments section. Nuclear Service water @ PSL is Intake Cooling Water (ICW).

A. Correct. See explanation.

B. Incorrect. The 2C ICW would be started IAW the ICW NOP. This requires the 2C ICW pump discharge valve to be throttled 10 turns open to prevent excessive header flow/pressure on a pump start.

C. Incorrect. Plausible in that TCV-14-4B would be full open but the ICW pp discharge valve would be throttled closed in preparation for the pump start.

D Incorrect. This concern was analyzed previously and found not to be an issue on Unit 2.

Technical Reference(s): 1-AOP-47.01, "Loss of a Safety Related AC Bus-Train B" (Attach if not previously provided)

OPS Policy 503-ICW pp ops

Proposed references to be provided to applicants during examination: N/A

Learning Objective: 0702829-03 (As available)

Question Source: Bank #

Modified Bank # 2405 (Note changes or attach parent)

New

Question History: Last NRC Exam

Question Cognitive Level: Memory or Fundamental Knowledge

Comprehension or Analysis X

10 CFR Part 55 Content: 55.41 10

55.43 5

Comments: OPS Policy 503 states:

If two ICW pumps are electrically aligned AND operating on the same electrical bus while in MODES 1, 2, or 3 (SIAS NOT blocked), the associated off-site power source shall be declared INOPERABLE and Tech Spec 3.8.1.1a shall be entered. (OPS Policy 503).

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	1	
	Group #	1	
	K/A #	CE02EK2.01	
	Importance Rating	3.3	3.7

Knowledge of the interrelations between the (Reactor Trip Recovery) and the following: Components, and functions of control and safety systems, including instrumentation, signals, interlocks, failure modes, and automatic and manual features.

Proposed Question: RO 17

Given the following:

- An uncomplicated trip from 100% power has occurred on Unit 2.
- 2-EOP-01, “STPAs” is being implemented.
- Reactor power is $1.0E^{-6\%}$ and lowering as indicated on Wide Range Instrumentation.

Which ONE of the following describes the status of the Nuclear Startup Channels?

A. Energized. They automatically energized at $1.0\ E^{-5\%}$ power.

B. NOT energized. They should be manually energized AT THIS TIME.

C. Energized. They automatically energized on the reactor trip signal.

D. NOT energized. They should NOT be manually energized until after 2-EOP-02 is entered.

Proposed Answer: D

Explanation (Optional): The S/U NI control switches are normally maintained in "OFF". Voltage is automatically removed from the startup channels when counts > 10,000 cps, so they must be manually energized when power is <1.0 $E^{-5\%}$. However the guidance to manually energize them is stated in 2-EOP-99, Appdx X section 2 which is performed <u>after</u> EOP-01is exited and an Optimal or Functional EOP is entered. For the given conditions, this would be 2-EOP-02. Since there are no other indications of Start Up Rate (CPS) to use, a value of 1.0 $E^{-5\%.}$ WR NI power is used in EOP-99 to ensure the channels will energize (i.e. be below the auto cutout of 10,000 cps).

A. Incorrect. Voltage is automatically *removed* from the startup channels, must be manually energized.
B. Incorrect. Correct method, power level not low enough (<10-5%).
C. Incorrect. See explanation.
D. Correct. See explanation

Technical Reference(s): 2-EOP-99, Appendix X, Section 2 (Attach if not previously provided)

0711403, Nuc Instr

Proposed references to be provided to applicants during examination: N/A

Learning Objective: 0702403-8 (As available)

Question Source: Bank # 4137

Modified Bank # (Note changes or attach parent)

New

Question History: Last NRC Exam

Question Cognitive Level: Memory or Fundamental Knowledge X

Comprehension or Analysis

10 CFR Part 55 Content: 55.41 7

55.43

Comments:

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	1	
	Group #	1	
	K/A #	CE05EK2.2	
	Importance Rating	3.7	4.2

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

Proposed Question: RO 18

Given the following:

- The Unit 1 Reactor (Rx) is critical at a stable power level of 2%.
- An ESDE on the 1A Steam Generator (SG) inside containment occurred.
- Reactor Coolant System (RCS) T_{ave} is currently 515°F and lowering.
- RCS pressure is 2220 psia and lowering.
- Pressurizer level is 25% and lowering.
- Both Atmospheric Dump Valves (ADV’s) are in service operating in Auto.

After the reactor is tripped, which ONE of the following describes the expected plant response and operator actions for this event?

A. BOTH SGs will depressurize at the same rate until MSIS. After the 1A SG dries out, operate the 1B ADV at saturation pressure for RCS Tavg of 525 to 535^{o}F

B. ONLY the 1A SG will depressurize. After the 1A SG dries out, operate the 1B ADV at saturation pressure for the lowest RCS T_{COLD}.

C. BOTH SGs will depressurize at the same rate until MSIS. After the 1A SG dries out, operate the 1B ADV at saturation pressure for the lowest RCS T_{COLD}

D. ONLY the 1A SG will depressurize. After the 1A SG dries out, operate the 1B ADV at saturation pressure for RCS Tavg of 525 to 535^{o}F

Proposed Answer: B

Explanation (Optional): For the given conditions (both ADV's in service), the MSIV's would be closed so only the 1A SG would depressurize. Even if the candidate doesn't recognize that, on Unit 1 the MSIV's have check valves. IAW Ops Policy 539, After the "A" SG dries out, operate the 1B ADV at the saturation pressure for the lowest RCS T_{COLD} to stabilize the RCS. ECCS flow won't occur for the given conditions due to RCS pressure being greater than HPSI pp shutoff head (1200 psi).

A. Incorrect. Plausible IAW 1-EOP-01, if closing the MSIV's terminates the ESD, the guidance states to stabilize the RCS at a Tavg of 525 to 535^{o}F. For the given conditions, the MSIV's would be closed since ADV's are in operation. Also, the ESD is in containment and therefore not isolable by closing the MSIV's even if they were open.
B. Correct. See explanation.
C. Incorrect. See explanation.
D. Incorrect. See explanation.

Technical Reference(s): 0711826 ESDE, T.S. 3.1.1.5 Reactivity Control Systems. (Attach if not previously provided)
Ops Policy 539

Proposed references to be provided to applicants during examination: N/A

Learning Objective: 0702826-01, 04, 09 (As available)

Question Source: Bank #
Modified Bank # (Note changes or attach parent)
New X

Question History: Last NRC Exam Used a part of HLC21 NRC Q78

Question Cognitive Level: Memory or Fundamental Knowledge
Comprehension or Analysis X

10 CFR Part 55 Content: 55.41 7
55.43

Comments: The question was significantly modified. Changed initial conditions (location of ESDE). Content of question was changed (removed trip criteria from question) to include characteristics of Unit differences with regard to MSIV design, stabilization actions and AFAS lockout. Should not count as one of the allowable repeat question from last 2 exams.

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	1	
	Group #	2	
	K/A #	APE005AG2.4.45	
	Importance Rating	4.1	4.3

Inoperable/Stuck Control Rod: Ability to prioritize and interpret the significance of each annunciator or alarm.

Proposed Question: RO 19

Unit 2 is in Mode 2 with the following:

- Reactor power is $1.0E^{-5}$%.
- CEA group 5 is at 52 inches and being withdrawn in manual sequential to a planned stopping height of 60 inches.
- CEA #59 does not move with the rest of the Group 5 CEAs.

If the CEAs were continued to be withdrawn, which ONE of the following alarms are expected during this evolution?

A. K-29, CEA PDIL (ADS).

B. K-18, Auto Withdraw Prohibit.

C. K-11, CEA Motion Inhibit.

D. K-26, CEA Withdrawal Prohibit.

Proposed Answer: C

Explanation (Optional):

A. Incorrect. PDIL will cause a CMI but is not enabled until power is > 10-4%.
B. Incorrect. Auto CEA withdrawal is NOT enabled at PSL. This alarm could potentially be in due to SBCS permissives being met.
C. Correct. CMI motion inhibit is generated due to > 5.5 inch deviation within a CEA group. Note, K-30, CEA Position Deviation Motion block (ADS) will also be in alarm.
D. Incorrect. CWP is generated on TM/LP, LPD, High SUR or VHP pre-trips with 2 out of 4 logic.

Technical Reference(s): 0711405, CEDS (Attach if not previously provided)

Proposed references to be provided to applicants during examination: N/A

Learning Objective: 0702405-04, 06 (As available)

Question Source: Bank #

Modified Bank # 4192 (Note changes or attach parent)

New

Question History: Last NRC Exam

Question Cognitive Level: Memory or Fundamental Knowledge

Comprehension or Analysis X

10 CFR Part 55 Content: 55.41 10

55.43 5

Comments: The KA statement is "Ability to prioritize and interpret annunciators that would be present for a stuck CEA" The prioritizing is recognizing for the given condition (i.e. the power level) that certain rod motion inhibits may or may not be present based on interlock logic. Also for the stated condition (CEA 59 is stuck) the candidate must interpret or anticipate a condition that would cause a specific alarm (lower priority than motion inhibit)

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	1	
	Group #	2	
	K/A #	APE024AK2.04	
	Importance Rating	2.6	2.5

Knowledge of the interrelations between Emergency Boration and the following: Pumps

Proposed Question: RO 20

Given the following:

- Unit 2 tripped from 100% due to a Loss of Offsite Power.
- All "AB" electrical busses are aligned to the "B" side.
- The 2B Charging pump is out of service with its control switch in stop.

Following the trip:

- The 2A Emergency Diesel Generator (EDG) tripped on overspeed.

If a condition that would require the crew to emergency borate existed, what operator actions would be required to establish a flow path?

Start the 2C Chg pump and ___(1)____.

If an SIAS were to subsequently occur, the 2C Chg pump breaker would __(2)__.

A. 1) the 2B Boric Acid Makeup pump then open the Emergency Borate valve (V2514)
2) open due to the 2B EDG output breaker cycling on SIAS and re-close

B. 1) open the Gravity Feed valves (V2508 and V2509)
2) remain closed since it is on the zero second load block

C. 1) the 2B Boric Acid Makeup pump then open the Emergency Borate valve (V2514)
2) remain closed since it is on the zero second load block

D. 1) open the Gravity Feed valves (V2508 and V2509)
2) open due to the 2B EDG output breaker cycling on SIAS and re-close

Proposed Answer: B

Explanation (Optional): Due to the electrical alignment, the “C” Chg pp will have power. On Unit 1, the 1C Chg pp is on the 18 second load block. On Unit 1, all 3 Chg pp’s receive a start signal on SIAS so the 1C Chg pp would auto start on SIAS – only 18 seconds later. On Unit 2 the Charging pumps are on the zero second load block and would stay closed following SIAS.

A. Incorrect. Bam pp’s and V2514 are “A” electric power. – not available.
B. Correct. See explanation.
C. Incorrect. Bam pp’s and V2514 are “A” electric power. – not available. Part 2 would be true on Unit 2. Chg pumps on Unit 2 are on the zero second load block
D. Incorrect. Gravity Feed valves and RWT to the Chg pp section are “B” electric power. See explanation

Technical Reference(s): 0711205, CVCS, (Attach if not previously provided)

2-NOP-02.02 Chg & LD, 2-AOP-02.02 Emergency Boration

Proposed references to be provided to applicants during examination: N/A

Learning Objective: 0702205-05,11 (As available)

Question Source: Bank # ______
Modified Bank # 5061
New ______

Question History: Last NRC Exam ______

Question Cognitive Level: Memory or Fundamental Knowledge X
Comprehension or Analysis ______

10 CFR Part 55 Content: 55.41 7
55.43 ______

Comments:

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	1	
	Group #	2	
	K/A #	APE028AA1.08	
	Importance Rating	3.7	3.6

Ability to operate and / or monitor the following as they apply to the Pressurizer Level Control Malfunctions: Selection of an alternate PZR level channel if one has failed.

Proposed Question: RO 21

Given the following conditions on Unit 2:

- The reactor is operating at 100% power.
- Channel “X” for Pressurizer (Pzr) Level control is SELECTED.
- Channel “Y” for Pzr Level control failed LOW.

Which ONE of the following states the CURRENT status of the Pzr Heaters

AND

after selecting the “Level” position on the Back Up Interlock Bypass key switch, which Pzr heaters are available?

A. All Pzr heaters off: All Pzr heaters are available

B. All Pzr heaters off; “A” side Pzr heaters ONLY

C. ONLY “B” side Pzr heaters off; “A” side Pzr heaters ONLY

D. ONLY “B” side Pzr heaters off; All Pzr heaters are available

Proposed Answer: B

Explanation (Optional): "A" side heaters correspond to "X" Channel and "B" side heaters correspond to "Y". Channel "A" failure of even the non-selected Pzr level channel will cause all 480V contactors to open (as well as the 4.16kv breaker on the channel that failed low). Only the non-failed channel heaters can be restored ("A" side).

A. Incorrect. 4.16kV breaker is open on the "B" side and can't be closed due to non-selected channel < 27% (failed low).
B. Correct. See explanation.
C. Incorrect. ALL heaters are de-energzed.
D. Incorrect. ALL heaters are de-energzed.

Technical Reference(s): 2-AOP-01.10 Pressurizer Pressure and Level (Attach if not previously provided)

0711206 PPLCS

Proposed references to be provided to applicants during examination: N/A

Learning Objective: 0702206-4a&h (As available)

Question Source: Bank #

Modified Bank # 4194 (Note changes or attach parent)

New

Question History: Last NRC Exam

Question Cognitive Level: Memory or Fundamental Knowledge

Comprehension or Analysis X

10 CFR Part 55 Content: 55.41 7

55.43

Comments: K/A changed from 028AA1.01. Refer to ES-401-4. The KA statement says ability to operate AND/OR monitor. The operate part is "after selecting the level position on the ….key switch" and the monitor part is recognizing heater availability following the given malfunction

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	1	
	Group #	2	
	K/A #	APE036AK1.03	
	Importance Rating	4.0	4.3

Knowledge of the operational implications of the following concepts as they apply to Fuel Handling Incidents: Indications of approaching criticality

Proposed Question: RO 22

Given the following:

- Core Reload is in progress on Unit 2.
- 32 Fuel Assemblies have been loaded into the core.
- During insertion of the 33rd assembly, Reactor Engineering (RE) reports that count rate has increased from 10 CPS to 24 CPS.

Which ONE of the following describes the condition that exists and the action required in accordance with 0-NOP-67.05, " Refueling Operation" for the stated conditions?

This is an:

A. EXPECTED condition. Direct RE to assess the nuclear instrument readings used for the 1/M plot and verify that they do NOT extrapolate to "0" when fuel movement resumes.

B. EXPECTED condition. Direct RE to validate the method being used to calculate the 1/M and renormalize the 1/M prior to inserting the next fuel assembly.

C. UNEXPECTED condition. Stop inserting the fuel assembly and verify Shutdown Margin while maintaining the fuel assembly at the current position.

D. UNEXPECTED condition. Withdraw the fuel assembly into the Refueling Machine Hoist/Mast and verify Shutdown Margin.

Proposed Answer: D

Explanation (Optional): Per the guidance in NOP-67.05, core alterations shall be immediately stopped if the count rate on any individual nuclear channel increases by a factor of two. See selection “C” also.

A. Incorrect. Not an expected condition. Also, per the guidance in NOP67.05, the fuel assembly shall be placed in its initial configuration (i.e. the position prior to being inserted into the core) if count rate doubles. Also, RE cannot direct resuming fuel movement – only the Refueling Supervisor (SRO) can do that for this condition.
B. Incorrect. This action is plausible in that the RE Supervisor has a procedure sign-off to periodically check the method being used to calculate the 1/M. RE may also renormalize base counts following loading of the first few fuel assemblies per the note in NOP-67.05 (page 14 of 85).
C. Incorrect. A note in NOP-67.05 (page 14 of 85) states that the initial loading of irradiated assemblies may cause the indicated count rate to double because the first 8 assemblies are twice burnt fuel placed in the vicinity of the detectors used for count rate monitoring. This was the 33rd assembly being loaded.
D. Correct. See explanation

Technical Reference(s): 0-NOP-67.05 Refueling Ops (Attach if not previously provided)

Proposed references to be provided to applicants during examination: N/A

Learning Objective: 070211-06 (As available)

Question Source: Bank #
Modified Bank # 4406 (Note changes or attach parent)
New

Question History: Last NRC Exam

Question Cognitive Level: Memory or Fundamental Knowledge
Comprehension or Analysis X

10 CFR Part 55 Content: 55.41 8,10
55.43

Comments: Refer to ED-401-4. See notes for this K/A.

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	1	
	Group #	2	
	K/A #	APE059AG2.4.35	
	Importance Rating	3.8	4.0

Accidental Liquid Radwaste Release: Knowledge of local auxiliary operator tasks during an emergency and the resultant operational effects.

Proposed Question: RO 23

Unit 1 is performing a Liquid Release of the 1A Waste Monitor Tank when the following alarm is received:

LIQUID WASTE
RAD
HIGH

N-37

Liquid release flow control valve, FCV-6627X, indicates open and will not close from the RTGB.

IAW 1-AOP-06.02, "Uncontrolled Release Of Radioactive Liquids" which ONE of the following is a required SUBSEQUENT Operator action?

A. At the 1A Waste Monitor Storage Tank, stop the 1A Waste Monitor pump AND at the CCW platform lock closed V21462, Waste Monitor Pumps Discharge to Discharge Canal Isolation valve.

B. At the 1A Waste Monitor Storage Tank, close FCV-6627X AND at the CCW platform lock closed V21462, Waste Monitor Pumps Discharge to Discharge Canal Isolation valve.

C. From the Liquid Waste Control panel, stop the 1A Waste Monitor pump AND close V21462, Waste Monitor Pumps Discharge to Discharge Canal Isolation valve.

D. From the Liquid Waste Control panel, close FCV-6627X AND at the Waste Monitor Storage Tanks, stop the 1A Waste Monitor pump.

Proposed Answer: A

Explanation (Optional):

A. Correct

B. Incorrect. FCV-6627X does not have local controls at the Waste Monitor Tank.

C. Incorrect. The Waste Monitor pump can be stopped at the local panel but V21462 cannot be closed from there. It is a manual valve.

D. Incorrect. FCV-6627X has indication only at the local control panel.

Technical Reference(s): 1-AOP-06.02, Uncontrolled Release of Radioactive Liquids (Attach if not previously provided)

Proposed references to be provided to applicants during examination: N/A

Learning Objective: 0702861- 1,2&3 (As available)

Question Source: Bank #

Modified Bank # (Note changes or attach parent)

New X

Question History: Last NRC Exam HLC20 NRC Q22

Question Cognitive Level: Memory or Fundamental Knowledge X

Comprehension or Analysis

10 CFR Part 55 Content: 55.41 10

55.43 5

Comments: This is question 1 of 4 allowed to be repeated from last two NRC exams

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	1	
	Group #	2	
	K/A #	APE067AA2.08	
	Importance Rating	2.9	3.6

Ability to determine and interpret the following as they apply to the Plant Fire on Site: Limits of affected area

Proposed Question: RO 24

Given the following on Unit 1:

- Several fire detectors have alarmed in the Cable Spreading Room

Which ONE of the following describes the expected actuation?

A. Halon will be discharging when header fuseable link melts

B. Halon will automatically be discharging into the cable spreading room

C. Pre-action dry pipe will actuate and automatically discharge water into the room

D. Pre-action dry pipe will charge with water, but only discharge if fuseable link melts

Proposed Answer: B

Explanation (Optional): Per AP 1&2-1800023, Fire Fighting Strategies, the Unit 1 Cable Spreading Room has a Halon Fire Suppression system. The Unit 2 Cable Spread Room has a Pre-Action Dry Pipe sprinkler system.

A. Incorrect. No fuseable links in the Halon system. Plausible because the pre-action and wet pipe systems do have fuseable links. Fire Dampers also operate with fuseable links.

B. Correct. See Explanation

A. Incorrect. See Explanation. This is a description of how a wet pipe system operates.

D. Incorrect. See explanation

Technical Reference(s): 1&2-1800023 Fire Fighting Strategies (Attach if not previously provided)

1800022 Fire Protection Plan

Proposed references to be provided to applicants during examination: N/A

Learning Objective: 0802830-03 (As available)

Question Source: Bank # ____

Modified Bank # ____ (Note changes or attach parent)

New X

Question History: Last NRC Exam ____

Question Cognitive Level: Memory or Fundamental Knowledge X

Comprehension or Analysis ____

10 CFR Part 55 Content: 55.41 ____

55.43 5

Comments: Refer to ES-401-4. See notes for this K/A.

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	1	
	Group #	2	
	K/A #	APE069AA2.02	
	Importance Rating	3.9	4.4

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

Proposed Question: RO 25

Given the following conditions on Unit 1:

- The reactor is operating at 100% power.
- A full "B" train INADVERTENT CIAS occurred.
- 1-AOP-69.01 "Inadvertent ESFAS Actuation" was entered.
- Section 4.2.2 "Recovery from Inadvertent CIAS" is being performed for "B" train CIAS components.
- "B" train valve V6555 "Waste Gas Containment Isolation valve" (downstream) is indicating OPEN on the RTGB.
- "A" train valve V6554 "Waste Gas Containment Isolation valve" (upstream) is also indicating OPEN on the RTGB.
- The affected Containment Penetration is #31.

Which ONE of the following states the status of the Containment Isolation Technical Specification at this time and the reason?

Containment Integrity is:

A. MET since V6554 is operable and capable of closing on an "A" train ESFAS signal.

B. MET since the "B" train CIAS signal was inadvertent, V6555 is still considered operable.

C. NOT MET because V6555 did not close on a "B" train CIAS signal. Penetration #31 MUST be isolated and MUST remain in this alignment until V6555 is determined to be operable.

D. NOT MET because V6555 did not close on a "B" train CIAS signal. Penetration #31 MUST be isolated; however it can be opened on an intermittent basis provided that a dedicated operator is on station to isolate the flowpath upon notification of an accident situation.

.

Proposed Answer: D

Explanation (Optional): The Containment Isolation TS is a part of the Containment Integrity TS. Containment Integrity exists when BOTH Containment automatic Isolation valves are capable of being closed to isolate containment penetrations. With V6555 inoperable, due to not closing on a CIAS signal, the CIS valve Tech Spec (3.6.3.1) is not satisfied. If 3.6.3.1 is not satisfied, then Cont. Integrity Tech Spec (3.6.1.1) cannot be satisfied either. Containment Integrity being met is plausible because the candidate could assume that the other valve in the penetration is unaffected and operable and can be used to satisfy containment integrity. Also the candidate could determine containment integrity to be unaffected for this event since the CIS actuation was inadvertent.

A. Incorrect. Both valves that provide isolation of the penetration must be operable. For this event, only V6554 is operable.
B. Incorrect. Even though the CIAS was an inadvertent signal, the fact that V6555 did not respond properly to the ESFAS signal renders that valve inoperable and the CIS valve TS LCO is not met.
C. Incorrect. See explanation and "D".
D. Correct. See explanation. The penetration can be opened IAW the Containment Integrity Tech Spec on an intermittent bases if the administrative controls stated in the selection are met.

Technical Reference(s): T.S. Bases 3/4.6.3.1 Containment Integrity, 1-AOP-69.01, "Inadvertent ESFAS Actuation" (Attach if not previously provided)

Operations Department Policy OPS-503 Technical Specification Guidance

Proposed references to be provided to applicants during examination: N/A

Learning Objective: 0702600-16,17 &18 (As available)

Question Source: Bank # ____

Modified Bank # ____ (Note changes or attach parent)

New X

Question History: Last NRC Exam ____

Question Cognitive Level: Memory or Fundamental Knowledge ____

Comprehension or Analysis X

10 CFR Part 55 Content: 55.41 ____

55.43 5

Comments: Refer to ES-401-4. See notes for this K/A.

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	1	
	Group #	2	
	K/A #	APE076AK3.06	
	Importance Rating	3.2	3.8

Knowledge of the reasons for the following responses as they apply to the High Reactor Coolant Activity : Actions contained in EOP for high reactor coolant activity

Proposed Question: RO 26

Given the following conditions on Unit 1:

- The reactor is at 100% power.
- Increased Reactor Coolant System (RCS) activity has caused entry into 1-AOP-01.06, “Excessive RCS Activity”.
- The specific activity of the RCS has stabilized at .15 uCi/gram Dose Equivalent (DEQ) Iodine 131
- DEQ Xenon-133 is at normal levels.

Which ONE of the following is a required action IAW 1-AOP-01.06 based on the current level of DEQ I-131 and the reason for the action?

A. Isolate letdown to prevent high gamma radiation areas in the RCA.

B. Position V6307, Flash Tank Divert Valve, to the Flash Tank on RTGB-105 to strip fission product gasses.

C. Immediately commence a plant shutdown due to Tech Spec RCS chemistry limits being exceeded.

D. Place all available CVCS Ion Exchangers in service to provide additional mechanical filtration to reduce RCS activity.

Proposed Answer: B

Explanation (Optional):

A. Incorrect. Plausible in that radiation would increase in area of letdown lines in RCA, but not procedurally addressed to isolate letdown.
B. Correct. At >.1 uCi/gram DEQ I-131, these are the required actions per the High RCS Activity AOP.
C. Incorrect. At >.75 uCi/gram DEQ I-131, a plant shutdown is required. Chemistry limits have not been exceeded per the given conditions.
D. Incorrect. If the current CVCS IX is not removing activity, then the standby CVCS IX is to be placed in service. Also, placing additional CVCS IXs in service will provide some filtration but the primary advantage is the additional removal of cations.

Technical Reference(s): 1-AOP-01.06, "Excessive RCS Activity", Unit 1 TS 3.4.8 (Attach if not previously provided)

FSAR Section 11.2.3

Proposed references to be provided to applicants during examination: N/A

Learning Objective: 0702861-03 Power Point (As available)

Question Source: Bank #

Modified Bank # 4160 (Note changes or attach parent)

New

Question History: Last NRC Exam

Question Cognitive Level: Memory or Fundamental Knowledge X

Comprehension or Analysis

10 CFR Part 55 Content: 55.41 5,10

55.43

Comments: Refer to ES-401-4. See notes for this K/A.

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	1	
	Group #	2	
	K/A #	CA16AK2.1	
	Importance Rating	3.2	3.5

Knowledge of the interrelations between the (Excess RCS Leakage) and the following: Components, and functions of control and safety systems, including instrumentation, signals, interlocks, failure modes, and automatic and manual features.

Proposed Question: RO 27

Given the following:

- Unit 2 is operating at 100% power.
- The 2A Charging (Chg) pump is running.
- The 2B Chg pump switch is in AUTO.
- The Chg pump selector switch is in the 2A-2B position.

A Small Break Loss of Coolant Accident then occurs with the following:

- The Reactor is manually tripped
- SIAS has actuated
- Pressurizer level is 25% and slowly rising
- All Charging pumps are now running

Complete the following statements:
(consider each statement independently)

The 2C Chg pump ___(1)____ following the SIAS signal.

Later in the event, if Pressurizer Level rises above Chg pump cut off set point, the 2B Chg pump (back-up) will __(2)___.

A. 1) was manually started
2) remain running

B. 1) was manually started
2) auto stop

C. 1) automatically started
2) remain running

D. 1) remains running
2) auto stop

Proposed Answer: A

Explanation (Optional): On Unit 2, ONLY the backup Chg pp (2B) auto starts on an SIAS signal. The other Chg pump must be manually startred. Also, if a SIAS signal is present, the back up Chg pump responses on the Pressurizer Level control system are bypassed so the pumps will continue to run regardless of the deviation from setpoint (at pzr level +3.6 % above setpoint, the back up Chg pp receives a stop signal). The Chg pp selector switch is configured such that the 2A Chg pp is the running pp and the 2B Chg pp is the back up.

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

Technical Reference(s): 2-AOP-01.10,Pzr Pressure and Level (Attach if not previously provided)

0711205 CVCS

Proposed references to be provided to applicants during examination: N/A

Learning Objective: 0702205-7, 9 & 11 (As available)

Question Source: Bank # 1285

Modified Bank # ______ (Note changes or attach parent)

New ______

Question History: Last NRC Exam ______

Question Cognitive Level: Memory or Fundamental Knowledge X

Comprehension or Analysis ______

10 CFR Part 55 Content: 55.41 7

55.43 ______

Comments:

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	2	
	Group #	1	
	K/A #	003K1.10	
	Importance Rating	3.0	3.2

Reactor Coolant Pump. Knowledge of the physical connections and/or cause-effect relationships between the RCPS and the following systems: RCS

Proposed Question: RO 28

The following conditions exist on Unit 1:

- The Reactor Coolant System (RCS) is solid, preparing for Reactor Coolant Pump sweeps.
- Shutdown Cooling has been secured.
- RCS temperature is 130°F.
- RCS pressure is 310 psia.
- Secondary side of the Steam Generator (SG) is 165°F.

Which ONE of the following results could occur if an RCP is started with the above conditions?

A. Excessive core uplift.

B. No adverse results should be expected.

C. An RCS pressure transient outside the LTOP system capacity.

D. Allowable brittle fracture stress limits for the SG could be exceeded

Proposed Answer: C

Explanation (Optional):

A. Incorrect. Plausible in that core uplift is a concern when starting the 4th RCP (RCS temp must be > 500°F) but this is the FIRST RCP to be started.

B. Incorrect. The SG/RCS ΔT is beyond the LCO limits (30°F). If applicant believes these are normal values for differential temperatures, this would be the correct response.

C. Correct. The SG feedwater temperature cannot be more than 30°F higher than the RCS for an RCP to be started. There might not be enough heat removal capacity from the feedwater, which is hotter than the RCS, to limit the RCS heat up (and subsequent pressure rise) from starting an RCP.

D. Incorrect. Brittle fracture concerns come from either high primary or secondary side pressure in the SG with both the RCS and Feedwater at low temperatures. Refer to TS 3.7.2.1 - The LCO is met with RCS & FW temps > 70°F for RCS & SG pressure > 200 psia.

Technical Reference(s): Unit 1TS 3.4.14 and bases (Attach if not previously provided)
1-NOP-01.05

Proposed references to be provided to applicants during examination: N/A

Learning Objective: 0702201-10,11 (As available)

Question Source: Bank # ______
Modified Bank # 4055 (Note changes or attach parent)
New ______

Question History: Last NRC Exam ______

Question Cognitive Level: Memory or Fundamental Knowledge ______
Comprehension or Analysis X

10 CFR Part 55 Content: 55.41 2-9
55.43 ______

Comments:

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	2	
	Group #	1	
	K/A #	004K5.30	
	Importance Rating	3.8	4.2

Chemical and Volume Control. Knowledge of the operational implications of the following concepts as they apply to the CVCS: Relationship between temperature and pressure in CVCS components during solid plant operation

Proposed Question: RO 29

Given the following:

- The Unit 1 Reactor Coolant System (RCS) is operating on solid pressure control.
- One train of Shutdown Cooling (SDC) is in service.
- BOTH LCV-2210P & Q, "Letdown Level Control Valves" are open with their controller in MANUAL.
- BOTH PCV-2201P & Q, "Letdown Pressure Control Valves" are throttled with their controller in AUTO set at 100 psig.

If HCV-3657, SDC Temp Control, were throttled OPEN, what is the effect on RCS temperature AND how would the Letdown Pressure Control valves respond to maintain letdown pressure on setpoint?

RCS temperature:

A. rises causing PCV-2201P&Q to throttle open.

B. lowers causing PCV-2201P&Q to throttle closed.

C. rises causing PCV-2201P&Q to throttle closed.

D. lowers causing PCV-2201P&Q to throttle open.

Proposed Answer: B

Explanation (Optional): If SDC Temperature Control valve FCV-3657 was opened, RCS temperature would lower. With RCS temperature lowering, RCS pressure will lower. Back Pressure control valves PCV-2201P&Q will auto close to raise pressure back to setpoint. PIC-2201 output lowers causing PCV-2201 to CLOSE to RAISE letdown pressure (direct acting not reverse acting).

A. Incorrect. See explanation. HCV-3657 operates to control RCS temperature. This would be the response if the valve were throttled closed
B. Correct. See explanation.
C. Incorrect. See explanation. HCV-3657 operates to control RCS temperature. This would be the response if the valve were throttled closed
D. Incorrect. See explanation.

Technical Reference(s): 1-GOP-305 (Attach if not previously provided)
0711205, CVCS

Proposed references to be provided to applicants during examination: N/A

Learning Objective: 0702205-3 & 10 0702217-22 (As available)

Question Source: Bank # ______
Modified Bank # ______ (Note changes or attach parent)
New X

Question History: Last NRC Exam HLC 20 NRC Q.30 significantly modified

Question Cognitive Level: Memory or Fundamental Knowledge ______
Comprehension or Analysis X

10 CFR Part 55 Content: 55.41 5
55.43 ______

Comments: Modified question to ask for controller response to a different positioning of HCV-3657. This changes the correct answer. Also changed the Units. They have different operating characteristics (MOVs vs. AOVs, etc.)

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	2	
	Group #	1	
	K/A #	005K2.01	
	Importance Rating	3.0	3.2

Residual Heat Removal System. Knowledge of bus power supplies to the following: RHR pumps

Proposed Question: RO 30

Given the following:

- Unit 2 is in Mode 5 on Shutdown Cooling (SDC).
- The “B” SDC train is in service.
- The “A” SDC train is in standby.
- The following annunciator is received:

4.16KV SWGR 2B2 **Δ CURRENT** **TRIP** **A-13**

Which ONE of the following describes the response of the “2B”Low Pressure Safety Injection pump?

A. Continues in operation.

B. Its supply breaker opens, but can be manually closed.

C. Its supply breaker opens, but recloses following a time delay.

D. Stops due to loss of AC power and its supply breaker cannot be reclosed.

Proposed Answer: B

Explanation (Optional): A 4.16KV SWGR 2B2 Δ CURRENT TRIP causes the following to occur: Aux and Startup transformer breakers open (i.e. disconnects from offsite power), 2B1 Station Service Transformer opens (all “B” side non – vital power gets de-energized) and the 2B2 to 2B3 tie breaker opens (the 2B3 Vital bus de-energizes and the 2B EDG starts and loads).

A. Incorrect. See explanation. Plausible if the applicant believes the 2B3 4.16kV breaker is unaffected.
B. Correct. See explanation.
C. Incorrect. Plausible if the applicant believes that the LPSI pump is on the EDG load sequencer on a LOOP.
D. Incorrect. Plausible if the applicant believes that the 2B EDG won’t load on the 2B3 bus due to a Δ CURRENT lockout (confuses with a 2B3 bus lockout). The 2B EDG won’t load if the 2B3 had a Δ CURRENT lockout.

Technical Reference(s): 2-ARP-01-A00 (Attach if not previously provided)
0711501

Proposed references to be provided to applicants during examination: N/A

Learning Objective: 0702217-4 & 10 (As available)

Question Source: Bank #
Modified Bank # 2549 (Note changes or attach parent)
New

Question History: Last NRC Exam

Question Cognitive Level: Memory or Fundamental Knowledge
Comprehension or Analysis X

10 CFR Part 55 Content: 55.41 7
55043

Comments:

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	2	
	Group #	1	
	K/A #	005K3.01	
	Importance Rating	3.9	4.0

Residual Heat Removal. Knowledge of the effect that a loss or malfunction of the RHRS will have on the following: RCS

Proposed Question: RO 31

Given the following conditions:

- Unit 1 is in MODE 4
- 1A Shutdown Cooling (SDC) loop is in service for Reactor Coolant System (RCS) cooldown.
- 1B1 and 1B2 Reactor Coolant Pumps (RCP) are running.
- SDC flow rate returning to the core is 3400 gpm as indicated on FI-3306
- RCS temperature is 295°F and being held constant for shift turnover.
- HCV-3657 is open and FCV-3306 is closed.
- 2 of the 4 LPSI header injection valves are open.
- The air supply line breaks on HCV-3657, “SDC Temp Control valve”.

As a result of the loss of air, HCV-3657 will __(1)__and SDC flow rate returning to the core will __(2)___.

A. 1) close
   2) lower to approximately 0 gpm

B. 1) open
   2) lower then return to 3400 gpm

C. 1) close
   2) rise then return to 3400 gpm

D. 1) open
   2) rise to approximately 4600 gpm

Proposed Answer: A

Explanation (Optional): Both HCV-3657 and FCV-3306 cannot be throttled simultaneously due to valve wear concerns. This would require the controllers for the valves to be in MANUAL not AUTO to ensure positive control over the valve positions. AW 1-NOP-03.05, the controllers for both HCV-3657 and FCV-3306 are in manual for the RCS cooldown. HCV-3657 fails closed and FCV-3306 fails open on a loss of air. This temperature correlates to one that would have HCV-3657 being throttled open from the fully closed position and FCV-3306 would be fully closed.

A. Correct, HCV-3657 fails closed on loss of air so all SDC flow would bypass the SDC HX. With FCV-3306 closed and in Manual, flow would be reduced to minimum.
B. Incorrect. Plausible since HCV-3657 fails closed and if it is incorrectly assumed that FCV-3306 will automatically compensate (with the controller in auto, maintaining flow on setpoint) for this failure. The flow element is downstream of FCV-3306.
C. Incorrect. Plausible if HCV-3657 failure mode is assumed to be open and it is assumed FCV-3306 will automatically compensate (with the controller in auto, maintaining flow on setpoint) for the failure.
D. Incorrect. Plausible because this would be the proper flow response if HCV-3657 failed open on a loss of air.

Technical Reference(s): 1-NOP-03.05, SDC (Attach if not previously provided)

Proposed references to be provided to applicants during examination: N/A

Learning Objective: 0702217-03 &4f (As available)

Question Source: Bank #
Modified Bank # (Note changes or attach parent)
New X

Question History: Last NRC Exam

Question Cognitive Level: Memory or Fundamental Knowledge
Comprehension or Analysis X

10 CFR Part 55 Content: 55.41 7
55.43

Comments: Refer to ES-401-4. K/A was changed from 005K3.06.

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	2	
	Group #	1	
	K/A #	006A2.12	
	Importance Rating	4.5	4.8

Emergency Core Cooling. Ability to (a) predict the impacts of the following malfunctions or operations on the ECCS; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations conditions requiring actuation of ECCS

Proposed Question: RO 32

Unit 2 is performing a cooldown per 2-GOP-305, "Reactor Plant Cooldown - Hot Standby To Cold Shutdown", for a refueling outage with the following conditions:

Time: 11:30

- RCS pressure is 1750 psia.
- RCS temperature is 504°F.
- 2A & 2B S/Gs are 740 psia.

Time: 11:32

- 2A Steam Line ruptures outside Containment and just upstream of the MSIV.
- RCS pressure is 1630 psia and rapidly lowering.
- SG pressures are 580 psia and rapidly lowering.

1) What ESFAS actuation(s) must be MANUALLY actuated?
2) Which procedure will be implemented to mitigate the event?

A. 1) BOTH MSIS, and SIAS.
   2) 2-EOP-05, "ESDE".

B. 1) ONLY SIAS.
   2) 2-EOP-05, "ESDE".

C. 1) BOTH MSIS, and SIAS.
   2) 2-ONP-01.01 "Plant Condition 1 Steam Generator Heat Removal LTOP Not in Effect".

D. 1) ONLY SIAS.
   2) 2-ONP-01.01 "Plant Condition 1 Steam Generator Heat Removal LTOP Not in Effect".

Proposed Answer: D

Explanation (Optional): With SIAS blocked and LM Safety functions not met exit AOP and implement LMONP (RCS Inventory Control safety function not met).

A. Incorrect. See "D"

B. Incorrect. See "D"

C. Incorrect. See "D"

D. Correct. At time 11:30, plant is below SIAS block permissive (1836 psia) so it should be blocked per 2-GOP-305. However MSIS block permissive has not yet been reached (700 psia) so it should be auto actuated at time 11:32. See explanation.

Technical Reference(s): 2-GOP-305, 2-AOP-08.01 Steam Leak; 2-ONP-01.01, Plant Condition 1 Low Mode, 2-EOP-01 (Attach if not previously provided)

Proposed references to be provided to applicants during examination: N/A

Learning Objective: 0702813-09

Question Source: Bank # ______
Modified Bank # 4009 (Note changes or attach parent)
New ______

Question History: Last NRC Exam ______

Question Cognitive Level: Memory or Fundamental Knowledge ______
Comprehension or Analysis X

10 CFR Part 55 Content: 55.41 5
55.43 ______

Comments:

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	2	
	Group #	1	
	K/A #	007K5.02	
	Importance Rating	3.1	3.4

Knowledge of the operational implications of the following concepts as the apply to PRTS: Method of forming a steam bubble in the PZR

Proposed Question: RO 33

Given the following on Unit 1:

- The unit has just completed drawing a bubble from a solid plant condition.
- Quench Tank pressure was noted to be 1 psig.
- Pressurizer (Pzr) is being maintained at 200 psia by cycling backup Pzr heaters.
- RCS temperature is 190°F.

If a PORV is venting fluid to the Quench Tank (QT), what would be the expected PORV tailpipe temperature AND which ONE of the following states the Technical Specification Limiting Condition for Operation leakage limit for this type of leakage?

(Assume 100% quality. References provided)

A. ~310ºF; 1 gpm

B. ~310ºF; 10 gpm

C. ~380ºF; 1 gpm

D. ~380ºF; 10 gpm

Proposed Answer: B

Explanation (Optional): By TS definition, RCS leakage into closed systems (e.g. valve packing leaks) that are captured and conducted to a collecting tank (QT) is Identified. The limit for Identified leakage is 10 gpm. Per the QT NOP (1-NPO-01.07) Limits and Precautions, If pressure in the QT lowers to < 1 psig, the possibility of increased leakage from the PORV's or Pzr Safeties could increase.

A. Incorrect: 1 gpm is the limit for unidentified leakage.
B. Correct: Find the 200 psia constant pressure line and where it intersects with the saturation line. Draw a straight line from the 200 psia mark on the saturation line to the 16 psia pressure line. The intersecting temperature line is approximately 305ºF g. Part 2 correct. See explanation.
C. Incorrect. Plausible if candidate uses the saturated temperature (380ºF) for 200 psia. 1 gpm is the limit for unidentified leakage.
D. Incorrect: See explanation in distracter "C". Part 2 correct.

Technical Reference(s): Steam tables, Unit 1 TS (Attach if not previously provided)
1-NOP-01.07 Quench Tank, GOP-502 Data Sheets (direction for drawing a Pzr bubble)

Proposed references to be provided to applicants during examination: Steam tables

Learning Objective: NUC-GFP-HXF-003-13 (As available)
0902723-02 & 05

Question Source: Bank #
Modified Bank # (Note changes or attach parent)
New X

Question History: Last NRC Exam

Question Cognitive Level: Memory or Fundamental Knowledge
Comprehension or Analysis X

10 CFR Part 55 Content: 55.41 5
55.43

Comments: Refer to ES-401-4. See notes for this K/A. The NRC allowed us the following: NRC will allow the initial conditions of the question to include that the Pzr was taken solid in preparation to draw bubble. Subsequently, for example, PORV/Pzr Safety develops a leak (due to Pzr being solid then experiences a pressure transient) which discharges to the Quench Tank.

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	2	
	Group #	1	
	K/A #	008K3.01	
	Importance Rating	3.4	3.5

Component Cooling Water. Knowledge of the effect that a loss or malfunction of the CCWS will have on the following: Loads cooled by CCWS.

Proposed Question: RO 34

Given the following on Unit 1:

- Unit 1 is operating at 100% power
- LS-14-1A ("A" side CCW Surge Tank Level Switch) on the Component Cooling Water (CCW) surge tank fails low causing the following annunciator

CCW SURGE TANK LEVEL HIGH/ COMPARTMENT A LEVEL LOW **S-6**

Which ONE of the following describes the impact on CCW operation and Reactor Coolant Pump (RCP) Cooling:

A. No Non-Essential header valves isolate, "A" and "B" CCW header supplies flow to the RCPs.

B. "A" side Non-Essential header valves auto close; "B" CCW header supplies flow to the RCPs.

C. "A" side Non-Essential header valves should be manually closed; All RCPs should be secured.

D. All four Non-Essential header valves auto close; All RCPs should be secured.

Proposed Answer: A

Explanation (Optional):

A. Correct: On Unit 1, there is no auto action associated with the "N" header valves due to low surge tank level.
B. Incorrect: This is plausible On Unit 2, there is auto action associated with the "N:"header valves and low CCW Surge tank condition.
C. Incorrect. This is plausible if a valid low level condition existed on the "A" CCW Surge Tank due to a rupture on the "A" CCW header
D. Incorrect: Plausible., This is a plausible action for a rupture of the "N" Header

Technical Reference(s): 1-AOP-14.01 Component Cooling Water Abnormal Operation (Attach if not previously provided)
1-AOP-25.01-25.01 Loss of RCB Cooling Fans

Proposed references to be provided to applicants during examination: N/A

Learning Objective: 0702862-08 (As available)

Question Source: Bank #
Modified Bank # 4011 (Note changes or attach parent)
New

Question History: Last NRC Exam

Question Cognitive Level: Memory or Fundamental Knowledge
Comprehension or Analysis X

10 CFR Part 55 Content: 55.41 7
55.43

Comments:

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	2	
	Group #	1	
	K/A #	010K4.03	
	Importance Rating	3.8	4.1

Pressurizer Pressure Control. Knowledge of PZR PCS design feature(s) and/or interlock(s) which provide for the following: Over pressure control.

Proposed Question: RO 35

On Unit 1, which ONE of the following directly feeds the Pressurizer PORV open signal when the PORV selector switch is in:

1) NORMAL RANGE
2) LOW RANGE

DIRECTLY from the:

A. 1) RPS high pressure trip bistables.
   2) Pressurizer pressure instruments PT-1103, 1104

B. 1) Pressurizer pressure instruments PT-1102 A through D
   2) Pressurizer pressure instruments PT-1102 A through D

C. 1) RPS high pressure trip bistables.
   2) Pressurizer pressure instruments PT-1102 A through D

D. 1) Pressurizer pressure instruments PT-1102 A through D
   2) Pressurizer pressure instruments PT-1103, 1104

Proposed Answer: A

Explanation (Optional): Normal Range open signal is directly from RPS high pressure bistables generated from PT-1102 A-D. Low Range open signal is from different Pressure Transmmitters (PT-1103, 1104)

A. Correct. See explanation.
B. Incorrect. Both parts wrong.
C. Incorrect. Part one correct but part 2 incorrect
D. Incorrect. Part 1 incorrect. Part 2 correct.

Technical Reference(s): 0711206, Pressurizer Pressure and Level Control (Attach if not previously provided)

Proposed references to be provided to applicants during examination: N/A

Learning Objective: 0702206-4 (As available)

Question Source: Bank #

Modified Bank # (Note changes or attach parent)

New X

Question History: Last NRC Exam HLC21 NRC Q38 (Changed to Unit 1)

Question Cognitive Level: Memory or Fundamental Knowledge X

Comprehension or Analysis

10 CFR Part 55 Content: 55.41 7

55.43

Comments: This is question 2 of 4 allowed to be repeated from last two NRC exams

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	2	
	Group #	1	
	K/A #	012A1.01	
	Importance Rating	2.9	3.4

Reactor Protection System. Ability to predict and/or monitor Changes in parameters (to prevent exceeding design limits) associated with operating the RPS controls including: Trip setpoint adjustment

Proposed Question: RO 36

Given the following conditions on Unit 1:

The unit is operating at 100% power.

Reactor Protection System (RPS) Channel "A" Tcold RTD (TE-1112CA) has been inadvertently set to the MAXIMUM value of the Tcold range.

Which ONE of the following describes the effect of this adjustment on the given parameters?

(Reference Provided)

Channel "A" :	TM/LP Trip Setpoint	Delta-T Power Indication
A.	Lowers	Lowers
B.	Lowers	Raises
C.	Raises	Raises
D.	Raises	Lowers

Proposed Answer: D

Explanation (Optional): An input into the TM/LP trip setpoint is MAX Tcold. Maximum Tcold input drives the TM/LP trip setpoint to the maximum RCS pressure value of 2500 psia. Actual RCS pressure must be above that trip setpoint pressure or the TM/LP trip will actuate (normal pressure for the given condition would be 2250 psia). For Delta T power indication, the difference between Thot and Tcold is measured in the CPC. For 100% power the delta-T would be maximum and for low power the delta-T would be minimum. If Tcold was calibrated high for 100% power, the delta-T would be smaller and delta-T power indication would lower (at 100% power the deltal T is max - Thot is approx. 50 degrees higher than Tcold).

A. Incorrect. See Explanation
B. Incorrect. See Explanation
C. Incorrect. See Explanation
D. Correct. See Explanation

Technical Reference(s): Core Protection Calculator Drawing from 0711404, RPS (Attach if not previously provided)

1-AOP-99.01

Proposed references to be provided to applicants during examination: N/A

Learning Objective: 0702404-4 & 17 (As available)

Question Source: Bank # ____

Modified Bank # ____ (Note changes or attach parent)

New X

Question History: Last NRC Exam ____

Question Cognitive Level: Memory or Fundamental Knowledge ____

Comprehension or Analysis X

10 CFR Part 55 Content: 55.41 5

55.43 ____

Comments:

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	2	
	Group #	1	
	K/A #	012A2.06	
	Importance Rating	4.4	4.7

RPS. 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: Failure of RPS signal to trip the reactor

Proposed Question: RO 37

Given the following conditions on Unit 2:

- Unit 2 is at 18% power.
- The Main Generator is on-line.
- The crew is raising turbine load at 1 MW/min.

The Main Transformer 2A Differential Current Alarm occurs resulting in:

- Turbine tripping on a generator lockout
- Reactor remains critical

Which ONE of the following describes the expected plant response and subsequent actions?

The Reactor should _________.

A. stay CRITICAL; Verify SBCS quick opens to remove reactor heat and go to 2-AOP-53.03, Main Generator

B. stay CRITICAL; Ensure SBCS responds in pressure control mode to remove reactor heat and enter 2-AOP-53.03, Main Generator

C. have automatically TRIPPED; Manually trip the reactor and enter EOP-01, Standard Post Trip Actions

D. have automatically TRIPPED; Manually trip the reactor then enter EOP-15, Functional Recovery due to the Reactivity Control Safety Function not being met.

Proposed Answer: C

Explanation (Optional): The Loss of Load Rx Trip becomes unbypassed above 15% so the Rx should have auto tripped. An EOP-01 entry condition from the PSTG is that a Rx trip has occurred or is required to have occurred. EOP-15 is not entered until EOP-01 is complete. The Main Transformer has guidance for this event as long as the Rx has not tripped or the unit is still on-line. SBCS will respond in pressure modulate mode since no Rx trip UV signal was developed from the CEA bus (Rx critical).

A. Incorrect. See explanation.
B. Incorrect. See explanation.
C. Correct. See explanation.
D. Incorrect. See explanation. This was a contingency action in an earlier version of EOP-01

Technical Reference(s): EOP-01- SPTA's , PSTG-01 (Attach if not previously provided)
2-AOP-53.03

Proposed references to be provided to applicants during examination: N/A

Learning Objective: 0702822-5, 12 (As available)

Question Source: Bank # ______
Modified Bank # ______ (Note changes or attach parent)
New X

Question History: Last NRC Exam ______

Question Cognitive Level: Memory or Fundamental Knowledge ______
Comprehension or Analysis X

10 CFR Part 55 Content: 55.41 5
55.43 5

Comments: Refer to ES-401-4. K/A was changed from 012A2.03.

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	2	
	Group #	1	
	K/A #	013A2.01	
	Importance Rating	3.9	4.1

Engineered Safety Features Actuation. Ability to (a) predict the impacts of the following malfunctions or operations on the ESFAS; and (b) based Ability on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations; LOCA

Proposed Question: RO 38

Given the following conditions on Unit 2:

- A Loss of Coolant Accident (LOCA) occurred.
- The crew has entered 2-EOP-03, “LOCA” with the following:
- Containment Spray Actuation Signal (CSAS) has automatically actuated.
- 2-HVS-1A and 2-HVS-1C, Containment Fan Coolers, are running.
- 2A Containment Spray (CS) pump running with a flow rate of 2600 gpm.
- 2B CS pump failed to auto start on the CSAS.
- Containment Pressure is 7 psig and rising.
- Containment Temperature is 220°F and rising.
- Hydrogen Analyzers have just been placed in service.

Which ONE of the following describes the status of the Containment Temperature and Pressure Safety Function and basis for 2-EOP-03, LOCA?

A. Met; based on current Containment Temperature and Pressure.

B. Not Met; but will be if the HVS-1B Containment Fan Cooler is started.

C. Not Met; but will be if the 2B CS pump is started with a flow rate of 2700 gpm.

D. Met; based on ONLY 2 Containment Fan Coolers running and the 2A CS pump at its current flow rate.

Proposed Answer: C

Explanation (Optional): Actions required are to ensure all available CFC's are running (2 CFC's make up a train).

A. Incorrect. Containment pressure is too high (< 5.4 psig). This would be correct on Unit 1.
B. Incorrect. Current plant conditions satisfy the safety function on Unit 1. Minimum CS flow is 2550 gpm on Unit 1. This paired with at least 2 CFC's would be correct. Also plausible if the candidate believes that the 2 CFC's must be in the same train ("A" train is 1/2-HVS-1A & B, "B" train is 1/2-HVS-1C & 1D).
C. Correct. This is the required minimum operable CFC's and CS train including required flow of at least 2700 gpm.
D. Incorrect. Plausible in that they should be running but one train of Cont. Spray with flow at 2700 gpm and 2 CFCs are needed to satisfy the safety function.

Technical Reference(s): 1 & 2-EOP-03 LOCA Safety Functions (Attach if not previously provided)

Proposed references to be provided to applicants during examination: N/A

Learning Objective: 0702824-9 &19 (As available)

Question Source: Bank #
Modified Bank # 3297 (Note changes or attach parent)
New

Question History: Last NRC Exam Modified Q43 of HLC21 NRC exam

Question Cognitive Level: Memory or Fundamental Knowledge
Comprehension or Analysis X

10 CFR Part 55 Content: 55.41 5
55.43 5

Comments:

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	2	
	Group #	1	
	K/A #	013.A4.01	
	Importance Rating	4.5	4.8

Engineered Safety Features Actuation. Ability to manually operate and/or monitor in the control room: ESFAS-initiated equipment which fails to actuate

Proposed Question: RO 39

Given the following events and conditions:

Unit 2 is operating at 100%
The 2C Auxiliary FeedWater (AFW) pump is out of service.

Time - 0200:

- A reactor trip occurred due to a loss of off-site power.
- The 2A Emergency Diesel Generator (EDG) automatically loaded on the bus
- The 2B EDG started but its output breaker DID NOT auto close
- 2A and 2B Steam Generator (S)G levels are 10% NR lowering

Time – 0204:

- "A" train of Auxiliary Feedwater (AFW) is feeding the 2A SG

Time - 0205:

- The 2B EDG output breaker was manually closed.

Which ONE of the following statements correctly describes the "B" Train AFW status at time 0206, and any subsequent actions (if any)?

The 2B AFW pump:

A. is running and feeding the 2B SG. No further action is required.

B. is running but NOT feeding the 2B SG. Open the 2B AFW flow control valves to establish the desired flow rate.

C. is NOT running. Manually initiate AFAS-2 using all 4 Manual Initiation switches on RTGB-202.

D. is NOT running. Manually start the "B" train of AFW in accordance with the operator hard card.

Proposed Answer: C

Explanation (Optional): With the 2C AFW pp OOS , the “B” AFW Train had no AC power to actuate until 0205 so a rupture ID (“A” FW Hdr DP > 150 psi) was present at the time of AFAS actuation (Both SG’s dropped below 19.5%) so no “B” AFW components responded to the AFAS-2 signal because of the Rupture ID lockout. IAW Ops Policy 521, this scenario is one in which Manual AFAS Initiation is allowed from the RTGB (on unit 2). Using this method, the rupture ID lockout is overridden.

A. Incorrect. See explanation

B. Incorrect. See explanation

C. Correct. See explanation

D. Incorrect. Plausible because the AFW hard card is used in EOP-01 to start/manipulate AFW components under normal conditions. However with the Rupture ID present, the “B” train AFW valves won’t remain open.

Technical Reference(s): 0711412 AFW/AFAS (Attach if not previously provided)
Ops Policy 521

Proposed references to be provided to applicants during examination: N/A

Learning Objective: 0702412-04.b, 07 (As available)

Question Source: Bank # ____
Modified Bank # 5190 (Note changes or attach parent)
New ____

Question History: Last NRC Exam ____

Question Cognitive Level: Memory or Fundamental Knowledge ____
Comprehension or Analysis X

10 CFR Part 55 Content: 55.41 7
55.43 ____

Comments:

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	2	
	Group #	1	
	K/A #	022.K4.03	
	Importance Rating	3.6	4.0

Containment Cooling System. Knowledge of CCS design feature(s) and/or interlock(s) which provide for the following: Automatic containment isolation

Proposed Question: RO 40

Given the following conditions:

Time: 0200

- A Small Break Loss of Coolant Accident has occurred on Unit 2.
- A loss of offsite power (LOOP) occurs.
- 2A and 2B Emergency Diesel Generators start and load as expected.

Time: 0220

- Safety Injection Signal Actuates (SIAS)

Which ONE of the following describes the expected condition of the Containment Fan Coolers following the LOOP, then following the SIAS?

__(1)__ Containment Cooling Fans running in ___(2)___ speed.

	0200	0220
A.	1) Three	Four
	2) Fast	Fast
B.	1) Three	Four
	2) Fast	Slow
C.	1) Four	Four
	2) Fast	Fast
D.	1) Four	Four
	2) Fast	Slow

Proposed Answer: D

Explanation (Optional): Discussed this KA with the NRC. They allowed substituting SIAS for CIAS. The Containment Cooling system receives no automatic containment isolation signal at PSL. On Unit 2, 3 CFCs are normally running in fast. On a LOOP, All 4 CFCs receive a start signal and remain in fast speed. On a SIAS, all 4 CFC's receive a start signal and switch to slow speed.

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

Technical Reference(s): 0711207, 1-EOP-99 (Attach if not previously provided)

Proposed references to be provided to applicants during examination: N/A

Learning Objective: 0702209-4e, 10 & 18e (As available)

Question Source: Bank # ____
Modified Bank # ____ (Note changes or attach parent)
New X

Question History: Last NRC Exam ____

Question Cognitive Level: Memory or Fundamental Knowledge X
Comprehension or Analysis ____

10 CFR Part 55 Content: 55.41 7
55.43 ____

Comments: Refer to ES-401-4. See notes for this K/A.

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	2	
	Group #	1	
	K/A #	026A3.01	
	Importance Rating	4.3	4.5

Containment Spray. Ability to monitor automatic operation of the CSS, including Pump starts and correct MOV positioning:

Proposed Question: RO 41

Given the following:

- A Large Break LOCA has occurred on Unit 2.
- The "B" Containment Spray Actuation signal (CSAS) failed to automatically or manually actuate.
- The 2B Containment Spray pump was started by the RCO.

Which ONE of the following identifies the status of the "B" Train Iodine Removal System at this time?

	2B Hydrazine Pump	SE-07-3B
A.	OFF	CLOSED
B.	ON	CLOSED
C.	ON	OPEN
D.	OFF	OPEN

Proposed Answer: B

Explanation (Optional): CS and Hyd pp& discharge valves operation is interlocked together. Hyd pumps start on breaker closure of associated CS pumps. Hyd pp discharge valve interlock is: Hyd pp running, CSAS signal and no low level signal from the Hyd Tank.

A. Incorrect. Hyd pp will start, not all interlocks made up for SE-07-3B to open (no “B” CSAS signal).
B. Correct. See explanation. .
C. Incorrect. See “A” explanation. No CSAS signal.
D. Incorrect. Hyd pp will start on CS pp start. No CSAS signal

Technical Reference(s): 0702401 (Attach if not previously provided)

Proposed references to be provided to applicants during examination: N/A

Learning Objective: 0702210-04, 0702401-06 (As available)

Question Source: Bank # 1850
Modified Bank # ______ (Note changes or attach parent)
New ______

Question History: Last NRC Exam ______

Question Cognitive Level: Memory or Fundamental Knowledge X
Comprehension or Analysis ______

10CFR Part Content: 55.41 7
55.43 ______

Comments:

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	2	
	Group #	1	
	K/A #	026G2.2.42	
	Importance Rating	3.9	4.6

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

Proposed Question: RO 42

The regularly scheduled QUARTERLY Code Run Test has just been performed on the 2A Containment Spray (CS) pump IAW 2-OSP-07.04A.

Which ONE of the following describes the specific parameter, from this particular surveillance, that must be satisfied in order to be in compliance with the Unit 2 CONTAINMENT SPRAY and COOLING SYSTEM Technical Specification LCO (4.6.2.1)?

A. 2A Hydrazine Pump flow as indicated on RTGB 206

B. 2A CS Pump developed head by a locally installed pressure gauge

C. 2A CS Pump vibration by local vibrometer

D. 2A CS Pump discharge flow as indicated on RTGB 206

Proposed Answer: B

Explanation (Optional): RO's perform this surveillance on a regularly scheduled frequency and sign off that CS pump discharge pressure is the TS required parameter for operability. Therefore, this is specific RO knowledge.

A. Incorrect. Plausible because Hydrazine pump rotation speed is part of the CS Pump Code Run surveillance acceptance criteria however Hydrazine flow is not. Pump rotation speed is measured and converted to flow.
B. Correct. Pump Discharge pressure is specifically measured as part of the surveillance. It is also mentioned in the TS surveillance (4.6.2.1.b)
C. Incorrect. Vibration is required only on Post Maintenance test runs only.
D. Incorrect. Pump flow is not measured for any part of this surveillance. It is plausible since flow is a common surveillance piece of data for other safety related pumps (CHG, ICW & CCW pumps).

Technical Reference(s): TS 3.6.2.1 (Attach if not previously provided)
2-OSP-07.04A

Proposed references to be provided to applicants during examination: N/A

Learning Objective: 0902723-02 (As available)

Question Source: Bank #
Modified Bank # (Note changes or attach parent)
New X

Question History: Last NRC Exam

Question Cognitive Level: Memory or Fundamental Knowledge X
Comprehension or Analysis

10 CFR Part 55 Content: 55.41 7 & 10
55.43 2 & 3

Comments:

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	2	
	Group #	1	
	K/A #	039G2.1.28	
	Importance Rating	4.1	4.1

Main and Reheat Steam. Knowledge of the purpose and function of major system components and controls.

Proposed Question: RO 43

What is the function of the 103% Turbine Overspeed Protection Circuit (OPC)?

A. Reheat stop valves and extraction non-return valves are maintained closed to prevent LP turbine overspeed following a turbine trip.

B. Reheat stop valves and extraction non-return valves momentarily close to prevent LP turbine overspeed following a turbine trip.

C. Governor valves and intercept valves are maintained closed to prevent turbine overspeed following a complete loss of electrical load.

D. Governor valves and intercept valves momentarily close to prevent turbine overspeed following a complete loss of electrical load.

Proposed Answer: D

Explanation (Optional):

A. Incorrect. Plausible as this is their function but these valves close on a turbine trip due to low Emergency Trip Hdr pressure (Test Dump Manifolds 1 & 2 open) Not on an OPC.

B. Incorrect. The OPC does not control these valves.

C. Incorrect. Valve closes momentarily.

D. Correct. The OPC circuit momentarily closes the governor and intercept valve at 103% but allows reopening when speed is less than 101% following a complete loss of electrical load (TDM-3 opens).

Technical Reference(s): 0711409, DEH (Attach if not previously provided)

Proposed references to be provided to applicants during examination: N/A

Learning Objective: 0702409-18 (As available)

Question Source: Bank # ____

Modified Bank # ____ (Note changes or attach parent)

New X

Question History: Last NRC Exam ____

Question Cognitive Level: Memory or Fundamental Knowledge X

Comprehension or Analysis ____

10 CFR Part 55 Content: 55.41 7

55.43 ____

Comments:

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	2	
	Group #	1	
	K/A #	059K3.04	
	Importance Rating	3.6	3.8

Main Feedwater. Knowledge of the effect that a loss or malfunction of the MFW will have on the following: RCS

Proposed Question: RO 44

Given the following:

- Unit 1 reactor is at 60% power.
- The 1A Main Feedwater pump trips.

Which ONE of the following describes the expected plant response BEFORE the automatic Reactor and Turbine Trip on Low Steam Generator (SG) Level? (Assume no operator action)

Reactor Coolant System (RCS) Pressure will:

A. increase because the RCS delta T power increases.

B. increase because the RCS temperature increases due to increased SG temperatures.

C. decrease because the increased boiling rate in the SG tube bundle region decreases Tavg.

D. decrease because the SG level initially increases, causing a contraction of the RCS inventory.

Proposed Answer: B

Explanation (Optional):

A. Incorrect. Plausible if applicant thinks that the differential temperature across the SG rises which equates to a higher ΔT power.
B. Correct. With a loss of feedwater, the subcooled margin in the SG is reduced which increased the boiling rate in the SG thereby increasing Tcold. The elevated temperature causes pressure to rise.
C. Incorrect. Plausible if applicant thinks less feedwater implies greater boiling in tube bundle region.
D. Incorrect. Plausible if applicant associates increase in SG level due to heatup implies a greater heat transfer area exists in the SG with a subsequent contraction of the RCS.

Technical Reference(s): 0711827, TLOF (Attach if not previously provided)

Proposed references to be provided to applicants during examination: N/A

Learning Objective: 0702827-02 (As available)

Question Source: Bank # 1074
Modified Bank # (Note changes or attach parent)
New

Question History: Last NRC Exam HLC 20 NRC Q45

Question Cognitive Level: Memory or Fundamental Knowledge
Comprehension or Analysis X

10 CFR Part 55 Content: 55.41 7
55.43

Comments: This is question 3 of 4 allowed to be repeated from last two NRC exams.

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	2	
	Group #	1	
	K/A #	061K2.01	
	Importance Rating	3.2	3.3

Auxiliary Feedwater. Knowledge of bus power supplies to the following: AFW system MOVs

Proposed Question: RO 45

Given the following conditions on Unit 2:

- The unit has just tripped from 100% power due to a loss of the 2A 125VDC bus.
- The 2AB 125VDC bus is aligned to the "B" train.
- 2-EOP-01, "SPTA's" is being implemented.
- No contingency actions have been taken.

Which ONE of the following describes the configuration of the 2B and 2C Auxiliary Feedwater pumps (AFW) immediately following AFAS actuation?

2B AFW pump is:

A. running feeding the 2B Steam Generator; 2C AFW pump is running feeding ONLY the 2A Steam Generator.

B. locked out due to a Feedwater Header Rupture ID; 2C AFW pump is running feeding ONLY the 2A Steam Generator.

C. running feeding the 2B Steam Generator; 2C AFW pump is running feeding BOTH the 2A and 2B Steam Generator.

D. locked out due to a Feedwater Header Rupture ID; 2C AFW pump is running feeding BOTH the 2A and 2B Steam Generator.

Proposed Answer: A

Explanation (Optional): The KA is met – the power supply for the MOVs is DC. A loss of the 2A DC bus causes a total loss of power to the "A" A/C electrical train post trip (the AB DC bus is energized due to the electrical alignment). Since the AB bus is energized, the 2C AFW pp should start and keep the "A" AFW header pressurized – so there will be no FW Hdr pressure rupture ID lockout of the "A" train. The "B" electrical train is aligned to offsite power so the 2B AFW MD pp has power. Due to the loss of a DC bus, SIAS, CIAS and MSIS signals are present.

A. Correct. The 2C AFW pp discharge valve cross power arrangement (e.g. ".A" SG valves are powered from the "B" DC bus). Also MV-08-03, Steam Admission valve to the 2C AFW pump is normally open.
B. Incorrect. Both the 2C AFW pump and the 2B AFW pump should start at the same time since the "B" train has offsite power (EDG starts on SIAS signal but doesn't close onto the bus since it is energized from offsite). If the candidate fails to recognize that the "A" train became pressurized from the2C AFW pp start, it's plausible to think that a rupture ID could occur. (IF the AB DC bus was aligned to the "A" train then this would be correct on Unit 1).
C. Incorrect. Plausible This would be true on Unit 1 due to the alignment and power supply for MV-08-03 (normally closed, powered from the AB DC bus)
D. Incorrect. Plausible. This would be true on Unit 1 due to the alignment and power supply for MV-08-03 (normally closed, powered from the AB DC bus). Also see "B"

Technical Reference(s): 0711412 AFW (Attach if not previously provided)
2-AOP-09.02 Auxiliary Feedwater

Proposed references to be provided to applicants during examination: N/A

Learning Objective: 0702412-19.a (As available)

Question Source: Bank #
Modified Bank # 670 (Note changes or attach parent)
New

Question History: Last NRC Exam Modified Significantly HLC 21 NRC Q49

Question Cognitive Level: Memory or Fundamental Knowledge
Comprehension or Analysis X

10 CFR Part 55 Content: 55.41 7
55.43

Comments:

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	2	
	Group #	1	
	K/A #	062A1.03	
	Importance Rating	2.5	2.8

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

Proposed Question: RO 46

Given the following on Unit 2:

- The reactor is operating at 100% power.
- The 2A3 4.16kV bus has been de-energized due to an inadvertent trip of the 2A3-2A2 breaker.
- The 2A Emergency Diesel Generator (EDG) has started and its output breaker is closed.
- 2-AOP-47.01A, "Loss of a Safety Related AC Bus-Train-A" is being implemented.
- The SNPO reports that there is NO apparent damage on the 2A3-2A2 breaker.

IAW 2-AOP-47.01A Attachment 7, "Restoration of Offsite Power with 2A EDG in Operation", the 2A EDG synchroscope should be slowly rotating in the __(1)__ direction.
If NON-EMERGENCY EDG trips were locked in AT THIS TIME, they would actuate when the __(2)__.

A. 1) fast (clockwise)
   2) 2A3 to 2A2 4.16kV bus tie breaker is closed

B. 1) fast (clockwise)
   2) Synch Plug switch is placed into the "TIE 2A3/2B3" position

C. 1) slow (counter clockwise)
   2) 2A3 to 2A2 4.16kV bus tie breaker is closed

D. 1) slow (counter clockwise)
   2) Synch Plug switch is placed into the "TIE 2A3/2B3" position

Proposed Answer: C

Explanation (Optional): On a LOOP, the 2A2 bus 4.16kV 3 to 2 tie breaker opens and provides a signal to start the EDG. The EDG is now in its Emergency mode of operation and the only 2 active EDG trips are overspeed and differential current. All others are bypassed. To restore offsite power, the sync switch must FIRST be placed in the "Tie A3/B3" position to allow the operator to control governor speed while syncing (closing the 3-2 tie breaker) the EDG with offsite power. The sync plug must remain in the Tie A3/B3 position until the EDG output breaker is opened to prevent isochronus operation of the EDG. The synchscope will be rotating in the slow (CCW) direction for this evolution since the EDG is powering the bus. It would be rotating in the other direction (fast – CW) if the bus was powered from offsite and it was desired to synch the EDG to it.

A. Incorrect. This direction is correct for synching a running EDG to a bus powered from offsite

B. Incorrect. Part 2 is plausible in that it is the First required step in restoring offsite power however it does not affect the non-emergency EDG trips.

C. Correct. This direction is correct for synching an EDG that is powering a bus to an offsite power source.

D. Incorrect. This direction is correct for synching a running EDG to a bus powered from offsite. See "B" Part 2.

Technical Reference(s): 2-AOP-47.01A "Loss of a Safety Related AC bus" (Attach if not previously provided)

0711501 Emergency Diesel Generator

Proposed references to be provided to applicants during examination: N/A

Learning Objective: 0702501-09.c, 14g & h (As available)

Question Source: Bank #

Modified Bank # (Note changes or attach parent)

New X

Question History: Last NRC Exam

Question Cognitive Level: Memory or Fundamental Knowledge X

Comprehension or Analysis

10 CFR Part 55 Content: 55.41 5

55.43

Comments:

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	2	
	Group #	1	
	K/A #	062K4.03	
	Importance Rating	2.8	3.1

AC Electrical Distribution. Knowledge of ac distribution system design feature(s) and/or interlock(s) which provide for the following: Interlocks between automatic bus transfer and breakers

Proposed Question: RO 47

Given the following:

- Unit 1 is at 100%
- An automatic reactor trip occurs

Which ONE of the following completes the following:

The __(1)___ signal DIRECTLY generates the __(2)__ bus automatic transfer from the auxiliary transformers to the Start-up transformers.

A. 1) TDM-1 and TDM-2
2) Live

B. 1) TDM-1 and TDM-2
2) Dead

C. 1) Generator Lockout
2) Live

D. 1) Generator Lockout
2) Dead

Proposed Answer: D

Explanation (Optional): The Generator primary lockout is an interlock associated with the automatic bus transfer from the Aux Transformers to the Startup Transformers on a Rx/Turbine trip. The turbine trip (caused by TDM-1 &2) trips the turbine and causes a Generator Lockout. It is the generator lockout signal that directly generates the fast – dead bus transfer. The type of transfer is "DEAD BUS' transfer because on generator lockout, the Aux Transformer breakers open causing a dead bus momentarily and if the Startup Transformer breaker doesn't close in.17 seconds, the Startup breakers are locked out and the bus remains de-energized.

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

Technical Reference(s): 0711307, Main Generator. (Attach if not previously provided)
0711409, DEH

Proposed references to be provided to applicants during examination: N/A

Learning Objective: 0702307-13.c (As available)

Question Source: Bank #
Modified Bank # (Note changes or attach parent)
New X

Question History: Last NRC Exam

Question Cognitive Level: Memory or Fundamental Knowledge X
Comprehension or Analysis

10 CFR Part 55 Content: 55.41 7
55.43

Comments:

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	2	
	Group #	1	
	K/A #	063A3.01	
	Importance Rating	2.7	3.1

Ability to monitor automatic operation of the DC electrical system, including: Meters, annunciators, dials, recorders, and indicating lights

Proposed Question: RO 48

Given the following conditions on Unit 1:

- Unit 1 is at 100%.
- The 1AA Battery Charger is out of service.
- Annunciator B-20, "125V DC Bus/ 1A Batt Chgr/ Batt Rm Fan Trouble" has just alarmed.
- The SNPO has been dispatched to verify the status of the 1A battery charger.

Which ONE of the following describes an indication, FROM THE CONTROL ROOM, that can be used to determine if the 1A vital DC bus is powered from the Battery ONLY?

A. ONLY the 1A DC Bus voltmeter on RTGB 101 indicates 130VDC slowly lowering.

B. ONLY the 1A DC Bus ammeter on RTGB 101 indicates a discharge rate.

C. Both an ammeter on RTGB 101 indicates a discharge rate AND the voltmeter on RTGB 101 indicates 130VDC slowly lowering.

D. A white light above the 1A DC Bus voltmeter on RTGB 101 is lit signifying potential is being supplied from a battery charger.

Proposed Answer: A

Explanation (Optional):

A. Correct. If the 1A Batt Chgr was carrying the bus, voltage would remain constant at approximately 132V.
B. Incorrect. No ammeter exists on Unit 1. Correct for Unit 2.
C. Incorrect. No ammeter exists on Unit 1. Correct for Unit 2.
D. Incorrect. Plausible if candidate thinks that the light is potential supplied ONLY from the battery charger. This is a DC Bus potential light.

Technical Reference(s): 1-ARP-01-B20 (Attach if not previously provided)

1-AOP-50.08 Loss of 125VDC Battery Charger

Proposed references to be provided to applicants during examination: N/A

Learning Objective: 0702503-03.c & 4 (As available)

Question Source: Bank #

Modified Bank # (Note changes or attach parent)

New X

Question History: Last NRC Exam

Question Cognitive Level: Memory or Fundamental Knowledge X

Comprehension or Analysis

10 CFR Part 55 Content: 55.41 7

55.43

Comments:

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	2	
	Group #	1	
	K/A #	064K6.07	
	Importance Rating	2.7	2.9

Emergency Diesel Generators. Knowledge of the effect of a loss or malfunction of the following will have on the ED/G system: Air receivers

Proposed Question: RO 49

The Unit 2 SNPO has reported the following local alarm on the 2A Emergency Diesel Generator (EDG)

STARTING AIR PRESS LOW 5-1

A relief valve failed open and reseated on the two Air Receiver Tanks with the following pressures being reported:

- 2A1: **45 psig**, 2A2: **50 psig**, 2A3: **152 psig**, 2A4: **155 psig**.

Which ONE of the following describes the effect of this condition on the 2A EDG OPERABILITY AND if a start signal occurs prior to any operator action?

A. INOPERABLE; 2A EDG would start.

B. OPERABLE; 2A EDG would NOT start.

C. OPERABLE; 2A EDG would start.

D. INOPERABLE; 2A EDG would NOT start.
.

Proposed Answer: C

Explanation (Optional): The Air Start system is redundant; only two receivers are required to start a cold EDG at least 5 times. Minimum Operability requirements are at least ONE of the FOUR Air Receiver tanks above 129 psig. There are a total of 4 air start motors but only two are required for a start. 85 psig is the minimum air pressure assumed to successfully start an EDG and is a design sizing criteria.

A. Incorrect. See explanation
B. Incorrect. See explanation. Plausible if applicant believes air pressure is not part of the operability specification for the emergency diesel generator.
C. Correct. See explanation
D. Incorrect. See explanation

Technical Reference(s): 2-ARP-06-A(5-1) (Attach if not previously provided)
2-OSP-59.01A 2A EDG Monthly Surveillance. 0711501, EDG

Proposed references to be provided to applicants during examination: N/A

Learning Objective: 0702501-15 (As available)

Question Source: Bank #
Modified Bank # (Note changes or attach parent)
New X

Question History: Last NRC Exam

Question Cognitive Level: Memory or Fundamental Knowledge
Comprehension or Analysis X

10 CFR Part 55 Content: 55.41 7
55.43

Comments:

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	2	
	Group #	1	
	K/A #	064K6.08	
	Importance Rating	3.2	3.3

Emergency Diesel Generator: Knowledge of the effect of a loss or malfunction of the following will have on the ED/G system: Fuel oil storage tanks.

Proposed Question: RO 50

Given the following:

- Unit 1 is at 100% power.
- The SNPO reports that the 1A Diesel Fuel Oil Transfer (DFOT) pump has tripped.
- The Diesel Oil Storage Tanks (DOST) are above the Technical Specification minimum levels.

Which ONE of the following states the impact on Tech Spec (TS) Limiting Condition (LCO) for Operation 3.8.1.1, “Electrical Power Systems - AC Sources”, AND if a Loss of Offsite Power were to occur, what would be the expected result?
(Assume no operator action)

TS LCO 3.8.1.1 is:

A. MET; The 1A EDG would run for ~47 minutes before running out of fuel

B. MET; The 1A EDG would run with make-up via gravity feed when Day Tank level dropped below the low level set point

C. NOT MET; The 1A EDG would run for ~47 minutes before running out of fuel

D. NOT MET; The 1A EDG would run with make-up via gravity feed when Day Tank level dropped below the low level set point

Proposed Answer: D

Explanation (Optional): To clarify, the DFO transfer pumps take a suction from the DFOSTs to transfer fuel oil to the EDGs via the Day Tanks. IAW 1-NOP-59.02A and Tech Specs, BOTH DFO transfer pumps are part of the EDG LCO (above the LCO line) so if it has tripped, the crew must enter the LCO TSAS. There are also cross connect capabilities so either the DFOSTs can be used to supply an EDG. Unit 1 also has a common fill line to both Day Tanks. On Unit 2, they are separate to each Day Tank. If the EDGs receive a start signal, fuel oil from the DFO Storage Tanks on Unit 1 will gravity feed when the day tanks go below the high level set point. While gravity feeding, if the Day Tanks reach the low level set point, the DFO transfer pumps are designed to auto start (if available). Unit 2 transfer system normally uses ONLY the auto DFOT pump start to fill the Day Tanks.

A. Incorrect. See explanation. Part 2 is correct for Unit 2 EDG Day Tanks (Assume tanks can't be re-filled during operation and EDG is fully loaded). IAW the EDG system text, on Unit 1, the EDG would run for ~32 minutes before the start of the DFOT pump is required. Unit 2s EDG would run for~47 minutes per the system text. The applicant determines 47 minutes satisfies the emergency diesel generators mission time.

B. Incorrect. See explanation

C. Incorrect. See explanation. Part 2 is correct for Unit 2 EDG Day Tanks (Assume tanks can't be re-filled during operation and EDG is fully loaded). See "A" also.

D. Correct. See explanation. Candidate must recall that the DFO Transfer pumps are part of the EDG LCO.

Technical Reference(s): 0711501, EDG (Attach if not previously provided)
1-NOP-59.02A

Proposed references to be provided to applicants during examination: N/A

Learning Objective: 0702501-11e (As available)

Question Source: Bank # ____
Modified Bank # ____ (Note changes or attach parent)
New X

Question History: Last NRC Exam ____

Question Cognitive Level: Memory or Fundamental Knowledge X
Comprehension or Analysis ____

10 CFR Part 55 Content: 55.41 7
55.43 ____

Comments:

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	2	
	Group #	1	
	K/A #	073A1.01	
	Importance Rating	3.2	3.5

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

Proposed Question: RO 51

Given the following on Unit 1:

- Unit 1 is at 100% power
- Unit 2 is at 100% power
- The Unit 1 in-service waste gas decay tank has ruptured with a gas release in progress

For the given conditions, complete the following statement:

A MINIMUM of___(1)_____ control room outside air intake rad monitor(s) in high alarm, causes ___(2)_____ control room(s) to go into recirc mode?

A. 1) One
2) only the Unit 1

B. 1) Two
2) only the Unit 1

C. 1) One
2) both Unit 1 and Unit 2

D. 1) Two
2) both Unit 1 and Unit 2

Proposed Answer: A

Explanation (Optional): The KA is met since the CROAI system uses process rad monitors that automatically places the control room on recirc and isolates outside air intake to the control room on high radiation level. This maintains the control room inhabitable during accident conditions such as high radiation levels in the plant.

A. Correct. The recorc actuation logic is 1 out of any 4 detectors in high alarm. With no CIAS present only the control room outside air intake rad monitor in alarm is affected.
B. Incorrect. Two is plausible because most actuation logic coincidence is 2 out of 4. Part 2 correct.
C. Incorrect. Part one correct. Part 2 incorrect. Part 2 is plausible because if a CIAS is present on either unit, Both control rooms go to recirc mode.
D. Incorrect. Two is plausible because most actuation logic coincidence is 2 out of 4. Part 2 is plausible because if a CIAS is present on either unit, Both control rooms go to recirc mode.

Technical Reference(s): 1-NOP-06.01 (Attach if not previously provided)
0511018, 0711410 RMS, ARP N-37

Proposed references to be provided to applicants during examination: N/A

Learning Objective: 0702410-5 (As available)

Question Source: Bank # ____
Modified Bank # ____ (Note changes or attach parent)
New X

Question History: Last NRC Exam ____

Question Cognitive Level: Memory or Fundamental Knowledge X
Comprehension or Analysis ____

10 CFR Part 55 Content: 55.41 5
55.43 ____

Comments:

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	2	
	Group #	1	
	K/A #	076K1.07	
	Importance Rating	2.5	2.3

Service Water. Knowledge of the physical connections and/or cause- effect relationships between the SWS and the following systems: Secondary closed cooling water.

Proposed Question: RO 52

Which ONE of the following describes the function of the 1A & 1B Turbine Cooling Water Heat Exchanger Outlet Valves (TCV-13-2A & 2B) AND Intake Cooling Water “A” & “B” Train to Turbine Cooling Water Hxs Valves (MV-21-2 & 3)?

TCV-13-2A & 2B controls __(1)__flow through the Turbine Cooling Water heat exchanger.

MV-21-2 & 3 close, to isolate TCW, on receipt of an SIAS signal to __(2)__ .

A. 1) Intake Cooling Water
   2) provide backpressure for Intake Cooling Water pumps to prevent run-out flow during accident conditions

B. 1) Turbine Cooling Water
   2) provide backpressure for Intake Cooling Water pumps to prevent run-out flow during accident conditions

C. 1) Turbine Cooling Water
   2) ensure sufficient cooling flow is available to the Component Cooling Water Heat Exchangers

D. 1) Intake Cooling Water
   2) ensure sufficient cooling flow is available to the Component Cooling Water Heat Exchangers

Proposed Answer: D

Explanation (Optional): The KA is met due to TCW being a secondary closed cooling water system that interfaces with nuclear service water (@ PSL this is ICW) in the TCW Heat Exchangers. The TCW Hx outlet (ICW) TCV’s use TCW temperature to control ICW flow through the HX.

A. Incorrect. Part 1 correct. Part 2 is plausible in that there is a component (ICW restriction orifice SO-21-1A & B) in the ICW line that has a design function of providing back pressure for ICW pumps to prevent run-out flow.
B. Incorrect. Controls ICW flow, not TCW flow. See “A” explanation for part 2.
C. Incorrect. Controls ICW flow, not TCW flow. Part 2 correct.
D. Correct.

Technical Reference(s): 0711313, ICW (Attach if not previously provided)
Design Base document for ICW

Proposed references to be provided to applicants during examination: N/A

Learning Objective: 0702313-3, 4 & 17 (As available)

Question Source: Bank # ______
Modified Bank # ______ (Note changes or attach parent)
New X

Question History: Last NRC Exam ______

Question Cognitive Level: Memory or Fundamental Knowledge X
Comprehension or Analysis ______

10 CFR Part 55 Content: 55.41 2 - 9
55.43 ______

Comments:

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	2	
	Group #	1	
	K/A #	078A4.01	
	Importance Rating	3.1	3.1

Instrument Air System. Ability to manually operate and/or monitor in the control room: Pressure gauges

Proposed Question: RO 53

Given the following:

Unit 1 is at 100% power.
The following indications are received:

INSTR AIR PRESS HIGH/LOW F-5	INSTR AIR COMPR AUTO START F-21

- Instrument Air Pressure indication on RTGB 102, PI-18-9, indicates 97 psig, lowering slowly.

The NPO reports that the1C and 1D Instrument Air Compressors are running.

IAW 1-AOP-18-.01"Instrument Air Malfunction":

If Instrument Air header pressure continues to lower; the unit to unit cross-tie from Unit 2 would open at __(1)__.

If Instrument Air header pressure continued to degrade, the crew should evaluate the need to perform a controlled shutdown when Instrument Air header pressure reaches a MINIMUM of __(2)__?

A. 1) 95 psig
   2) 75 psig

B. 1) 85 psig
   2) 75 psig

C. 1) 95 psig
   2) 60 psig

D. 1) 85 psig
   2) 60 psig

Proposed Answer: B

Explanation (Optional): The KA is met since the unit to unit cross-ties valves utilize PICs to develop open and close signals for the valves. The control room alarms provide concurren indications along with PI-18-9 on RTGB 102 of auto actions that are occurring for the given conditions in the IA systemThe Unit IA cross-tie valve opens at 85 psig (lowering) on the unaffected unit and closes at 95 psig (rising) on the affected unit. The guidance to trip the reactor applies when IA pressure on the affected unit goes below 60 psig. Below 75 psig, the contingency action from 1-AOP-18-.01 is to evaluate the need to shutdown (Via RDP AOP)

A. Incorrect. Trip reactor below 60 psig. IOA from 1-AOP-18.01.
B. Correct. See explanation
C. Incorrect. Trip reactor below 60 psig. IOA from 1-AOP-18.01
D. Incorrect. Part 1 incorrect. Below 75 psig, the contingency action from 1-AOP-18-.01 is to evaluate the need to shutdown (Via RDP AOP).

Technical Reference(s): 1-AOP-18.01, Instrument Air Malfunction (Attach if not previously provided)
1-ARP-01-F

Proposed references to be provided to applicants during examination: N/A

Learning Objective: 0702313-17 (As available)

Question Source: Bank #
Modified Bank # 4391 (Note changes or attach parent)
New

Question History: Last NRC Exam

Question Cognitive Level: Memory or Fundamental Knowledge X
Comprehension or Analysis

10 CFR Part 55 Content: 55.41 7
55.43

Comments:

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	2	
	Group #	1	
	K/A #	078G2.4.8	
	Importance Rating	3.8	4.5

Instrument air system, Knowledge of how abnormal operating procedures are used in conjunction with EOPs.

Proposed Question: RO 54

Given the following conditions on Unit 1:

- A loss of offsite power has occurred on Unit 1.
- The crew is performing actions of 1-EOP-09, LOOP/LOFC
- The SM directs the crew to perform a controlled cooldown to 350°F in accordance with 1-AOP-01.13, “Natural Circulation Cooldown”.

Which ONE of the following local (field) operator actions must be completed to DIRECTLY support the cooldown from the CONTROL ROOM?

A. Reset Non-Essential Load Breakers IAW 1-EOP-99, Appendix P, “Restoration of Components Actuated by ESFAS”.

B. Crosstie Unit 1 Condensate Storage Tank with Unit 2 Condensate Storage Tank IAW 1-AOP-09.02, “Auxiliary Feedwater”.

C. Perform 1-EOP-99, Appendix X, “Secondary Plant Post Trip Actions” Section 2.

D. Perform 1-EOP-99, Appendix H, “Operation of the 1A and 1B Instrument Air Compressors.”

Proposed Answer: D

Explanation (Optional): NRC agreed to allow the question to implement EOP-99 appdx H guidance vice Instrument Air AOP. The question states actions required to DIRECTLY support the cooldown. All the selections provide guidance for field actions that are plausible because they could occur but for the given conditions, the only action that Directly supports the cooldown from the control room is Appdx H – restoring instrument air (specifically to the ADV's).

A. Incorrect. Resetting the non-essential load breakers is required to restore letdown. Cooldown can be performed from the Control Room with letdown isolated.

B. Incorrect. Plausible because Unit 2 CST is sized to hold 125,000 for Unit 1 if needed following damage from a tornado (design basis). Unit 1 CST would be made up to FIRSTvia a Fire Pump rather than x-tie CST's.

C Incorrect. Appendix X Section 2 is used to configure secondary side components from the control room, This appdx would be needed more for cooldown if LOOP was not present (Most secondary side equipment is powered from sources not supplied by the EDGs).

D. Correct. On Unit 1 ONLY, ADV's must be LOCALLY operated if IA is not restored. The question asks what would facilitate the cooldown FROM the CONTROL ROOM. Since these valves are air operated, instrument air must be restored to allow control room operation.

Technical Reference(s): 1-EOP-99, LOOP (Attach if not previously provided)
1-AOP-01.13, Natural Circulation Cooldown

Proposed references to be provided to applicants during examination: N/A

Learning Objective: 0702835-14 (As available)

Question Source: Bank # ____
Modified Bank # 4161 (Note changes or attach parent)
New ____

Question History: Last NRC Exam ____

Question Cognitive Level: Memory or Fundamental Knowledge ____
Comprehension or Analysis X

10 CFR Part 55 Content: 55.41 10
55.43 5

Comments: Refer to ES-401-4. See notes for this K/A.

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	2	
	Group #	1	
	K/A #	103A4.06	
	Importance Rating	2.7	2.9

Containment systems Ability to manually operate and/or monitor in the control room: Operation of the containment personnel airlock door

Proposed Question: RO 55

IAW 2 -NOP-68.01, "Containment Building Access Hatches-Operation", interlocks that are installed to prevent both airlock doors from being open at the same time must be functional __(1)__. A control room annunciator alarms to alert the control room operators if __(2)__ door(s) is(are) open .

A. 1) in ALL Modes of operation
   2) EITHER the "inner" OR "outer"

B. 1) in ALL Modes of operation
   2) BOTH the "inner" and "outer"

C. 1) ONLY in Modes 1 thru 4
   2) EITHER the "inner" OR "outer"

D. 1) ONLY in Modes 1 thru 4
   2) BOTH the "inner" and "outer"

Proposed Answer: C

Explanation (Optional): 2-NOP-68.01 states that the interlocks on the personnel air lock doors must be functional in Modes 1-4. They can be disengaged in Modes 5 &6. Annunciators are present for the Units' control room (Unit 2 P-35). The alarm comes of limit switches from both doors so either one open would generate the alarm. It would be plausible for the candidate to think that the alarm comes in only when both doors are open since that would indicate a violation of containment integrity.

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

Technical Reference(s): 2-NOP-68.01 (Attach if not previously provided)

Proposed references to be provided to applicants during examination: ____________

Learning Objective: 0702600-07.b, 12 (As available)

Question Source: Bank # ______
Modified Bank # ______ (Note changes or attach parent)
New X

Question History: Last NRC Exam ______

Question Cognitive Level: Memory or Fundamental Knowledge X
Comprehension or Analysis ______

10 CFR Part 55 Content: 55.41 7
55.43 ______

Comments:

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	2	
	Group #	2	
	K/A #	001K3.02	
	Importance Rating	3.4	3.5

Control Rod Drive: Knowledge of the effect that a loss or malfunction of the CRDS will have on the following: RCS

Proposed Question: RO 56

Given the following on Unit 1:

- A plant start-up is in progress with power stable at 15%.
- The Main Generator is on line.
- CEAs are at 110" on group 7.
- One CEA in group 7 is 3" below the remainder of CEAs.
- The CEDS control is placed in Manual Individual mode to realign the CEA.

- When the RCO initially withdraws the CEA, the CEA moves outward but it continues to WITHDRAW when the control switch is released due to a control switch failure.

As a result, which ONE of the following will occur?
(Assume NO Operator action)

As power rises:

A. BOTH T-ave and T-ref will increase at the same rate and the CEA withdrawal should stop when a group deviation occurs.

B. BOTH T-ave and T-ref will increase at the same rate and the CEA withdrawal should stop when an Automatic CEA Withdrawal Prohibit occurs.

C. ONLY T-ave will increase and the CEA withdrawal should stop when a group deviation occurs.

D. ONLY T-ave will increase and the CEA withdrawal should stop when an Automatic CEA Withdrawal Prohibit occurs.

Proposed Answer: C

Explanation (Optional): The automatic withdrawal and insertion of CEA's is disabled on both Units. PSL doesn't operate CEA's in Auto Sequential mode on either Unit. Inputs to the AWP alarm are Tcold >554°F and T-ave 6.6°F greater than T-ref. The effect that a CEA uncontrollably withdrawing is that RCS temperature ONLY will rise.

A. Incorrect. Changes in Tave will make minor changes in steam pressure which has a minor effect on Tref (Turbine first stage pressure). Part 2 correct.
B. Incorrect. Changes in Tave will make minor changes in steam pressure which has a minor effect on Tref (Turbine first stage pressure). Plausible if candidate thinks that an Automatic Withdrawal Prohibit has occurred due to Tcold >554°F (alarm is still enabled). See explanation.
C. Correct. Changes in Tave will make minor changes in steam pressure which has a minor effect on Tref (Turbine first stage pressure). CEA Motion Inhibit Circuitry stops the withdrawal on group deviation
D. Incorrect. Part 1 correct. Part 2 incorrect. Plausible if candidate thinks that an Automatic Withdrawal Prohibit (due to T-ave 6.6°F greater than T-ref.) has occurred.

Technical Reference(s): 1-AOP-66.01, Dropped or Misaligned CEA Abnormal Ops, 1-ARP-01-K9, K14, K24 (Attach if not previously provided)

0711405, CEDS SD

Proposed references to be provided to applicants during examination: N/A

Learning Objective: 0702405-09 (As available)

Question Source: Bank # 2222

Modified Bank # ______ (Note changes or attach parent)

New ______

Question History: Last NRC Exam ______

Question Cognitive Level: Memory or Fundamental Knowledge ______

Comprehension or Analysis X

10 CFR Part 55 Content: 55.41 7

55.43 ______

Comments:

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	2	
	Group #	2	
	K/A #	017K6.01	
	Importance Rating	2.7	3.0

Incore Temperature Monitor System: Knowledge of the effect that a loss or malfunction of the following ITM system components: Sensors and Detectors

Proposed Question: RO 57

If the external leads of a Core Exit Thermocouple short together, a __(1)___ temperature than actual would be indicated.

In accordance with Ops Policy-503, “Technical Specification Guidance,” a TOTAL of __(2)___ Core Exit Thermocouples per core quadrant is required to be operable for Mode 1 – 3 operation.

A. 1) higher
   2) 4

B. 1) lower
   2) 2

C. 1) lower
   2) 4

D. 1) higher
   2) 2

Proposed Answer: C

Explanation (Optional): TOTAL Required number of operable CET's/quadrant is 4 per channel. 2 is plausible because that is the required MINIMUM number of operable channels of CETs/quadrant. Also 4 detectors are required to be operable for the RVLMS which uses thermocouple detectors also. For a short circuit where the external leads of the CET come together, TC's fail low due to no current flow.

C. Correct. See explanation

Technical Reference(s): PSL OPS 0711602 (Attach if not previously provided)
0711410

Proposed references to be provided to applicants during examination: N/A

Learning Objective: PSL OPS 0702206-17 (As available)
PSL OPS 0702410-5

Question Source: Bank # ____
Modified Bank # ____ (Note changes or attach parent)
New X

Question History: Last NRC Exam ____

Question Cognitive Level: Memory or Fundamental Knowledge X
Comprehension or Analysis ____

10 CFR Part 55 Content: 55.41 7
55.43 ____

Comments:

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	2	
	Group #	2	
	K/A #	029A2.03	
	Importance Rating	2.7	3.1

Containment Purge system. Ability to (a) predict the impacts of the following malfunctions or operations on the Containment Purge System; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations:

Proposed Question: RO 58

Given the following conditions on Unit 2:

- The plant is currently in Mode 3
- Radiation Protection has requested that a containment purge be performed to reduce particulate activity in Containment.

Which ONE of the following describes the required method of purging the Containment atmosphere under these conditions?

Operation of:

A. HVE-1&2, airborne radioactivity removal system IAW 2-NOP-25.05, "Containment Ventilation Systems".

B. HVE-7A/B through the Continuous Purge (mini-purge) mode filter train IAW 2-NOP-25.02, "Continuous Containment / Hydrogen Purge System Operation".

C. HVE-7A/B through the Shield Building Ventilation filter train IAW 2-EOP-99, Appendix N ""Hydrogen Purge Operation".

D. HVE-8A/B through the normal Containment Purge (main-purge) System filter train IAW 2-NOP-06.20, "Controlled Gaseous Batch Release to Atmosphere".

Proposed Answer: B

Explanation (Optional): Discussed this KA with the NRC. The question could be based on the required valve line up to initiate/start a Containment "Mini" Purge for example. This question meets the second part of the KA and addresses the higher cognitive 2nd part (i.e. use the appropriate procedure for the specified condition which is high Containment particulate activity that must be reduced). The impact of the operating condition would be that the high containment particulate activity condition might not be affectively mitigated if an inappropriate containment purge line up or application was used.

A. Incorrect. HVE-1 & 2 are only on Unit 1. The NOP guidance that exists for these fans is **1-NOP-25.05** not 2-NOP-25.01. This system could be used on Unit 1 for the given conditions but the most effective system would be the one described in selection B.
B. Correct. For this mode of operation (non-accident), this would be the correct system to use.
C. Incorrect. This alignment is used for accident conditions (EOP's). The alignment guidance for this filtration path is in 2-EOP-99 Appdx N, "Hydrogen Purge Operation". This system is on Unit 2 only.
D. Incorrect. On Unit 2, can't use this system until Mode 5 to be in compliance with Tech Specs (Cont. Isol.). This system could be used on Unit 1.

Technical Reference(s): 2-NOP-25.02 (Attach if not previously provided)
0702602 Power Point

Proposed references to be provided to applicants during examination: N/A

Learning Objective: 0702602-3, 4 &10 (As available)

Question Source: Bank # ____
Modified Bank # ____ (Note changes or attach parent)
New X

Question History: Last NRC Exam ____

Question Cognitive Level: Memory or Fundamental Knowledge ____
Comprehension or Analysis X

10 CFR Part 55 Content: 55.41 5
55.43 5

Comments: Refer to ES-401-4. K/A was changed.

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	2	
	Group #	2	
	K/A #	028A4.03	
	Importance Rating	3.1	3.3

Hydrogen Recombiner and Purge Control. Ability to manually operate and/or monitor in the control room: Location and operation of hydrogen sampling and analysis of containment atmosphere, including alarms and indications

Proposed Question: RO 59

Given the following on Unit 1:

- A small break LOCA has occurred.
- 1-EOP-03, "LOCA," was entered and the direction to place both Hydrogen Analyzers in service was given.

In accordance with 1-EOP-99, Appendix L, the Hydrogen Analyzers are placed in service at the Hydrogen Analyzer operating station __(1)__.

To align the sampling point for the Hydrogen Analyzer requires manually operating valves __(2)__.

A. 1) on the 43ft elevation in the Reactor Auxiliary Building
2) in BOTH the control room AND locally in the Reactor Auxiliary Building

B. 1) in the control room
2) ONLY in the control room

C. 1) on the 43ft elevation in the Reactor Auxiliary Building
2) ONLY in the control room

D. 1) in the control room
2) in BOTH the control room AND locally in the Reactor Auxiliary Building

Proposed Answer: B

Explanation (Optional): The Hydrogen Analyzer is placed in service to determine H2 levels in containment. IAW EOP-99, Appdx L, the Hydrogen Analyzer is placed in service at the control panel in the control room. The actual Hydrogen Analyzer Cabinet is located in cubicles in the RAB on the 43ft elev. All Hydrogen sampling alignments are made at the control panel in the control room however it is plausible that field actions are required if the applicant confuses aligning the Hydrogen Analyzer sample points with placing the Hydrogen Purge system in service (Field actions are required on Unit 1 for placing the Hydrogen Purge system in operation). Also, if he associates sample point alignments being made in the field to the Hydrogen Analyzer in the RAB that would be made upon Chemistry request.
A. Incorrect. See explanation.
B. Correct. See explanation.
C. Incorrect. See explanation.
D. Incorrect. See explanation.

Technical Reference(s): 1-EOP-99, Appdx L (Attach if not previously provided)

Proposed references to be provided to applicants during examination: N/A

Learning Objective: 0702602-3 & 9 (As available)

Question Source: Bank #
Modified Bank # (Note changes or attach parent)
New X

Question History: Last NRC Exam

Question Cognitive Level: Memory or Fundamental Knowledge
Comprehension or Analysis X

10 CFR Part 55 Content: 55.41 7
55.43

Comments:

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	2	
	Group #	2	
	K/A #	034A3.01	
	Importance Rating	2.5	3.1

Fuel Handling Equipment. Ability to monitor automatic operation of the Fuel Handling System, including: travel limits

Proposed Question: RO 60

Which ONE of the following would be expected while operating the Refueling Machine (RFM) during a core onload?

A. A Bridge and Trolley lockout interlock is present any time the RFM Hoist is being lowered or raised, while on index at a core location, to prevent RFM movement.

B. If fuel movement had to be suspended, the RFM operator should ensure that the fuel transfer carriage is placed in its stored position on the Spent Fuel Pool side.

C. When lowering the RFM Hoist over the core with a fuel assembly grappled on, hoist motion is automatically stopped when the Lower Grapple operate zone is reached.

D. Operation with the “Programmable Logic Controller (PLC)” switch in the “OVRD” position is permitted to trouble shoot an OVERLOAD condition on a fuel assembly that is being raised out of the core.

Proposed Answer: A

Explanation (Optional): The Bridge/Trolley interlock prevents horizontal motion in any direction of the RFM when the hoist is in motion

A. Correct. This is an accurate statement concerning a RFM travel interlock. See explanation
B. Incorrect. When fuel is not being moved, the preferred location for the transfer carriage is on the containment side in case V4111 needs to be closed for containment isolation. Due to the operational design of the transfer carriage, V4111 (fuel transfer canal penetration isolation valve) can't be physically closed with the transfer carriage on the spent fuel side due to the transfer carriage cable obstructing the refueling canal penetration.
C. Incorrect. For the given conditions, Hoist Motion is not stopped when the LGOZ is entered. The LGOZ is an identified hoist elevation which is just above (8") the Fuel Hoist Down Limit which is the lowest point that the hoist will travel.
D. Incorrect. Operation with the PLC switch in OVRD bypasses all interlocks. It is intended for emergency use ONLY to allow a fuel assembly to be placed in a safe condition. This is plausible because there is procedural guidance in the RFM NOP (1-NOP-67.04) on trouble shooting an overload condition but overriding the PLC is not part of that guidance.

Technical Reference(s): 1-NOP-67.04 RFM Ops (Attach if not previously provided)
0702211-Fuel Handling Power Point

Proposed references to be provided to applicants during examination: N/A

Learning Objective: 0702211-04,06&13 (As available)

Question Source: Bank # ______
Modified Bank # ______ (Note changes or attach parent)
New X

Question History: Last NRC Exam ______

Question Cognitive Level: Memory or Fundamental Knowledge X
Comprehension or Analysis ______

10 CFR Part 55 Content: 55.41 7
55.43 ______

Comments: Refer to ES-401-4. See notes for this K/A.

.

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	2	
	Group #	2	
	K/A #	035K1.12	
	Importance Rating	3.7	3.9

Steam Generators. Knowledge of the physical connections and/or cause-effect relationships between the S/GS and the following systems: RPS

Proposed Question: RO 61

Given the following conditions on Unit 1:

- The Unit is in Mode 3.
- Control Element Assembly testing is planned.

Which ONE of the following Reactor Protection System RPS trips is **NOT** bypassed during this testing?

A. Low Steam Generator Level

B. Thermal Margin / Low Pressure

C. Low Steam Generator Pressure

D. Low Reactor Coolant System Flow

Proposed Answer: A

Explanation (Optional): The question is asking for specific bypasses other than the trip unit bistable bypasses. ZPMB is auto removed if power goes higher than 1%.

A. Correct. There are no automatic SG Level bypasses

B. Incorrect. ZPMB would be in effect.

C. Incorrect. Low SG pressure trip bypass would be in effect (actual SG pressure < 700psia).

D. Incorrect. ZPMB would be in effect.

Technical Reference(s): 0711404 RPS (Attach if not previously provided)

Proposed references to be provided to applicants during examination: N/A

Learning Objective: 0702404-04 (As available)

Question Source: Bank # 510

Modified Bank # (Note changes or attach parent)

New

Question History: Last NRC Exam

Question Cognitive Level: Memory or Fundamental Knowledge X

Comprehension or Analysis

10 CFR Part 55 Content: 55.41 2-9

55.43

Comments:

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	2	
	Group #	2	
	K/A #	041K5.01	
	Importance Rating	2.9	3.2

Steam Dump/Turbine Bypass Control. Knowledge of the operational implications of the following concepts as they apply to the SDS: Relationship of no-load T-ave. to saturation pressure relief setting on valves
.

Proposed Question: RO 62

Given the following Unit 1:

- Unit 1 is at 12% power with Tavg at 535°F and Steam Generator pressure at 900 psia.
- The Main Generator has just been synchronized to the grid.
- The Main Generator picked up 40 MWe and then TRIPPED 5 seconds later.

Which ONE of the following states the expected plant response?

A. Reactor power indicates 12% with Steam Bypass Control System valves opening to control steam generator pressure at 940 psia for 4 minutes then ramp to 900 psia over the next 5 minutes.

B. Reactor power indicates 12% with Steam Bypass Control System valves opening to control steam generator pressure at 900 psia ONLY.

C. Reactor trips with SBCS closing to control steam generator pressure at 940 psia for 4 minutes then ramp to 900 psia over the next 5 minutes.

D. Reactor trips with both Atmospheric Dump Valves opening to control steam generator pressure at 900 psia.

Proposed Answer: B

Explanation (Optional): With the Main Generator on line for 5 seconds, that would give SBCS valves time to close in response so after the turbine ONLY trips, SBCS valves must re-open to control SG pressure at no load conditions.

A. Incorrect. This would be the SBCS valve response for the Tavg modulate mode (Tavg >555°F with a Rx trip).
B. Correct. SBCS is in pressure modulate mode due to Tavg < 555°F with NO Rx trip (TCB's open). In the pressure modulate mode, SBCS valves control ONLY at 900 psia.
C. Incorrect. With power < 15%, ONLY the turbine trips (loss of load Rx trip enabled >15%). See explanation. SCBS valves would be opening.
D. Incorrect. ADV's are used for power level between 5-8% not 12%.

Technical Reference(s): 0711406 SBCS (Attach if not previously provided)

Proposed references to be provided to applicants during examination: N/A

Learning Objective: 0702406-07.c (As available)

Question Source: Bank # ______

Modified Bank # ______ (Note changes or attach parent)

New X

Question History: Last NRC Exam Significantly modified Q60 HLC 21 NRC

Question Cognitive Level: Memory or Fundamental Knowledge ______

Comprehension or Analysis X

10 CFR Part 55 Content: 55.41 5

55.43 ______

Comments:

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	2	
	Group #	2	
	K/A #	071K4.06	
	Importance Rating	2.7	3.5

Waste Gas Disposal. Knowledge of design feature(s) and/or interlock(s) which provide for the following: Sampling and monitoring of waste gas release tanks.

Proposed Question: RO 63

Given the following conditions on Unit 2:

- Annunciator N-34 “Gas Analyzer Trouble” is in alarm
- The gas analyzer local panel oxygen monitor and Chemistry samples on the in-service gas decay tank indicate 2.2%

Which ONE of the following actions should be taken?

Suspend all additions of waste gases and _______.

A. ensure the Gas Surge header inlet to the Gas SURGE Tank “auto” closes and the nitrogen purge supply to the Gas SURGE Tank “auto” opens

B. manually align nitrogen to the Gas SURGE Tank

C. ensure the Gas Surge header inlet to the Gas DECAY Tank “auto” closes and the nitrogen purge supply to the Gas DECAY Tank “auto” opens

D. manually align nitrogen to the in-service Gas DECAY Tank

Proposed Answer: A

Explanation (Optional): The KA is met. There are no special design features or interlocks for high O2 levels in the gas decay tanks on Unit 1 ONLY on Unit 2.

A. Correct. This is the unit 2 design feature.
B. Incorrect. Per 1-AOP-06.03, nitrogen is not locally added to the Gas Surge Tank.
C. Incorrect. Plausible. Partially correct from the unit 2 design feature in that the gas surge header is isolated but N2 is sent to the gas surge tank not the gas decay tank.
D. Incorrect. This is what would be done on Unit 1 (all manual actions). The intent of the action is to locally add nitrogen to the gas decay tank to lower the O2 concentration below the explosive limit of 2%. Refer to TS 3.11.2.5 LCO action

Technical Reference(s): 2-AOP-06.03 Waste Gas System (Attach if not previously provided)
2-NOP-06.23 Auto Gas Analyzer Operation

Proposed references to be provided to applicants during examination: N/A

Learning Objective: 0702861-03 (As available)

Question Source: Bank # ____
Modified Bank # 4203 (Note changes or attach parent)
New ____

Question History: Last NRC Exam ____

Question Cognitive Level: Memory or Fundamental Knowledge X
Comprehension or Analysis ____

10 CFR Part 55 Content: 55.41 7
55.43 ____

Comments:

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	2	
	Group #	2	
	K/A #	072A1.01	
	Importance Rating	3.4	3.6

Area Radiation Monitoring. Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating the ARM system controls including: Radiation Levels

Proposed Question: RO 64

Given the following conditions on Unit 2:

TIME

- 1200: The unit had to be manually tripped due to a severe DEH leak on Governor Valve #1
- 1202: A 350 gpm tube rupture developed in the 2A Steam Generator (SG).
- 1205: SIAS & CIAS actuations occurred on low Reactor Coolant System (RCS) pressure.
- 1210: 2-EOP-01, “SPTA’s” are in progress and the crew has just begun to evaluate the Containment Conditions safety function.

Which ONE of the following rad monitor “alarms” and “trend” indications would be AVAILABLE AT THIS TIME to determine the status of the Containment Conditions safety function (Secondary Activity)?

(ASSUME NO OPERATOR ACTIONS HAVE BEEN TAKEN and no other complications exist post trip)

A. Main Steam Line Rad Monitor AND SG Blowdown Rad Monitor

B. Steam Jet Air Ejector AND SG Blowdown Rad Monitor

C. ONLY Main Steam Line Rad Monitor

D. ONLY Steam Jet Air Ejector

Proposed Answer: D

Explanation (Optional):The KA is met because the question requires knowledge of the MSLRM operating characteristics, i.e. the MSLRM is an area rad monitor that detects secondary activity (N-16 gammas) only when the Rx is NOT shutdown.

A. There was not enough time (3 minutes) for any activity to be detected by the SG BD rad monitors prior to CIS. Post CIS, all SG Blowdown flow is isolated so the SG BD rad monitors have no flow to the detectors.

B. Incorrect. CIS has isolated the SGBD sample lines and Appdx A (override CIS close signal to the SGBD sample valves) is not procedurally performed until EOP-04 is entered.

C. Incorrect. The SGTR developed AFTER the reactor was shutdown so no N-16 gammas are present to be detected by the MSLRM.

D. Correct. MSIV's should still be open with no reason present to close them. It is desirable to maintain SBCS in service with a SGTR present.

Technical Reference(s): 2-EOP-01 (Attach if not previously provided)
0711410 Rad Monitors

Proposed references to be provided to applicants during examination: N/A

Learning Objective: 0702861-03 (As available)

Question Source: Bank # _____
Modified Bank # _____ (Note changes or attach parent)
New X

Question History: Last NRC Exam _____

Question Cognitive Level: Memory or Fundamental Knowledge _____
Comprehension or Analysis X

10 CFR Part 55 Content: 55.41 5
55.43 _____

Comments:

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	2	
	Group #	2	
	K/A #	075K2.03	
	Importance Rating	2.6	2.7

Circulating Water. Knowledge of bus power supplies to the following: Emergency/essential SWS pumps

Proposed Question: RO 65

Unit 1 is at 100% power, steady state.

- An Equipment Clearance order is being executed to remove 1B Intake Cooling Water (ICW) pump from service for a motor inspection.
- It is desired to align 1C ICW pump to replace the 1B ICW pump.
- The operating crew is addressing a prerequisite in 1-NOP-21.03C, “1C Intake Cooling Water Operation,” which states to ensure the 1C ICW pump is aligned per 1-NOP-52.02, “Alignment of 1AB Busses and Components.”

Which ONE of the following describes the electrical alignment that will be performed for the 1C ICW pump to take the place of the 1B ICW pump for the given plant conditions?

A. ONLY the “1AB” 4.16 KV bus aligned to the “B” 4.16 KV side.

B. ONLY the “1AB” 4.16 KV AND “1AB” DC bus aligned to the “B” 4.16 KV and “B” DC side.

C. The “1AB” 4.16 KV bus, “1AB” 480 V bus AND the “1AB” DC bus aligned to the “B” side.

D. The “1AB” 4.16 KV bus aligned to the “B” 4.16 KV side and the “1AB” 480 V bus and the “1AB” DC bus aligned to either the “B” side OR the “A” side.

Proposed Answer: C

Explanation (Optional):

A. Incorrect. Must align 480 V AND DC to B side bus to meet T.S. LCO
B. Incorrect. Must align 480 V AND DC to B side bus to meet T.S. LCO
C. Correct.
D. Incorrect. 480 V and DC MUST be to B side. Cannot be to the "A" train.

Technical Reference(s): 1-NOP-52.02, Alignment of 2AB Busses and Components. (Attach if not previously provided)
0711313 ICW

Proposed references to be provided to applicants during examination: N/A

Learning Objective: 0702313-11 (As available)

Question Source: Bank # 4189
Modified Bank # (Note changes or attach parent)
New

Question History: Last NRC Exam HLC21 NRC Q64

Question Cognitive Level: Memory or Fundamental Knowledge X
Comprehension or Analysis

10 CFR Part 55 Content: 55.41 7
55.43

Comments: This is question 4 of 4 allowed to be repeated from last two NRC exams. Refer to ES-401-4. See notes for this K/A.

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	3	
	Group #	1	
	K/A #	G2.1.42	
	Importance Rating	2.5	3.4

Conduct of Operations. Knowledge of new and spent fuel movement procedures.

Proposed Question: RO 66

Given the following on Unit 2:

- A Core Reload is in progress.
- Both BF_3 Log Startup Channels are in service with the “B” Channel selected for audible count rate monitoring (control room and containment).
- While Reactor Engineering was monitoring the indicated count rates for a 1/M plot, it was determined that the “B” Log Startup Channel had failed low.

IAW 0-NOP-67.05, “Refueling Operation”, which ONE of following describes the impact on the fuel movement?

A. With the “B” Log Startup Channel inoperable, the core reload MUST STOP until it is returned to service.

B. With the “A” Log Startup Channel operable, the core reload can continue as long as audible is selected for that channel.

C. The core reload can continue by substituting a Wide Range Log Safety Channel and selecting the audible count rate to that channel.

D. The core reload can continue by substituting an Appendix R Wide Range (Excore) and selecting the audible count rate to channel “A”.

Proposed Answer: D

Explanation (Optional): For Unit 2 ONLY, if one of the two Startup channels is out of service, an Appendix R channel can be used in lieu of the Startup Channel

A. Incorrect. See explanation.

B. Incorrect. See explanation.

C. Incorrect. This would be correct on Unit 1.

D. Correct. See explanation

Technical Reference(s): 0-NOP-67.05, Refueling Ops (Attach if not previously provided)

Proposed references to be provided to applicants during examination: N/A

Learning Objective: 0702211-10 (As available)

Question Source: Bank #

Modified Bank # (Note changes or attach parent)

New X

Question History: Last NRC Exam

Question Cognitive Level: Memory or Fundamental Knowledge X

Comprehension or Analysis

10 CFR Part 55 Content: 55.41 10

55.43 7

Comments:

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	3	
	Group #	1	
	K/A #	G2.1.45	
	Importance Rating	4.3	4.3

Conduct of Operation. Ability to identify and interpret diverse indications to validate the response of another indication.

Proposed Question: RO 67

Unit 1 was operating at 100% when the following annunciator alarmed due to a loss of power to the MA Instrument Inverter:

120V AC INSTR
BUS MA
INVERTER
TROUBLE
B43

Which ONE of the following Control Room alarms would **NOT** be expected to annunciate for this event?

A. Q-19 1B S/G PRESS MSIS CHANNEL TRIP

B. Q-16 CNTMT RAD HIGH CIS CHANNEL TRIP

C. R-10 ENGINEERED SAFEGUARDS ATI FAULT

D. R-11 CNTMT PRESS HIGH CSAS CHANNEL TRIP

Proposed Answer: D

Explanation (Optional): This alarm comes in when the MA Instrument Inverter has a loss of power.

A. Incorrect. Expected alarm since MSIS is an ESF that deenergizes to trip so the channel is in a trip condition on loss of power. Student may choose if there is an incorrect association with the loss of A ESF channel and the 1B S/G Press MSIS Channel Trip.

B. Incorrect. Expected alarm since CIS is an ESF that deenergizes to trip so the channel is in a trip condition on loss of power. Student may choose if there is an incorrect association with the loss of the 'A' 120 VAC Instrument Bus and the radiation indication failing low.

C. Incorrect. Expected due to tripping of all the (except RAS & CSAS) A ESFAS channels when ATI circuit runs its tests on the 'A' Channel will see power loss as a test failure and activate the alarm.

D. Correct. Unlike other ESFAS channels like the MSIS and CIS, a CSAS channel trip requires power to energize to trip so this alarm would NOT be expected on a loss of the MA 120 VAC Instrument Bus.

Technical Reference(s): 1-ARP-01-Q 16 & 19, 1-ARP-01-R 10 & 11, 0711401, CWDs 8770 -B - 295, 331 (Attach if not previously provided)

Proposed references to be provided to applicants during examination: N/A

Learning Objective: 0702401-06 & 14 (As available)

Question Source: Bank #

Modified Bank # 3981 (Note changes or attach parent)

New

Question History: Last NRC Exam

Question Cognitive Level: Memory or Fundamental Knowledge

Comprehension or Analysis X

10 CFR Part 55 Content: 55.41 7

55.43 5

Comments:

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	3	
	Group #	2	
	K/A #	G2.2.1	
	Importance Rating	4.5	4.4

Equipment Control. Ability to perform pre-startup procedures for the facility, including operating those controls associated with plant equipment that could affect reactivity.

Proposed Question: RO 68

Given the following on Unit 2:

- Reactor start-up is in progress
- Mode 2 has just been declared

Reactor Engineering predicts that the reactor will become critical approximately 600 pcm earlier than the ECC calculation.

Which ONE of the following describes the correct course of action in accordance with 2-GOP-302, Reactor Plant Startup – Mode 3 to Mode 2?

Stop CEA withdrawal, _________.

A. and immediately initiate emergency boration

B. and ensure CEAs are inserted to a position equivalent to (-) 500 pcm from the apparent critical position

C. maintain the present rod height, and verify that the 1/M predicted rod position is greater than minimum rod height for criticality

D. borate the Reactor Coolant System until criticality is predicted within the proper band. Recalculate the ECC prior to continuing CEA withdrawal

Proposed Answer: B

Explanation (Optional):

A. Incorrect. Plausible This is a required action to take if criticality is achieved PRIOR to the -500 pcm position
B. Correct. This is the required action per 2-GOP-302.
C. Incorrect. Partially correct (stop the CEA withdrawal and notify RE). It's incorrect to leave the CEA's at the present height while verifying calculations
D. Incorrect. Would not borate to ECC target band in the middle of a startup with a reactivity anomaly. Boration/Dilution is performed earlier in the startup process

Technical Reference(s): 2-GOP-302 (Attach if not previously provided)

Proposed references to be provided to applicants during examination: N/A

Learning Objective: 0702801-01 & 06 (As available)

Question Source: Bank # 1744

Modified Bank # (Note changes or attach parent)

New

Question History: Last NRC Exam

Question Cognitive Level: Memory or Fundamental Knowledge

Comprehension or Analysis X

10 CFR Part 55 Content: 55.41 5,10

55.43 5, 6

Comments:

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	3	
	Group #	2	
	K/A #	G2.2.13	
	Importance Rating	4.1	4.3

Equipment Control. Knowledge of tagging and clearance procedures.

Proposed Question: RO 69

Given the following:

- Unit 1 is at 100% power.
- An equipment clearance order (ECO) is being developed for a system with the following parameters: pressure: 100 psia and 130°F.
- Due to an equipment deficiency, only a SINGLE CHECK valve is available as an isolation boundary

In accordance with OP-AA-101-1000, “Clearance and Tagging”, at a minimum, which ONE of the following describes the Energy classification and whose permission is required to allow work with a check valve used as an isolation boundary?

A. High Energy; Joint Safety Committee

B. Low Energy; Joint Safety Committee

C. Low Energy; Shift Manager

D. High Energy; Shift Manager

Proposed Answer: B

Explanation (Optional): IAW the ECO admin, systems that contain fluids, steam etc. in excess of 500 psig or 200°F, are classified as high energy and require double isolation. If a check valve is the only means of boundary isolation, Joint Safety Committee Approval permission is required on the ECO regardless of high or low energy. SM is plausible because for clearances with a high energy system with single valve isolation, he can authorize per the ECO procedure.

A. Incorrect. See Explanation
B. Correct. See Explanation
C. Incorrect. See Explanation
D. Incorrect. See Explanation

Technical Reference(s): OP-AA-101-1000, Clearance and Tagging (Attach if not previously provided)

Proposed references to be provided to applicants during examination: N/A

Learning Objective: 0702741C-4 ECO Lab Guide (As available)

Question Source: Bank #
Modified Bank # (Note changes or attach parent)
New X

Question History: Last NRC Exam

Question Cognitive Level: Memory or Fundamental Knowledge X
Comprehension or Analysis

10 CFR Part 55 Content: 55.41 10
55.43

Comments:

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	3	
	Group #	2	
	K/A #	G2.2.23	
	Importance Rating	3.1	4.6

Equipment Control. Ability to track Technical Specification limiting conditions for operations.

Proposed Question: RO 70

Given the following conditions on Unit 1:

Due to equipment unavailability, the Containment Fan Cooler flow weekly surveillance check must be delayed 24 hours.

To ensure compliance with the Technical Specification Limiting Condition of Operation (LCO), the surveillance must be tracked via:

A. an Action Request ONLY.

B. Equipment Out of Service program AND an Action Request.

C. 1-OP-0010125A, Data Sheet 29, “Surveillance Tracker” (Data Sheet Pink).

D. 1-OP-0010125A, Data Sheet 30, “Unscheduled Surveillances and Evolution Tracking” (Data Sheet Green).

Proposed Answer: C

Explanation (Optional): Data Sheet green and Data Sheet pink is the common terminology used in the control room.

A. Incorrect. Plausible since the surveillance will not exceed the 1.25% frequency so it wouldn't be characterized as inoperable (put in OOS log) but it could be used to document the status of the equipment until the surveillance is complete.

B. Incorrect. Plausible if the surv periodicity was exceeded (>1.25%).

C. Correct. Used to specifically track unscheduled surveillances which continue past shift turnover but < 1.25% frequency.

D. Incorrect. Plausible because the data sheet is also used for surveillances which continue past shift turnover.

Technical Reference(s): 1-OP-0010125A, Surv Data Sheets (Attach if not previously provided)

Proposed references to be provided to applicants during examination: None

Learning Objective: 0702744-06 Conduct of Ops 0902711-15b (As available)

Question Source: Bank #

Modified Bank # (Note changes or attach parent)

New X

Question History: Last NRC Exam

Question Cognitive Level: Memory or Fundamental Knowledge X

Comprehension or Analysis

10 CFR Part 55 Content: 55.41 10

55.43 2

Comments:

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	3	
	Group #	3	
	K/A #	G2.3.12	
	Importance Rating	3.2	3.7

Radiation Control. 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.

Proposed Question: RO 71

Given the following conditions on Unit 1:

- 1-GOP-302, "Reactor Plant Startup – Mode 3 to Mode 2" is being implemented.
- Critical data is being taken (Reactor power is stable at 5.0E^{-4}%).
- An oil leak on the 1A2 Reactor Coolant Pump (RCP) is suspected.
- A containment entry is required to check the RCP Oil Collection Tank level.
- No Management Exemptions have been authorized for this entry.

IAW ADM- 09.05, "Containment Entries Mode 1-4", entry:

A. cannot occur because reactor power level is beyond the administrative limit for entry inside the biological shield wall.

B. can occur as planned while holding at the current power level.

C. cannot occur unless ALL Control Element Assemblies are fully inserted.

D. can occur as long as Mode 1 is not entered.

Proposed Answer: B

Explanation (Optional):

A. Incorrect. The RCP Oil Collection tank is just outside the bioshield wall and entry is allowed if Rx power is < 1.0E-3%.
B. Correct. See “A”
C. Incorrect. Not true. Personnel may be allowed in containment during withdrawal of Shutdown group CEA’s.
D. Incorrect. Personnel are allowed in containment to inspect the RCP Oil Collection Tank at power (Mode-1) however, personnel are not allowed in containment with a power change in progress.

Technical Reference(s): ADM-09.05 Cont. Entry Mode 1-4- Caution (Attach if not previously provided)

Proposed references to be provided to applicants during examination: N/A

Learning Objective: 0902712-59 (As available)

Question Source:
Bank #
Modified Bank # (Note changes or attach parent)
New X

Question History: Last NRC Exam

Question Cognitive Level:
Memory or Fundamental Knowledge
Comprehension or Analysis X

10 CFR Part 55 Content:
55.41 12
55.43

Comments:

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	3	
	Group #	3	
	K/A #	G2.3.5	
	Importance Rating	2.9	2.9

Radiation Control. Ability to use radiation monitoring systems, such as fixed radiation monitors and alarms, portable survey instruments, personnel monitoring equipment, etc.

Proposed Question: RO 72

Given the following:

- The Unit 2 reactor is operating 100%.
- The Radiation Monitoring Computer System (RMCS) is “magenta” for the “B” Main Steam Line (MSL) radiation monitor.
- There is a suspected tube leak in the “B” Steam Generator (SG).
- The Unit Supervisor directs use of the RM-23P at the “B” MSL line RM-80.

When the RM-23P is placed in service, which ONE of the following describes:

	Control Room Alarm function	“B” MSL radiation reading
A.	None	ONLY Local at RM-23P
B.	RM-23 Radiation Monitor Panel	ONLY Local at RM-23P
C.	None	RM-23 Radiation Monitor Panel
D	RM-23 Radiation Monitor Panel	RM-23 Radiation Monitor Panel

Proposed Answer: A

Explanation (Optional): The RM-23 Radiation Monitors in the control room have radiation level indications and alarm status in addition to the RMCS. However, the MSL radiation monitors do not have a control room display on the RM-23 Panel. The only control display is on the RMCS. A Note in 2-NOP-26.01 states that when taking readings with the portable RM23P at the RM-80, the alarm function and the indication on the RM-80 &RM23 Radiation Monitoring Panel are disabled. Per OPS Policy 503 (Tech Spec Guidance), Rad Monitors identified in Tech Specs (MSL RM's are TS -3/4.3.3) that alarm in the control room must have alarm capability in order to be declared Operable.

Because the RM-80 for the MSLRMs is not communicating with the RMCS in the Control Room, no indication or alarms will be available in the Control room.

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

Technical Reference(s): 2-NOP-26.01 (Attach if not previously provided)
0711411 Unit 2 Rad Monitoring

Proposed references to be provided to applicants during examination: N/A

Learning Objective: 0702411-7.a, 13.d (As available)

Question Source: Bank # ____
Modified Bank # ____ (Note changes or attach parent)
New X

Question History: Last NRC Exam ____

Question Cognitive Level: Memory or Fundamental Knowledge ____
Comprehension or Analysis X

10 CFR Part 55 Content: 55.41 12
55.43 4

Comments:

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	3	
	Group #		
	K/A #	G2.4.17	
	Importance Rating	3.9	4.3

Emergency Procedures/Plan. Knowledge of EOP terms and definitions.

Proposed Question: RO 73

Given the following:

- Unit 1 tripped from 100% power.
- The “A” Steam Generator (SG) has experienced an Excess Steam Demand event due to a failed open Main Steam Safety Valve (MSSV).
- The “B” SG has a sheared U-tube.
- The crew has entered 1-EOP-15, “Functional Recovery”.

Complete the following statement:

The most AFFECTED SG is the __(1)__ SG. It will remain the most AFFECTED SG until __(2)__.

A. 1) “A”
   2) the MSSV is gagged

B. 1) “A”
   2) 1-EOP-99 Appendix R is complete

C. 1) “B”
   2) 1-EOP-99 Appendix R is complete

D. 1) “B”
   2) the MSSV is gagged

Proposed Answer: A

Explanation (Optional): There are procedural steps in EOP-15 to "Determine the Most Affected SG" (for the case of a dual SG event) followed by steps to "Isolate the Most Affected SG". For this question, the ESDE SG would be the SG that gets isolated leaving the SGTR SG to cooldown the plant. Per Ops Policy 521 (EOP Implementation), if a MSSV for a SG is stuck open (resulting in an ESDE), or was stuck open, causing entry into an EOP, then that SG (AFFECTED) shall be considered faulted until the MSSV is gagged. Depressurizing the RCS to within 50 psid of the SG is directed in the EOP to minimize SG tube leakage and maintain SG level on scale.

A. Correct. See explanation

Technical Reference(s): Operations Department Policy: OPS-521 Emergency Operating Procedure Implementation (Attach if not previously provided)
0702828 Functional Recovery

Proposed references to be provided to applicants during examination: N/A

Learning Objective: 0702828-07 (As available)

Question Source: Bank #
Modified Bank # (Note changes or attach parent)
New X

Question History: Last NRC Exam

Question Cognitive Level: Memory or Fundamental Knowledge X
Comprehension or Analysis

10 CFR Part 55 Content: 55.41 10
55.43

Comments:

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	3	
	Group #		
	K/A #	G2.4.47	
	Importance Rating	4.2	4.2

Emergency Procedures/Plan. Ability to diagnose and recognize trends in an accurate and timely manner utilizing the appropriate control room reference material.

Proposed Question: RO 74

Given the following on Unit 1:

Time 0020:

- Reactor Coolant System (RCS) leak rate was estimated at 30 gpm based on Charging vs. Letdown mismatch with Containment Radiation slowly trending up and Pressurizer pressure and level slowly lowering.

Time 0025:

- An Unusual Event (SU5) classification was declared.

1) Which of the following states the basis for the classification and

2) The LATEST time the NRC must be notified?

(Reference Provided)

A. 1) Identified RCS leakage >25 gpm
   2) Time 0120

B. 1) Unidentified RCS Leakage >10 gpm
   2) Time 0120

C. 1) Identified RCS leakage >25gpm
   2) Time 0125

D. 1) Unidentified RCS leakage >10 gpm
   2) Time 0125

Proposed Answer: D

Explanation (Optional): Question was written based on knowledge of E-Plan for RCS Leakage. The NRC must be notified no later than one hour after the event has been classified, not one hour after the event was initiated. For the given conditions, SU5 should be declared based on Unidentified leakage >10 gpm. It is not controlled leakage (seal water from the RCP's) or Identified (SGTR leakage or pressure boundary leakage or leakage into a closed system).

D. Correct. For the conditions given, the location of the leak is indeterminate so it meets the unidentified definition. See explanation

Technical Reference(s): EPIP-01, 'Classification of Emergencies' page 20 –Hot Conditions SU5 (Attach if not previously provided)

Proposed references to be provided to applicants during examination: EPIP-01, 'Classification of Emergencies' page 20 –Hot Conditions SU5

Learning Objective: 0902701-8 (As available)

Question Source: Bank #

Modified Bank # (Note changes or attach parent)

New X

Question History: Last NRC Exam

Question Cognitive Level: Memory or Fundamental Knowledge

Comprehension or Analysis X

10 CFR Part 55 Content: 55.41 10

55.43 5

Comments:

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	3	
	Group #	4	
	K/A #	G2.4.6	
	Importance Rating	3.7	4.7

Emergency procedures/ Plan: Knowledge of EOP mitigation strategies.

Proposed Question: RO 75

Given the following conditions on Unit 1:

- 1-EOP-03, "LOCA" is being implemented
- Pressurizer Pressure 900 psia and slowly lowering.
- T_{HOT} is 508°F and slowly lowering.
- Rep. CET 515°F and slowly lowering.
- Pressurizer Level is 70% and slowly rising.
- Both Steam Generators are 25% Narrow Range and rising with total AFW flow of 350 gpm.
- Both Steam Generator pressures are 660 psia slowly lowering.
- ECCS flow is 650 gpm.
- Containment Temperature is 185°F and slowly lowering.

Which ONE of the following states the strategy that should be implemented AT THIS TIME?

(References Provided)

Cooldown and ___________.

A. throttle ECCS flow to allow Pressurizer level to lower to meet the Inventory Control Safety Function

B. ensure 1-EOP-99, Figure 2 is being maintained. Subcooling requirements take precedence over Pressurizer level.

C. depressurize to maximize ECCS flow. Maximizing ECCS flow takes precedence over Pressurizer level and subcooling

D. throttle ECCS flow as Pressurizer level approaches 100%. Preventing Pressurizer level from going solid takes precedence over subcooling requirements.

Proposed Answer: B

Explanation (Optional):

A. Incorrect. Pressurizer level does not meet desired level of 30-68% but subcooling is not met so ECCS throttling is not allowed.
B. Correct. Subcooling takes precedence over Pressurizer level.
C. Incorrect. Depressurizing to maximize ECCS flow is only allowed if Figure 1A subcooling requirements are met
D. Incorrect. Subcooling takes precedence over Pressurizer level.

Technical Reference(s): 1-EOP-03 (Attach if not previously provided)

Proposed references to be provided to applicants during examination: 1-EOP-99 Fig 1A, 1B, 2

Learning Objective: 0702824-18 (As available)

Question Source: Bank # 3971

Modified Bank # ____ (Note changes or attach parent)

New ____

Question History: Last NRC Exam ____

Question Cognitive Level: Memory or Fundamental Knowledge ____

Comprehension or Analysis X

10 CFR Part 55 Content: 55.41 10

55.43 3

Comments: