U.S. Nuclear Regulatory Commission
Site-Specific
Written Examination

Applicant Information	
Name:	Region: (I) II / III / IV
Date: 10/25/02	Facility/Unit: Millstone 2
License Level: (RO) / SRO	Reactor Type: W / (CE) BW / GE
Start Time:	Finish Time:

Instructions

Use the answer sheets provided to document your answers. Staple this cover sheet on top of the answer sheets. The passing grade requires a final grade of at least 80.00 percent. Examination papers will be collected six hours after the examination starts.

Applicant Certification

All work done on this examination is my own. I have neither given nor received aid.

_____
Applicant's Signature

Results	
Examination Value	_____ Points
Applicant's Score	_____ Points
Applicant's Grade	_____ Percent

U.S. Nuclear Regulatory Commission
Site-Specific Written Examination Answer Sheet
Millstone Unit Two Reactor Operator Examination

Name: RO Answer Key Date: _____ Grade: _____

1)	[A]	[B]	[C]	[D]
2)	[A]	[B]	[C]	[D]
3)	[A]	[B]	[C]	[D]
4)	[A]	[B]	[C]	[D]
5)	[A]	[B]	[C]	[D]
6)	[A]	[B]	[C]	[D]
7)	[A]	[B]	[C]	[D]
8)	[A]	[B]	[C]	[D]
9)	[A]	[B]	[C]	[D]
10)	[A]	[B]	[C]	[D]
11)	[A]	[B]	[C]	[D]
12)	[A]	[B]	[C]	[D]
13)	[A]	[B]	[C]	[D]
14)	[A]	[B]	[C]	[D]
15)	[A]	[B]	[C]	[D]
16)	[A]	[B]	[C]	[D]
17)	[A]	[B]	[C]	[D]
18)	[A]	[B]	[C]	[D]
19)	[A]	[B]	[C]	[D]
20)	[A]	[B]	[C]	[D]
21)	[A]	[B]	[C]	[D]
22)	[A]	[B]	[C]	[D]
23)	[A]	[B]	[C]	[D]
24)	[A]	[B]	[C]	[D]
25)	[A]	[B]	[C]	[D]
26)	[A]	[B]	[C]	[D]
27)	[A]	[B]	[C]	[D]
28)	[A]	[B]	[C]	[D]
29)	[A]	[B]	[C]	[D]
30)	[A]	[B]	[C]	[D]
31)	[A]	[B]	[C]	[D]
32)	[A]	[B]	[C]	[D]
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34)	[A]	[B]	[C]	[D]
35)	[A]	[B]	[C]	[D]
36)	[A]	[B]	[C]	[D]
37)	[A]	[B]	[C]	[D]
38)	[A]	[B]	[C]	[D]
39)	[A]	[B]	[C]	[D]
40)	[A]	[B]	[C]	[D]
41)	[A]	[B]	[C]	[D]
42)	[A]	[B]	[C]	[D]
43)	[A]	[B]	[C]	[D]
44)	[A]	[B]	[C]	[D]
45)	[A]	[B]	[C]	[D]
46)	[A]	[B]	[C]	[D]
47)	[A]	[B]	[C]	[D]
48)	[A]	[B]	[C]	[D]
49)	[A]	[B]	[C]	[D]
50)	[A]	[B]	[C]	[D]

U.S. Nuclear Regulatory Commission
Site-Specific Written Examination Answer Sheet
Millstone Unit Two Reactor Operator Examination

51)	[A]	[B]	[C]	[D]
52)	[A]	[B]	[C]	[D]
53)	[A]	[B]	[C]	[D]
54)	[A]	[B]	[C]	[D]
55)	[A]	[B]	[C]	[D]
56)	[A]	[B]	[C]	[D]
57)	[A]	[B]	[C]	[D]
58)	[A]	[B]	[C]	[D]
59)	[A]	[B]	[C]	[D]
60)	[A]	[B]	[C]	[D]
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62)	[A]	[B]	[C]	[D]
63)	[A]	[B]	[C]	[D]
64)	[A]	[B]	[C]	[D]
65)	[A]	[B]	[C]	[D]
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67)	[A]	[B]	[C]	[D]
68)	[A]	[B]	[C]	[D]
69)	[A]	[B]	[C]	[D]
70)	[A]	[B]	[C]	[D]
71)	[A]	[B]	[C]	[D]
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73)	[A]	[B]	[C]	[D]
74)	[A]	[B]	[C]	[D]
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77)	[A]	[B]	[C]	[D]
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85)	[A]	[B]	[C]	[D]
86)	[A]	[B]	[C]	[D]
87)	[A]	[B]	[C]	[D]
88)	[A]	[B]	[C]	[D]
89)	[A]	[B]	[C]	[D]
90)	[A]	[B]	[C]	[D]
91)	[A]	[B]	[C]	[D]
92)	[A]	[B]	[C]	[D]
93)	[A]	[B]	[C]	[D]
94)	[A]	[B]	[C]	[D]
95)	[A]	[B]	[C]	[D]
96)	[A]	[B]	[C]	[D]
97)	[A]	[B]	[C]	[D]
98)	[A]	[B]	[C]	[D]
99)	[A]	[B]	[C]	[D]
100)	[A]	[B]	[C]	[D]

All work done on this examination is my own; I have neither given, nor received aid.

_____
Examinee's Signature

1 | ☑ RO ☑ SRO | Question ID: **0153945** | **Origin: Modified** | ☐ Memory? (Check=Yes)

The plant is operating at 100% power and the monthly CEA operability surveillance is in progress. The Primary Plant Operator (PPO) has just finished inserting CEA #45 (Group A) 5 steps from the fully withdrawn position, when it suddenly slips to the 167 step position.

Which one of the following combinations of CEAPDS and PPC position indications matches what would be displayed on C-04 under these conditions?

A CEAPDS indicates 167 steps Computer indicates 175 steps ☑

B CEAPDS indicates 167 steps Computer indicates 167 steps ☐

C CEAPDS indicates 175 steps Computer indicates 167 steps ☐

D CEAPDS indicates 175 steps Computer indicates 175 steps ☐

Justification A: correct, CEAPDS will display the slipped CEA position because it monitors the reed switches for the individual CEA. However, the PPC will only display a change in CEA position if the CEDM was actually "pulsed" to move the CEA. The only exception is if the CEA dropped to the bottom, in which case, the computer will reset to 0 steps..
"B" is incorrect because the computer was not 'pulsed' to the 167 step position, only to the 175 step position. This is a credible answer if the student is confused about which system, the computer or CEAPDS, will display actual CEA position on a dropped/slipped CEA.
"C" is incorrect because CEAPDS will show actual position regardless of whether the CEA was inserted normally or it slipped/dropped and because the computer was not 'pulsed' to the 167 step position, only to the 175 step position. This is a credible answer if the student is confused about which system, the computer or CEAPDS, will display actual CEA position on a dropped/slipped CEA.
"D" is incorrect because CEAPDS will display actual CEA position regardless of whether the CEA slipped or was inserted normally. This is a credible answer if the student is confused about which system, the computer or CEAPDS, will display actual CEA position on a dropped/slipped CEA.

Reference LOIT, [001 CED-01-C 2918], 2302A, CEDS, CEAPDS, PPC, 2556, MB-00910

NRC K/A System/E/A		NRC K/A Generic	
System	005 Inoperable/Stuck Control Rod	2.1	Conduct of Operations
Number	GA	2.1.19	
SEE GENERIC K/A		Ability to use plant computer to obtain and evaluate parametric information on system or component status.	
Importance RO/SRO		3.0	3.0
10CFR Link		(CFR: 45.12)	

 # 2 | ☑ RO ☑ SRO | Question ID: **0068259** | **Origin: Bank** | ☐ Memory? (Check=Yes)

The plant has tripped from 100% power, steady state, due to a loss of all 4 off-site lines. Buses 24C and 24D are being carried by their respective EDGs. All other equipment is operating normally for the loss of power conditions.

During the performance of EOP 2525, Standard Post Trip Actions, the PPO notes Q-power reading ~40%.

What is the cause of the Q-power reading seen by the PPO?

A The condenser steam dumps remain closed due to a loss of vacuum resulting in higher RCS temperatures, which allows for greater neutron leakage. This larger neutron leakage is interpreted by RPS as a higher Q-power. ☐

B If NOT placed in Manual and Closed, the condenser steam dumps will open due to the LNP. The lower RCS temperatures add positive reactivity causing NI power to rise, which RPS equates into a higher Q-power. ☐

C The difference between Th and Tc will grow as natural circulation is established. RPS translates this growing difference between Th and Tc as a rise in delta-T power, which equates to the observed rise in Q-power. ☑

D The loss of off-site power has resulted in a loss of power to the Th and Tc instruments. Because Th and Tc have different minimum values, a higher than normal delta-T will be calculated and displayed as a higher Q-power. ☐

Justification Q = M Cp (Th - Tc) = U A (Tc - Tsg); As NC is established, delta-T must rise to accommodate the heat transfer from the RCS to SG and establish NC flow. RPS will translate the rise in delta-T as a rise in delta-T power. Q-power is the auctioneered largest value of NI or delta-T power. NI power has already dropped off to the intermediate range; therefore, delta-T power will be seen as Q-power.
"A" is incorrect because, although the failure of the condenser steam dumps to open will result in slightly higher RCS temperatures, the affect on neutron leakage is minimal and will NOT cause nuclear power to rise.
"B" is incorrect because the condenser steam dumps will NOT open. The loss of of-site power will result in a loss of condenser vacuum causing the condenser steam dumps to remain closed.
"D" is incorrect because the RCS temperature instruments do NOT lose power during a loss of off-site power.

Reference MP2*LORT 2525, 2532, NC, HTFF, MB-03062

NRC K/A System/E/A

System 015/ Reactor Coolant Pump (RCP)
017 Malfunctions

Number AK1.01

Knowledge of the operational implications of the following concepts as they apply to Reactor Coolant Pump Malfunctions (Loss of RC Flow): Natural circulation in a nuclear reactor power plant

Importance RO/SRO 4.4 4.6

10CFR Link (CFR 41.8 / 41.10 / 45.3)

NRC K/A Generic

# 3	✔ RO ✔ SRO	Question ID: **1000101**	Origin: **New**	Memory? (Check=Yes)

The plant is operating normally at 100% power. During the initiation of the surveillance to force Pressurizer sprays, a malfunction occurs causing the Loop 1 spray valve, 2-RC-100E to stick open. The plant is manually tripped due to lowering RCS pressure. During the performance or EOP 2525, Stand ard Post Trip Actions, all 4 RCPs were eventually tripped to stop the presure reduction.

When EOP 2525, Standard Post Trip Actions, were completed, the following conditions were noted:

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

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

A Swap the power supply and start "B" charging pump and restore Pressurizer level to between 35 and 70%. ☐

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

C Start both motor driven auxiliary feedwater pumps to restore S/G level to between 10 and 80%. ☐

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

Justification Per EOP 2528, Loss of Offsite Power/Loss of Forced Circulation, one of the steps listed under the heading of "Check Single Phase Natural Circulation" is to ensure that HIC-4165, Steam Dump Tavg Controller is in MANUAL and closed when NO RCPs are operating.
"A" is incorrect because there is NO procedural requirement to check Pressurizer level for natural circulation flow. This is credible because older revisions of this procedure required pressure level and 35 to 70% is the normal range of Pressurizer level.
"C" is incorrect because S/G level is NOT a criteria for checking natural circulation flow. This is credible because the procedure requires S/G level to be between 40 and 70%, but this is for RCS heat removal, NOT for natural circulation flow verification.
"D" is incorrect because lowering Tave is NOT required to verify natural circulation flow. This is credible because older revisions of the procedure required Tave to be maintained between 530-535°F; NOT for natural circulation flow, but for RCS heat removal. The procedure now requires Tc to be maintained less than 535 degrees F.

Reference MP2*LOIT, EOP, 2528, NC, MB-05902

NRC K/A System/E/A

NRC K/A Generic

System A13 Natural Circulation Operations

Number AA2.2

Ability to determine and interpret the following as they apply to the (Natural Circulation Operations) Adherence to appropriate procedures and operation within the limitations in the facility's license and amendments.

Importance RO/SRO 2.9 3.8

10CFR Link (CFR: 43.5 / 45.13)

# 4	✔ RO ✔ SRO	Question ID: **1000102**	Origin: **New**	Memory? (Check=Yes)

The following conditions exist:

- The unit is operating at 100% power.
- Burnup is 6,000 MWD/MTU

The plant sustains an excess steam demand event due to a stuck open atmospheric dump valve on No. 1 SG.

- Upon the trip, Bus 24D is faulted and "B" Charging pump fails to start.
- EOP 2525 is complete and EOP 2536, Excess Steam Demand, has been entered.
- RCS temperature has been stabilized at 481°F.
- Emergency Boration has been initiated due to the cooldown using only the "A" charging pump.
- Chemistry reports that present RCS Boron concentration is 1025 ppm.
- All other equipment functions as expected.

Based on the above conditions AND excluding the effects of Xenon, what is the lowest RCS temperature allowed in order to achieve the required minimum SHUTDOWN MARGIN (SDM)?

A 346°F ☐

B 468°F ✔

C RCS temperature is already below the minimum ☐

D SDM is met for any desired RCS temperature. ☐

Justification	Per OP 2208-12, Shutdown Boron Concentration versus Moderator Temperature Cycle 15, using the 6,000 MWD/MTU curve, the minimum temperature equates to approximately 465°F. Using the values on the table, the interpolated minimum value for RCS temperature is 468°F (most conservative). "A" is incorrect but credible because it is the minimum temperature for 6,000MWD/MTU and 1125 ppm. "C" is incorrect but credible if the student uses any curve less than 6,000 MWD/MTU. "D" is incorrect but credible if the student uses any curve greater than 6,000 MWD/MTU.
Reference	LOIT, 2208, EB, 2528, SDM, MB-05410 **Requires the use of OP 2208-12**

NRC K/A System/E/A

NRC K/A Generic

System 024 Emergency Boration

Number AK1.04

Knowledge of the operational implications of the following concepts as they apply to Emergency Boration: Low temperature limits for boron concentration

Importance RO/SRO 2.8 3.6

10CFR Link CFR 41.8 / 41.10 / 45.3)

# 5	✔ RO ✔ SRO	Question ID: **1000103**	Origin: **New**	Memory? (Check=Yes)

With the plant operating at 100% power, the following alarms are received:

- RBCCW HDR B PRESS LO
- RBCCW HDR B FLOW HI
- RBCCW SURGE TK LEVEL HI/LO
- PMW HEADER LOW PRESSURE
- Various low flow annunciators for components supplied by "B" RBCCW header

The cause of the indicated high flow on the "B" RBCCW header is a rupture _____.

A downstream of the RBCCW surge tank outlet orifice to the "B" RBCCW header. ☐

B on the RBCCW inlet piping to the "C" RBCCW heat exchanger. ☐

C between the "C" RBCCW pump discharge isolation and check valves. ☐

D on the RBCCW inlet piping to the letdown heat exchanger. ✔

Justification	A header rupture on the RBCCW inlet to the letdown heat exchanger will indicate high flow on the "B" RBCCW header flow instrument. The letdown heat exchanger is downstream of the flow instrument. "A" is incorrect but credible because the student may mistakenly believe that the surge tank outlet orifice is a flow device. Additionally, a rupture iin the RBCCW supply header would NOT result in higher indicated header flow. "B" is incorrect but credible because the flow instrument is downstream of the heat exchangers. The student may incorrectly believe it is upstream. "C" is incorrect but credible because the student may mistakenly believe that the flow instrument is located at the pump discharge.
Reference	LOIT, RBCCW, 2564, MB-05026

NRC K/A System/E/A

System 026 Loss of Component Cooling Water (CCW)

Number AK3.04

Knowledge of the reasons for the following responses as they apply to the Loss of Component Cooling Water: Effect on the CCW flow header of a loss of CCW

Importance RO/SRO 3.5 3.7

10CFR Link (CFR 41.5,41.10 / 45.6 / 45.13)

NRC K/A Generic

# 6	✔ RO ✔ SRO	Question ID: **1000052**	Origin: **New**	Memory? (Check=Yes)

Initial Condition: 100% steady-state power, RCS Tavg 572° F, Channel 'X' pressurizer pressure controller is in service with its setpoint at 2250 psia and pressurizer pressure is 2250 psia. Both sets of proportional heaters are in service, there are no backup heaters on, and both main spray valves are closed.

A step change in Turbine control valve position causes RCS Tavg to rise by 4° F.

Which of the following conditions would be indicative of a malfunction of the pressurizer pressure control system?

A Both main spray valves go partially open. ☐

B All pressurizer backup heaters are on. ☐

C Both sets of proportional heaters are at minimum output. ✔

D Annunciator "Pressurizer CH Y Pres Hi/Lo" alarms. ☐

Justification	C: correct, a 4° F rise in Tavg should generate a 4% rise in pzr level and a 60 psi rise in pressure due to the in-surge, all heaters come on to heat the colder water entering the pzr on an in-surge, proportional heaters off would have to be due to a malfunction; A: chosen if examinees think sprays should go full open or pressure rise is too small to open sprays; B: chosen if examinees forget that the pzr is not a saturated system in this case; D: chosen if examinees think only the selected pzr pressure control channel would alarm
Reference	MP2*LOIT, PLPCS, MB-02325

NRC K/A System/E/A

System 027 Pressurizer Pressure Control System (PZR PCS) Malfunction

Number AK1.02

Knowledge of the operational implications of the following concepts as they apply to Pressurizer Pressure Control Malfunctions: Expansion of liquids as temperature increases

Importance RO/SRO 2.8 3.1

10CFR Link (CFR 41.8 / 41.10 / 45.3)

NRC K/A Generic

# 7	✔ RO	SRO	Question ID: **0153482**	Origin: **Modified**	Memory? (Check=Yes)

Thirty minutes after an Excess Steam Demand Event, the following conditions exist:

- Tc is 380 degrees F and stable.
- Th is 405 degrees F and stable.
- CETs are 410 degrees and stable.
- Pressurizer pressure is 1720 psia and rising.
- Pressurizer level is 63% and rising.
- RVLMS is 100% and stable.
- Containment pressure is 18 psig and lowering.
- RCPs are NOT running.
- HPSI pumps have been stopped.

Based on the stated conditions, determine which of the following actions is required.

A Maintain the present conditions for an additional 30 minutes prior to continuing the cooldown.

B Immediately restart HPSI flow to prevent forming a head bubble.

C While maintaining the present RCS pressure, secure all charging pumps to reduce Pressurizer level.

D Initiate auxiliary spray and restore letdown to lower RCS pressure to less than 1660 psia. ✔

Justification EOP 2541, Appendix 2, RCS P/T curve. Given the above conditions, the RCS is above the 200°F subcooling which exceeds the PTS limitation for Millstone 2. Per EOP 2536, Excess Steam Demand, if RCS pressure exceeds the upper limit of the P/T curve, then stop the cooldown, initiate auxiliary spray, manually control letdown and charging, and throttle/stop HPSI. (RCS pressure is above HPSI shut off head; therefore, HPSI termination is NOT a priority.)
"A" student may choose this distractor based on exceeding 80° F/hr C/D rate and believe need to "soak" prior to continuing C/D.
"B" is incorrect because the restart criteria has NOT been met. This is credible if the student believes that a sudden cooldown with no RCPs in operation will always result in a head bubble.
"C" is incorrect because lowering Pressurizer level while maintaining the present RCS pressure will NOT lower subcooling below the 200°F PTS limit. This is credible if the student believes that Pressurizer level is above the procedural limit.

Reference LOIT, [000 536-01-B 1222] (12/4/97), 2536, 2541, SCM, PTS, MB-05925
Requires use of the P/T curve

NRC K/A System/E/A

System A11 RCS Overcooling

Number AK1.3

Knowledge of the operational implications of the following concepts as they apply to the (RCS Overcooling) Annunciators and conditions indicating signals, and remedial actions associated with the (RCS Overcooling).

Importance RO/SRO 3.0 3.2

10CFR Link (CFR: 41.8 / 41.10 / 45.3)

NRC K/A Generic

8 | ✔ RO ✔ SRO | Question ID: **0156781** | Origin: **Modified** | ✔ Memory? (Check=Yes)

Which of the following loss of condenser vacuum events would require a MANUAL trip of the reactor?

A 100% plant power, loss of one circulating water pump, and condenser backpressure is 4.5 inches of mercury absolute and slowly lowering.

B 75% plant power, loss of one circulating water pump in EACH condenser, and backpressure is 3.5 inches of mercury absolute and stable.

C 45% plant power, 2 circulating water pumps are lost in the SAME condenser, and backpressure is 3.5 inches of mercury absolute and stable. ✔

D 13% plant power, 2 circulating water pumps are lost in the SAME condenser, and backpressure is 4 inches of mercury absolute and stable.

Justification AOP 2517, Circulating Water Malfunctions, and AOP 2574, Loss of Condenser Vacuum, require a manual reactor and turbine trip if 2 circulating water pumps are lost in the same condenser while operating at greater than 15% power. This was a recent event at MP2.
"A" is incorrect because the condition does not require a reactor trip, but does require a downpower to restore and maintain vacuum less than 4.5 inches of mercury absolute. This is credible if the student incorrectly assumes a trip is required at 4.5 inches of mercury absolute or as a result of a loss of one circulating water pump.
"B" is incorrect because a trip is not required for a loss of one circulating water pump in each condenser if vacuum is being maintained less than 6.5 inches of mercury absolute. This is credible because a reactor trip is required if 2 circulating water pumps are lost in the same condenser while operating at greater than 12% power.
"D" is incorrect because a reactor trip is NOT required for a loss of 2 circulating water pumps in the same condenser while less than 15% power. This is credible because a turbine trip is required for this condition.

Reference LOIT, [000 563-01-B 1443] (9/9/96), 2574, 2517, AOP, MB-01405

NRC K/A System/E/A

System 051 Loss of Condenser Vacuum

Number AA2.02

Ability to determine and interpret the following as they apply to the Loss of Condenser Vacuum: Conditions requiring reactor and/or turbine trip

Importance RO/SRO 3.9 4.1

10CFR Link (CFR: 43.5 / 45.13)

NRC K/A Generic

# 9	✔ RO ✔ SRO	Question ID: **1000001**	Origin: **New**	✔ Memory? (Check=Yes)

Initial Conditions: 100% power, normal system alignments with the 'A' DG out for root blower replacement. A sudden, hard ground on DC bus 201B causes a Station Blackout.

Which procedural actions are required specifically due to the loss of 201B, and why?

A Manually trip open individual load breakers on bus 24D to de-energize loads running with no relay protection. ☐

B Manually trip open the RSST feeder breaker to bus 24D readying the bus to be energized from the unit 3 x-tie. ☐

C Manually trip the 13U DG locally due to it running with no protection or service water. ☑

D Manually trip the feeder breakers to bus 24A and 25A to remove potential from bus loads as the main turbine coasts down. ☐

Justification A: credible since load breakers on 24D are closed and have no tripping protection w/o DC, however not running due to no AC; B: credible since unit 3 x-tie is the success path, however RSST feeder is not closed and 24D cannot be energized from unit 3 w/o DC control power; D: credible since 24A & 25A feeder breakers do not trip, loads stay tied to NSST, but main generator excitation is removed; C: correct since DG air start solenoids fail open on DC loss and loss of DC prevents breaker closure to power SW & no DC control power for remote tripping or protective trips, (Contingency action 10.2 of EOP 2530).

Reference MP2*LOIT, EOP 2530, Station Blackout, MB-05912

NRC K/A System/E/A

System 055 Loss of Offsite and Onsite Power (Station Blackout)

Number EK3.02

Knowledge of the reasons for the following responses as the apply to the Station Blackout: Actions contained in EOP for loss of offsite and onsite power

Importance RO/SRO 4.3 4.6

10CFR Link (CFR 41.5 / 41.10 / 45.6 / 45.13)

NRC K/A Generic

# 10	✔ RO	SRO	Question ID: 0155243	Origin: Bank	Memory? (Check=Yes)

The plant is operating at 100% power, steady state when the following alarms are received:

* "INVERTER INV-3 TROUBLE" (C08).
* "VA-30 ON ALTERNATE SUPPLY VR-11" (C08)
* "High Temperature Alarm" (INV-3 local)

A scan of the control room reveals Channel "C" safety instruments are still energized.

Which of the following describe the status of VA-30 based on the above alarms?

A VA-30 is NOT operable, and will temporarily deenergize if a Loss-Of-Offsite-Power occurred. ✔

B VA-30 is operable, and will NOT be affected by a Loss-Of-Offsite-Power.

C VA-30 is NOT operable, and safety channel "C" is being powered from a battery backup source.

D VA-30 is NOT operable, and will NOT be affected by a Loss-Of-Offsite-Power.

Justification	The ARP-2590F for VA-10, 20, 30, or 40 cautions that if aligned to the alternate power supply, the VA's are NOT operable (B is wrong). Also, the Caution in the ARP-2592B.3 states that when a 120 VAC Panel is powered from an Alternate source it is not OPERABLE. This is because the T.S. Surveillance 4.8.2.1 states the A.C. Busses must be energized from NORMAL A.C. sources. None of the safety channels have a battery backup, only channel "Y" of PRZ level control (C is wrong). Loss of Normal Power will deenergize the alternate power, which comes from VR-11 (D is wrong).
Reference	MP2 LOIT LVD-00-C MB-4880 2345, MB-05618

NRC K/A System/E/A		NRC K/A Generic	
System	057 Loss of Vital AC Electrical Instrument Bus	2.4	Emergency Procedures /Plan
Number	GA	2.4.10	
SEE GENERIC K/A		Knowledge of annunciator response procedures.	
Importance RO/SRO		3.0	3.1
10CFR Link		(CFR: 41.10 / 43.5 / 45.13)	

 # 11 | ✔ RO ✔ SRO | Question ID: **0156632** | **Origin: Modified** | ✔ Memory? (Check=Yes)

The plant is operating at 100% power, with the following conditions:
Bus 24E is aligned to Bus 24C.
'A' and 'C' Service Water Pumps are in service.
The 'C' Service Water Pump trips and will NOT restart.

Which of the following actions is required?

A Trip the reactor, secure 'B' & 'D' RCPs, emergency trip the 'B' DG, Go To EOP 2525 . ✔

B Align the 'B' Service Water Pump to supply the 'B' Service Water Header, align 24E from the unit 3 x-tie then start the 'B' Service Water Pump

C Align 'B' Service Water Pump to supply 'B' Service Water Header, start 'B' Service Water Pump, and log into TSAS 3.0.3.

D Align Bus 24E to 24D and 'B' Service Water Pump to 'B' Service Water Header. Start the 'B' Service Water Pump.

Justification A: correct, AOP 2565 requires the 'B' Service Water Pump electrically & mechanically aligned to facility 2; B, C, & D are all physically possible, but not procedurally allowed.

Reference MP2 LORT 3991 [000 565-01-B 1486] (9/18/97) 2565, AOP, MB-05043

NRC K/A System/E/A

System 062 Loss of Nuclear Service Water

Number GA

SEE GENERIC K/A

Importance RO/SRO 3.4 3.6

10CFR Link (CFR: 41.10 / 43.5 / 45.13)

NRC K/A Generic

2.4 Emergency Procedures /Plan

2.4.11

Knowledge of abnormal condition procedures.

 # 12 | ✔ RO ✔ SRO | Question ID: **1000046** | Origin: **New** | ✔ Memory? (Check=Yes)

If a fire in the plant causes the 25' 6" cable vault spreading room deluge to activate, the Fire procedure AOP 2559 directs you to have the fire brigade wedge open the 25' 6" cable vault spreading room East door to stairway 10, and the door from the bottom of stairway 10 to the outside.

What is the reason for these actions?

A Allows unobstructed access for fire hoses to be brought into the area from the hose station located by the Aux. Building access point.

B Prevents deluge water from over-flowing into the DC switchgear rooms by allowing it to flow outside. ✔

C Provides a flowpath for smoke purge from the affected fire area.

D Ensures access to and from the fire area in the event that the fire disables the keycard readers.

Justification B: correct, ventilation passages between the cable spreading room and the DC switchgear rooms are equipped with 3" high coffer dams, providing the stairwell as a drain path ensures that the dams are not over-flowed; A: the deluge should be more than adequate, but if hoses are required they are available in the area; C: smoke would rise rather than go down the stairwell and this type of action would be evaluated and initiated by the fire brigade, not proceduralized; D: only the bottom stairwell door has a reader and all doors can be overridden using keys

Reference MP2*LOIT, fire, 2559, MB-05666

NRC K/A System/E/A

System 067 Plant fire on site

Number AK1.02

Knowledge of the operational implications of the following concepts as they apply to Plant Fire on Site: Fire fighting

Importance RO/SRO 3.1 3.9

10CFR Link (CFR 41.8 / 41.10 / 45.3)

NRC K/A Generic

 # 13 | ✔ RO ✔ SRO | Question ID: **1000003** | **Origin: New** | Memory? (Check=Yes)

Due to a fire in Appendix R Area R-1 the plant was tripped and the control room was evacuated.
The crew has assembled at Appendix R panel C-10 and has taken control in accordance with AOP 2579A.
Indicated pressurizer is 2253 psia on panel C-10.
Pressurizer level indicated on panel C-10 is 35% and rising slowly.
The SM directs you to operate charging and control RCS temperature to ensure the pressurizer level upper Tech Spec is not exceeded.

Using AOP 2579A Attachment 9, to what value can indicated pressurizer level rise before the upper level Tech Spec limit is exceeded?

A 45% ✔

B 51%

C 65%

D 70%

Justification A: correct; B: chosen if examinee uses 1500# line; C: chosen if examinee adds required actual level rise to present indicated; D: chosen if examinee just specifies Tech Spec limit.

Choosing correct answer requires examinee to use graph and know PZR Tech Spec limit.

Reference MP2*LOIT, 2559, 2579A, Fire, Control Room Evacuation, C-10, MG-00673
Requires AOP 2579A, Attachment 9

NRC K/A System/E/A

System 068 Control Room Evacuation

Number AA2.07

Ability to determine and interpret the following as they apply to the Control Room Evacuation: PZR level

Importance RO/SRO 4.1 4.3

10CFR Link (CFR: 43.5 / 45.13)

NRC K/A Generic

# 14	✔ RO ✔ SRO	Question ID: 0071401	Origin: Bank	✔ Memory? (Check=Yes)

During a refueling outage with fuel movement in progress, which one of the following would be considered a loss of Containment Closure?

A Fuel Transfer Tube isolation valve 2-RW-280 not fully closed.

B Containment Purge valves are open with a Purge in progress.

C SG Secondary side manways off and a main steam safety is removed. ✔

D Containment equipment hatch held in place by only 6 bolts.

Justification Technical Specification 3.9.4 states that the equipment door needs to be held in place by at least 4 bolts. Containment purge must be capable of being automatically isolated (implying it may be in operation) with fuel movement in progress, the refuel pool is full and RW 280 must be open. If the SG Secondary side manway is removed and the Atm Steam Dump is cycled, closure is violated per SP 2614B

Reference MP2*LOIT*05558*2515* AOP, NRC, APP, MB-05558

NRC K/A System/E/A

System 069 Loss of Containment Integrity

Number AA2.01

Ability to determine and interpret the following as they apply to the Loss of Containment Integrity: Loss of containment integrity

Importance RO/SRO 3.7 4.3

10CFR Link (CFR: 43.5 / 45.13)

NRC K/A Generic

# 15	✔ RO	SRO	Question ID: 1000053	Origin: New	✔ Memory? (Check=Yes)

The plant has experienced a loss of all feed.
All actions of EOP 2537 LOAF were accomplished and Once-Through-Cooling (OTC) was initiated when SG wide range level reached 70".
The 'A' Auxiliary Feedwater pump has been repaired and is now providing SG feed.

Which of the following is a condition that must be satisfied before the PORVs may be reclosed?

A RCS parameters indicate stable Natural Circulation has been restored.

B At least one steam generator with level at 70" or higher. ✔

C Both steam generators with level at 70" or higher.

D RCS CET subcooling at least 30° F.

Justification	B: correct, EOP 2540D, HR-3 step 13 "Terminate Once Through-Cooling" specifies conditions needed; A: NC requires meeting P/T curve; C: one SG is adequate to remove decay heat; D: CETs will be roughly saturation temperature with PORVs open
Reference	MP2*LOIT, 2537, OTC, MB-05975

NRC K/A System/E/A

System 074 Inadequate Core Cooling

Number EK3.07

Knowledge of the reasons for the following responses as the apply to the Inadequate Core Cooling: Starting up emergency feedwater and RCPs

Importance RO/SRO 4.0 4.4

10CFR Link (CFR 41.5 / 41.10 / 45.6 / 45.13)

NRC K/A Generic

 # 16 | ✔ RO | SRO | Question ID: **1000201** | **Origin: New** | Memory? (Check=Yes)

An RCS chemistry sample taken upon reaching 100% power analyzes at 80 micro-curies/gram dose equivalent Iodine 131.
The SM directs that reactor power be reduced due to the activity level exceeding Tech Spec limits.

What is the maximum allowable power level for this activity level and why is continued power operation allowed rather than shutting down?

A <60%, avoids use of ADVs associated with plant shutdown

B <75%, accomodates short-term activity increases due to Iodine spiking ✔

C <80%, avoids use of ADVs associated with plant shutdown

D <90%, accomodates short-term activity increases due to Iodine spiking

Justification	B: correct, Tech Spec figure 3.4-1 yields 74.5% if read correctly; A: using the wrong axis yields 60%; C: same # as micro-curies, possible guess; 90% is a much used lower power level for things like CV testing; reason for allowing continued operation is to accommodate short-term activity level increases due to Iodine spiking during power level changes.
Reference	MP2*LOIT, Tech Specs, dose equivalent Iodine (DEI) 131, MB-06113 **Requires use of Tech Spec Figure 3.4-1**

NRC K/A System/E/A

System 076 High Reactor Coolant Activity

Number GA

SEE GENERIC K/A

Importance RO/SRO 3.4 3.8

10CFR Link (CFR: 41.10 / 43.2 / 45.12)

NRC K/A Generic

2.1 Conduct of Operations

2.1.32

Ability to explain and apply all system limits and precautions

# 17	✔ RO	SRO	Question ID: 0156340	Origin: Modified	Memory? (Check=Yes)

Initial Conditions:
100% power, All Rods Fully Withdrawn

Group 7 CEA #38 slips into the core and stops at 140 steps withdrawn.
After the required downpower, an initial step in recovery of the CEA requires bypassing CMI.

Which of the conditions listed caused the CMI?

A Local Power Density pre-trips on 2 channels of RPS.

B CEA Group Deviation Backup. ✔

C Violation of the Power Dependent Insertion Limit.

D CEA Group Out of Sequence violation.

Justification	B: correct, CEA Group Deviation Backup; A: credible since LPD pre-trips generate CWP, if present, but can't bypass, must reset; C: CMI on PDIL, not PPDIL; D: No OOS generated since CEA 38 is group 7.
Reference	MP2*LOIT*3614 [001 CED-01-C RO-6a] (8/15/96) 2302A, CEDS, APP, MB-02244

NRC K/A System/E/A

System 003 Dropped Control Rod

Number AA2.04

Ability to determine and interpret the following as they apply to the Dropped Control Rod: Rod motion stops due to dropped rod

Importance RO/SRO 3.4 3.6

10CFR Link (CFR: 43.5 / 45.13)

NRC K/A Generic

 # 18 | ✔ RO ✔ SRO | Question ID: **1000006** | **Origin: New** | ✔ Memory? (Check=Yes)

Which of the following heat removal complications , by itself, would indicate that EOP 2526 (Reactor Trip Recovery) was NOT the correct subsequent EOP to enter at the completion of EOP 2525 (Standard Post Trip Actions)?

A MSIVs closed

B No RCPs running ✔

C Loss of condenser vacuum

D Ability to feed ONLY one Steam Generator

Justification B: correct, requires entry into EOP 2528 Loss of Off-site Power/Loss of Forced Circulation; A: credible since MSIVs could have closed on MSIS which could be generated by ESAS failure, SIAS on CTMT pressure, or ESDE; C: credible since loss of vacuum causes loss of main feed, but aux feed still available; D: credible since one SG could be lost due to ESDE or SGTR. The key to the correct answer is the condition "by itself". This rules out consideration of the "possible" root causes.

Reference MP2*LOIT, 2526, heat removal, HR, MB-05480

NRC K/A System/E/A

System E02 Reactor Trip Recovery

Number EK2.2

Knowledge of the interrelations between the RTR and 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.

Importance RO/SRO 3.5 4.0

10CFR Link (CFR: 41.7 / 45.7)

NRC K/A Generic

 # 19 | ✔ RO ✔ SRO | Question ID: **0053616** | Origin: **Bank** | Memory? (Check=Yes)

The plant was at 100% power when a Loss of Load caused the reactor to trip and the PORVs to open. Thirty minutes after the trip, RCS pressure is 1850 psia and the Quench Tank pressure is 45 psig.

Which one of the following PORV discharge temperatures would be indicated if a PORV is leaking by?

A 250 degrees F

B 274 degrees F

C 293 degrees F ✔

D 625 degrees F

Justification Sat. temp. for 45 psig (60 psia) is 292.7°F
#1 is sat. temp. for 30 psia (if mistakenly subtracted 15 from 45 to get psia)
#2 is sat. temp. for 45 psia
#4 is sat. temp. for 1850 psia

Reference MP2*LORT*4308 [002 RCS-01-C 4929] (2/11/97) QT, PZR, RCS, PORV, HTFF, MB-05424
Requires use of Steam Tables

NRC K/A System/E/A

NRC K/A Generic

System 008 Pressurizer (PZR) Vapor Space Accident (Relief Valve Stuck Open)

Number AA2.15

Ability to determine and interpret the following as they apply to the Pressurizer Vapor Space Accident: ESF control board, valve controls, and indicators

Importance RO/SRO 3.9 4.2

10CFR Link (CFR: 43.5 / 45.13)

20 | ✔ RO ✔ SRO | Question ID: 1000104 | Origin: New | Memory? (Check=Yes)

Thirty minutes after a small break LOCA from 100% power operation, the following conditions exist:

RCPs are secured.
Pressurizer pressure is 1175 psia and rising slowly.
Pressurizer level is 21% and rising slowly
CET temperatures are 534°F and stable.
RCS subcooling based on CETs is 35°F and stable.
RVLMS indicates 61% on both channels.

The US directs the PPO to energize pressurizer heaters.

Pressurizer level will _____.

A rise due to expansion of the water in the pressurizer as it is being heated.

B rise due to the expansion of the head void.

C lower due to the collapse of the head void. ✔

D lower due to the cold water being injected by the HPSI Pumps.

Justification As the RCS is pressurized up to and above the saturation pressure for the head, the head void will collapse. The water entering the head will come from the pressurizer resulting in lowering level possibly resulting in loss of level.
"A" is incorrect. Water being heated in the pressurizer will not expand into the pressurizer. As the water is heated, it will flash to steam resulting in raising RCS pressure. This is credible because when water is heated it will normally expand.
"B" is incorrect because the increase in RCS pressure will cause the void to collapse. This is credible if the student believes the void will grow due to adding more heat (from pressurizer heaters) to the RCS.
"D" is incorrect because the injection flow from HPSI will be reduced as RCS pressure increases. This is credible if the student thinks that the reduction in the head void will cause a reduction in RCS pressure resulting in more HPSI flow.

Reference LOIT, E32-01-C, LOCA, 2532, PZR, MB-05939

NRC K/A System/E/A

NRC K/A Generic

System 009 Small Break LOCA

Number EA2.06

Ability to determine or interpret the following as they apply to a small break LOCA: Whether PZR water inventory loss is imminent

Importance RO/SRO 3.8 4.3

10CFR Link (CFR 43.5 / 45.13)

 # 21 | ✔ RO | SRO | Question ID: **1000009** | Origin: **New** | Memory? (Check=Yes)

Initial Conditions: 100% power with all normal alignments EXCEPT the 4160V x-tie from unit 3 is not available.
Then VA-10 was lost , AOP 2504C was entered and the plant was stabilized at 100% power.
Electrical maintenance was gearing up to replace VA-10's main breaker when a Large Break LOCA occurred coincident with a loss of off-site power.
Due to the loss of VA-10 only Facility 2 ESAS actuated equipment responded.
Subsequently the 'B' LPSI pump trips on overload and cannot be restarted.
Bus 24C has been manually load shed by the spare RO.
The US then directs you to perform actions necessary to place the 'A' LPSI pump in service.

Which of the following actions will be required to start the 'A' LPSI pump?

A Manually start the 'A' LPSI pump, the 'A' EDG is already supplying bus 24C

B Manually start the 'A' EDG, its output breaker will automatically close and the Facility 1 ESAS loads will sequence on.

C Manually start the 'A' EDG, manually close its output breaker and the Facility 1 ESAS loads will sequence on.

D Manually start the 'A' EDG, manually close its output breaker then any Facility 1 ESAS loads must be manually started. ✔

Justification D: correct, loss of VA-10 affects all ESAS Actuation Cabinet 5 outputs, including: load shed, UV EDG start & sequencer, and accident signal actuations; distractors A, B, & C all contain some correct information, but some false aspects as well. Examinee requires full system knowledge of the affect of the VA-10 loss to determine correct answer.

Reference MP2*LOIT, VA10, ESAS, sequencer, MB-05738

NRC K/A System/E/A

NRC K/A Generic

System 011 Large Break LOCA

Number EA1.04

Ability to operate and monitor the following as they apply to a Large Break LOCA: ESF actuation system in manual

Importance RO/SRO 4.4 4.4

10CFR Link (CFR 41.7 / 45.5 / 45.6)

# 22	✔ RO ✔ SRO	Question ID: 1000105	Origin: New	Memory? (Check=Yes)

The plant is operating at 100% power, MOL, when a VCT low level alarm is annunciated. The US directs the PPO to make up to the VCT using the appropriate blend. During the blend, the PPO is momentarily distracted by a fire panel trouble alarm. As the PPO is addressing the fire alarm, a PMW FLOW HI/LO annunciator is received on C-04 and inadvertently acknowledged by the SPO. A few minutes later, the PPO notices reactor power slowly lowering.

Which of the following caused this condition?

A A high level in the VCT automatically isolated makeup from the PMW Storage Tank.

B The PMW flow controller failed high resulting in an automatic isolation of PMW

C The Boric Acid flow controller failed low automatically causing makeup to be from the RWST.

D PMW flow was stopped or lowered resulting in too much Boric Acid being added to the VCT. ✔

Justification	PMW flow was somehow decreased to less than 10 gpm (alarm setpoint) by an unspecified failure which resulted in only Boric Acid being injected to the VCT. After a short duration, the VCT Boron concentration increased which caused a power reduction. "A" is incorrect because a high level in the VCT will automatically stop PMW AND Boric Acid if the controls are in "AUTO". This is credible if the student thinks that only PMW is isolated on a high level to prevent a dilution event. "B" is incorrect because a failure of the PMW controller will NOT automatically isolate flow. This is credible if the student believes that PMW is automatically isolated by a controller failure. "C" is incorrect because a failure of the Boric Acid controller will NOT automatically swap makeup to the RWST. This is credible if the student believes that makeup flow will be diverted to the RWST on a Boric Acid controller failure to prevent losing Boric Acid makeup capabilities.
Reference	LOIT, CVC-00-C, MM-14, 2304C, 2590C, MB-02343

NRC K/A System/E/A

System 022 Loss of Reactor Coolant Makeup

Number GA

SEE GENERIC K/A

Importance RO/SRO

10CFR Link

NRC K/A Generic

2.4 Emergency Procedures /Plan

2.4.46

Ability to verify that the alarms are consistent with the plant conditions.

3.5 3.6

(CFR: 43.5 / 45.3 / 45.12)

# 23	✔ RO ✔ SRO	Question ID: 1000008	Origin: New	Memory? (Check=Yes)

The plant is shut down in Mode 6, with the following conditions:
- The RCS is being refilled from Th centerline.
- RCS level is presently at the vessel flange.
- Shutdown Cooling System is in service on RCS.
- Time elapsed after shutdown is 20 days
- RCS temperature is 95 °F
- The reactor had been operating at 100% power for the last 6 months.

Which of the following is the approximate Time to Boil for the RCS if SDC is lost?

A ~49 minutes ✔

B ~78 minutes

C ~120 minutes

D ~780 minutes

Justification	A: correct, Heatup rate is ~2.4 deg. F/minute for RCS Heatup Rate with Reduced Inventory (OP 2264, Attachment 8), Time to Boil = (212 deg. F - 95 deg. F)/(2.4 deg. F/min) = 48.75 minutes. B: This time results if wrong graph (Attachment 10) is chosen and a power of ten math error is introduced; C: This time results if wrong graph (Attachment 9) is chosen, likely if examinee doesn't consider SG tubes not filled; D: This time results if wrong graph (Attachment 10) is chosen
Reference	MP2*LORT*5630 [121 264-01-C No Obj] (10/18/96) 2264, 2572, SDC, MB-05145 **Provide OP 2264 Attachments 8, 9, & 10**

NRC K/A System/E/A

System 025 Loss of Residual Heat Removal System (RHRS)

Number AK1.01

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

Importance RO/SRO 3.9 4.3

10CFR Link (CFR 41.8 / 41.10 / 45.3)

NRC K/A Generic

 # 24 | ✔ RO ✔ SRO | Question ID: **1000007** | Origin: **New** | Memory? (Check=Yes)

Initial Conditions: 100% power with CEDM MG set #1 out of service, TCB-9 is closed.
A momentary partial loss of DC causes some RPS TCBs to change state.
The following pattern of TCB status lights is displayed on the CEDS at the top of the RPS panels:

MG #1		TCB-9	MG #2
TCB-2 Red	TCB-6 Red	TCB-3 Green	TCB-7 Green
TCB-1 Red	TCB-5 Red	TCB-4 Green	TCB-8 Green

Based on these indications, what is the status of the CEDS?

A Both CEDM power busses are energized and all CEAs are at their initial position. ✔

B CEDM power bus #2 is de-energized, half of the CEAs are inserted, the RO must manually trip the other TCBs.

C CEDM power bus #2 is de-energized, half of the CEAs are inserted, An RPS LPD trip should have opened the other TCBs.

D Both CEDM power busses are de-energized and all CEAs are fully inserted.

Justification A: correct, with x-tie breaker TCB-9 closed, the output from either MG set will power up both CEDS busses via either set of TCBs; B: credible if examinee assumes all power to CEDM power bus #2 goes through right hand set of TCBs; C: credible if examinee assumes all power to CEDM power bus #2 goes through right hand set of TCBs, then dropping CEAs should generate LPD condition; D: credible if examinee doesn't credit TCB-9 being closed, however TCB-9 is a manual breaker so the DC transient won't affect it.

Reference MP2*LOIT CEDS, TCB, ATWS, 2302A, MB-02251

NRC K/A System/E/A

System 029 Anticipated Transient Without Scram (ATWS)

Number EA2.07

Ability to determine or interpret the following as they apply to a ATWS: Reactor trip breaker indicating lights

Importance RO/SRO 4.2 4.3

10CFR Link (CFR 43.5 / 45.13)

NRC K/A Generic

 # 25 | ✔ RO ✔ SRO | Question ID: **1000044** | Origin: **New** | ✔ Memory? (Check=Yes)

Which of the following indicates a loss of high voltage to the detectors for the 'A' wide range NI channel?

A Channel 'A' wide range NI meter on panel C04 drops to the bottom of the scale. ✔

B Channel 'A' wide range NI meter on panel C04 shifts to % power as indicated by "% Power" lit on the indicator above the meter.

C Annunciator "CH 'A' Wide Range Extended Range CPS" on panel C04 clears.

D "Non-OPR" light flashing on the Channel 'A' RPS wide range NI drawer.

Justification A: correct, although the meter would still have power the detector would not generate any pulses; B: this occurs when the extended range bistable de-energizes, examinees may chose if they believe that the channel would default to the linear detector; C: this alarm clears at 1000 cps increasing, examinees may chose if they believe that the alarm power is derived from the detector; D: all of the 'alarm' lights on the NI drawers flash when they clear, solid when they are activated, examinees may chose if they don't recall this

Reference MP2*LOIT, 2380, NIS, MB-01436

NRC K/A System/E/A

NRC K/A Generic

System 033 Loss of Intermediate Range Nuclear Instrumentation

Number AA1.01

Ability to operate and / or monitor the following as they apply to the Loss of Intermediate Range Nuclear Instrumentation: Power-available indicators in cabinets or equipment drawers

Importance RO/SRO 2.9 3.1

10CFR Link (CFR 41.7 / 45.5 / 45.6)

26 | ✔ RO ✔ SRO | Question ID: 1000023 | Origin: New | ✔ Memory? (Check=Yes)

When an annunciator is received, indicating that the Steam Generator Blowdown (SGBD) Sample radmonitor has detected high SG activity, several automatic actions occur.

Which of the following sets is correct in regard to the automatic action and the reason for it?

A SGBD Quench Tank outlet 2-MS-135 gets a close signal. This prevents exceeding the processing capacity of the Aerated Radwaste System.

B SGBD Tank outlet 2-MS-15 gets a close signal. This diverts the contaminated blowdown to the Aerated Radwaste System

C SGBD sample valves, 2-MS-191A & B, get a close signal. This prevents an unprocessed discharge.

D SGBD sample to secondary sample sink isolations HV-4287 & 4288 get a close signal. This prevents a non-permitted discharge. ✔

Justification D: correct, contaminated SGBD leaving the plant is considered a discharge and must be documented with a discharge permit, A & B are valid signals, but neither one goes to ARWS; C is false in that the sample valves only get a close signal on CIAS.

Reference MP2*LOIT, SGTL, SGBD, 2569, MB-05773

NRC K/A System/E/A

NRC K/A Generic

System 037 Steam Generator (S/G) Tube Leak

Number AK3.10

Knowledge of the reasons for the following responses as they apply to the Steam Generator Tube Leak: Automatic actions associated with high radioactivity in S/G sample lines

Importance RO/SRO 3.3 3.7

10CFR Link (CFR 41.5,41.10 / 45.6 / 45.13)

 # 27 | ✔ RO ✔ SRO | Question ID: **1000045** | **Origin: New** | ✔ Memory? (Check=Yes)

Given: An SGTR in #1 SG concurrent with a loss of off-site power has occurred.
Initial cooldown on both RCS loops has been completed and #1 SG has been completely isolated.

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

A #1 SG pressure 50# or more greater than #2 SG pressure.

B #1 Th 10° F or more higher than #2 Th. ✔

C #1 loop delta-P 5# or more less than #2 loop delta-P.

D #1 loop Tc 5° F or more lower than #2 loop Tc.

Justification B: correct, Note 2 on page 26 of EOP 2534 SGTR; A: isolated SG pressure remains elevated as part of success strategy to minimize pri-to-sec leakage; C: natural circ delta-P is ~1/2 # or less in loop #2, can't get 5# less; D: once #1 SG is completely isolated there is no way for its Tc to be lower

Reference MP2*LOIT, 2534, SGTR, N/C, MB-05785

NRC K/A System/E/A

System 038 Steam Generator Tube Rupture (SGTR)

Number EK1.03

Knowledge of the operational implications of the following concepts as they apply to the SGTR: Natural circulation

Importance RO/SRO 3.9 4.2

10CFR Link (CFR 41.8 / 41.10 / 45.3)

NRC K/A Generic

# 28	✔ RO ✔ SRO	Question ID: 1000011	Origin: New	Memory? (Check=Yes)

Initial Conditions: 100% power, 'B' Auxiliary Feedwater (AFW) pump is the only equipment Out of Service. The main feeder breaker on Vital DC distribution panel faults open, de-energizing DV-10 resulting in a plant trip on high pressurizer pressure due to closure of the MSIVs. Main feedwater is lost due to no steam supply.
EOP 2525, Standard Post Trip Actions, directs you to establish adequate feedwater flow to at least one Steam Generator.

Which of the following actions will establish an adequate and controllable supply of AFW to at least one Steam Generator?

A Start the 'A' AFW pump, close 2-FW-44, and feed only #1 SG with its AFW regulating valve in local manual.

B Start the 'A' AFW pump, close 2-FW-44, and feed only #2 SG with its AFW regulating valve in Manual on C05.

C Shift Turbine Driven AFW pump control power to Facility 2, close 2-FW-44, and feed only #1 SG with its AFW regulating valve in local manual.

D Shift Turbine Driven AFW pump control power to Facility 2, close 2-FW-44, and feed only #2 SG with its AFW regulating valve in Manual on C05. ✔

Justification	D: correct, DV-10 is the supply for Facility 1 TDAFP control power, FW-44 isolates the discharge header to #1 SG; A: 150 gpm per SG is within the pump's capacity, but DV-10 supplies control power to the pump breaker; B: 150 gpm per SG is within the pump's capacity, but DV-10 supplies control power to the pump breaker, also this addresses the wrong side of FW-44; C: wrong only in the fact that TDAFP is on the wrong side of FW-44
Reference	MP2*LOIT, 2537, TDAFP, DV10, MB-05726

NRC K/A System/E/A

System E06 Loss of Feedwater

Number EA1.1

Ability to operate and / or monitor the following as they apply to the (Loss of Feedwater)
Components, and functions of control and safety systems, including instrumentation, signals, interlocks, failure modes, and automatic and manual features.

Importance RO/SRO 4.0 3.9

10CFR Link (CFR: 41.7 / 45.5 / 45.6)

NRC K/A Generic

# 29	✔ RO ✔ SRO	Question ID: 1000106	Origin: New	✔ Memory? (Check=Yes)

While operating at 100% power, the plant experiences a loss of DV-20. All equipment operates as expected.

In addition to performing the actions of EOP 2525, Standard Post Trip Actions, which of the following additional actions must be performed to prevent equipment damage?

A ✔
- Dispatch an operator to manually trip the "B" D/G and isolate starting air.
- Adjust 2-FW-11B, AFW Regulating Valve Isolation Valve, locally to the desired flow rate.
- Secure F-39B, RM-8262A and B Sample Fan.

B
- Locally adjust 2-FW-11B, AFW Regulating Valve Isolation Valve, to the desired flow rate.
- Dispatch an operator to secure the Turbine Driven Auxiliary Feedwater Pump.
- Trip all facility two 480 volt, 4160 volt, and 6900 volt AC breakers locally.

C
- Dispatch an operator to secure the Turbine Driven Auxiliary Feedwater Pump.
- Dispatch an operator to manually trip the "B" D/G and isolate starting air.
- Place all facility two RBCCW air operated valves in local, manual control.

D
- Trip all facility two 480 volt, 4160 volt, and 6900 volt AC breakers locally.
- Place all facility two RBCCW air operated valves in local, manual control.
- Dispatch an operator to manually operate the #2 Atmospheric Dump Valve.

Justification On a loss of DV-20, the "B" D/G will start, but will have no control or protection other than mechanical overspeed. The "B" DG must be tripped to prevent damage. A loss of DV-20 will also cause the "B" AFW Reg Valve to fail open. An operator must control feed flow to #2 S/G locally to prevent overfilling the S/G. Additionally, the flow path for F-39B will isolate due to loss of DC control power to the isolation valves.
"B" is incorrect for 2 reasons: The Turbine Driven Aux Feed Pump does NOT automatically start and will NOT need to be secured locally. Tripping the AC breakers is NOT necessary. An older revision to this procedure required tripping the AC breakers because they have NO tripping power on a loss of DC; therefore, there was NO way to trip them either remotely or automatically.
"C" is incorrect for the same reason as "B" with regard to the TDAFP and because Facility 2 RBCCW valves lose DC control power, but fail 'as is'. Therefore, they do NOT need to be placed in local, manual unless they require a change in position.
"D" is incorrect for the same reasons in "B" and "C", plus the #2 Atmospheric Dump Valve has NOT lost control power; therefore there is NO need to operate the valve locally.

Reference LOIT, A06-01-C, DC, 2345C, 2525, 2506B, MB-05725

NRC K/A System/E/A

System 058 Loss of DC Power

Number AA1.03

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

Importance RO/SRO 3.1 3.3

10CFR Link (CFR 41.7 / 45.5 / 45.6)

NRC K/A Generic

# 30	✔ RO ✔ SRO	Question ID: 1000047	Origin: New	Memory? (Check=Yes)

The approved discharge permit for "A" CWMT authorizes a discharge flow rate of 100 gpm.
The Aux. Building PEO initiates the discharge of the "A" CWMT with an initial tank level of 87%.
At the end of exactly 16 minutes the PEO records the "A" CWMT level at 82%.
Flow recorder FR-9050 indicates that 1150 gallons have been discharged.
The PEO checks the flow rate using the following formula from the procedure:
Flow Rate = [Previous level (%) - Current level (%)] x 320 gallons per % level divided by "Time interval between recording levels (minutes)"
The PEO requests that you perform an independent check of his calculations.

Based on your calculation you would direct the PEO to:

A Readjust the discharge flow control valve to raise the discharge rate accordingly.

B Readjust the discharge flow control valve to lower the discharge rate accordingly.

C Secure the discharge, then recommence by controlling the discharge flow rate based on tank level change. ✔

D Continue the discharge and recheck FR-9050 versus "A" CWMT delta-level at the end of one hour.

Justification	C: correct, the flow instrument must be considered inop, 2617A directs securing the discharge and recommencing using delta-level method; A: examinees may chose this distractor if they believe actual flow is too low based on FR-9050 reading; B: examinees may chose this distractor if they believe actual flow is too high based on delta-level calculation; D: examinees may chose this distractor if they feel that 16 minutes is too short a duration for valid data
Reference	MP2*LOIT, 2617A, CLRWS, MB-04398

NRC K/A System/E/A

NRC K/A Generic

System 059 Accidental Liquid Radwaste Release

Number AA1.03

Ability to operate and / or monitor the following as they apply to the Accidental Liquid Radwaste Release: Flow rate controller

Importance RO/SRO 3.0 2.9

10CFR Link (CFR 41.7 / 45.5 / 45.6)

 # 31 | ✔ RO ✔ SRO | Question ID: **1000107** | Origin: **New** | Memory? (Check=Yes)

Two days prior to shutdown for a refueling outage, an alarm is received on R8997, Charging Pump Area Ventilation Radiation Monitor. The radiation monitor is reading just above the alarm setpoint.

The following radiation monitors also indicate a relatively small, but steady, unexplained rise:

- R8434B, Aux Building Gaseous Radiation Monitor
- R8998, VCT Area Ventilation Radiation Monitor
- R8132B, U2 Stack Gas Radiation Monitor

The response of these radiation monitors was caused by which of the following:

A A rupture of the waste gas surge tank during RCS degasification.

B A pinhole leak in the degassifier after cooler. ✔

C Evaporation of water in the SFP lowers level by 18 inches.

D Rupture of a piping section during a spent resin transfer to the Spent Resin Tank.

Justification "A" is incorrect because a rupture of the waste gas surge tank would result in nearly instantaneous alarms on the listed Radiation Monitors, plus others.
"C" is incorrect because a reduction in SFP level will result in the SFP walls drying out. This will cause a gradual rise in particulate activity which would be seen on R8145A, SFP Exhaust Particulate Radiation Monitor and R8132A, U2 Stack Particulate Radiation Monitor.
"D" is incorrect because a rupture of a spent resin line would cause an immediate jump in associated RMs.

Reference LOIT, RMS-00-C, RM, gaseous, 2617B, MB-00685

NRC K/A System/E/A

System 060 Accidental Gaseous Radwaste Release

Number AA2.01

Ability to determine and interpret the following as they apply to the Accidental Gaseous Radwaste: A radiation-level alarm, as to whether the cause was due to a gradual (in time) signal increase or due to a sudden increase (a spike), including the use of strip-chart recorders, meter and alarm observations

Importance RO/SRO 3.1 3.7

10CFR Link (CFR: 43.5 / 45.13)

NRC K/A Generic

 # 32 | ✔ RO ✔ SRO | Question ID: **0054838** | Origin: **Modified** | Memory? (Check=Yes)

Which of the following must be verified in response to an alarm on the Unit 2 Stack Gaseous and Particulate High Range (Kaman) Radiation Monitor (RM-8168) and why must it be verified?

A All running Main Exhaust fans tripped; to ensure the release limits associated with Unit 2 are NOT exceeded.

B Control Room Ventilation in Recirculation mode; to prevent airborne exposure to the Control Room inhabitants.

C Closure of containment Hydrogen Purge Valves (2-EB-91/92/99/100); to limit the release to the environment from a subsequent LOCA.

D Purge of the MP2 Stack Gaseous Radiation Monitor (RM-8132B); to prevent self contamination of the radiation monitor. ✔

Justification D: correct, ARP 2590E; A: ME fans trip in response to CIAS; B: RM-9799A/B alarming causes CRACS in recirc; C: RM-8240/8241 alarming causes closure of H2 purge valves if open

Reference MP2*LOIT*2088 [072 RMS-01-C 5046] (8/27/96) RM, 2383, NRC, APP

NRC K/A System/E/A

System 061 Area Radiation Monitoring (ARM) System Alarms

Number AK3.02

Knowledge of the reasons for the following responses as they apply to the Area Radiation Monitoring (ARM) System Alarms: Guidance contained in alarm response for ARM system

Importance RO/SRO 3.4 3.6

10CFR Link (CFR 41.5,41.10 / 45.6 / 45.13)

NRC K/A Generic

# 33	✔ RO ✔ SRO	Question ID: **1000074**	Origin: **New**	Memory? (Check=Yes)

The plant experienced a small break LOCA concurrent with an ESDE.
On the trip, off-site power was lost and the 'A' EDG output breaker failed to close.
All Facility 2 equipment responded as designed.
The crew completed 2525, diagnosed 2 events and entered EOP 2540.
Two of the 'B' header HPSI valves have been throttled shut and the 'B' CS pump has been secured.
After the 'A' EDG output breaker was repaired the SPO is restoring vital auxiliaries using EOP 2540B, MVA-AC-3.
The EDG was started, closed onto bus 24C, and the 'A' SW pump has been started.

With respect to Facility 1 RBCCW, what is the correct action to be performed?

A Throttle the 'A' RBCCW pump discharge to 10%, start the pump, and throttle the discharge open. ✔

B Close RBCCW Supply to "A" Shutdown Cooling Heat Exchanger, 2-RB-13.1A.

C Start and run both Facility 1 Containment Air Recirculation fans >15 minutes prior to starting Facility 1 RBCCW.

D Check RBCCW surge tank level >40% then start Facility 1 RBCCW pump at full flow.

Justification A: correct, CTMT pressure is <20# (CS PP off), pp has been off >5 mins requires throttling discharge on start; B: valve will NOT receive an open signal on the SIAS; therefore it does NOT need to be closed. Student may believe it needs to be closed to limit RBCCW flow through the Facility 1 header.; C: area of concern for water hammer is hot RBCCW in idle CAR cooler flashing on pp start, running fans would cool the water; D: ensuring surge tank level >40% addresses subcooled margin for heated water pocket in CAR coolers

Reference MP2*LOIT, 2540, FR, RBCCW, MB-05925

NRC K/A System/E/A

System E09 Functional Recovery

Number EK2.1

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

Importance RO/SRO 3.6 3.9

10CFR Link (CFR: 41.7 / 45.7)

NRC K/A Generic

 # 34 | ✔ RO ✔ SRO | Question ID: **0164580** | **Origin: Modified** | Memory? (Check=Yes)

The following conditions exist:
The plant is at 100% power
The 'C' Charging pump is operating with normal letdown flow
Pressurizer level control is selected to Channel "Y"

If Bus 22F was then lost, which one of the following describes the condition of charging and letdown approximately 3 minutes following the bus loss, with all controls in Auto and NO operator action?

A No charging pumps operating and no letdown flow ✔

B No charging pumps operating and maximum letdown flow

C First backup charging pump operating and maximum letdown flow

D First backup charging pump operating and no letdown flow

Justification A: Correct, with the loss of Bus 22F, "C" charging pump is lost. With 40 gpm letdown flow and no charging, letdown will rapidly isolate due to high temperature; B & C: without isolation of letdown on high temperature, either answer would be plausible; D: could be selected if examinee recognized letdown loss on high temperature, but didn't fully understand backup charging pump start logic.

Reference MP2*LORT MB-00236 C98503, 2503F, MB-05632

NRC K/A System/E/A

System 028 Pressurizer (PZR) Level Control Malfunction

Number AA1.02

Ability to operate and / or monitor the following as they apply to the Pressurizer Level Control Malfunctions: CVCS

Importance RO/SRO 3.4 3.4

10CFR Link (CFR 41.7 / 45.5 / 45.6)

NRC K/A Generic

 # 35 | ✔ RO ✔ SRO | Question ID: **1000012** | **Origin: New** | Memory? (Check=Yes)

The plant is at 100% power, the 'A' Instrument Air Compressor is out of service, otherwise all systems are aligned normally.
The 'C' Instrument Air Compressor is in service, maintaining header pressure at 120 psig.
A fault in the 345 kV switchyard causes a plant trip and a loss of all off-site power.
While performing Standard Post Trip Actions the SPO notices instrument air header pressure at 105 psig and decreasing slowly.

What action, (if any), must the operator take to ensure a continued supply of instrument air?

A The controller for the 'C' Instrument Air Compressor must be reset due to the momentary loss of power.

B No action required, the 'B' Instrument Air Compressor will auto-start at 91 psig decreasing.

C The controller for the 'B' Instrument Air Compressor must be reset and valve 2-SW-3.2A overridden open to supply cooling to TBCCW.

D Station Air must be x-tied from unit 3 and handswitch SA-10.1, Station Air to Instrument Air X-tie on C06 must be placed to open. ✔

Justification	D: correct; A: the power supply for 'C' IAC is de-energized on a loss of all off-site power; B: the 'B' IAC has power and its auto-start setpoint is 91 psig, but its controller drops out on loss of power and must be manually reset; C: all 3 TBCCW pumps are powered from non-vital busses, therefore they are de-energized, although the 'B' IAC can be restarted it will shutdown very shortly due to high temperature
Reference	MP2*LOIT AOP 2563 Loss of IA, MB-05431

NRC K/A System/E/A

System 065 Loss of Instrument Air

Number GA

SEE GENERIC K/A

Importance RO/SRO

10CFR Link

NRC K/A Generic

2.4 Emergency Procedures /Plan

2.4.48

"Ability to interpret control room indications to verify the status and operation of system, and understand how operator actions and directives affect plant and system conditions."

3.5 3.8

(CFR: 43.5 / 45.12)

 # 36 | ✔ RO ✔ SRO | Question ID: **0156778** | **Origin: Modified** | ✔ Memory? (Check=Yes)

Initial Conditions: 100% power, no equipment out of service, all systems aligned normally.
The crew detects a 3 gpm RCS leak and enters AOP 2568.
During the performance of AOP 2568, the SPO determines a steady rise in RBCCW surge tank level of ~3 gpm.

Which of the following lists contains only components which must be considered as potential sources of leakage for the stated condition?

A Letdown Heat Exchanger, RCS Sample Cooler, Quench Tank/Primary Drain Tank Cooler

B Letdown Heat Exchanger, RCS Sample Cooler, RCP thermal barrier and seal coolers ✔

C Letdown Heat Exchanger, Quench Tank/Primary Drain Tank Cooler, RCP thermal barrier and seal coolers

D RCS Sample Cooler, PDT and Quench Tank Heat Exchanger, RCP thermal barrier and seal coolers

Justification B: correct, the 3 listed components have a higher pressure on the side exposed to primary water; the QT/PDT cooler is normally not pressurized on the primary side and even when it is the pressure is significantly lower than RBCCW presure.

Reference MP2*LOIT*4218 [000 568-01-B 1488] (9/9/96) 2568, AOP, NRC, APP, MB-05505

NRC K/A System/E/A

System A16 Excess RCS Leakage

Number AK2.1

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.

Importance RO/SRO 3.2 3.5

10CFR Link (CFR: 41.7 / 45.7)

NRC K/A Generic

37 | ✔ RO | SRO | Question ID: 1000013 | Origin: New | Memory? (Check=Yes)

Which of the following conditions would prevent closing the Reactor Protection System trip circuit breakers, (TCBs)?

A Turbine trip not reset

B SG level transmitters failed high on Channel 'A' for SG #1 and Channel 'C' for SG #2

C SG pressure transmitters failed low on Channel 'A' for SG #1 and Channel 'A' for SG #2

D Containment pressure transmitters failed high on Channel 'B' and 'D' ✔

Justification	A: turbine trip input is automatically bypassed below ~15% power; B: High SG level on 2 channels is a valid trip input for the turbine, but not for the RPS; C: Low SG pressure is a valid trip input for the RPS, but coming in on the same channel for both SGs doesn't satisfy the 2/4 logic required to trip; D: Containment pressure is a valid input to RPS to ensure the reactor is tripped on a condition requiring SIAS.
Reference	MP2*LOIT, RPS trips, 2302A, TCBs, MB-03153

NRC K/A System/E/A

System 001 Control Rod Drive System

Number K4.10

Knowledge of CRDS design feature(s) and/or interlock(s) which provide for the following: Trip signals that would prevent reset of reactor trip signals

Importance RO/SRO 3.6 3.8

10CFR Link (CFR: 41.7)

NRC K/A Generic

38 | ✔ RO ✔ SRO | Question ID: **0153900** | Origin: **Modified** | Memory? (Check=Yes)

The plant had operated at 100% for 45 days when the "A" SGFP sprung an oil leak.
Power was reduced to remove the 'A' steam generator feed pump from service for repair.
Reactor Engineering has established an ESI of 0.0 as read on channel 'D'.
Channel 'D' ASI currently indicates +0.022.
Reactor power has just reached 55%.
Group 7 CEAs are currently at 165 steps.

As xenon builds in, which of the following actions should the PPO perform to maintain ASI within the allowable band over the next 4 hours?

A Dilute the RCS to maintain power; withdraw CEAs to control ASI. ✔

B Dilute the RCS to maintain power; ASI will move in the direction of the ESI as the boron is diluted.

C Dilute the RCS to maintain power; insert CEAs to control ASI.

D Insert CEAs to maintain power and control ASI.

Justification OP 2393, section 5.4, requires a band of plus or minus 0.03 around the ESI once the power has been stabilized. In this case the ASI must be maintained between 0.03 and -0.03. The voltmeter reading +0.022 is a factor of ten higher than ASI (precaution 4.7); therefore, ASI is +0.0022. This value is well within the allowable band. However, the axial flux distribution is slightly bottom peaked. Over the next few hours, the Xenon will build up faster in the top of the core due to the lower relative flux. ASI will then shift even more to the bottom of the core. This requires CEA withdrawal to move the flux shape back to the ESI. Also, in order to counter the overall increase in Xenon concentration in the core, the operators will need to dilute boron to maintain a constant reactor power.

Reference MP2*LOIT*5042 [152 117-01-C 165] (10/16/97) 2393, ASI, ESI, MB-02082

NRC K/A System/E/A

System 001 Control Rod Drive System

Number GS

SEE GENERIC K/A

Importance RO/SRO 2.8 3.2

10CFR Link (CFR: 43.6)

NRC K/A Generic

2.2 Equipment Control

2.2.34

Knowledge of the process for determining the internal and external effects on core reactivity.

# 39	✔ RO	SRO	Question ID: 1000024	Origin: New	Memory? (Check=Yes)

CONVEX calls to inform the plant that a peak demand situation is forecast with voltage expected to decrease approximately 5% from its present value of 359 kV to 341 kV.

What is the expected affect that this voltage reduction will have on the RCPs and what action should operators take?

A RCP motor windings will heat up minimally. No action required unless computer alarms are received. ✔

B RCP stator heating will decrease bearing oil viscosity. RBCCW temperature must be lowered to offset heatup.

C RCP flow capacity will be decreased. Monitor the RPS Low-Flow Trip bistables for proximity to pre-trips.

D RCP rotation will slow by ~5%. Monitor the RPS Underspeed Trip bistables for proximity to pre-trips.

Justification	A: correct, decreased voltage will increase current flow with slight heat up of motor windings. Computer alarms will warn operators well before any temperature limits are exceeded; B: Any effect of higher motor winding temperature will be too small to affect oil viscosity; C: RCS flow is constant, synchronous speed pump, same gpm per revolution-same rpm; D: RCP speed dictated by frequency not voltage
Reference	MP2*LOIT, 2590B, 2301C, RCP, 345 Kv, MB-03043

NRC K/A System/E/A

System 003 Reactor Coolant Pump System (RCPS)

Number A2.03

Ability to (a) predict the impacts of the following malfunctions or operations on the RCPS; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: Problems associated with RCP motors, including faulty motors and current, and winding and bearing temperature problems

Importance RO/SRO 2.7 3.1

10CFR Link (CFR: 41.5 / 43.5/ 45.3 / 45/13)

NRC K/A Generic

 # 40 | ✔ RO ✔ SRO | Question ID: **0154360** | **Origin: Modified** | Memory? (Check=Yes)

Initial Conditions: 100% power, 2250 psia, no equipment out of service, all systems aligned normally
Annunciator C02/3*BA26 "RCP C MID SEAL PRES HI" alarm actuates.
The PPO goes to C-04R and obtains the following readings:

Vapor seal: 60 psig and steady
Upper seal: 1050 psig and steady
Middle seal: 1950 psig and steady

Based on these readings, which "C" RCP seal has failed?

A Lower ✔

B Middle

C Upper

D Vapor

Justification OP 2301C, Section 4.13; An RCP seal is considered to have failed when the D/P across that stage is less than or equal to 500 psia and the RCS is between 2200 and 2300 psia. With the lower seal dropping 300 psid, the middle seal dropping 900 psid, and the upper seal dropping 990 psid; the lower seal meets the procedural criteria to be considered failed.

Reference MP2*LORT*6592 [003 RCS-01-C 4933] (2/26/97) RCP, OP2301C, MB-03038

NRC K/A System/E/A

System 003 Reactor Coolant Pump System (RCPS)

Number A4.04

Ability to manually operate and/or monitor in the control room: RCP seal differential pressure instrumentation

Importance RO/SRO 3.1 3.0

10CFR Link (CFR: 41.7 / 45.5 to 45.8)

NRC K/A Generic

41 | ✔ RO ✔ SRO | Question ID: 1000121 | Origin: New | Memory? (Check=Yes)

Due to the loss of the "A" RCP, the crew is required to initiate shutdown cooling (SDC) WITHOUT concurrent reactor coolant pump (RCP) operations. The following conditions exist:

- Pressurizer pressure is 350 psia
- Pressurizer steam space temperature, T109, is 432°F
- The final 2 RCPs have been secured

Auxiliary spray must be initiated to reduce RCS pressure to allow the initiation of SDC.

Which of the following will result in exceeding the maximum spray line differential temperature allowed by the Technical Requirements Manual?

A Spray line temperatures, T-103 and T-104, indicate 225°F

B Charging header temperature, T-229, indicates 195°F

C Volume control tank (VCT) temperature, T-225 indicates 75°F

D Containment temperature, CVCONTEMP, indicates 78°F ✔

Justification The maximum spray line differential temperature allowed by the TRM is 350°F to limit thermal stress on the spray nozzle. Transient Temperature Verification, SP 2602B, states, "If RCPs are NOT operating, Containment average temperature, CVCONTEMP, or positions 5 and 6 of TEMP SEL SW (C-01) is used to calculate differential temperature when spray flow is initiated." (SP 2602B provides an administrative limit of 200°F differential temperature on the pressurizer spray nozzle.)
"A" is incorrect because spray line temperatures are used to calculate differential temperature only while RCPs are running.
"B" is incorrect because charging header temperature is used only AFTER auxiliary spray has been initiated.
"C" is incorrect because VCT temperature is NOT used to calculate spray nozzle differential temperature.

Reference LOIT, CVS-00-C, CVCS, SDC, 2304C, 2207, 2310, SP 2602B, MB-05322

NRC K/A System/E/A

System 004 Chemical and Volume Control System

Number K5.11

Knowledge of the operational implications of the following concepts as they apply to the CVCS: Thermal stress, brittle fracture, pressurized thermal shock

Importance RO/SRO 3.6 3.9

10CFR Link (CFR: 41.5/45.7)

NRC K/A Generic

 # 42 | ✔ RO | SRO | Question ID: **1000015** | **Origin: New** | Memory? (Check=Yes)

You are reviewing an ECP prior to making the RCS boron adjustment specified in the ECP . The calculation is referenced to pre-trip reactivity conditions.
Pre-trip conditions were: 100% steady-state power, equilibrium Xenon, 9200 MWD/MTU core burnup, 876 ppm boron, all CEAs at 180 steps withdrawn, normal operating temperature and pressure.
ECP conditions are: 7 hours post-trip, 532° F, normal operating pressure, target CEA position of Group 7 @ 60 steps withdrawn.

When totaling the defects to verify the boron change, which of the following sets of reactivity defects lists the correct direction (sign) for all of the defects?

A Moderator (-); Fuel (-); Xenon (+); Samarium (+); CEAs (+); Burnup (no change)

B Moderator (+); Fuel (+); Xenon (-); Samarium (-); CEAs (-); Burnup (-)

C Moderator (+); Fuel (+); Xenon (-); Samarium (-); CEAs (-); Burnup (no change) ✔

D Moderator (-); Fuel (-); Xenon (+); Samarium (no change); CEAs (+); Burnup (-)

Justification C: correct, A: the direction assigned to each reactivity component is exact opposite of correct, if examinee doesn't apply proper sign convention this answer could be chosen; B: if examinee makes the improper assumption that a later time equals more burnup and incorrectly assesses MTC and FTC this answer could be chosen; D: if examinee makes similar assumptions as in B, but considers Sm change to be neglible this answer could be chosen

Reference MP2*LOIT, ECP, 2208, MB-02866

NRC K/A System/E/A

System 004 Chemical and Volume Control System

Number A4.02

Ability to manually operate and/or monitor in the control room: Calculation of ECP and related boration/dilution/reactivity relationships

Importance RO/SRO 3.2 3.9

10CFR Link (CFR: 41/7 / 45.5 to 45.8)

NRC K/A Generic

# 43	✔ RO	SRO	Question ID: 1000016	Origin: New	Memory? (Check=Yes)

A personnel error while working in ESAS actuation cabinet AC-5 generates ONLY a spurious Facility 1 SRAS. There have been NO operator actions taken yet in response to the spurious SRAS when a design basis Large Break LOCA occurs approximately one minute later.

If NO operator actions are taken, what will be the affect on RCS injection/core cooling and containment pressure and why?

A RCS injection will be unaffected, but containment pressure will be lower. The SDC heat exchanger outlet goes open, cooling the facility one containment spray.

B RCS injection will be reduced, but containment pressure will be unaffected. The 'A' LPSI pump NOT starting due to SRAS reduces the amount of core cooling provided by facility 1.

C Neither RCS injection nor containment pressure will be affected by the SRAS signal. ESAS requires a valid SIAS in order to process an SRAS signal.

D RCS injection will be reduced and containment pressure will be higher. No facility 1 injection or spray due to containment pressure backseating the RWST outlet check valve ✔

Justification D: correct, the DBA LBLOCA generates >40# in CTMT which is sufficient to backseat the RWST suction header check valve, thereby starving the ECCS equipment on Z1 suction header; A: no HPSI, LPSI, or CS flow; the SDC Hx outlet will go open, but no flow on the CS side going to CTMT; B: no HPSI, LPSI, or CS flow; SRAS sends a stop signal to the LPSI pump, but this is irrelevant, w/o a viable suction header the pump would not provide flow; C: the CSAS actuation requires a valid SIAS

Reference MP2*LOIT, ESAS, SRAS, 2571, MB-02468

NRC K/A System/E/A

System 013 Engineered Safety Features Actuation System (ESFAS)

Number K3.02

Knowledge of the effect that a loss or malfunction of the ESFAS will have on the following: RCS

Importance RO/SRO 4.3 4.5

10CFR Link (CFR: 41.7 / 45.6)

NRC K/A Generic

# 44	✔ RO	SRO	Question ID: **0054764**	Origin: **Bank**	✔ Memory? (Check=Yes)

Which one of the following conditions will initiate an Auxiliary Feedwater Actuation Signal (AFAS)?

A Channels "A" and "C" of ESAS sense PZR pressure at 2410 psia for 15 seconds.

B Channel "C" and "D" level detectors on #1 S/G sense water level at 10% for 3 minutes and 30 seconds. ✔

C Channel "B" and "D" of RPS sense PZR pressure at 2410 psia AND delta T power at 18% for 12 seconds.

D NI Control Channels "9" and "10" sense power at 25% for 3 minutes and 30 seconds.

Justification Auto Aux Feedwater will start if S/G level is < 27% for 3 minutes & 25 seconds. "A" not correct because need Control Channel NI of > 20% along with the high pressure and time delay. "C" NOT correct because we use Control Channel NI power (NOT delta T power) and it's less than 20% anyway.

Reference MP2*LOIT*2012 [061 AFW-01-C 2530] (8/19/96) 2322, AFAS, ATWS, MB-02470

NRC K/A System/E/A

System 013 Engineered Safety Features Actuation System (ESFAS)

Number A3.01

Ability to monitor automatic operation of the ESFAS including: Input channels and logic

Importance RO/SRO 3.7 3.9

10CFR Link (CFR: 41.7 / 45.5)

NRC K/A Generic

# 45	✔ RO	SRO	Question ID: 1000017	Origin: New	Memory? (Check=Yes)

Initial Conditions: 100% power, steady-state, ASI 0.01 as read on RPS channel 'A'.
Channel 'B' linear range NI lower detector fails to 15% .
Channel 'B' linear range NI upper detector remains at 51%.

What effect will this have on the Reactor Protection System (RPS)?

A Channel 'B' RPS will trip on LPD due to a large negative offset, TM/LP setpoint will go to minimum, comparator averager Hi alarm will actuate on channel 'B' RPS..

B Channel 'B' RPS will trip on LPD due to a large positive offset, TM/LP setpoint will go to minimum, comparator averager Hi alarm will actuate on channel 'B' RPS.

C Channel 'B' RPS will trip on LPD due to a large positive offset, TM/LP setpoint will increase, comparator averager Hi & Hi-Hi alarms will actuate on channel 'B' RPS.

D Channel 'B' RPS will trip on LPD due to a large negative offset, TM/LP setpoint will increase, comparator averager Hi & Hi-Hi alarms will actuate on channel 'B' RPS. ✔

Justification	D: correct ASI is L-U/L+U, ASI becomes ~ -0.5, drop in indicated power tends to lower TM/LP setpoint, but ASI effect more than offsets the effect, comparator averager Hi & Hi-Hi alarms will actuate on channel 'B' RPS; distractors may be chosen based on math sign error in evaluating ASI, neglecting to consider the effect of ASI on TM/LP, and underestimating the affect on channel 'B' versus the average
Reference	MP2*LOIT RPS, 2381, TM/LP, ASI, NI, MB-01437

NRC K/A System/E/A

NRC K/A Generic

System 015 Nuclear Instrumentation System

Number K3.01

Knowledge of the effect that a loss or malfunction of the NIS will have on the following: RPS

Importance RO/SRO 3.9 4.3

10CFR Link (CFR: 41.7 / 45.6)

46 | ✔ RO ✔ SRO | Question ID: 0153297 | Origin: Modified | Memory? (Check=Yes)

A reactor start up is in progress.
An ECP has been performed for Group 7 @ 60 steps.
The PPO stops Manual Sequential CEA withdrawal with Group 5 at 60 steps to fully withdraw Group 4 CEAs in Manual Individual.
The SPO notes that the Level 1 and Level 2 bistables red lights are on solid, (not flashing), on all 4 RPS channels.

Based on the above conditions, which one of the following is the correct course of action?

A Level 1 and 2 bistable lights lit is expected, RE must perform I/M plot for Group 4 CEAs fully withdrawn.

B Immediately fully insert all regulating CEAs. ✔

C Verify the wide range meters on C-04 have shifted from "CPS" to "%".

D The RPS wide range drawers were not properly initialized, use toggle switches to reset the level 1 and 2 bistables.

Justification	B: correct, Level 1 and 2 bistables lights energize at 10-4% power, criticality occurs ~10-5%, with 2 CEA groups to go before reaching critical rod height there is a reactivity imbalance. The reactor startup procedure requires that the regulating CEAs be inserted and a new ECP be calculated.; A: RE normally performs 1/M at CEA group top, but bistable lights are not expected at this point in startup and CEA insertion takes precedence over 1/M; C: CPS to % change is indicated by a single red light on wide range drawer labeled extended range; D: if the drawer had not been properly initialized the bistable lights would be flashing, lights flash when resetting, solid indicates bistable is armed
Reference	MP2*LORT*1954 [015 NIS-01-C 4713] (1/9/97) 2202, ECP, SDM, CEA, MB-04065

NRC K/A System/E/A

NRC K/A Generic

System 015 Nuclear Instrumentation System

Number A3.01

Ability to monitor automatic operation of the NIS, including: Console and cabinet indications

Importance RO/SRO 3.8 3.8

10CFR Link (CFR: 41.7 / 45.5)

# 47	✔ RO ✔ SRO	Question ID: 1000018	Origin: New	Memory? (Check=Yes)

During a Large Break LOCA which of the following sets of data provide definite indication that a portion of the core height is uncovered?

A Pressurizer pressure: 750 psia; RVLMS level: 0%; Maximum HJTC temperature: 712° F

B Pressurizer pressure: 900 psia; RVLMS level: 0%; Maximum CET temperature: 532° F

C Pressurizer pressure: 750 psia; Maximum HJTC temperature: 750° F; Maximum CET temperature: 525° F ✔

D Pressurizer pressure: 900 psia; Maximum HJTC temperature: 800° F; Loop 1 & 2 Th 530° F

Justification	C: correct, for 750 psia CET @ 525 indicates ~14° F superheat; A: RVLMS @ 0% only means the lowest RVLMS thermocouple (at 7%) is uncovered, the heated junction thermocouple (HJTC) would be expected to read >200° F above saturation temperature of 511° F; B: RVLMS @ 0% only means the lowest RVLMS thermocouple (at 7%) is uncovered, P/T relationship is saturated; D: HJTC reading is within reason for uncovered in a saturated environment, P/T relationship is saturated.
Reference	MP2*LOIT, ICCS, CET, SCM, 2387, MB-08084 **Requires use of Steam Tables**

NRC K/A System/E/A

System 017 In-Core Temperature Monitor System (ITM)

Number A1.01

Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating the ITM system controls including: Core exit temperature

Importance RO/SRO 3.7 3.9

10CFR Link (CFR: 41.5 / 45.7)

NRC K/A Generic

# 48	☑ RO ☐ SRO	Question ID: 1000019	Origin: New	☐ Memory? (Check=Yes)

Initial Conditions: 100% power, 'A' EDG is out for PMs, 'A', 'B', and 'C' CAR fans running in Fast.
A small break LOCA develops. When the plant is tripped, the RSST is lost due to a fault.
All other plant equipment operates as expected.
SIAS has NOT actuated, but containment pressure is >1.0 psig, contingency actions in EOP 2525 direct the operator to:
-Ensure at least 2 CAR fans operating with RBCCW cooling
-Shift all available Containment Aux. Circ. Fans to SLOW
-Start all available PIR fans

What must the operator perform to accomplish the directed actions?

A Verify 'B' & 'D' CAR fans in Slow, neither Containment Aux. Circ. Fan is available, start 'B' PIR fan ☑

B Verify 'B' CAR fan in Fast start 'D' in Fast, neither Containment Aux. Circ. Fan available, start 'B' PIR fan ☐

C Verify 'B' & 'D' CAR fans in Slow, shift 'B' Containment Aux. Circ. Fan to Slow, start 'B' PIR fan ☐

D Verify 'B' CAR fan in Fast start 'D' in Fast, shift 'B' Containment Aux. Circ. Fan to Slow, start 'B' PIR fan ☐

Justification A: correct, only B & D CAR fans powered due to no 'A' DG and CAR fans start in Slow or shift to Slow on SIAS or UV, CTMT Aux Circ fans are non-vital power, only 'B' PIR fan has power to star and doesn't auto-start on any signal ; B: chosen if examinee thinks CAR fans only start/shift to Slow on SIAS; C: chosen if examinee thinks Aux Circ fans are vital powered; D: chosen if examinee thinks CAR fans only start/shift to Slow on SIAS and Aux Circ fans are vital powered

Reference MP2*LOIT, CAR, CCS, 2313A, MB-05425

NRC K/A System/E/A

NRC K/A Generic

System 022 Containment Cooling System (CCS)

Number K2.01

Knowledge of power supplies to the following:
Containment cooling fans

Importance RO/SRO 3.0 3.1

10CFR Link (CFR:41.7)

 # 49 ☑ RO ☑ SRO Question ID: **1000110** Origin: **New** ☐ Memory? (Check=Yes)

A reactor trip occurred from 100% power. During the performance of EOP 2525, Standard Post Trip Actions, the SPO notes that only the 6900 volt AC buses are deenergized due to a failure to transfer to the RSST. All other electrical buses are energized from their normal source.

Which of the following describes the effect of the loss of power on the secondary system and the appropriate subsequent actions?

A The loss of condensate flow to the main turbine seals will cause a loss of condenser vacuum. Per EOP 2526, Reactor Trip Recovery, the SPO must immediately open the atmospheric dumps in MANUAL. ☐

B Condenser vacuum will be lost due to the loss of cooling to the steam jet air ejector. Per EOP 2525, Standard Post Trip Actions, the SPO must close the MSIVs and open 2-AR-17, Condenser Vacuum Breaker. ☑

C Severe water hammer will occur in the feedwater heaters due the to loss of cooling by condensate. Per OP 2320, Feedwater System, the SPO must close the steam supply valves to the feedwater heaters. ☐

D The condensate surge tank will overflow resulting in a chemical release to the environment. Per OP 2319B, Condensate Storage and Surge System, the reject valve to the surge tank must be isolated. ☐

Justification A loss of 6900 Volt AC buses results in a loss of condensate pumps. The loss of condensate will result in a loss of condenser vacuum due to the loss of cooling for the SJAE and the loss of flow to the feed pump seals. EOP 2525, step 11 states that if offsite power is lost or the condenser is NOT available, then close both MSIVs and open 2-AR-17, condenser vacuum breaker.
"A" is incorrect because turbine seals will still be maintained by gland seal steam (NOT condensate) until the MSIVs are closed. Closing the MSIVs will result in automatic opening of the atmospheric dump valves This is credible if the student does not remember what supplies the turbine seals. Also, the student may incorrectly believe that the ADVs must be immediately opened manually.
"C" is incorrect; although cooling is lost to the feedwater heaters, closing the steam supply valves will do no good. There is no extraction steam from the turbine to supply the heaters.
"D" is incorrect because condensate pump discharge pressure provides flow to the CST. A loss of 6900 volt AC buses causes a loss of condensate pumps; therefore the CST will NOT fill up.

Reference LOIT, E25-00-C, 6.9Kv, Condensate, 2319A, 2525, MB-05431

NRC K/A System/E/A

NRC K/A Generic

System 056 Condensate System

Number A2.04

Ability to (a) predict the impacts of the following malfunctions or operations on the Condensate System; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations
Loss of condensate pumps

Importance RO/SRO 2.6 2.8

10CFR Link (CFR: 41.5/43.5/45.3/45.13)

 # 50 ☑ RO ☐ SRO Question ID: **0169415** **Origin: Modified** ☑ Memory? (Check=Yes)

The D/P across the condensate demineralizers is limited to 60 psid during normal operating condition.

The limitation is in place to _____.

The action performed when demineralizer D/P approaches or exceeds this limit while operating at 100% power is to _____.

A reduce resin degradation due to high pressure
place an additional demineralizer in service. ☐

B prevent exceeding design flow through the demineralizers
reduce power until demineralizer D/P is less than 60 psid. ☐

C prevent loss of main feed pump suction pressure
throttle open the condensate demineralizer bypass valve, CNM-2. ☑

D reduce resin carry-over to the steam generators
trip the reactor and secure condensate pumps. ☐

Justification OP 2319A, precaution 3.3 states that CPF differential pressure should be maintained less than 60 psid. The reason for not exceeding 60 psid is to prevent loss of suction pressure for the SGFPs. Annunciator Response Procedure, ARP 2693E, for annunciator E-3, CONDENSATE POLISHER DIFFERENTIAL PRESSURE HIGH, has a setpoint of 60 psid corresponding to the limit of the precaution. Step 5 states that if the alarm is due to excess condensate flow for the present power level, then verify that condensate header pressure is not lowering to the feed pump low suction pressure trip and open COND DEMIN BYP valve, CNM-2.
"A" is incorrect because the resin will not degrade due to high pressure. Additionally, the spare demineralizer is not placed in service at 100% power.
"B" is incorrect because 60 psid does not necessarily mean the demineralizer flow limit has been exceeded. Reducing power may reduce demineralizer D/P, but it is not the fastest or most efficient means. There is no procedural requirement to reduce power to reduce CFP D/P.
"D" is incorrect because a high D/P does not mean that a demineralizer failure is imminent. Additionally, the reactor would not be tripped for a CPF high D/P.

Reference MP2*LOIT, CPF-00-C, CPF 2319C, MB-02387

NRC K/A System/E/A

System 056 Condensate System

Number GS

SEE GENERIC K/A

Importance RO/SRO

10CFR Link

NRC K/A Generic

2.1 Conduct of Operations

2.1.32

Ability to explain and apply all system limits and precautions

3.4 3.8

(CFR: 41.10 / 43.2 / 45.12)

 # 51 ☑ RO ☐ SRO Question ID: **1000111** Origin: **New** ☐ Memory? (Check=Yes)

While operating at 100% power, a turbine control malfunction resulted in a turbine trip. During the performance of EOP 2525, Standard Post Trip Actions, the following parameters are queried and reported:

- All CEAs are inserted
- The turbine is tripped
- All electrical buses are energized
- Pressurizer level is 22% and lowering
- Pressurizer pressure is 1820 psia and lowering
- All RCPs are operating
- #1 S/G pressure is 810 psia and lowering
- #2 S/G pressure is 840 psia and lowering
- RCS Tc is 521°F and lowering

The operators are continuing to perform the actions of EOP 2525.

At this point in EOP 2525, which of the following statements describes the event or condition that would result in the above indications?

A A small break LOCA resulting in a loss of pressurizer pressure and level. ☐

B Loss of feedwater to #1 S/G causing a reduction in #1 S/G pressure. ☐

C #1 feed regulating valve failed to close causing an excessive cooldown. ☑

D #2 atmospheric dump valve failed open causing a swell on #2 S/G. ☐

Justification Overfeeding of either or both S/Gs would cause RCS temperature to lower which would result in the other indications. S/G pressure would initially lower more on the affected S/G.
"A" is incorrect because a small break LOCA would have no affect on RCS temperature until safety injection flow was initiated. Pressurizer pressure and level would be the only parameters initially affected.
"B" is incorrect because a loss of feedwater to either or both S/Gs would not cause a reduction in any primary system parameters.
"D" is incorrect because a failure of #2 ADV (open) would cause #2 S/G pressure to be lower than #1 S/G pressure.

Reference LOIT, MFW-00-C, MFW, 2321, MB-05432

NRC K/A System/E/A

NRC K/A Generic

System 059 Main Feedwater (MFW) System

Number K1.05

Knowledge of the physical connections and/or cause-effect relationships between the MFW and the following systems: RCS

Importance RO/SRO 3.1 3.2

10CFR Link (CFR: 41.2 to 41.9 / 45.7 to 45.8)

 # 52 ☑ RO ☑ SRO Question ID: **1000112** Origin: **New** ☑ Memory? (Check=Yes)

The following conditions exist:

- Plant is stable at 87% power.
- "A" and "B" condensate pumps are in service.
- The "C" condensate pump hand switch is in Pull-To-Lock.
- All other equipment is operating as expected.

The CONDENSATE PUMP DIS PRES LO alarm is suddenly annunciated on C-05 and remains locked in.

What is the required response to this alarm?

A If condensate header pressure is less than 460 psig, then start the "C" condensate pump. ☑

B Manually raise speed on the main feed pumps until the low pressure alarm clears. ☐

C Because both main feed pumps will trip within 5 seconds, manually trip the reactor. ☐

D Manually lower the speed on the main feed pumps until the low pressure alarm clears. ☐

Justification ARP 2590D for B-11, CONDENSATE PUMP DIS PRES LO, states that if a condensate pump tripped, then verify the standby pump is running or start the standby pump. Additionally, the procedure requires starting tadditional condensate pumps if condensate header discharge pressure is less than 460 psig. The annunciator is alarmed at 400 psig. A low feed pump suction pressure will cause a pump trip at 245 psig sustained for greater than 5 seconds. A condensate header pressure of 400 psig is approximately equal to 260 psig at the suction of the feed pumps (Approximately 140 psid across the feedwater heaters and CPF).
"B" is incorrect because raising the speed on the affected pump will result in more feed flow causing condensate header pressure to lower even morer.
"C" is incorrect because the main feed pumps will NOT trip in 5 seconds at the alarm setpoint (corresponding to 260 psig suction pressure); therefore a reactor trip is NOT required.
"D" is incorrect because lowering the speed on the main feed pumps will result in higher condensate header pressure, but only temporarily until the feed regulating valves open to maintain S/G level.

Reference LOIT, MFW-00-C, MFW, 2321, MB-02269

NRC K/A System/E/A		NRC K/A Generic	
System	059 Main Feedwater (MFW) System	2.4	Emergency Procedures /Plan
Number	GS	2.4.50	
SEE GENERIC K/A		Ability to verify system alarm setpoints and operate controls identified in the alarm response manual.	
Importance RO/SRO		3.3	3.3
10CFR Link		(CFR: 45.3)	

 # 53 ☑ RO ☑ SRO Question ID: **1000113** **Origin: New** ☐ Memory? (Check=Yes)

While operating at 100% power, with the "B" auxiliary feed pump out of service for maintenance, the plant experiences an excess steam demand (ESD) event on the #1 Steam Generator (SG) immediately followed by a loss of VA-10 . An automatic reactor trip is actuated followed by SIAS and MSI. During the performance of EOP 2525, Standard Post Trip Actions, the SPO is directed to isolate #1 SG and feed only the #2 SG using Aux Feed Water (AFW). The SPO has secured the "A" auxiliary feedwater pump and is attempting to start the turbine driven auxiliary feedwater pump.

Which one of the following additional actions will prevent feeding #1 SG while maintaining feedwater flow to #2 SG during the combined loss of VA-10/ESD event?

A Dispatch a PEO to locally close 2-FW-43A, "A" auxiliary feed regulating valve. ☑

B Swap the turbine driven auxiliary feed pump control power supply to Facility 2. ☐

C Place #1 OVERRIDE/MAN/START/RESET switch in 'Pull-To-Lock'. ☐

D Place 2-FW-43A, "A" auxiliary feed regulating valve controller, in MANUAL and closed. ☐

Justification The loss of VA-10 will cause the #1 aux feed regulating valve to fail open. In order to maintain feedwater flow to #2 SG and prevent feeding #1 SG, the turbine driven auxiliary feedwater pump must be in service with the cross-tie valve, 2-FW-44 closed. With 2-FW-44 supplied by Facility 2, the valve may be closed from C-05.
"C" is incorrect. Placing #1 OVERRIDE/MAN/START/RESET switch in 'Pull-To-Lock' will NOT prevent feeding #1 SG because the #1 aux feed regulating valve fails open on loss of VA-10.
"B" is incorrect because the control power supply to the turbine driven auxiliary feedwater pump is NOT affected; i.e., swapping power supplies will have NO impact on the turbine driven auxiliary feedwater pump or which S/G has feedwater flow.
"D" is incorrect because 2-FW-43A fails open on loss of power (VA-10) and CANNOT be closed from C-05.

Reference LOIT, AFW-00-C, AFW, 2534, 2322, MB-05737

NRC K/A System/E/A

System 061 Auxiliary / Emergency Feedwater (AFW) System

Number K2.01

Knowledge of bus power supplies to the following:
AFW System MOVs.

Importance RO/SRO 3.2 3.3

10CFR Link (CFR: 41.7)

NRC K/A Generic

 # 54 ☑ RO ☐ SRO Question ID: **1000077** **Origin: New** ☐ Memory? (Check=Yes)

The crew is in EOP 2532, Loss of Primary Coolant, responding to a SBLOCA complicated by a loss of off-site power.
The US has directed a plant cooldown be initiated.
5 minutes into the cooldown annunciator window C12 on panel C05, "Condensate Storage Tank At Minimum Level" alarms.
The SPO reports that CST level has been lowering consistent with AFW usage and is presently reading 66%.

In response to this report the US will direct:

A The Condensate Surge Tank contents be transferred to the Condensate Storage Tank. ☐

B Transfer water from the Primary Water Storage Tank to the Condensate Storage Tank to maintain level above the alarm setpoint. ☐

C Ensure maximum available makeup from the water treatment vendor and availability of firewater as AFW suction source. ☑

D Halt RCS cooldown to minimize usage of AFW until tank level restored to greater than alarm setpoint. ☐

Justification C: correct, ARP C05*C12 response to CST @ minimum level alarm; A: no flowpath for this transfer, prohibited to avoid hotwell reject water from contaminating the CST; B: no flowpath for this transfer; D: CST volume at alarm setpoint is based on cooling down to SDC while removing decay heat for limited time, stopping cooldown lengthens decay heat removal time and may prevent reaching SDC

Reference MP2*LOIT, AFW, CST, MB-05944

NRC K/A System/E/A

System 061 Auxiliary / Emergency Feedwater (AFW) System

Number A1.04

Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating the AFW controls including: AFW source tank level

Importance RO/SRO 3.9 3.9

10CFR Link (CFR: 41.5/45.5)

NRC K/A Generic

 # 55 ☑ RO ☑ SRO Question ID: **0155565** **Origin: Modified** ☑ Memory? (Check=Yes)

The plant is operating at 100% power, with the following conditions present:
* Letdown is being diverted to Clean Liquid Radwaste (CLRW).
* The OFF-LINE CLRW Receiver Tank (CWRT) is FULL.
* The IN-SERVICE CWRT level has just reached 95% and the tank HI LEVEL alarm has actuated.

To prevent an overfill condition and potential spill situation, how will the CLRW System respond to this condition?

A Letdown will automatically realign to the VCT. ☐

B The in-service CWRT will realign to the EDST. ☐

C Influent to the in-service CWRT will automatically be realigned to the in-service CWMT. ☑

D Influent to the in-service CWRT will automatically be realigned to the in-service AWDT. ☐

Justification C: correct, CWRT to CWMT swap occurs at 95% level going up. Purpose of the Receiver Tank Auto-Bypass; A: this will prevent overfill, but won't address the need for L/D; B & D: plausible as they are receptacles for other sources of radwaste

Reference MP2*LOIT*2916 [068 CLR-04-C 3002] (8/22/96) 2335A, CLRW, MB-00581

NRC K/A System/E/A

System 068 Liquid Radwaste System (LRS)

Number K4.01

Knowledge of design feature(s) and/or interlock(s) which provide for the following: Safety and environmental precautions for handling hot, acidic, and radioactive liquids

Importance RO/SRO 3.4 4.1

10CFR Link (CFR: 41.7)

NRC K/A Generic

 # 56 ☑ RO ☐ SRO Question ID: **0155982** **Origin: Modified** ☑ Memory? (Check=Yes)

The plant is at 100% power with a discharge of the Aerated Waste Monitor Tank (AWMT) in progress.

The Aux Building PEO observed the AWMT level lower to 11%, at which time the discharge is automatically terminated on low level.

Without any operator intervention, which of the following describes the system configuration as a result of the automatic termination?
(Assume that ALL controls associated with the aerated waste system function as designed)

A The AWMT pump has turned off and the discharge valves are open. ☑

B The AWMT pump is running and the inboard discharge valve is closed. ☐

C The AWMT pump has turned off and both discharge valves are closed. ☐

D The AWMT pump is running and the outboard discharge valve is closed. ☐

Justification At approximately 11% lowering, the AWMT pump is automatically secured. The discharge valves remain open until closed by the operator.
"B" is incorrect because the pump will not continue to run and neither discharge valve gets a closed signal when the AWMT reaches the low level limit.
"C" is incorrect because neither discharge valve gets a closed signal when the AWMT reaches the low level limit.
"D" is incorrect because the pump will not continue to run and neither discharge valve gets a closed signal when the AWMT reaches the low level limit.

Reference LOIT, [069 ALR-04-C 2990] (6/3/97), 2336B, 2617A, MB-00632

NRC K/A System/E/A

System 068 Liquid Radwaste System (LRS)

Number A3.02

Ability to monitor automatic operation of the Liquid Radwaste System including: Automatic isolation

Importance RO/SRO 3.6 3.6

10CFR Link (CFR: 41.7 / 45.5)

NRC K/A Generic

25203-26021
Sheet 1

56

57 | ☑ RO ☐ SRO | Question ID: 1000048 | Origin: New | ☑ Memory? (Check=Yes)

The Waste Gas Disposal System and the systems it serves are designed and operated to minimize the potential for a flammable or explosive combination of oxygen and hydrogen.

Which of the following design criteria or operational practices do NOT help guarantee the absence of a flammable or explosive combination of oxygen and hydrogen?

A The waste gas compressors auto-trip at +0.3 psig waste gas surge tank pressure. ☐

B The coolant waste receiver and monitor tanks are maintained at > +1 psig N2 pressure. ☐

C Potentially hydrogenated systems drains are hard piped to Clean Liquid Radwaste. ☐

D Maintaining a constant pressurizer steam space vent to the VCT. ☑

Justification D: correct, RCS dissolved hydrogen ensures no O2 in RCS, pzr vent removes fission gas buildup preventing a "hard bubble"; A, B, C: all 3 prevent air from entering the WGDS or CLRW (served by WGDS).

Reference MP2*LOIT, GRWS, WGDS, H2, 2337, MB-00502

NRC K/A System/E/A

System 071 Waste Gas Disposal System (WGDS)

Number K5.04

Knowledge of the operational implication of the following concepts as they apply to the Waste Gas Disposal System: Relationship of hydrogen/oxygen concentrations to flammability

Importance RO/SRO 2.5 3.1

10CFR Link (CFR: 41.5 / 45.7)

NRC K/A Generic

 # 58 ☑ RO ☑ SRO Question ID: **0156044** **Origin: Modified** ☑ Memory? (Check=Yes)

A discharge of the "A" Waste Gas Decay Tank is in progress when the Aux. Building PEO calls to report that the Waste Gas Discharge Flow Recorder FR 9097 is NOT working.

What action will you direct the PEO to take?

A No action other than submitting a TR is required. ☐

B Commence logging the "A" WGDT pressure every 15 minutes for the duration of the discharge. ☐

C Secure the discharge immediately. ☑

D Contact Chemistry to draw a grab sample for counting and repeat hourly until the discharge is complete. ☐

Justification C: correct, satisfying limits on activity discharge rates requires documentation of flow rate, securing discharge on loss of flow recorder is procedurally required; A: TR will be submitted, but it is not the only action required; B: the pressure decay method is acceptable when the flow recorder is out, but it is performed as a pre-planned evolution; D: grab samples can be used when radmonitors are inop (not flow monitors).

Reference MP2*NLO*1821 [071 GRW-04-C 3897] (6/3/97) 2337, MC, MB-00508

NRC K/A System/E/A		NRC K/A Generic	
System	071 Waste Gas Disposal System (WGDS)	2.1	Conduct of Operations
Number	GS	2.1.8	
SEE GENERIC K/A		Ability to coordinate personnel activities outside the control room.	
Importance RO/SRO		3.8	3.6
10CFR Link		(CFR: 45.5 / 45.12 / 45.13)	

59 | ☑ RO ☑ SRO | Question ID: 1000081 | Origin: New | ☑ Memory? (Check=Yes)

An operator is monitoring RCS level locally during a mid-loop drain-down operation.

Which of the following radiation sources contributes the most dose to the operator's TEDE?

A Neutron exposure from the spent core, (no off-load yet). ☐

B Alpha emitters coating the inside of the RCS piping. ☐

C Beta contamination on the step-off pad inside the SG access tent. ☐

D Gamma radiation from a crud trap located 4 feet away. ☑

Justification D: correct, gamma radiation is the only type of radiation present which is not totally attenuated by the conditions specified; A: not critical, no neutrons; B: RCS piping blocks all alpha; C: Beta radiation from inside tent is blocked by tent material.

Reference MP2*LOIT/LOUT, RW

NRC K/A System/E/A

System 072 Area Radiation Monitoring (ARM) System

Number K5.01

Knowledge of the operational implications of the following concepts as they apply to the ARM system: Radiation theory, including sources, types, units, and effects

Importance RO/SRO 2.7 3.0

10CFR Link (CFR: 41.5 / 45.7)

NRC K/A Generic

# 60	☑ RO ☐ SRO	Question ID: 1000049	Origin: New	☐ Memory? (Check=Yes)

During the previous operating cycle 100% power was achieved with a measured RCS flow of 400,000 gpm and a delta-T of 48° F.
Eddy current testing on SG tubes required plugging a number of tubes sufficient to reduce RCS flow to 384,000 gpm.

What is the predicted RCS delta-T for 100% power during the subsequent operating cycle?

A 48° F ☐

B 49° F ☐

C 50° F ☑

D 51° F ☐

Justification C: correct, Q*=m* cp (delta-T), Q* and cp are constant, 48/x = 384000/400000; x = 48 x 400000/384000; x = 50;
A: chosen if examinee believes delta-T is not flow dependent; B or D: chosen if examinee guesses

Reference MP2*LOIT, delta-T, MB-03062

NRC K/A System/E/A

System 002 Reactor Coolant System (RCS)

Number A1.07

Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating the RCS controls including: Reactor differential temperature

Importance RO/SRO 3.3 3.5

10CFR Link (CFR: 41.5 / 45.7)

NRC K/A Generic

 # 61 ☑ RO ☑ SRO Question ID: **1000020** Origin: **New** ☑ Memory? (Check=Yes)

With the plant in a normal 100% configuration, which of the following describes an interlock or design feature that ensures that HPSI will provide balanced injection flow adequate to ensure core cooling on a design basis Large Break LOCA regardless of potential cold leg break location?

A A SIAS open signal will not drive the injection valves beyond their maintained throttled position ensuring balanced flow. ☑

B A SIAS will cause the injection valves to open to a throttled position which ensures balanced flow. ☐

C The injection valves are sized to pass the correct balanced flow when in the full open position. ☐

D Each injection header is equipped with a flow orifice which is sized to pass the correct balanced flow. ☐

Justification A: correct, the open position for the HPSI injection header stops are tested and set to pass a balanced flow per header such that the total doesn't exceed pump runout, thereby ensuring that a rupture on any one cold leg will NOT rob core cooling flow from the intact legs; B: the valves receive a SIAS, but are already open; C & D: either would work if true

Reference MP2*LOIT, 2307, LPSI, MB-00168

NRC K/A System/E/A

System 006 Emergency Core Cooling System (ECCS)

Number K4.17

Knowledge of ECCS design feature(s) and/or interlock(s) which provide for the following: Safety Injection valve interlocks

Importance RO/SRO 3.8 4.1

10CFR Link (CFR: 41.7)

NRC K/A Generic

# 62	☑ RO ☐ SRO	Question ID: 1000021	Origin: New	☐ Memory? (Check=Yes)

Initial Conditions: 100% power, 480 V buses 22A and 22B are cross-tied due to the 24A to 22A 4160 V/480 V stepdown transformer tagged out. Prior to cross-tying the buses, caution tags were placed on the pressurizer backup heater control switches as required by the procedure.
The surveillance for forcing pressurizer sprays for boron equalization must be performed at this time.

Based on heater group power supplies and any applicable restrictions due to the bus cross-ties, which of the following describes the pressurizer heater alignment that will exist during the performance of the surveillance?

A '3' and '4' backup heater groups on, 'A' and 'B' Proportional groups on at minimum output ☑

B '3' and '4' backup heater groups on, 'A' and 'B' Proportional groups on at maximum output ☐

C '2', '3' and '4' backup heater groups on, 'A' and 'B' Proportional groups on at minimum output ☐

D '2', '3' and '4' backup heater groups on, 'A' and 'B' Proportional groups on at maximum output ☐

Justification	A: correct, cross-tying 480 V buses requires that both associated backup heater groups be tagged out, forcing sprays is accomplished by noting the initial pressure then lowering the pzr pressure controller to obtain a 50% output (~50# decrease in setpoint) which opens sprays, energizing available backup heaters, then adjusting the pressure controller to maintain the initial pressure; the pzr proportional heater control program drives the heater output to minimum when actual pressure is ~25# below setpoint; one of the distractors would be chosen if the examinee thinks that tags specify that only the far side heater group may not be used and/or they don't understand the proportional heater control logic
Reference	MP2*LOIT, 2654B, pzr heaters, 480V, 2344A, MB-05632

NRC K/A System/E/A

System 010 Pressurizer Pressure Control System (PZR PCS)

Number K2.01

Knowledge of bus power supplies to the following: PZR heaters

Importance RO/SRO 3.0 3.4

10CFR Link (CFR: 41.7)

NRC K/A Generic

 # 63 ☑ RO ☑ SRO Question ID: **0153363** **Origin: Modified** ☐ Memory? (Check=Yes)

The plant is at 100% power with all parameters normal when:
- The selected pressurizer level controller slowly degrades such that pressurizer level rises to approximately 69%.
- Pressurizer pressure peaks at approximately 2310 psia.
- All backup heaters energize ON.

The PPO correctly diagnoses the problem and shifts to the alternate pressurizer level controller which responds correctly to restore pressurizer level.

Based on this information, which one of the following is the correct action to be taken in regard to pressurizer pressure?

A Monitor the system to ensure automatic operation restores pressurizer pressure. ☑

B De-energize the backup heaters by placing their control switches in the PULL-TO-LOCK position. ☐

C De-energize the backup heaters by placing their control switches in OFF then return to AUTO. ☐

D Take MANUAL control of PZR sprays using the selected pressure controller and return pressure to normal. ☐

Justification A: correct, The control system is responding normally to this event and though B, C, and D seem to be reasonable actions these distractors would only compound the problem when PZR level is returned to normal or if another transient occurred.

Reference MP2*LORT*2435 [011 PLC-01-C 4813] (3/4/97) 2304A, RCS, PLPCS, MB02325

NRC K/A System/E/A

System 011 Pressurizer Level Control System (PZR LCS)

Number K3.03

Knowledge of the effect that a loss or malfunction of the PZR LCS will have on the following: PZR PCS

Importance RO/SRO 3.2 3.7

10CFR Link (CFR: 41.7 / 45.6)

NRC K/A Generic

 # 64 ☑ RO ☑ SRO Question ID: **1000022** **Origin: New** ☐ Memory? (Check=Yes)

Daily RPS surveillance 2601D is in progress on channel 'A' of the RPS. The PPO is at the point in the procedure where the 'Nuclear Pwr Calibrate' potentiometer is adjusted to match the calculated voltage when vital instrument bus VA-30 is lost.

Based on the above, what is the resulting condition of the RPS?

A The K3 relay has de-energized, tripping open TCB 3 and 7, but the reactor has NOT tripped. ☑

B RPS channel 'C' is de-energized, but all TCBs remain closed. ☐

C The reactor has just tripped due to two coincident High Power Trip signals. ☐

D The RPS is placed in a 1 out of 3 logic when channel 'A' High Power trips due to loss of power to the Bypass circuit. ☐

Justification A: correct, the K3 relay is powered by vital AC (VA30) therefore the associated TCBs (3 & 7) open; B: RPS channel C is de-energized, but due to the power loss to the K3 relay the associated TCBs open; C: only the C channel provides an input, A channel is bypassed; D: bypass power is provided by the same source as the channel's normal power

Reference MP2*LOIT, RPS, 2380, VIAC, TCB, MB-03144

NRC K/A System/E/A

System 012 Reactor Protection System

Number K1.01

Knowledge of the physical connections and/or cause effect relationships between the RPS and the following systems: 120V vital/instrument power system

Importance RO/SRO 3.4 3.7

10CFR Link (CFR: 41.2 to 41.9 / 45.7 to 45.8)

NRC K/A Generic

 # 65 ☑ RO ☑ SRO Question ID: **1000027** **Origin: New** ☑ Memory? (Check=Yes)

A reactor startup was in progress when a valve packing leak is reported in the RCS loop area.
As a safety precaution, to allow RCS loop area entry for packing leak repair, all CEAs are driven into the core.

As soon as the workers have left containment the US directs you to perform necessary actions to have all CEAs read "0" steps on the computer and CEAPDS.

What must you do to accomplish this?

A Using the "CEA Position Editor" on the PPC, set all CEAs to "0" steps, all CEA positions on CEAPDS will already be at "0" steps. ☐

B Fully insert each CEA in "MI" mode, then using the "CEA Position Editor" on the PPC, set all CEAs to "0" steps. ☐

C Trip open and then reclose TCBs 1 through 8. All CEA positions on CEAPDS and the PPC will be at "0" steps. ☑

D All CEAPDS CEA positions are already at "0" steps. Verify all PPC CEA positions at"0" steps. Use "CEA Position Editor" to correct any individual CEAs not at "0". ☐

Justification C: correct, CEAs cannot be driven to "0" steps, they must be tripped, "0" step reed switch re-zeroes the PPC; A: "Editor" can change PPC position, but can't change reed switch position on CEAPDS; B: CEAs cannot be driven to "0" steps; D: since TCBs were not opened, all CEAs are reading 1 to 2 steps withdrawn.

Reference MP2*LOIT, 2302A, 2202, RPI, CEAPDS, MB-02263

NRC K/A System/E/A

System 014 Rod Position Indication System (RPIS)

Number A4.04

Ability to manually operate and/or monitor in the control room: Re-zeroing of rod position prior to startup

Importance RO/SRO 2.7 2.7

10CFR Link (CFR: 41.7 / 45.5 to 45.8)

NRC K/A Generic

 # 66 ☑ RO ☑ SRO Question ID: **1000026** Origin: **New** ☐ Memory? (Check=Yes)

Initial Conditions: 100% power, no equipment out of service, all systems aligned normally.
RCS loop 2 hot leg temperature detector T-121X fails high, (615° F).
(T-121X provides the hot leg temperature input to Channel 'Y' Tavg calculator.)

What impact will this failure have on plant operations and what action(s) will be required?

A All backup charging pumps would start and letdown goes to minimum. Stop backup charging pumps, place letdown controller in Manual and balance letdown with charging. ☐

B Steam Dump & Bypass Valves Tavg controller HIC-4165 will open the SD&BVs. HIC-4165 must be placed in Manual and the SD&BVs reclosed. ☐

C SD&BVs and ADVs will cause an excessive RCS cooldown on a plant trip. The Reactor Regulating System must be shifted to Channel 'X'. ☑

D The Q-power signal to CEAPDS will go to maximum. CEAPDS must be shifted to Channel 'X' RRS to allow the PPDIL and PDIL setpoints to lower as power is decreased. ☐

Justification C: correct, Channel 'Y' RRS is normally in service due to the Quick-Open relay being removed in Channel 'X', the high calculated Tavg would keep the steam dumps open, over-cooling the RCS, shifting to 'X' (w/o the relay) would prevent this; A: pzr level is max at a Tavg equal to ~85% power, raising Tavg has no further effect on pzr level; B: a Quick-open signal is processed for the SD&BVs, but a turbine tripped relay closure is required to pass the signal to the controller; D: Q-power signal for CEAPDS is from RPS safety channels

Reference MP2*LOIT, 2386, RRS, Tavg, MB-03170

NRC K/A System/E/A

System 016 Non-Nuclear Instrumentation System (NNIS)

Number A2.01

Ability to (a) predict the impacts of the following malfunctions or operations on the NNIS; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: Detector failure

Importance RO/SRO 3.0 3.1

10CFR Link (CFR: 41.5 / 43.5 / 45.3 / 45.5)

NRC K/A Generic

 # 67 ☑ RO ☐ SRO Question ID: **1000028** Origin: **New** ☑ Memory? (Check=Yes)

Which of the following losses would prevent Facility 2 Containment Spray from performing its intended function on a CSAS?

A 125v DC bus DV40 ☐

B 125v DC bus D21 ☐

C 120v AC bus VR21 ☐

D 125v DC bus DV20 ☑

Justification D: correct, DV20 provides breaker control power to 4160v bus 24D which is the power source for the Facility 2 CS pump; A: chosen if examinee considers DV10, 20, 30, & 40 align with 24A, B, C, & D; B: bus D21 supplies control power to non-vital equipment, many with a 'B' designator;
C: VR21 supplies 120v AC to non-vital Facility 2 equipment; Since the question doesn't specify the CS pump, examinees must consider all things that could make Facility 2 CS unavailable, including the header stop valve and ESAS actuation signals

Reference MP2*LOIT; CS, MB-05728

NRC K/A System/E/A

NRC K/A Generic

System 026 Containment Spray System (CSS)

Number K2.01

Knowledge of bus power supplies to the following: Containment spray pumps

Importance RO/SRO 3.4 3.6

10CFR Link (CFR: 41.7)

# 68	☑ RO ☑ SRO	Question ID: 0055404	Origin: Bank	☐ Memory? (Check=Yes)

The ESAS automatic test inserter (ATI) module has a key-switch labeled "CTMT PURGE VALVE ATI BYPASS".

The switch has two positions: "OPERATE" and "BYPASS".

With the plant operating normally in MODE 1, what two functions does the switch perform when placed in the "BYPASS" position?

A Blocks the Containment Purge input to the ATI fault alarm on C-01 and removes the ATI test pulse from each Containment Purge Valve Initiation channel ☑

B Removes the ATI test pulse from the CTMT RAD MONITORS and from the Containment Purge Valve Initiation portion of the ATI ☐

C Initiates an ATI fault alarm on Panel C-01 and removes the ATI test pulse from each Containment Purge Valve Initiation channel ☐

D Generates a signal to the Containment Purge Valve Initiation portion of the ATI and removes the ATI test pulse from the CTMT RAD MONITORS ☐

Justification A is correct. SP-2604I, OPS Form 2619A-1, OP-2384 state, "CTMT PURGE VALVE ATI BY-PASS" switch removes ATI test pulse from each of the 4 ESAS channels of Containment Purge Valve Isolation. It also generates a signal to sensor channel "CONTAINMENT RADN" group of ATI, ensuring NO ATI fault alarm is generated.
B is incorrect. The CTMT RAD MONITORS do NOT receive an ATI test pulse.
C is incorrect. The ATI fault alarm is blocked.
D is incorrect. See B.

Reference MP2*LOIT[013 ESA-01-C] 2384, ESAS, 2314B, Purge

NRC K/A System/E/A

NRC K/A Generic

System 029 Containment Purge System (CPS)

Number K1.03

Knowledge of the physical connections and/or cause- effect relationships between the Containment Purge System and the following systems: Engineered safeguards

Importance RO/SRO 3.6 3.8

10CFR Link (CFR: 41.2 to 41.9 / 45.7 to 45.8)

# 69	☑ RO ☑ SRO	Question ID: 0055281	Origin: Bank	☑ Memory? (Check=Yes)

Which one of the following statements describes the design feature that prevents inadvertent draining of the spent fuel pool through the spent fuel pool cooling (SPFC) System?

A SPFC pumps will automatically trip when the low SFP level alarm is annunciated. ☐

B Deepest SFPC suction piping extends only halfway down into the SFP. ☐

C SFPC suction piping has a siphon breaker slightly below the normal water level. ☑

D Primary makeup valve to the SFP automatically opens on a low level in the SFP. ☐

Justification SFPC suction piping has a siphon breaker near the normal water level. Suction to the SFP cooling pumps will be lost when level is approximately 1 foot below the alarm at 36'.
"A" is incorrect because there is NO automatic trip of the SFP cooling pumps.
"B" is incorrect because, although the deepest suction piping extends to one foot below the top of the fuel racks and is normally in service, the normal suction piping siphon breaker will stop flow through the suction pipe.
"D" is incorrect because the makeup valve to the SFP does NOT automatically open for any reason.

Reference LOIT, [033 SFP-01-C), 2305, SFP, MB-10518

NRC K/A System/E/A

System 033 Spent Fuel Pool Cooling System (SFPCS)

Number K4.03

Knowledge of design feature(s) and/or interlock(s) which provide for the following: Anti-siphon devices

Importance RO/SRO 2.6 2.9

10CFR Link (CFR: 41.7)

NRC K/A Generic

# 70	☑ RO ☑ SRO	Question ID: 1000050	Origin: New	☐ Memory? (Check=Yes)

The SPO hears tones signifying alarms coming in.
As he looks up to scan the alarm lights he notices a number of valves going closed on panel C05, among them are the SG Blowdown Tank outlet, 2-MS-15 and the SGBD Quench Tank discharge, 2-MS-135.

What alarm and condition would cause these valves to close?

A "Blowdown Rad Mon Flow Hi" due to a failure of the flow detector. ☐

B "Blowdown Tk Level Hi/Lo" due to a low level in the Blowdown Tank ☐

C "Main Steamline Hi-Rad/Inst. Fail" due to power loss to the radmonitor. ☐

D "Process Mon Rad Hi-Hi/Fail" due to SG tube leakage. ☑

Justification D: correct, an SGTL would alarm the SJAE RM which causes the common alarm drop "Process Mon Rad Hi-Hi/Fail" on C06/7.
A is incorrect. There is NO Blowdown Tk Level Hi.Lo annunciator.
B is incorrect. There is NO Blowdown Rad Monitor Flow Hi annunciator.
C is incorrect. Most RMs on fail cause same actions as high alarm, but this RM doesn't affect SGBD.

Reference MP2*LOIT, 2569, SGBD RM, 2383, MB-02895

NRC K/A System/E/A

System 035 Steam Generator System (S/GS)

Number A4.08

Ability to manually operate and/or monitor in the control room: Recognition that increasing radiation levels in secondary systems may mean leaking and possibly ruptured S/G tubes

Importance RO/SRO 4.1 4.4

10CFR Link (CFR: 41.7 / 45.5 to 45.8)

NRC K/A Generic

 # 71 ☑ RO ☑ SRO Question ID: **0070221** **Origin: Bank** ☑ Memory? (Check=Yes)

Which of the following 2 barriers are a design feature to prevent Steam Generator #1 from blowing down through a break on the Steam Generator #2 steam header in containment?

A Only the main steam isolation valves on both #1 and #2 SGs. ☐

B The main steam header non-return valve on #2 SG and the main steam isolation valve on #1 SG. ☑

C Only the main steam header non-return valves on both #1 and #2 SG. ☐

D The main steam header non-return valve on #1 SG and the main steam isolation valve on #2 SG. ☐

Justification A non-return check valve (2-MS-1A, 2-MS-1B) is welded to the downstream portion of each of the MSIV trip valves. The non-return valve is opened by the steam flowing through it. The availability of both valves ensures that a failure of either the non-return header valve or the isolation valve will allow the intact SG to be isolated. The presence of the non-return valve on the SG with the lowest pressure, in conjunction with the main steam isolation valve on the SG with the highest pressure, prevents the S/G with the highest pressure from blowing down through a broken main steam line in containment even if the air-operated disk on the intact SG fails to close.
"A" is incorrect because a failure of the #1 main steam isolation valve will allow steam flow through #2 main steam isolation valve and out through the break.
"C" is incorrect because the #1 main steam header non-return valve will NOT prevent the flow of higher pressure steam from #1 SG to #2 SG should the #2 SG main steam header non-return valve fail..
"D" is incorrect because the #1 main steam header non-return valve will NOT prevent the flow of higher pressure steam from #1 SG to #2 SG should the #2 SG main steam isolation valve fail.

Reference MP2 LOIT MSS 2316A, MB-02884

NRC K/A System/E/A

System 039 Main and Reheat Steam System (MRSS)

Number K4.05

Knowledge of MRSS design feature(s) and/or interlock(s) which provide for the following: Automatic isolation of steam line

Importance RO/SRO 3.7 3.7

10CFR Link (CFR: 41.7)

NRC K/A Generic

 # 72 ☑ RO ☑ SRO Question ID: **1000051** **Origin: New** ☐ Memory? (Check=Yes)

Due to existing minor steam generator tube leakage the SJAE radmonitor is reading 50 cpm.

The SPO identifies a slight rise in condenser backpressure and dispatches a PEO to Condenser Air Removal System operation.
The PEO reports that the Steam Jet Air Ejectors are operating properly, but indicated Condenser Air Removal System flow has doubled.

With the Condenser Air Removal System flow doubled and the SG tube leakage constant, how will the SJAE radmonitor reading respond and why?

A The SJAE radmonitor reading will be one half of the initial. Concentration of the off-gas is diluted by the additional air. ☐

B The SJAE radmonitor reading will be the same as the initial. Slipstream flow to the radmonitor is based on sample fan flow, therefore constant. ☐

C The SJAE radmonitor reading will be the same as the initial. Half the concentration at twice the flow rate equals the same cpm. ☑

D The SJAE radmonitor reading will be twice as much as the initial. Twice the number of radioactive molecules will pass the radmonitor each minute. ☐

Justification C: correct for the reason stated; A: concentration is diluted, but flow rate doubles; B: radmonitor is attached to off-gas piping, not slip-streamed; D: flow rate doubles, but concentration is halved

Reference MP2*LOIT, 2329, SJAE, air removal, MB-00339

NRC K/A System/E/A

System 055 Condenser Air Removal System (CARS)

Number K1.06

Knowledge of the physical connections and/or cause-effect relationships between the CARS and the following systems: PRM system

Importance RO/SRO 2.6 2.6

10CFR Link (CFR: 41.2 to 41.9 / 45.7 to 45.8)

NRC K/A Generic

 # 73 ☑ RO ☑ SRO Question ID: **1000114** **Origin: New** ☐ Memory? (Check=Yes)

The plant has sustained a station blackout. The crew has energized bus 24E from the Unit 3 RSST and are about to energize bus 24C from bus 24E.

A voltage of _____ volts and a current of _____ amps will prevent exceeding the 3 MVA electrical limit.

The limit is imposed to prevent _____.

A 4180 ; 412; exceeding the maximum Unit 2 load assumed in the worst case event. ☑ RA

B 4140; 422; exceeding the overcurrent rating on 24E/34B TIE BKR, 34B-24E-2 (A505). ☐

C 4160; 300; overheating of the cable between bus 24E and bus 24C. ☑

D 4060; 431; overheating of the cable between bus 24E and bus 34B. ☐

Justification Per Attachment 23U of EOP 2541, a combination of 4180 volts and 412 amps falls into the acceptable region. Analysis shows that Unit 2 will require no more than 3 MVA in the worst case scenario.
"B" is incorrect because a combination of 4140 volts and 422 amps exceeds the 3 MVA limit. Also, the over current rating on the 24E/24B cross tie breaker is 1200 amps.
"C" is incorrect. While a combination of 4140 volts and 422 amps is within the 3 MVA limit, there is no cable overheating concern. There was a concern at one time, but the problem was resolved.
"D" is incorrect because a combination of 4060 volts and 431 amps exceeds the 3 MVA limit. Also, there is no cable over heating concern.

Reference LOIT, E30-00-C, 2530, 23E, MVA, 2541, MB-03540
Requires the use of EOP 2541, Attachment 23U

NRC K/A System/E/A

System 062 A.C. Electrical Distribution

Number GS

SEE GENERIC K/A

Importance RO/SRO

10CFR Link

NRC K/A Generic

2.1 Conduct of Operations

2.1.32

Ability to explain and apply all system limits and precautions

3.4 3.8

(CFR: 41.10 / 43.2 / 45.12)

 # 74 ☑ RO ☑ SRO Question ID: **1000078** Origin: **New** ☐ Memory? (Check=Yes)

The US is in EOP 2540B directing the SPO to verify that at least one vital DC bus is available and powered from its associated battery charger.

The SPO refers to the 3 meters associated with bus 201A, "Battery Volts", "Battery Amps", and "Bus Amps".

Which of the following sets of readings indicates that bus 201A is supplying Facility 1 DC loads and is powered from its associated charger?

A "Battery Volts" 126 "Battery Amps" +20 "Bus Amps" +20 ☐

B "Battery Volts" 132 "Battery Amps" +20 "Bus Amps" +20 ☐

C "Battery Volts" 134 "Battery Amps" -5 "Bus Amps" 0 ☐

D "Battery Volts" 134 "Battery Amps" -5 "Bus Amps" +15 ☑

Justification D: correct, 134volts indicates a battery on float charge with an indicated 5 amp float and 15 amps worth of load on the bus; A: 126 volts is the low voltage alarm setpoint and both ammeters at +20 indicates a 20 amp drain on the battery; B: 132 volts is a fully charged battery, but without any float charge, both ammeters at +20 indicates a 20 amp drain on the battery; C: 134volts indicates a battery on float charge with an indicated 5 amp float, but there is no load indicated on the DC bus indicating it is stripped or the tie breaker is open

Reference MP2*LOIT, 2345A, 125 VDC, MB-04880

NRC K/A System/E/A

NRC K/A Generic

System 063 DC Electrical Distribution System

Number A3.01

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

Importance RO/SRO 2.7 3.1

10CFR Link (CFR: 41.7 / 45.5)

 # 75 ☑ RO ☑ SRO Question ID: **0053376** **Origin: Bank** ☐ Memory? (Check=Yes)

The Maintenance Department has just completed replacing a service water vent valve on the "B" Emergency Diesel Generator (EDG) jacket cooling heat exchanger. The on-shift Plant Equipment Operator (PEO) performs the required pre-start checks and completes all necessary valve alignments. When the final tag is cleared, the PEO informs the US that the "B" EDG is ready for the surveillance test. The SPO then notes that the "DIESEL GEN, 13U DISABLED" annunciator on C-08 is still lit.

Which one of the following statements describes the status of the "B" EDG?

A The EDG CANNOT be test run AND will NOT auto start on an LNP until the STARTING AIR PRESSURE LOW alarm is acknowledged. ☐

B The EDG will auto start on an LNP, but CANNOT be test run prior to pressing the skid mounted alarm reset button. ☐

C The EDG can be test run AND can auto start on an LNP, but the skid mounted alarm reset button must be pressed to clear the disabled alarm. ☐

D The EDG CANNOT be test run AND will NOT auto start on an LNP until the skid mounted alarm reset button is pressed. ☑

Justification Closing the air start valves isolates the air receivers from the DG which will prevent the DG from starting. The shutdown relay, which also prevents the diesel from manual or auto starting, is energized by a low air pressure condition when the air isolation valves are closed and tagged. When air pressure is restored, the shutdown relay must be reset, which is done by pressing the 'alarm reset' button on the skid mounted gageboard.
"A" is incorrect because the local low pressure alarm will only clear the D/G trouble alarm on C-08, but has no impact on starting the D/G.
"B incorrect because the skid mounted alarm reset button must be pressed to allow the D/G to auto start or start for a test.
"C" is incorrect for the same reason as "B".

Reference LOIT, [064 EDG-01-C 3619] (11/25/97), EDG, 2346A, MB-02449

NRC K/A System/E/A

System 064 Emergency Diesel Generators (ED/G)

Number K6.07

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

Importance RO/SRO 2.7 2.9

10CFR Link (CFR: 41.7 / 45.7)

NRC K/A Generic

 # 76 ☑ RO ☑ SRO Question ID: **0054923** **Origin: Modified** ☐ Memory? (Check=Yes)

A high alarm on containment gaseous radiation monitor, RM-8262B, will cause which of the following automatic actions?

A If open for containment venting, the Hydrogen Purge valves will close. ☐

B Control Room ventilation system automatically shifts to recirculation mode. ☐

C Closure of the containment purge isolation valves during containment purge operations. ☑

D Containment isolation when a second containment radiation monitor alarm is received. ☐

Justification When any 1 of these 4 RMs reaches its setpoint, the Containment Purge Valves, AC-4, AC-5, AC-6, & AC-7, receive a close signal and will close if they are open. These valves are only allowed to be open during Modes 5 and 6.

A High Rad of 7 E4 cpm or Instrument Failure on RM-8262A or B will give the common alarm on C-06/07, DA-24, and also the alarm on C-01, C-36: CTMT RAD ACTUATION SIG CH 1 TRIP.
"A" is incorrect because these valves close on alarm of the containment high range area radmonitors, RM-8240 & 8241
"B" is incorrect because the control room ventilation will shift to recirculation when control room ventilation radiation monitor, RM-9799A or 9799B alarms; not containment radiation monitors.
"D" is incorrect because a containment isolation will not be generated when a second containment atmospheric radiation monitor is alarmed. Containment isolation is not impacted by any radiation monitors.

Reference LOIT, [072 RMS-04-C 5064] (6/3/97), 2383, MB-03075

NRC K/A System/E/A

System 073 Process Radiation Monitoring

Number K4.01

Knowledge of design feature(s) and/or interlocks which provide for the following: Release termination when radiation exceeds setpoint

Importance RO/SRO 4.0 4.3

10CFR Link (CFR: 41.7)

NRC K/A Generic

 # 77 ☑ RO ☑ SRO Question ID: **0156702** **Origin: Modified** ☑ Memory? (Check=Yes)

The plant is in normal operation at 55% power, when Bus 24A is deenergized due to an electrical malfunction.

After cross tying the 480 volt load centers, the US directs you to use the water box cross tie design feature to maintain the main condenser as a heat sink.

Which of the following describes the appropriate final condition of the Circulating Water (CW) System?

A 'A' CW Pump is supplying 'A' and 'B' Water Boxes and 'C' CW Pump is supplying 'C' and 'D' Water Boxes. ☐

B 'B' CW Pump is supplying 'A' and 'C' Water Boxes and 'D' CW Pump is supplying 'B' and 'D' Water Boxes. ☐

C 'A' CW Pump is supplying 'A' and 'C' Water Boxes and 'C' CW Pump is supplying 'B' and 'D' Water Boxes. ☐

D 'B' CW Pump is supplying 'A' and 'B' Water Boxes and 'D' CW Pump is supplying 'C' and 'D' Water Boxes.' ☑

Justification 'A' and 'C' CW Pumps are deenergized and the 'B' CW Pump cannot supply the 'C' Water Box and the 'D' CW Pump cannot supply the 'B' Water Box.
"A" is incorrect because the 'A' and 'C' Circ pumps are deenergized due to the loss of bus 24A.
'C' is incorrect for the same reason as 'A'. Additionally the 'A' pump cannot supply the 'B' water box and 'C' pump cannot supply the 'B' water box.
"D" is incorrect because the 'B' pump cannot supply the 'C' water box and the 'D' pump cannot supply the 'B' water box.

Reference MP2*LOIT*4132 [CWS-01-C], CW, Circ, 2325, MB-01172

NRC K/A System/E/A

System 075 Circulating Water System

Number K4.01

Knowledge of circulating water system design feature(s) and interlock(s) which provide for the following: Heat sink

Importance RO/SRO 2.5 2.8

10CFR Link (CFR: 41.7)

NRC K/A Generic

 # 78 ☑ RO ☑ SRO Question ID: **1000202** **Origin: New** ☐ Memory? (Check=Yes)

The instrument air supply to the Containment Air Receiver must be isolated to repair an air leak on the supply piping. In order to maintain air to Containment for valve operation, the Station Air System must be aligned to the Containment Air Receiver. A dedicated operator has been selected and briefed.

Crosstying Station Air to supply the Containment Instrument Air Receiver _____.

A must be minimized to prevent moisture build up in the Containment Instrument Air System which may impact the operation of air operated valves in Containment ☑

B must be limited to one hour to ensure the CONTAINMENT INTEGRITY Technical Specification action statement is NOT exceeded ☐

C will result in a lower supply pressure to air operated valves in Containment which may cause the valves to operate more slowly during an event ☐

D will require the Containment Instrument Air System to be purged prior to use for breathing air due to the oil vapor contained in the Station Air System ☐

Justification A is correct. Caution prior to step 4.4.1 in OP 2332A, Station Air, states, "Station Air System has NO air dryer, crosstying Station Air to supply the Containment Instrument Air Receiver should be minimized to prevent moisture build up in the Containment portion of the Instrument Air System."
B is incorrect. With a dedicated operator stationed, there is NO limit on the CONTAINMENT INTEGRITY Tech Spec LCO.
C is incorrect. The Station Air System operates at roughly the same pressure as the Instrument Air System. Additionally, air pressure is regulated at the individual components at a much lower pressure than the system.
D is incorrect. There is NO requirement to purge the Instrument Air System after crosstying to the Station Air System.

Reference MP2*LOIT (SAS-01-C) 2332A, SA, IA, CTMT

NRC K/A System/E/A

System 079 Station Air System (SAS)

Number GS

SEE GENERIC K/A

Importance RO/SRO

10CFR Link

NRC K/A Generic

2.1 Conduct of Operations

2.1.32

Ability to explain and apply all system limits and precautions

3.4 3.8

(CFR: 41.10 / 43.2 / 45.12)

 # 79 ☑ RO ☑ SRO Question ID: **1000124** Origin: **New** ☑ Memory? (Check=Yes)

Which of the following will cause an automatic start of a fire pump?

A A single high temperature actuation of a heat detector for the main transformer. ☑

B Operation of the local manual actuation station for the main generator exciter. ☐

C A single heat detector in the "B" D/G room fails indicating a high temperature. ☐

D Actuation of 1 ion and 1 photoelectric smoke detector in the East DC switchgear room ☐

Justification Any single heat detector actuation in the main transformer deluge will result in the actuation of the associated deluge system. When the deluge system activates, the fire water header pressure will lower and cause an automatic start of at least one fire pump.
"B" is incorrect because, although the main generator exciter fire suppression system will activate, the fire suppression system is Carbon Dioxide.
"C" is incorrect because, although a single heat detector will activate the D/G room deluge valve, a fusible link must melt in at least one of the sprinkler heads to actually start fire water flow.
"D" is incorrect because, although 1 ion and 1 photoelectric smoke detector will actuate the East DC switchgear room fire suppression system, the system is Halon.

Reference LOIT, (FPS-00-C), Fire, FW, MB-11313

NRC K/A System/E/A

NRC K/A Generic

System 086 Fire Protection System (FPS)

Number A3.01

Ability to monitor automatic operation of the Fire Protection System including: Starting mechanisms of fire water pumps

Importance RO/SRO 2.9 3.3

10CFR Link (CFR: 41.7 / 45.5)

 # 80 ☑ RO ☑ SRO Question ID: **0153503** **Origin: Modified** ☐ Memory? (Check=Yes)

A plant cooldown is in progress with RCS temperature at 400°F.

Which of the following describes the status of power to 2-SI-652 (SDC Suction Valve)?

A MCC breaker closed with its opening coil removed. ☐

B MCC breaker key-locked open ☐

C MCC breaker closed, manual disconnect switch open. ☑

D Facility 1 breaker, (B5110), closed; opening and closing coils removed from control cabinet; and manual disconnect closed. ☐

Justification C: correct, too early in cooldown to enable 2-SI-652, manual disconnect in control room prevents Type V LOCA from hot-short or sabotage, MCC breaker closed allows position indication; A: MCC breaker is closed, but opening & closing coils are installed, valve opening prevented by pressure interlock and disconnect; B: key lock on panel C01 used in place of a handswitch for administrative control of valve, but this operates opening & closing coils, MCC breaker is closed; D: this is the normal alignment for 2-SI-651 which serves as the CTMT inside isolation valve for the SDC penetration

Reference MP2*LORT*3471 [005 SIP-01-C 7399] (1/13/97) SDC, 2310, VLV, MB-03187

NRC K/A System/E/A

System 005 Residual Heat Removal System (RHRS)

Number K2.03

Knowledge of bus power supplies to the following: RCS pressure boundary motor-operated valves

Importance RO/SRO 2.7 2.8

10CFR Link (CFR: 41.7)

NRC K/A Generic

81 | ☑ RO ☑ SRO | Question ID: 1000030 | Origin: New | ☑ Memory? (Check=Yes)

What barrier(s) are in place to prevent transferring the contents of the RCS Quench Tank (QT) to the Primary Drain Tank (PDT) when cooling the QT following the opening of a PORV or Safety?

A A single handswitch opens either the suction & return valves for the QT or for the PDT. ☐

B Suction and return for the QT and PDT is via a pair of two way valves. ☐

C QT and PDT use separate suction and return valves which are interlocked to prevent concurrent opening. ☐

D QT and PDT use separate suction and return valves. Procedure prevents concurrent opening. ☑

Justification D: correct, physically possible, procedurally prevented; A: 2 handswitches, one per suction & return set; B: separate valves and handswitches; C: no interlock

Reference MP2*LOIT, QT & PDT, MB-00581

NRC K/A System/E/A

System 007 Pressurizer Relief Tank/Quench Tank System (PRTS)

Number K4.01

Knowledge of PRTS design feature(s) and/or interlock(s) which provide for the following: Quench tank cooling

Importance RO/SRO 2.6 2.9

10CFR Link (CFR: 41.7)

NRC K/A Generic

82 | ☑ RO ☐ SRO | Question ID: 1000031 | Origin: New | ☑ Memory? (Check=Yes)

Which of the following statements correctly describes how an RCP will be affected by a total loss of RBCCW flow?

A The anti-reverse device will fail to prevent the RCP from rotating in the reverse direction. ☐

B The upper guide bearing is only affected if the oil lift pump is running. ☐

C Loss of cooling to the thermal barrier causes the lower seal cavity temperature to rise. ☑

D Stator temperature rise occurs due to loss of cooling water flow in the stator cooling channels. ☐

Justification C: correct, RCP leakoff up through the thermal barrier first enters the lower seal cavity, not being initially cooled it is primarily responsible for the temperature rise in the lower cavity; A: the anti-reverse device is not directly cooled by RBCCW, but its bearing will heatup as the pump's oil system heats up; B: at speed the thrust bearing 'pumps' oil through the system, therefore the lift pump not running is irrelevant, the bearing will heat up; D: the RCP is not equipped with stator cooling channels for RBCCW, examinee may assume that such a large motor may require such cooling like the main generator.

Reference MP2*LOIT; RBCCW, RCP, MB-03011

NRC K/A System/E/A

System 008 Reactor Building Closed Cooling Water System

Number K3.03

Knowledge of the effect that a loss or malfunction of the CCWS will have on the following: RCP

Importance RO/SRO 4.1 4.2

10CFR Link (CFR: 41.7/45.6)

NRC K/A Generic

 # 83 ☑ RO ☑ SRO Question ID: **1000032** **Origin: New** ☑ Memory? (Check=Yes)

You are on-shift, approximately 24 hours into a Large Break LOCA.
The 'A' H2 Recombiner is already in service.
You have been directed to place the 'B' H2 Recombiner in service.
Normally you would rotate the 'B' H2 Recombiner potentiometer until its kW meter reads the kW you had calculated per the procedure.
However, the kW meter for the 'B' H2 Recombiner, (JI-8723), is malfunctioning.

In order to apply the correct power to the heaters you must rotate the 'B' H2 Recombiner potentiometer until:

A The potentiometer window reads the calculated kW value. ☐

B The potentiometer window reads the same as the 'A' H2 Recombiner. ☐

C The ammeter on C01 reads the calculated amperage for the required power. ☐

D A clamp-on ammeter at the control cabinet reads the calculated amperage for the required power. ☑

Justification D: correct, per the procedure a CTMT pressure corrected kW is calculated then using the existing voltage you calculate the amperage which will give the required power; A: the potentiometer window is only a vernier scale related to percentage of full travel, because of the affect of differing voltage there is no direct correlation between setting and power; B: baseline kW for the 'A' recombiner is 45 while the 'B' uses 53, the 'B' recombiner would not reach sufficient temperature if this method were used. C: There is NO ammeter on C-01 for the H2 Recombiner.

Reference MP2*LOIT, 2313C, recombiner, MB-02539

NRC K/A System/E/A

NRC K/A Generic

System 028 Hydrogen Recombiner and Purge Control System (HRPS)

Number K6.01

Knowledge of the effect of a loss or malfunction on the following will have on the HRPS: Hydrogen recombiners

Importance RO/SRO 2.6 3.1

10CFR Link (CFR: 41.7 / 45.7)

84 | ☑ RO ☐ SRO | Question ID: 1000119 | Origin: New | ☑ Memory? (Check=Yes)

During a fuel shuffle, the refueling machine operator will be moving a spent fuel bundle from the reactor core to the north upender per OP 2303A, Refueling Machine Operations.

Which of the following conditions will PREVENT the refueling machine from moving to the transfer machine zone in the semi-automatic mode?

A The BRIDGE/TROLLEY INTERLOCK is clear and deactivated. ☐

B The bridge and trolley are in the core area when 'semi-automatic' is selected. ☐

C The upender is in the horizontal position on the containment side of the transfer tube. ☑

D The refueling machine is in the core area with the hoist at the "HOIST UP" limit. ☐

Justification OP 2303A, Refueling Machine Operations. The Note prior to step 4.8.4 states, 'Refueling Machine will NOT enter RTMZ unless upender is on Containment side and vertical." Step 4.8.4 states, "Ensure upender on Containment side and vertical." With the upender on the Containment side and horizontal, the refueling machine will NOT move to the Reactor-side Transfer Machine Zone (RTMZ).
"A" is incorrect because the Bridge/Trolley Interlock must be clear and deactivated prior to moving the refueling machine to any location in semi-automatic; however the student may believe that the BTI needs to be activated.
"B" is incorrect because the semi-automatic mode is normally selected to move fuel from the core area to the upender; however, the student may believe that the refueling machine must clear the core area prior to moving to the upender in semi-automatic.
"D" is incorrect because the hoist must be fully raised to allow the refueling machine to leave the core area and to enter the transfer machine zone; however, the student may believe that the up limit is an interlock to prevent refueling machine movement in any mode.

Reference LOIT, REF-04-C, Refuel, 2303A, MB-10376

NRC K/A System/E/A

System 034 Fuel Handling Equipment System (FHES)

Number GS

SEE GENERIC K/A

Importance RO/SRO

10CFR Link

NRC K/A Generic

2.2 Equipment Control

2.2.28

Knowledge of new and spent fuel movement procedures.

2.6 3.5

(CFR: 43.7 / 45.13)

 # 85 ☑ RO ☑ SRO Question ID: **1000075** Origin: **New** ☑ Memory? (Check=Yes)

Which of the following will prevent the "A, B, C, and D Steam Dump & Bypass Valves", (SD&BV), from Quick-Opening on a plant trip from 100% power?

A SD & BV controller HIC-4165 in Manual. ☐

B RRS Channel Select Switch in "X". ☑

C RRS Channel Select Switch in "Y" ☐

D ADV Quick-Open Permissive Switch in OFF. ☐

Justification B: correct, the K-7 relay which sends the Q/O signal has been removed from the 'X' channel of RRS due to induced noise problems; A: the Q/O signal is independent of the controller mode; C: 'Y' is the normally selected channel of RRS when at higher powers in order to have a Q/O signal available; D: this switch will remove the Q/O signal from the ADVs only

Reference MP2*LOIT, 2386, RRS, Q/O, SD&BV, MB-03171

NRC K/A System/E/A

System 041 Steam Dump System (SDS) and Turbine Bypass Control

Number K6.03

Knowledge of the effect of a loss or malfunction on the following will have on the SDS: Controller and positioners, including ICS, S/G, CRDS

Importance RO/SRO 2.7 2.9

10CFR Link (CFR: 41.7 / 45.7)

NRC K/A Generic

 # 86 ☑ RO ☐ SRO Question ID: **0066904** **Origin: Bank** ☐ Memory? (Check=Yes)

Main Turbine Control Valve testing is being performed, with all systems and equipment configured as required.

When the SPO closes the first control valve per the test procedure, an EHC malfunction prevents the other three control valves from responding to the one that closed.

Which one of the following describes an expected plant response to this malfunction?

A The plant will trip when RPS receives a signal that the main control valve is completely closed. ☐

B The pressurizer spray valves will open and the "A" condenser steam dump valve will open ~100%. ☑

C The main feed regulating valves will close momentarily due to the large steam generator swell. ☐

D The plant will trip due to the sudden rise in the TM/LP setpoint. ☐

Justification When the MTCV closes, a 25% power rejection occurs. This will cause RCS temp. and press. to rise dramatically. As the test is done while forcing sprays and with the "A" dump valve cracked open, both will respond immediately to the temp. and press. rise.
#1 is wrong because RPS requires 2/4 control valves to close for a trip and the one that closed is bypassed by procedure.
#3 is wrong because the sudden drop in steam demand will cause a SG pressure rise with a concurrent shrink, not swell.
#4 is wrong because the TM/LP setpoint will not rise faster than RCS pressure (from Th rise), resulting in a hi-pressure trip, if anything.

Reference LOIT, MTC-00-C, 2323, TURB, 2656, SP, control valve testing, MTC, MB-02325

NRC K/A System/E/A

NRC K/A Generic

System 045 Main Turbine Generator (MT/G) System

Number K3.01

Knowledge of the effect that a loss or malfunction of the MT/G system will have on the following: Remainder of the plant

Importance RO/SRO 2.9 3.2

10CFR Link (CFR: 41.7 / 45.6)

# 87	☑ RO ☐ SRO	Question ID: 1000118	Origin: New	☐ Memory? (Check=Yes)

With the plant operating at 100% power in a normal alignment and an incoming tide, the US has directed the SPO to commence mussel cooking the "B" water box.

With NO additional operator action, what affect will this have on RBCCW and TBCCW system temperatures?

A Facility 2 RBCCW header temperature will rise and TBCCW header temperature will rise. ☐

B Both RBCCW facility header temperatures will rise and TBCCW header temperature will be unaffected. ☐

C There will be no change in either RBCCW facility header temperature or in TBCCW header temperature. ☐

D Facility 1 RBCCW header temperature will rise and TBCCW header temperature will rise. ☑

Justification	With an incoming tide, the water current at the intake structure will be from the "D" circ bay to the "A" circ bay. Warm water from the "B" circ bay will flow toward the "A" circ bay. With the "A" service water pump running, the warmer water will be injected through the "A" service water header resulting in an increase in temperature on Facility 1 RBCCW and the TBCCW system. "A" is incorrect because only an outgoing tide will cause a rise in Facility 2 RBCCW header temperature. "A" is credible if the student is confused about the tidal effects on a bay adjacent to the bay being mussel cooked. "B" is incorrect for the same reason as "A". "C" is incorrect because the warm water from mussel cooking WILL cause a rise in service water injection temperature, resulting in a rise in TBCCW and RBCCW header temperatures. This is credible if the student fails to make the connection between the warm water from mussel cooking and the service water intake in an adjacent bay.
Reference	LOIT, SWS-00-C, SW, 2326, 2325, MB-01180

NRC K/A System/E/A

NRC K/A Generic

System 076 Service Water System (SWS)

Number A1.02

Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating the SWS controls including: Reactor and turbine building closed cooling water temperatures.

Importance RO/SRO 2.6 2.6

10CFR Link (CFR: 41.5 / 45.5)

# 88	☑ RO ☑ SRO	Question ID: 1000033	Origin: New	☑ Memory? (Check=Yes)

A lamicoid plaque on panel C02 directs you to make a notification when charging flow is raised.

Who needs to be notified and why?

A Aux. Building PEO; throttle position of the in-service ion exchanger outlet valve must be adjusted to establish proper CVCS radmonitor flow. ☐

B HP technician; area around CVCS letdown piping must be resurveyed due to higher letdown flow rate. ☑

C Chemistry technician; the in-service ion exchanger must be checked to ensure higher letdown flow rate doesn't cause channeling. ☐

D CVCS system engineer; CVCS pump run data is required for on-going fatigue-cracking failure study. ☐

Justification	B: correct, higher flow rate transports short-lived activity, (N-16), outside CTMT prior to significant decay; A: previously true regarding effecton radmonitor flow, letdown radmonitor recently retired and valved out; C: letdown IX can handle full flow w/o concern regarding channeling; D: lamicoid clearly specifies HP
Reference	MP2*LOIT, CVCS, 2304, (CFR-55-43.b.4), MB-02356

NRC K/A System/E/A

System 2.1 Conduct of Operations

Number G

SEE GENERIC K/A

Importance RO/SRO

10CFR Link

NRC K/A Generic

2.1 Conduct of Operations

2.1.14

Knowledge of system status criteria which require the notification of plant personnel.

2.5 3.3

(CFR: 43.5 / 45.12)

 # 89 ☑ RO ☑ SRO Question ID: **1000034** **Origin: New** ☐ Memory? (Check=Yes)

Surveillance procedure 2612A 'A' Service Water Pump Tests provides the following formulas to be used when verifying that the pump is capable of generating acceptable delta-P:

Sea level = 14 - Distance from floor to water level
Suction pressure = Sea level x 0.45
Delta-P = Discharge - Suction pressure

A PEO in the intake structure measures the 'Distance from floor to water level' and reads the 'Discharge' pressure from the strainer inlet. He then reports these values to the control room.

Which of the following sets of data meets Acceptance Criteria?

A 4000 gpm header flow, 63 psig discharge pressure, 6 feet from floor to water level ☐

B 5000 gpm header flow, 57 psig discharge pressure, 18 feet from floor to water level ☑

C 6000 gpm header flow, 57 psig discharge pressure, 8 feet from floor to water level ☐

D 7000 gpm header flow, 52 psig discharge pressure, 12 feet from floor to water level ☐

Justification	B: correct, although discharge pressure is below the line the large distance to the water level indicates a very low tide, since the graph is referenced to mean sea level (14') the lower suction head translates to an increase in delta-P correcting to 58.8 psid; A: 63 psi is well above the curve, but the high sea level translates to a negative effect on DP resulting at 59.4 psid (below the curve); C: with a higher flow than B and the same discharge pressure this set looks OK except for the negative effcet of the high water level which corrects to 54.3 psid; D: this pressure is almost right on the curve, but corrects to 51.1 psid due to the elevated sea level
Reference	MP2*LOIT, SW, 2612A, MB-00112 **Requires the use of SP 2612A, Attachment 4**

NRC K/A System/E/A

System 2.1 Conduct of Operations

Number G

SEE GENERIC K/A

Importance RO/SRO

10CFR Link

NRC K/A Generic

2.1 Conduct of Operations

2.1.25

"Ability to obtain and interpret station reference materials such as graphs, monographs, and tables which contain performance data."

2.8 3.1

(CFR: 41.10 / 43.5 / 45.12)

 # 90 ☑ RO ☑ SRO Question ID: **1000203** Origin: **New** ☐ Memory? (Check=Yes)

The plant is in MODE 6 preparing to fill the refuel pool for refueling, with the following conditions:
- The reactor vessel head has been removed.
- The RCS is filled to the top of the vessel flange.
- The refuel pool is completely dry.
- The transfer tube flange has just been removed.
- RWST level is 98%.

If the refuel pool is filled to 10 feet above the vessel flange using only the RWST, what will be the expected indicated level in the RWST?

A 35% ☐

B 46% ☐

C 53% ☑

D 71% ☐

Justification	C is correct. Using attachment 1 of OP 2209A, a total of 212,317 gallons of water will used from the RWST. [28,685 + 54,229 + 403 + (10 x 12,900) = 212,317 gallons] The RWST has a capacity of 475,000 gallons (4,750 gals/%). The present volume is (0.98 x 475,000 =) 465,500 gallons. When the refuel pool is filled, the final volume of the RWST will be (465,500 - 212,317 =) 253,183 gallons. A volume of 253,183 divided by 4,750 gals/% = 53.3% (53%). A is incorrect. If only the volume of the refuel pool above the flange to the 36'6" elevation were used, then the final level in the RWST would be 35%. B is incorrect. If the examinee assumed that there was 212,317 gallons LEFT (instead of removed) in the RWST, then the final level would be 46%. D is incorrect. Using the above method, if the North and South saddle volumes are NOT included, the final RWST level would be 71%
Reference	MP2*LOIT (209-01-C) RWST, Refuel, 2209A **Requires the use of OP 2209A, Attachment 1**

NRC K/A System/E/A

System 2.2 Equipment Control

Number G

SEE GENERIC K/A

Importance RO/SRO

10CFR Link (CFR: 43.2 / 45.2)

NRC K/A Generic

2.2 Equipment Control

2.2.27

Knowledge of the refueling process.

2.6 3.5

(CFR: 43.6 / 45.13)

 # 91 ☑ RO ☑ SRO Question ID: **1000036** **Origin: New** ☑ Memory? (Check=Yes)

When performing surveillance 2601H (Charging Pump Operability Test, Fac2) on the 'B' charging pump, in order to ensure the pump start is in response to the Facility 2 SIAS start signal, which of the following must be ensured?

A 'B' Charging Pp. Handswitch in Normal-After-Trip ☐

B 'Chg Pp. Override' switch in 'Level 2' position ☐

C 'B' Charging Pp. Handswitch in Pull-To Lock ☑

D 'B' Charging Pp. Handswitch white light not lit ☐

Justification C: correct, in the PTL position only a SIAS signal will start the pp.; A: a low level deviation could start the pp in this case; B: this position of the Override switch starts both b/u chg pps; D: white light not lit indicates inability to start in any case

Reference MP2*LOIT, 2601H, CVCS, MB-02339

NRC K/A System/E/A

System 2.2 Equipment Control

Number G

SEE GENERIC K/A

Importance RO/SRO

10CFR Link (CFR: 43.2 / 45.2)

NRC K/A Generic

2.2 Equipment Control

2.2.12

Knowledge of surveillance procedures.

3.0 3.4

(CFR: 41.10 / 45.13)

# 92	☑ RO ☑ SRO	Question ID: 1000080	Origin: New	☐ Memory? (Check=Yes)

Your team is planning a job to be performed in an area classified as a high-radiation area due to a crud trap.
The dose rate at the component to be worked is 600 mrem/hour.
Installation of temporary shielding on the crud trap will lower the dose rate at the component to 200 mrem/hour
Installation and removal of the temporary shielding will add 500 mrem of exposure.
Using a long-handled tool will reduce the worker's exposure to 1/2 the dose rate at the component.
Records indicate that the job takes 1 1/2 hours without the long-handled tool and 2 hours with it.

Which of the following options satisfies the requirement to perform the job with the least total exposure?

A Install shielding, use the tool. ☐

B Install shielding, do not use the tool. ☐

C Do not install shielding, use the tool. ☑

D Do not install shielding, do not use the tool. ☐

Justification C: correct, no exposure for the shielding and 300 mr x 2 hrs = 600 mrem; A: shielding 500 mr + 100 mr x 2hrs = 700 mrem; B: shielding 500 mr + 200 mr x 1 1/2 hrs = 800 mrem; D: no exposure for the shielding and 600 mr x 1 1/2 hrs = 900 mrem

Reference MP2*LOIT/LOUT, 10-CFR-20, ALARA

NRC K/A System/E/A

System 2.3 Radiation Control

Number G

SEE GENERIC K/A

Importance RO/SRO

10CFR Link

NRC K/A Generic

2.3 Radiation Control

2.3.1

Knowledge of 10 CFR: 20 and related facility radiation control requirements.

2.6 3.0

(CFR: 41.12 / 43.4. 45.9 / 45.10)

93 ☑ RO ☑ SRO Question ID: 1000204 Origin: New ☐ Memory? (Check=Yes)

The plant has been shut down due to a leak in the CVCS Regenerative Heat Exchanger. You have been directed to open and red tag the vents and drains associated with the heat exchanger. The following conditions exist:

- The area around the CVCS Regenerative Heat Exchanger has been posted a 'Locked High Radiation Area'.
- The area is at the MINIMUM required radiation level for the posting.
- Your present annual exposure is 500 mRem.
- All the valves you have been assigned to operate are inside the posted area.

What would be your maximum calculated stay time in this area in order to avoid exceeding the Millstone administrative limit?

A 4.5 hours ☐

B 2.5 hours ☐

C 1 hour ☐

D 30 minutes ☑

Justification D is correct. The Millstone administrative limit, based on ALARA considerations, is 1,000 mRem/yr; therefore, your maximum allowed exposure is 500 mRem. The minimum radiation level for a 'Locked High Radiation Area' is 1,000 mRem/hr. The maximum allowed time is 30 minutes. (500 mRem divided by 1,000 mRem/hr = 0.5 hr. 0.5 hr x 60 minutes/hr = 30 minutes)
A is incorrect. If the administrative limit is assumed to be 5,000 mRem/yr (4,500 mRem left for the year), then the maximum stay time is 4.5 hrs.
B is incorrect. If the assumed Millstone administrative limit is 3,000 mRem/yr (2,500 mRem left for the year), then the maximum stay time is 2.5 hrs.
C is incorrect. If the lock high radiation area minimum value is assumed to be 500 mRem, then the maximum stay time is 1 hr.

Reference MP2*LOIT ALARA, radiation

NRC K/A System/E/A

System 2.3 Radiation Control

Number G

SEE GENERIC K/A

Importance RO/SRO

10CFR Link

NRC K/A Generic

2.3 Radiation Control

2.3.2

Knowledge of facility ALARA program.

2.5 2.9

(CFR: 41.12 / 43.4. 45.9 / 45.10)

 # 94 ☑ RO ☑ SRO Question ID: **1000039** **Origin: New** ☐ Memory? (Check=Yes)

Initial Conditions: The plant has been cooled down.
RCS temperature is presently 95°F.
The RCS is vented to containment.
Containment pressure is 18" water gravity and decreasing due to venting using the H2 purge valves and EBFS to the site stack.

If a release of radioactive Xenon gas were to occur in containment, how would the release be mitigated/terminated?

A The H2 purge valves would be closed in accordance with a containment closure plan. ☑

B The H2 purge valves would close in response to an auto CIAS actuation. ☐

C The H2 purge valves would close in response to an auto CPVIS actuation in 1 of 4 logic. ☐

D The H2 purge valves would close in response to an auto CPVIS actuation in 2 of 4 logic. ☐

Justification A: correct, in Mode 5 with the RCS vented to containment a containment closure plan is required and closure tags are hung on the H2 purge valves to remind the operator that the valves must be closed manually if containment closure is required; B: auto SIAS/CIAS is blocked except on containment high pressure, with the RCS at 95°F this won't occur; C: 1 of 4 CPVIS will close the CTMT purge valves, not the H2 purge valves; D: same reason as C

Reference MP2*LOIT, CPVIS, H2 Purge, 2314B, MB-02470

NRC K/A System/E/A

System 2.3 Radiation Control

Number G

SEE GENERIC K/A

Importance RO/SRO

10CFR Link

NRC K/A Generic

2.3 Radiation Control

2.3.9

Knowledge of the process for performing a containment purge.

2.5 3.4

(CFR: 43.4 / 45.10)

# 95	☑ RO ☑ SRO	Question ID: 1000040	Origin: New	☑ Memory? (Check=Yes)

Initial Conditions: 100% power, NO equipment out of service, all systems normal.

An N-16 HIGH radmonitor alarm comes in and is verified to be valid based on other indications.
Primary to secondary leak rate is 165 gpd.
NO other alarms are annunciated.

What operator actions are required in response to the verified alarm?

A The leak rate is less than the Tech Spec limit; therefore, operation may continue indefinitely. ☐

B Refer to OP 2204, Load Changes and be in Hot Standby in less than 24 hours. ☐

C Refer to AOP 2575, Rapid Downpower and be in Hot Standby in less than 6 hours. ☑

D Immediately trip the plant and enter EOP 2525, Standard Post Trip Actions. ☐

Justification C: correct. The ARP directs entry into AOP 2569 SGTL which directs the operator to verify the alarm based on other indications then refer to AOP 2575 and to be in Hot Standby in less than 6 hours if the primary to secondary leak rate is in excess of 150 gpd. A: 0.035 gpm is the Tech Spec limit for SG leakage; however the N-16 rad monitor indicates a leak rate equivalent to 0.12 gpd; B: OP 2204 would NOT be used if the primary to secondary leak rate is greater than 75 gpd. Additionally, the plant must be in Hot Standby within 6 hours, NOT 24 hours. D: This response is required for a verified main steam line radmonitor alarm.

Reference MP2*LOIT, 2569, 2575, SGTL, SJAE RM, MB-05773

NRC K/A System/E/A

System 2.3 Radiation Control

Number G

SEE GENERIC K/A

Importance RO/SRO

10CFR Link

NRC K/A Generic

2.3 Radiation Control

2.3.10

Ability to perform procedures to reduce excessive levels of radiation and guard against personnel exposure.

2.9 3.3

(CFR: 43.4 / 45.10)

96 | ✔ RO ✔ SRO | Question ID: 1000041 | Origin: New | ☑ Memory? (Check=Yes)

A step in EOP 2534 Steam Generator Tube Rupture directs that the most affected steam generator be isolated.

At the completion of this step, what will be the status of the most affected steam generator's atmospheric dump valve?

A C05 controller in Auto with its setpoint at 1000 psia. ☐

B C05 controller in Auto with its setpoint at 920 psia. ☑

C C05 controller in Manual and closed. ☐

D Isolated by closing the upstream manual isolation valve. ☐

Justification B: correct, this setpoint is well above the SG pressure at the point in the procedure where the SG is isolated, remaining in Auto at 920 ensures that an increase in SG pressure will be halted by the ADV vice relying on safeties which industry experience shows may not reseat, thus becoming an unisolable release; A: setpoint is just below the nominal setpoint for the lowest safety, same idea as in B but too close; C: chosen if examinee doesn't recall SGTR success strategy; D: chosen for same reason as C, but more confidence in manual valve than electronic controller

Reference MP2*LOIT, 2534, SGTR, MB-05780

NRC K/A System/E/A		NRC K/A Generic
System	2.3 Radiation Control	2.3 Radiation Control
Number	G	2.3.11
	SEE GENERIC K/A	Ability to control radiation releases.
Importance RO/SRO		2.7 3.2
10CFR Link		(CFR: 45.9 / 45.10)

97 | ☑ RO ☑ SRO | Question ID: 0055915 | Origin: Bank | ☑ Memory? (Check=Yes)

An event is in progress that requires security safeguards be relaxed to prevent injury to security personnel . This will require a departure from license conditions (invoking 10CFR50.54 x).

Which of the following individuals has the authority to direct this action?

A Station Duty Officer ☐

B Security Shift Supervisor ☐

C Affected Unit Shift Manager ☑

D Any on-shift licensed operator ☐

Justification Under the Operations section of Master Manual 14, Section 2, Responsibilities, the shift manager is only individual listed who can authorize the use of 10CFR50.54x. 10CFR50.54y states, "this section (x) shall be approved, as a minimum, by a senior licensed operator.
"A" is incorrect because the station duty officer is the unaffected shift technical advisor and is NOT the senior individual at the facility. Additionally, the station duty officer is NOT likely to have a senior license.
"B" is incorrect because the security shift supervisor is NOT licensed and is NOT the senior facility representative.
"D" is incorrect because an individual with only a reactor operator license CANNOT authorize the use of 10CFR50.54x.

Reference MP2*LOIT*3161 [119 RLH-O2-C 47] (9/9/96) ADMIN, LICRES, 10CFR, MP-14-MMM

NRC K/A System/E/A

System 2.4 Emergency Procedures /Plan

Number G

SEE GENERIC K/A

Importance RO/SRO

10CFR Link

NRC K/A Generic

2.4 Emergency Procedures /Plan

2.4.12

Knowledge of general operating crew responsibilities during emergency operations.

3.4 3.9

(CFR: 41.10 / 45.12)

 # 98 ☑ RO ☑ SRO Question ID: **0156523** **Origin: Modified** ☑ Memory? (Check=Yes)

EOP 2540C1, Functional Recovery of RCS Inventory Control, contingency action 7.1 for success path IC-1 states, "If the RCS Inventory Control safety function is NOT satisfied, Go To the next appropriate RCS Inventory Control success path."

When used in this situation, what does the term 'Go To' mean?

A Complete the actions of success path IC-1 and enter success path IC-2. ☐

B Perform the actions of success path IC-1 concurrently with the actions of success path IC-2. ☐

C Use the applicable steps of success path IC-2 , and complete the actions of success path IC-1. ☐

D Leave success path IC-1 and perform the actions of success path IC-2. ☑

Justification	OP 2260, Unit 2 EOP User's Guide, states, "The words "Go To" are used to accomplish branching." Branching is used to direct the user to exit the procedure in use and not return unless otherwise directed. "A" is incorrect because the procedure presently in use does NOT provide instructions for the given condition. "B" is incorrect for the same reason as "A". "C" is incorrect because the term requires the user to leave the procedure in use and NOT return unless other wise directed.
Reference	LOIT, [121 226-01-C 655] (8/26/96), 2260, EOP, 2537, MB-05269

NRC K/A System/E/A

System 2.4 Emergency Procedures /Plan

Number G

SEE GENERIC K/A

Importance RO/SRO

10CFR Link

NRC K/A Generic

2.4 Emergency Procedures /Plan

2.4.17

Knowledge of EOP terms and definitions.

3.1 3.8

(CFR: 41.10 / 45.13)

 # 99 ☑ RO ☑ SRO Question ID: **0153723** **Origin: Modified** ☐ Memory? (Check=Yes)

A fire in Appendix "R" Fire Area R-1 has resulted in the evacuation of the Control Room. Which one of the following actions, as specifically identified in AOP 2579A, "Fire Procedure for Hot Standby Appendix R Fire Area R-1", is required to be completed within the first 30 minutes of the Control Room evacuation?

A Power is established to a vital 4160 Volt bus ☐

B Auxiliary Feed flow is established to a steam generator ☑

C RCS make up is established via a charging pump ☐

D "C" Battery Charger is aligned to Facility 2 ☐

Justification B is correct. The caution prior to step 1 of AOP 2579A states, "Failure to initiate Auxiliary Feedwater flow to any SG within 30 minutes of a loss of normal feedwater may result in that SG boiling dry.
A is incorrect. Power must be restored within 4 hours of the reactor shutdown
C is incorrect. Charging flow is required to be restored within 4 hours of the reactor trip.
D is incorrect. "C" battery Charger is required to be aligned to Facility 2 prior to depletion of the "B" Battery. This is assumed to take longer than 30 minutes.

Reference MP2*LOIT [79R-01-C 1612] Fire, 2579

NRC K/A System/E/A		NRC K/A Generic
System	2.4 Emergency Procedures /Plan	2.4 Emergency Procedures /Plan
Number	G	2.4.25
	SEE GENERIC K/A	Knowledge of fire protection procedures.
Importance RO/SRO		2.9 3.4
10CFR Link		(CFR: 41.10 / 45.13)

 # 100 ☑ RO ☑ SRO Question ID: **0074346** **Origin: Bank** ☐ Memory? (Check=Yes)

Unit 2 has just experienced an uncomplicated Reactor Trip and the shift is carrying out the actions of EOP 2525, Standard Post Trip Actions. The Primary Plant Operator (PPO) has just finished confirming the status of Containment Combustible Gas Control with the Unit Supervisor (US), when he/she notices the VCT pressure is at 3 psig with level at 70% and trending down.

In accordance with the EOP Implementation Guide, what report would the PPO provide to the Unit Supervisor concerning VCT conditions?

A Subsequent Actions on the Primary Side are completed; VCT level and pressure are in the low end of the band. ☐

B Subsequent Actions on the Primary Side are complete and verified; all conditions are normal ☐

C Aligning charging pump suction to the RWST due to low VCT level and pressure. ☑

D Immediate Actions on the Primary Side are complete and satisfactory; proceeding with Subsequent Actions. ☐

Justification Per the EOP Implementation Guide (dated 7/7/2000): The Unit Supervisor will query the PPO and SPO on their completion of their subsequent actions and need not query individual subsequent action steps, unless an action is in doubt. The PPO and SPO should report the status of their subsequent actions to the US, contingency actions taken, and subsequent actions not able to be completed. Normal response would be "I have completed and verified my subsequent operator actions."
"A" is incorrect because VCT level is just below the normal band prescribed in EOP 2525; therefore the contingency action for that step must be performed and must be reported to the US.
"B" is incorrect for the same reason as "A".
"D" is incorrect because Containment Combustible Gas Control is the last step queried by the US; therefore the US is aware of the status of Immediate Actions.

Reference MP2*LOIT, E25-00-C, VCT, 2304, 2525 Actions, MB-05431

NRC K/A System/E/A

System 2.4 Emergency Procedures /Plan

Number G

SEE GENERIC K/A

Importance RO/SRO

10CFR Link

NRC K/A Generic

2.4 Emergency Procedures /Plan

2.4.47

Ability to diagnose and recognize trends in an accurate and timely manner utilizing the appropriate control room reference material.

3.4 3.7

(CFR: 41.10,43.5 / 45.12)

U.S. Nuclear Regulatory Commission
Site-Specific
Written Examination

Applicant Information	
Name:	Region: (I) / II / III / IV
Date: 10/25/02	Facility/Unit: Millstone 2
License Level: RO / (SRO)	Reactor Type: W / (CE) / BW / GE
Start Time:	Finish Time:

Instructions

Use the answer sheets provided to document your answers. Staple this cover sheet on top of the answer sheets. The passing grade requires a final grade of at least 80.00 percent. Examination papers will be collected six hours after the examination starts.

Applicant Certification

All work done on this examination is my own. I have neither given nor received aid.

_____
Applicant's Signature

Results		
Examination Value	_____	Points
Applicant's Score	_____	Points
Applicant's Grade	_____	Percent

U.S. Nuclear Regulatory Commission
Site-Specific Written Examination Answer Sheet
Millstone Unit Two Senior Reactor Operator Examination

Name: SRO Answer Key Date: _____ Grade: _____

1)	[A]	[B]	[C]	[D]
2)	[A]	[B]	[C]	[D]
3)	[A]	[B]	[C]	[D]
4)	[A]	[B]	[C]	[D]
5)	[A]	[B]	[C]	[D]
6)	[A]	[B]	[C]	[D]
7)	[A]	[B]	[C]	[D]
8)	[A]	[B]	[C]	[D]
9)	[A]	[B]	[C]	[D]
10)	[A]	[B]	[C]	[D]
11)	[A]	[B]	[C]	[D]
12)	[A]	[B]	[C]	[D]
13)	[A]	[B]	[C]	[D]
14)	[A]	[B]	[C]	[D]
15)	[A]	[B]	[C]	[D]
16)	[A]	[B]	[C]	[D]
17)	[A]	[B]	[C]	[D]
18)	[A]	[B]	[C]	[D]
19)	[A]	[B]	[C]	[D]
20)	[A]	[B]	[C]	[D]
21)	[A]	[B]	[C]	[D]
22)	[A]	[B]	[C]	[D]
23)	[A]	[B]	[C]	[D]
24)	[A]	[B]	[C]	[D]
25)	[A]	[B]	[C]	[D]
26)	[A]	[B]	[C]	[D]
27)	[A]	[B]	[C]	[D]
28)	[A]	[B]	[C]	[D]
29)	[A]	[B]	[C]	[D]
30)	[A]	[B]	[C]	[D]
31)	[A]	[B]	[C]	[D]
32)	[A]	[B]	[C]	[D]
33)	[A]	[B]	[C]	[D]
34)	[A]	[B]	[C]	[D]
35)	[A]	[B]	[C]	[D]
36)	[A]	[B]	[C]	[D]
37)	[A]	[B]	[C]	[D]
38)	[A]	[B]	[C]	[D]
39)	[A]	[B]	[C]	[D]
40)	[A]	[B]	[C]	[D]
41)	[A]	[B]	[C]	[D]
42)	[A]	[B]	[C]	[D]
43)	[A]	[B]	[C]	[D]
44)	[A]	[B]	[C]	[D]
45)	[A]	[B]	[C]	[D]
46)	[A]	[B]	[C]	[D]
47)	[A]	[B]	[C]	[D]
48)	[A]	[B]	[C]	[D]
49)	[A]	[B]	[C]	[D]
50)	[A]	[B]	[C]	[D]

U.S. Nuclear Regulatory Commission
Site-Specific Written Examination Answer Sheet
Millstone Unit Two Senior Reactor Operator Examination

51)	[A]	[B]	[C]	[D]
52)	[A]	[B]	[C]	[D]
53)	[A]	[B]	[C]	[D]
~~54)~~	~~[A]~~	~~[B]~~	~~[C]~~	~~[D]~~ Delete KAS 11/1/02
55)	[A]	[B]	[C]	[D]
56)	[A]	[B]	[C]	[D]
57)	[A]	[B]	[C]	[D]
58)	[A]	[B]	[C]	[D]
59)	[A]	[B]	[C]	[D]
60)	[A]	[B]	[C]	[D]
61)	[A]	[B]	[C]	[D]
62)	[A]	[B]	[C]	[D]
63)	[A]	[B]	[C]	[D]
64)	[A]	[B]	[C]	[D]
65)	[A]	[B]	[C]	[D]
66)	[A]	[B]	[C]	[D]
67)	[A]	[B]	[C]	[D]
68)	[A]	[B]	[C]	[D]
69)	[A]	[B]	[C]	[D]
70)	[A]	[B]	[C]	[D]
71)	[A]	[B]	[C]	[D]
72)	[A]	[B]	[C]	[D]
73)	~~[A]~~ RP	[B]	[C]	[D]
74)	[A]	[B]	[C]	[D]
75)	[A]	[B]	[C]	[D]

76)	[A]	[B]	[C]	[D]
77)	[A]	[B]	[C]	[D]
78)	[A]	[B]	[C]	[D]
79)	[A]	[B]	[C]	[D]
80)	[A]	[B]	[C]	[D]
81)	[A]	[B]	[C]	[D]
82)	[A]	[B]	[C]	[D]
83)	[A]	[B]	[C]	[D]
84)	[A]	[B]	[C]	[D]
85)	[A]	[B]	[C]	[D]
86)	[A]	[B]	[C]	[D]
87)	[A]	[B]	[C]	[D]
88)	[A]	[B]	[C]	[D]
89)	[A]	[B]	[C]	[D]
90)	[A]	[B]	[C]	[D]
91)	[A]	[B]	[C]	[D]
92)	[A]	[B]	[C]	[D]
93)	[A]	[B]	[C]	[D]
94)	[A]	[B]	[C]	[D]
95)	[A]	[B]	[C]	[D]
96)	[A]	[B]	[C]	[D]
97)	[A]	[B]	[C]	[D]
98)	[A]	[B]	[C]	[D]
99)	[A]	[B]	[C]	[D]
100)	[A]	[B]	[C]	[D]

All work done on this examination is my own; I have neither given, nor received aid.

_____
Examinee's Signature

# 1	☑ RO	☑ SRO	Question ID: **0153945**	**Origin: Modified**	☐ Memory? (Check=Yes)

The plant is operating at 100% power and the monthly CEA operability surveillance is in progress. The Primary Plant Operator (PPO) has just finished inserting CEA #45 (Group A) 5 steps from the fully withdrawn position, when it suddenly slips to the 167 step position.

Which one of the following combinations of CEAPDS and PPC position indications matches what would be displayed on C-04 under these conditions?

A	CEAPDS indicates 167 steps	Computer indicates 175 steps	☑
B	CEAPDS indicates 167 steps	Computer indicates 167 steps	☐
C	CEAPDS indicates 175 steps	Computer indicates 167 steps	☐
D	CEAPDS indicates 175 steps	Computer indicates 175 steps	☐

Justification A: correct, CEAPDS will display the slipped CEA position because it monitors the reed switches for the individual CEA. However, the PPC will only display a change in CEA position if the CEDM was actually "pulsed" to move the CEA. The only exception is if the CEA dropped to the bottom, in which case, the computer will reset to 0 steps..
"B" is incorrect because the computer was not 'pulsed' to the 167 step position, only to the 175 step position. This is a credible answer if the student is confused about which system, the computer or CEAPDS, will display actual CEA position on a dropped/slipped CEA.
"C" is incorrect because CEAPDS will show actual position regardless of whether the CEA was inserted normally or it slipped/dropped and because the computer was not 'pulsed' to the 167 step position, only to the 175 step position. This is a credible answer if the student is confused about which system, the computer or CEAPDS, will display actual CEA position on a dropped/slipped CEA.
"D" is incorrect because CEAPDS will display actual CEA position regardless of whether the CEA slipped or was inserted normally. This is a credible answer if the student is confused about which system, the computer or CEAPDS, will display actual CEA position on a dropped/slipped CEA.

Reference LOIT, [001 CED-01-C 2918], 2302A, CEDS, CEAPDS, PPC, 2556, MB-00910

NRC K/A System/E/A

System 005 Inoperable/Stuck Control Rod

Number GA

SEE GENERIC K/A

Importance RO/SRO

10CFR Link

NRC K/A Generic

2.1 Conduct of Operations

2.1.19

Ability to use plant computer to obtain and evaluate parametric information on system or component status.

3.0 3.0

(CFR: 45.12)

# 2	☑ RO	☑ SRO	Question ID: 0068259	Origin: Bank	☐ Memory? (Check=Yes)

The plant has tripped from 100% power, steady state, due to a loss of all 4 off-site lines. Buses 24C and 24D are being carried by their respective EDGs. All other equipment is operating normally for the loss of power conditions.

During the performance of EOP 2525, Standard Post Trip Actions, the PPO notes Q-power reading ~40%.

What is the cause of the Q-power reading seen by the PPO?

A The condenser steam dumps remain closed due to a loss of vacuum resulting in higher RCS temperatures, which allows for greater neutron leakage. This larger neutron leakage is interpreted by RPS as a higher Q-power. ☐

B If NOT placed in Manual and Closed, the condenser steam dumps will open due to the LNP. The lower RCS temperatures add positive reactivity causing NI power to rise, which RPS equates into a higher Q-power. ☐

C The difference between Th and Tc will grow as natural circulation is established. RPS translates this growing difference between Th and Tc as a rise in delta-T power, which equates to the observed rise in Q-power. ☑

D The loss of off-site power has resulted in a loss of power to the Th and Tc instruments. Because Th and Tc have different minimum values, a higher than normal delta-T will be calculated and displayed as a higher Q-power. ☐

Justification Q = M Cp (Th - Tc) = U A (Tc - Tsg); As NC is established, delta-T must rise to accommodate the heat transfer from the RCS to SG and establish NC flow. RPS will translate the rise in delta-T as a rise in delta-T power. Q-power is the auctioneered largest value of NI or delta-T power. NI power has already dropped off to the intermediate range; therefore, delta-T power will be seen as Q-power.
"A" is incorrect because, although the failure of the condenser steam dumps to open will result in slightly higher RCS temperatures, the affect on neutron leakage is minimal and will NOT cause nuclear power to rise.
"B" is incorrect because the condenser steam dumps will NOT open. The loss of of-site power will result in a loss of condenser vacuum causing the condenser steam dumps to remain closed.
"D" is incorrect because the RCS temperature instruments do NOT lose power during a loss of off-site power.

Reference MP2*LORT 2525, 2532, NC, HTFF, MB-03062

NRC K/A System/E/A

System 015/ Reactor Coolant Pump (RCP)
017 Malfunctions

Number AK1.01

Knowledge of the operational implications of the following concepts as they apply to Reactor Coolant Pump Malfunctions (Loss of RC Flow): Natural circulation in a nuclear reactor power plant

Importance RO/SRO 4.4 4.6

10CFR Link (CFR 41.8 / 41.10 / 45.3)

NRC K/A Generic

# 3	☑ RO	☑ SRO	Question ID: **1000101**	**Origin: New**	☐ Memory? (Check=Yes)

The plant is operating normally at 100% power. During the initiation of the surveillance to force Pressurizer sprays, a malfunction occurs causing the Loop 1 spray valve, 2-RC-100E to stick open. The plant is manually tripped due to lowering RCS pressure. During the performance or EOP 2525, Stand ard Post Trip Actions, all 4 RCPs were eventually tripped to stop the presure reduction.

When EOP 2525, Standard Post Trip Actions, were completed, the following conditions were noted:

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

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

A Swap the power supply and start "B" charging pump and restore Pressurizer level to between 35 and 70%. ☐

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

C Start both motor driven auxiliary feedwater pumps to restore S/G level to between 10 and 80%. ☐

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

Justification Per EOP 2528, Loss of Offsite Power/Loss of Forced Circulation, one of the steps listed under the heading of "Check Single Phase Natural Circulation" is to ensure that HIC-4165, Steam Dump Tavg Controller is in MANUAL and closed when NO RCPs are operating.
"A" is incorrect because there is NO procedural requirement to check Pressurizer level for natural circulation flow. This is credible because older revisions of this procedure required pressure level and 35 to 70% is the normal range of Pressurizer level.
"C" is incorrect because S/G level is NOT a criteria for checking natural circulation flow. This is credible because the procedure requires S/G level to be between 40 and 70%, but this is for RCS heat removal, NOT for natural circulation flow verification.
"D" is incorrect because lowering Tave is NOT required to verify natural circulation flow. This is credible because older revisions of the procedure required Tave to be maintained between 530-535°F; NOT for natural circulation flow, but for RCS heat removal. The procedure now requires Tc to be maintained less than 535 degrees F.

Reference MP2*LOIT, EOP, 2528, NC, MB-05902

NRC K/A System/E/A

NRC K/A Generic

System A13 Natural Circulation Operations

Number AA2.2

Ability to determine and interpret the following as they apply to the (Natural Circulation Operations) Adherence to appropriate procedures and operation within the limitations in the facility's license and amendments.

Importance RO/SRO 2.9 3.8

10CFR Link (CFR: 43.5 / 45.13)

# 4	✔ RO	✔ SRO	Question ID: **1000102**	**Origin: New**	Memory? (Check=Yes)

The following conditions exist:

- The unit is operating at 100% power.
- Burnup is 6,000 MWD/MTU

The plant sustains an excess steam demand event due to a stuck open atmospheric dump valve on No. 1 SG.

- Upon the trip, Bus 24D is faulted and "B" Charging pump fails to start.
- EOP 2525 is complete and EOP 2536, Excess Steam Demand, has been entered.
- RCS temperature has been stabilized at 481°F.
- Emergency Boration has been initiated due to the cooldown using only the "A" charging pump.
- Chemistry reports that present RCS Boron concentration is 1025 ppm.
- All other equipment functions as expected.

Based on the above conditions AND excluding the effects of Xenon, what is the lowest RCS temperature allowed in order to achieve the required minimum SHUTDOWN MARGIN (SDM)?

A 346°F ☐

B 468°F ☑

C RCS temperature is already below the minimum ☐

D SDM is met for any desired RCS temperature. ☐

Justification	Per OP 2208-12, Shutdown Boron Concentration versus Moderator Temperature Cycle 15, using the 6,000 MWD/MTU curve, the minimum temperature equates to approximately 465°F. Using the values on the table, the interpolated minimum value for RCS temperature is 468°F (most conservative). "A" is incorrect but credible because it is the minimum temperature for 6,000MWD/MTU and 1125 ppm. "C" is incorrect but credible if the student uses any curve less than 6,000 MWD/MTU. "D" is incorrect but credible if the student uses any curve greater than 6,000 MWD/MTU.
Reference	LOIT, 2208, EB, 2528, SDM, MB-05410 **Requires the use of OP 2208-12**

NRC K/A System/E/A

System 024 Emergency Boration

Number AK1.04

Knowledge of the operational implications of the following concepts as they apply to Emergency Boration: Low temperature limits for boron concentration

Importance RO/SRO 2.8 3.6

10CFR Link CFR 41.8 / 41.10 / 45.3)

NRC K/A Generic

# 5	✔ RO	✔ SRO	Question ID: **1000103**	Origin: New	☐ Memory? (Check=Yes)

With the plant operating at 100% power, the following alarms are received:

- RBCCW HDR B PRESS LO
- RBCCW HDR B FLOW HI
- RBCCW SURGE TK LEVEL HI/LO
- PMW HEADER LOW PRESSURE
- Various low flow annunciators for components supplied by "B" RBCCW header

The cause of the indicated high flow on the "B" RBCCW header is a rupture _____.

A downstream of the RBCCW surge tank outlet orifice to the "B" RBCCW header. ☐

B on the RBCCW inlet piping to the "C" RBCCW heat exchanger. ☐

C between the "C" RBCCW pump discharge isolation and check valves. ☐

D on the RBCCW inlet piping to the letdown heat exchanger. ☑

Justification A header rupture on the RBCCW inlet to the letdown heat exchanger will indicate high flow on the "B" RBCCW header flow instrument. The letdown heat exchanger is downstream of the flow instrument.
"A" is incorrect but credible because the student may mistakenly believe that the surge tank outlet orifice is a flow device. Additionally, a rupture iin the RBCCW supply header would NOT result in higher indicated header flow.
"B" is incorrect but credible because the flow instrument is downstream of the heat exchangers. The student may incorrectly believe it is upstream.
"C" is incorrect but credible because the student may mistakenly believe that the flow instrument is located at the pump discharge.

Reference LOIT, RBCCW, 2564, MB-05026

NRC K/A System/E/A

System 026 Loss of Component Cooling Water (CCW)

Number AK3.04

Knowledge of the reasons for the following responses as they apply to the Loss of Component Cooling Water: Effect on the CCW flow header of a loss of CCW

Importance RO/SRO 3.5 3.7

10CFR Link (CFR 41.5,41.10 / 45.6 / 45.13)

NRC K/A Generic

6 | ✓ RO ✓ SRO | Question ID: **1000052** | Origin: **New** | Memory? (Check=Yes)

Initial Condition: 100% steady-state power, RCS Tavg 572° F, Channel 'X' pressurizer pressure controller is in service with its setpoint at 2250 psia and pressurizer pressure is 2250 psia. Both sets of proportional heaters are in service, there are no backup heaters on, and both main spray valves are closed.

A step change in Turbine control valve position causes RCS Tavg to rise by 4° F.

Which of the following conditions would be indicative of a malfunction of the pressurizer pressure control system?

A Both main spray valves go partially open. ☐

B All pressurizer backup heaters are on. ☐

C Both sets of proportional heaters are at minimum output. ☑

D Annunciator "Pressurizer CH Y Pres Hi/Lo" alarms. ☐

Justification C: correct, a 4° F rise in Tavg should generate a 4% rise in pzr level and a 60 psi rise in pressure due to the in-surge, all heaters come on to heat the colder water entering the pzr on an in-surge, proportional heaters off would have to be due to a malfunction; A: chosen if examinees think sprays should go full open or pressure rise is too small to open sprays; B: chosen if examinees forget that the pzr is not a saturated system in this case; D: chosen if examinees think only the selected pzr pressure control channel would alarm

Reference MP2*LOIT, PLPCS, MB-02325

NRC K/A System/E/A

System 027 Pressurizer Pressure Control System (PZR PCS) Malfunction

Number AK1.02

Knowledge of the operational implications of the following concepts as they apply to Pressurizer Pressure Control Malfunctions: Expansion of liquids as temperature increases

Importance RO/SRO 2.8 3.1

10CFR Link (CFR 41.8 / 41.10 / 45.3)

NRC K/A Generic

# 7	RO	✓ SRO	Question ID: **1000071**	Origin: **New**	Memory? (Check=Yes)

As the on-shift US, you are monitoring the PPO's CEA withdrawal to ensure rate of power increase limits are not exceeded.

Given a core with an axial shape index of +0.04 and a continuous 10 step withdrawal of the same CEA group.

Which of the following withdrawals would add the greatest amount of positive reactivity?

A 0 to 10 steps ☐

B 60 to 70 steps ☑

C 110 to 120 steps ☐

D 170 to 180 steps ☐

Justification B: correct, with a bottom peaked core, (ASI = L-U/L+U), the greatest concentration of flux, hence CEA worth would be in the middle of the lower half of the core; A, C, & D: all have lesser flux levels therefore lower integral rod worth for the specified withdrawal

Reference MP2*LOIT/LOUT, SRO, CEDS, 2302A, (CFR 55.43.6), MB-02864

NRC K/A System/E/A

System 001 Continuous Rod Withdrawal

Number AK1.21

Knowledge of the operational implications of the following concepts as they apply to Continuous Rod Withdrawal: Integral rod worth

Importance RO/SRO 2.9 3.2

10CFR Link (CFR 41.8 / 41.10 / 45.3)

NRC K/A Generic

# 8	☑ RO	☑ SRO	Question ID: **0156781**	**Origin: Modified**	☑ Memory? (Check=Yes)

Which of the following loss of condenser vacuum events would require a MANUAL trip of the reactor?

A 100% plant power, loss of one circulating water pump, and condenser backpressure is 4.5 inches of mercury absolute and slowly lowering. ☐

B 75% plant power, loss of one circulating water pump in EACH condenser, and backpressure is 3.5 inches of mercury absolute and stable. ☐

C 45% plant power, 2 circulating water pumps are lost in the SAME condenser, and backpressure is 3.5 inches of mercury absolute and stable. ☑

D 13% plant power, 2 circulating water pumps are lost in the SAME condenser, and backpressure is 4 inches of mercury absolute and stable. ☐

Justification AOP 2517, Circulating Water Malfunctions, and AOP 2574, Loss of Condenser Vacuum, require a manual reactor and turbine trip if 2 circulating water pumps are lost in the same condenser while operating at greater than 15% power. This was a recent event at MP2.
"A" is incorrect because the condition does not require a reactor trip, but does require a downpower to restore and maintain vacuum less than 4.5 inches of mercury absolute. This is credible if the student incorrectly assumes a trip is required at 4.5 inches of mercury absolute or as a result of a loss of one circulating water pump.
"B" is incorrect because a trip is not required for a loss of one circulating water pump in each condenser if vacuum is being maintained less than 6.5 inches of mercury absolute. This is credible because a reactor trip is required if 2 circulating water pumps are lost in the same condenser while operating at greater than 12% power.
"D" is incorrect because a reactor trip is NOT required for a loss of 2 circulating water pumps in the same condenser while less than 15% power. This is credible because a turbine trip is required for this condition.

Reference LOIT, [000 563-01-B 1443] (9/9/96), 2574, 2517, AOP, MB-01405

NRC K/A System/E/A

System 051 Loss of Condenser Vacuum

Number AA2.02

Ability to determine and interpret the following as they apply to the Loss of Condenser Vacuum: Conditions requiring reactor and/or turbine trip

Importance RO/SRO 3.9 4.1

10CFR Link (CFR: 43.5 / 45.13)

NRC K/A Generic

# 9	✔ RO	✔ SRO	Question ID: **1000001**	Origin: **New**	✔ Memory? (Check=Yes)

Initial Conditions: 100% power, normal system alignments with the 'A' DG out for root blower replacement. A sudden, hard ground on DC bus 201B causes a Station Blackout.

Which procedural actions are required specifically due to the loss of 201B, and why?

A Manually trip open individual load breakers on bus 24D to de-energize loads running with no relay protection. ☐

B Manually trip open the RSST feeder breaker to bus 24D readying the bus to be energized from the unit 3 x-tie. ☐

C Manually trip the 13U DG locally due to it running with no protection or service water. ☑

D Manually trip the feeder breakers to bus 24A and 25A to remove potential from bus loads as the main turbine coasts down. ☐

Justification A: credible since load breakers on 24D are closed and have no tripping protection w/o DC, however not running due to no AC; B: credible since unit 3 x-tie is the success path, however RSST feeder is not closed and 24D cannot be energized from unit 3 w/o DC control power; D: credible since 24A & 25A feeder breakers do not trip, loads stay tied to NSST, but main generator excitation is removed; C: correct since DG air start solenoids fail open on DC loss and loss of DC prevents breaker closure to power SW & no DC control power for remote tripping or protective trips, (Contingency action 10.2 of EOP 2530).

Reference MP2*LOIT, EOP 2530, Station Blackout, MB-05912

NRC K/A System/E/A

System 055 Loss of Offsite and Onsite Power (Station Blackout)

Number EK3.02

Knowledge of the reasons for the following responses as the apply to the Station Blackout: Actions contained in EOP for loss of offsite and onsite power

Importance RO/SRO 4.3 4.6

10CFR Link (CFR 41.5 / 41.10 / 45.6 / 45.13)

NRC K/A Generic

# 10	RO	☑ SRO	Question ID: 1000180	Origin: New	Memory? (Check=Yes)

The plant is initially at 100% power, steady-state conditions, all CEAs at 180 steps (ARO).
Quarterly CEA Partial Movement surveillance is in progress.
The core center CEA, #1 in Group 7 is being exercised when the PPO reports that it has dropped to 150 steps withdrawn.

What affect does this event have on further CEA motion and what condition will the US direct the PPO to verify?

A All CEA motion is halted, CEAPDS generates a CMI due to PDIL violation. ☐

B All outward CEA motion is halted, RPS generates a CWP due to 2 or more LPD pre-trips. ☐

C All CEA motion is halted, CEAPDS generates a CMI due to a backup Group Deviation ☑

D All Group 7 CEA motion is halted, PPC generates a CMI due to a Group Gross Deviation ☐

Justification C: correct, 8 step deviation generates CMI on all CEAs; A: PDIL is 137 steps @ 100%; B: center CEA is too weak and too balanced to cause LPD; D: PPC doesn't generate CMI or CWP signals

Reference MP2*LOIT/LOUT, SRO, 2302A, 2556, TS Bases, CEDS, (CFR 55.43.b.6), MB-05817

NRC K/A System/E/A

NRC K/A Generic

System 003 Dropped Control Rod

Number AA2.04

Ability to determine and interpret the following as they apply to the Dropped Control Rod: Rod motion stops due to dropped rod

Importance RO/SRO 3.4 3.6

10CFR Link (CFR: 43.5 / 45.13)

 # 11 ☑ RO ☑ SRO Question ID: **0156632** **Origin: Modified** ☑ Memory? (Check=Yes)

The plant is operating at 100% power, with the following conditions:
Bus 24E is aligned to Bus 24C.
'A' and 'C' Service Water Pumps are in service.
The 'C' Service Water Pump trips and will NOT restart.

Which of the following actions is required?

A Trip the reactor, secure 'B' & 'D' RCPs, emergency trip the 'B' DG, Go To EOP 2525 . ☑

B Align the 'B' Service Water Pump to supply the 'B' Service Water Header, align 24E from the unit 3 x-tie then start the 'B' Service Water Pump ☐

C Align 'B' Service Water Pump to supply 'B' Service Water Header, start 'B' Service Water Pump, and log into TSAS 3.0.3. ☐

D Align Bus 24E to 24D and 'B' Service Water Pump to 'B' Service Water Header. Start the 'B' Service Water Pump. ☐

Justification A: correct, AOP 2565 requires the 'B' Service Water Pump electrically & mechanically aligned to facility 2; B, C, & D are all physically possible, but not procedurally allowed.

Reference MP2 LORT 3991 [000 565-01-B 1486] (9/18/97) 2565, AOP, MB-05043

NRC K/A System/E/A

System 062 Loss of Nuclear Service Water

Number GA

SEE GENERIC K/A

Importance RO/SRO

10CFR Link

NRC K/A Generic

2.4 Emergency Procedures /Plan

2.4.11

Knowledge of abnormal condition procedures.

3.4 3.6

(CFR: 41.10 / 43.5 / 45.13)

# 12	☑ RO	☑ SRO	Question ID: **1000046**	**Origin: New**	☑ Memory? (Check=Yes)

If a fire in the plant causes the 25' 6" cable vault spreading room deluge to activate, the Fire procedure AOP 2559 directs you to have the fire brigade wedge open the 25' 6" cable vault spreading room East door to stairway 10, and the door from the bottom of stairway 10 to the outside.

What is the reason for these actions?

A Allows unobstructed access for fire hoses to be brought into the area from the hose station located by the Aux. Building access point. ☐

B Prevents deluge water from over-flowing into the DC switchgear rooms by allowing it to flow outside. ☑

C Provides a flowpath for smoke purge from the affected fire area. ☐

D Ensures access to and from the fire area in the event that the fire disables the keycard readers. ☐

Justification B: correct, ventilation passages between the cable spreading room and the DC switchgear rooms are equipped with 3" high coffer dams, providing the stairwell as a drain path ensures that the dams are not over-flowed; A: the deluge should be more than adequate, but if hoses are required they are available in the area; C: smoke would rise rather than go down the stairwell and this type of action would be evaluated and initiated by the fire brigade, not proceduralized; D: only the bottom stairwell door has a reader and all doors can be overridden using keys

Reference MP2*LOIT, fire, 2559, MB-05666

NRC K/A System/E/A

System 067 Plant fire on site

Number AK1.02

Knowledge of the operational implications of the following concepts as they apply to Plant Fire on Site: Fire fighting

Importance RO/SRO 3.1 3.9

10CFR Link (CFR 41.8 / 41.10 / 45.3)

NRC K/A Generic

# 13	☑ RO	☑ SRO	Question ID: 1000003	Origin: New	☐ Memory? (Check=Yes)

Due to a fire in Appendix R Area R-1 the plant was tripped and the control room was evacuated.
The crew has assembled at Appendix R panel C-10 and has taken control in accordance with AOP 2579A.
Indicated pressurizer is 2253 psia on panel C-10.
Pressurizer level indicated on panel C-10 is 35% and rising slowly.
The SM directs you to operate charging and control RCS temperature to ensure the pressurizer level upper Tech Spec is not exceeded.

Using AOP 2579A Attachment 9, to what value can indicated pressurizer level rise before the upper level Tech Spec limit is exceeded?

A 45% ☑

B 51% ☐

C 65% ☐

D 70% ☐

Justification A: correct; B: chosen if examinee uses 1500# line; C: chosen if examinee adds required actual level rise to present indicated; D: chosen if examinee just specifies Tech Spec limit.

Choosing correct answer requires examinee to use graph and know PZR Tech Spec limit.

Reference MP2*LOIT, 2559, 2579A, Fire, Control Room Evacuation, C-10, MG-00673
Requires AOP 2579A, Attachment 9

NRC K/A System/E/A

System 068 Control Room Evacuation

Number AA2.07

Ability to determine and interpret the following as they apply to the Control Room Evacuation: PZR level

Importance RO/SRO 4.1 4.3

10CFR Link (CFR: 43.5 / 45.13)

NRC K/A Generic

# 14	☑ RO	☑ SRO	Question ID: 0071401	Origin: Bank	☑ Memory? (Check=Yes)

During a refueling outage with fuel movement in progress, which one of the following would be considered a loss of Containment Closure?

A Fuel Transfer Tube isolation valve 2-RW-280 not fully closed. ☐

B Containment Purge valves are open with a Purge in progress. ☐

C SG Secondary side manways off and a main steam safety is removed. ☑

D Containment equipment hatch held in place by only 6 bolts. ☐

Justification	Technical Specification 3.9.4 states that the equipment door needs to be held in place by at least 4 bolts. Containment purge must be capable of being automatically isolated (implying it may be in operation) with fuel movement in progress, the refuel pool is full and RW 280 must be open. If the SG Secondary side manway is removed and the Atm Steam Dump is cycled, closure is violated per SP 2614B
Reference	MP2*LOIT*05558*2515* AOP, NRC, APP, MB-05558

NRC K/A System/E/A

NRC K/A Generic

System 069 Loss of Containment Integrity

Number AA2.01

Ability to determine and interpret the following as they apply to the Loss of Containment Integrity: Loss of containment integrity

Importance RO/SRO 3.7 4.3

10CFR Link (CFR: 43.5 / 45.13)

# 15	RO	✔ SRO	Question ID: 1000054	Origin: New	Memory? (Check=Yes)

A plant cooldown is in progress using OP 2207.
The protected facility is Facility 1.
RCS temperature is 270° F and pressure is 375 psia with the 'A' & 'B' RCPs running.
The Shutdown Cooling System is in recirc for the warmup/pressurization leak check using the 'B' LPSI pump.
The 'A' HPSI pump is OPERABLE**** per the applicable Tech Spec.

The Seismic Monitor alarm comes in accompanied by a strong ground movement.
RCS pressure drops rapidly with presurizer level going off-scale low and containment pressure rapidly rising to 6 psig.

Based on the initial conditions and this event, what actions must the US direct?

A Monitor automatic operation of the 'A' HPSI, 'A' LPSI, and all CAR fans in slow speed. ☐

B Monitor automatic operation of the 'A' HPSI and all CAR fans in slow speed. Secure SDC and realign LPSI for injection. ☐

C Monitor automatic operation of all CAR fans in slow speed. Remove 'A' HPSI pump handswitch from pull-to-lock and monitor start. Secure SDC and realign LPSI for injection. ☑

D SIAS is blocked. All required equipment must be aligned and started manually. ☐

Justification C: correct, SIAS on CTMT pressure can't be blocked so CAR fans will respond accordingly, the 'A' HPSI is required to be in PTL due to lowered RCS temperature and LPSI alignment prevents injection until realigned, these actions are directed by OP 2207 in response to a LOCA; A: chosen by examinees if they key on Facility 1 protected and believe HPSI and LPSI maintained fully operable; B: chosen by examinees if they forget that HPSI is in PTL for PTS; D: chosen by examinees if they forget that SIAS will actuate on CTMT pressure

Reference MP2*LOIT/LOUT, LBLOCA, 2207, manual ESAS, (CFR 55.43.b.5), MB-02476

NRC K/A System/E/A

NRC K/A Generic

System 011 Large Break LOCA

Number EA1.04

Ability to operate and monitor the following as they apply to a Large Break LOCA: ESF actuation system in manual

Importance RO/SRO 4.4 4.4

10CFR Link (CFR 41.7 / 45.5 / 45.6)

# 16	RO	✓ SRO	Question ID: 1000056	Origin: New	Memory? (Check=Yes)

- The plant was at 12% power rolling the main turbine when steam header pressure started dropping.
- The plant was manually tripped when RPS pre-trips were received on steam generator low pressure.
- At the completion of EOP 2525 all steam dumps to the condenser and both ADVs are fully closed.
- All Main Steam Safeties have been verified closed.
- The SPO has tripped the running SGFP.
- #1 S/G level is 31% and dropping.
- #2 S/G level is 55% and stable.
- #1 S/G pressure is 640 psia and dropping.
- #2 S/G pressure is 720 psia and stable.

What procedure will be entered based on these indications and what actions must be directed?

A EOP 2526; restart one SGFP and restore #1 SG 40 - 70% level, raise the 'A' Steam Bypass valve setpoint to 900 psig. ☐

B EOP 2536; verify both channels of MSIS have actuated, override both facilities of AAFAS, start both MDAFW pumps, and feed SG #2 at 600 gpm until level is restored to 70%. ☐

C EOP 2536; actuate both channels of MSIS, override both facilities of AAFAS, start MDAFW pump(s) and feed only SG #2 after CETs stabilize, restore level 40% to 70%. ☑

D EOP 2540; evaluate priorities, initiate action to correct excessive RCS cooldown, second priority is loss of all feed condition. ☐

Justification C: correct, SG pressures are above MSIS setpoint, AAFAS must be overridden to prevent AFW to faulted SG, and feed is delayed until after cooldown is complete; A: specified pressures and levels are not low enough to actuate ESF systems, examinees may choose if they believe an accident signal is required to enter an accident EOP; B: close, but MSIS has not actuated and feeding intact SG too early aggravates the cooldown; D: chosen if examinees identify the ESDE and think that no feed constitutes a LOAF condition (2 events)

Reference MP2*LOIT/LOUT,SRO, AAFAS, 2322, 2536, 2525, (CFR-55.43.b.5), MB-05433

NRC K/A System/E/A

System E05 Excessive Heat Transfer

Number EK2.1

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

Importance RO/SRO 3.8 4.0

10CFR Link (CFR: 41.7 / 45.7)

NRC K/A Generic

# 17	RO	SRO	Question ID: 1000055	Origin: New	Memory? (Check=Yes)

The crew is responding to an Excess Steam Demand Event (ESDE) in containment.
#1 SG is the faulted steam generator.
Containment pressure peaked at 8 psig and is presently 4 psig.
The SPO stabilizes RCS temperatures when the faulted steam generator has blown down.
RCS temperatures are:
- CET temperatures and both loops Th are 380° F
- #1 Tc temperature is 372° F
- #2 Tc temperature is 355° F

Which set of extreme lower and upper pressure limits would the PPO be required to operate within to comply with the acceptance criteria of the P/T Curve?

A Lower pressure limit greater than or equal to: 277 psia
Upper pressure limit less than or equal to: 1326 psia ☐

B Lower pressure limit greater than or equal to: 338 psia
Upper pressure limit less than or equal to: 1089 psia ☑

C Lower pressure limit greater than or equal to: 208 psia
Upper pressure limit less than or equal to: 1326 psia ☐

D Lower pressure limit greater than or equal to: 144 psia
Upper pressure limit less than or equal to: 1089 psia ☐

Justification B: correct, lower limit is based on highest RCS temperature (CET or Th) with 30° F sub-cooled margin and accounting for a harsh CTMT environment, upper limit is based on lowest Tc (Rx vessel wall exposure) and 200° F sub-cooled max; A: Chosen if examinees miss harsh environment & use 380° F for both limits; C: chosen if examinees miss harsh environment on minimum and use Th for max limit; D: chosen if examinees mis-read table, pressure is saturation for lowest Tc and high limit is correct

** Provide copy of EOP 2541 Attachment 2, RCS P/T Curve Figure 1 and attached tables.

Reference MP2*LOIT/LOUT, SRO, 2541, P/T, PTS, RCS subcooling, MB-05847
(CFR 55.43.b.5)
Requires the use of EOP 2541, Appendix 2

NRC K/A System/E/A

System E05 Excessive Heat Transfer

Number EK3.2

Knowledge of the reasons for the following responses as they apply to the (Excessive Heat Transfer) Normal, abnormal and emergency operating procedures associated with (Excessive Heat Transfer).

Importance RO/SRO 3.5 4.0

10CFR Link (CFR: 41.5 / 41.10, 45.6, 45.13)

NRC K/A Generic

# 18	☑ RO	☑ SRO	Question ID: **1000006**	Origin: **New**	☑ Memory? (Check=Yes)

Which of the following heat removal complications , by itself, would indicate that EOP 2526 (Reactor Trip Recovery) was NOT the correct subsequent EOP to enter at the completion of EOP 2525 (Standard Post Trip Actions)?

A MSIVs closed ☐

B No RCPs running ☑

C Loss of condenser vacuum ☐

D Ability to feed ONLY one Steam Generator ☐

Justification B: correct, requires entry into EOP 2528 Loss of Off-site Power/Loss of Forced Circulation; A: credible since MSIVs could have closed on MSIS which could be generated by ESAS failure, SIAS on CTMT pressure, or ESDE; C: credible since loss of vacuum causes loss of main feed, but aux feed still available; D: credible since one SG could be lost due to ESDE or SGTR. The key to the correct answer is the condition "by itself". This rules out consideration of the "possible" root causes.

Reference MP2*LOIT, 2526, heat removal, HR, MB-05480

NRC K/A System/E/A

NRC K/A Generic

System E02 Reactor Trip Recovery

Number EK2.2

Knowledge of the interrelations between the RTR and 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.

Importance RO/SRO 3.5 4.0

10CFR Link (CFR: 41.7 / 45.7)

 # 19 ☑ RO ☑ SRO Question ID: **0053616** Origin: **Bank** ☐ Memory? (Check=Yes)

The plant was at 100% power when a Loss of Load caused the reactor to trip and the PORVs to open. Thirty minutes after the trip, RCS pressure is 1850 psia and the Quench Tank pressure is 45 psig.

Which one of the following PORV discharge temperatures would be indicated if a PORV is leaking by?

A 250 degrees F ☐

B 274 degrees F ☐

C 293 degrees F ☑

D 625 degrees F ☐

Justification Sat. temp. for 45 psig (60 psia) is 292.7°F
#1 is sat. temp. for 30 psia (if mistakenly subtracted 15 from 45 to get psia)
#2 is sat. temp. for 45 psia
#4 is sat. temp. for 1850 psia

Reference MP2*LORT*4308 [002 RCS-01-C 4929] (2/11/97) QT, PZR, RCS, PORV, HTFF, MB-05424
Requires use of Steam Tables

NRC K/A System/E/A

System 008 Pressurizer (PZR) Vapor Space Accident (Relief Valve Stuck Open)

Number AA2.15

Ability to determine and interpret the following as they apply to the Pressurizer Vapor Space Accident: ESF control board, valve controls, and indicators

Importance RO/SRO 3.9 4.2

10CFR Link (CFR: 43.5 / 45.13)

NRC K/A Generic

20 | ☑ RO ☑ SRO | Question ID: 1000104 | Origin: New | ☐ Memory? (Check=Yes)

Thirty minutes after a small break LOCA from 100% power operation, the following conditions exist:

RCPs are secured.
Pressurizer pressure is 1175 psia and rising slowly.
Pressurizer level is 21% and rising slowly
CET temperatures are 534°F and stable.
RCS subcooling based on CETs is 35°F and stable.
RVLMS indicates 61% on both channels.

The US directs the PPO to energize pressurizer heaters.

Pressurizer level will _____.

A rise due to expansion of the water in the pressurizer as it is being heated. ☐

B rise due to the expansion of the head void. ☐

C lower due to the collapse of the head void. ☑

D lower due to the cold water being injected by the HPSI Pumps. ☐

Justification As the RCS is pressurized up to and above the saturation pressure for the head, the head void will collapse. The water entering the head will come from the pressurizer resulting in lowering level possibly resulting in loss of level.
"A" is incorrect. Water being heated in the pressurizer will not expand into the pressurizer. As the water is heated, it will flash to steam resulting in raising RCS pressure. This is credible because when water is heated it will normally expand.
"B" is incorrect because the increase in RCS pressure will cause the void to collapse. This is credible if the student believes the void will grow due to adding more heat (from pressurizer heaters) to the RCS.
"D" is incorrect because the injection flow from HPSI will be reduced as RCS pressure increases. This is credible if the student thinks that the reduction in the head void will cause a reduction in RCS pressure resulting in more HPSI flow.

Reference LOIT, E32-01-C, LOCA, 2532, PZR, MB-05939

NRC K/A System/E/A

NRC K/A Generic

System 009 Small Break LOCA

Number EA2.06

Ability to determine or interpret the following as they apply to a small break LOCA: Whether PZR water inventory loss is imminent

Importance RO/SRO 3.8 4.3

10CFR Link (CFR 43.5 / 45.13)

# 21	RO	SRO	Question ID: 0054362	Origin: Bank	Memory? (Check=Yes)

While operating at 100% power, a plant trip occurs. While carrying out EOP-2525, Standard Post Trip Actions, the operators observe the following plant conditions:

* All CEAs are inserted.
* All buses are energized.
* Pressurizer Level is 10%, lowering.
* Pressurizer Pressure is 1700 psia, lowering.
* Tavg is 505 °F, lowering.
* RCS subcooling is 100 °F, rising.
* Feeding both SGs with Main Feedwater.
* #1 SG level 15% and dropping.
* #2 SG level 42% and stable.
* #1 SG pressure 450psia and dropping.
* #2 SG pressure 650 psia and dropping.
* Containment pressure 1.5 psig, rising.
* NO Rad. Monitors in alarm, NONE going up.

Which procedure will the operators implement next?

A EOP 2532, Loss of Coolant Accident ☐

B EOP 2534, S/G Tube Rupture ☐

C EOP 2536, Excess Steam Demand ☑

D EOP 2537, Loss Of All Feedwater. ☐

Justification EOP 2541 Diagnostic Flowchart
Both SGs are less than 800 psia and subcooling is rising, therefore ESD and not LOCA. Main feedwater is available, therefore no LOAF. No rad. monitors, therefore no SGTR and no LOCA.

Reference MP2 LOIT/LOUT, SRO, E25-01-C MB-2532, 10CFR43(b)(5), MB-05433

NRC K/A System/E/A

System A11 RCS Overcooling

Number AK1.3

Knowledge of the operational implications of the following concepts as they apply to the (RCS Overcooling) Annunciators and conditions indicating signals, and remedial actions associated with the (RCS Overcooling).

Importance RO/SRO 3.0 3.2

10CFR Link (CFR: 41.8 / 41.10 / 45.3)

NRC K/A Generic

# 22	☑ RO	☑ SRO	Question ID: **1000105**	Origin: **New**	☐ Memory? (Check=Yes)

The plant is operating at 100% power, MOL, when a VCT low level alarm is annunciated. The US directs the PPO to make up to the VCT using the appropriate blend. During the blend, the PPO is momentarily distracted by a fire panel trouble alarm. As the PPO is addressing the fire alarm, a PMW FLOW HI/LO annunciator is received on C-04 and inadvertently acknowledged by the SPO. A few minutes later, the PPO notices reactor power slowly lowering.

Which of the following caused this condition?

A A high level in the VCT automatically isolated makeup from the PMW Storage Tank. ☐

B The PMW flow controller failed high resulting in an automatic isolation of PMW ☐

C The Boric Acid flow controller failed low automatically causing makeup to be from the RWST. ☐

D PMW flow was stopped or lowered resulting in too much Boric Acid being added to the VCT. ☑

Justification	PMW flow was somehow decreased to less than 10 gpm (alarm setpoint) by an unspecified failure which resulted in only Boric Acid being injected to the VCT. After a short duration, the VCT Boron concentration increased which caused a power reduction. "A" is incorrect because a high level in the VCT will automatically stop PMW AND Boric Acid if the controls are in "AUTO". This is credible if the student thinks that only PMW is isolated on a high level to prevent a dilution event. "B" is incorrect because a failure of the PMW controller will NOT automatically isolate flow. This is credible if the student believes that PMW is automatically isolated by a controller failure. "C" is incorrect because a failure of the Boric Acid controller will NOT automatically swap makeup to the RWST. This is credible if the student believes that makeup flow will be diverted to the RWST on a Boric Acid controller failure to prevent losing Boric Acid makeup capabilities.
Reference	LOIT, CVC-00-C, MM-14, 2304C, 2590C, MB-02343

NRC K/A System/E/A		NRC K/A Generic	
System	022 Loss of Reactor Coolant Makeup	2.4	Emergency Procedures /Plan
Number	GA	2.4.46	
SEE GENERIC K/A		Ability to verify that the alarms are consistent with the plant conditions.	
Importance RO/SRO		3.5	3.6
10CFR Link		(CFR: 43.5 / 45.3 / 45.12)	

23 | ☑ RO ☑ SRO | Question ID: 1000008 | Origin: New | ☐ Memory? (Check=Yes)

The plant is shut down in Mode 6, with the following conditions:
- The RCS is being refilled from Th centerline.
- RCS level is presently at the vessel flange.
- Shutdown Cooling System is in service on RCS.
- Time elapsed after shutdown is 20 days
- RCS temperature is 95 °F
- The reactor had been operating at 100% power for the last 6 months.

Which of the following is the approximate Time to Boil for the RCS if SDC is lost?

A ~49 minutes ☑

B ~78 minutes ☐

C ~120 minutes ☐

D ~780 minutes ☐

Justification A: correct, Heatup rate is ~2.4 deg. F/minute for RCS Heatup Rate with Reduced Inventory (OP 2264, Attachment 8), Time to Boil = (212 deg. F - 95 deg. F)/(2.4 deg. F/min) = 48.75 minutes. B: This time results if wrong graph (Attachment 10) is chosen and a power of ten math error is introduced; C: This time results if wrong graph (Attachment 9) is chosen, likely if examinee doesn't consider SG tubes not filled; D: This time results if wrong graph (Attachment 10) is chosen

Reference MP2*LORT*5630 [121 264-01-C No Obj] (10/18/96) 2264, 2572, SDC, MB-05145
Provide OP 2264 Attachments 8, 9, & 10

NRC K/A System/E/A

System 025 Loss of Residual Heat Removal System (RHRS)

Number AK1.01

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

Importance RO/SRO 3.9 4.3

10CFR Link (CFR 41.8 / 41.10 / 45.3)

NRC K/A Generic

# 24	☑ RO	☑ SRO	Question ID: 1000007	Origin: New	☐ Memory? (Check=Yes)

Initial Conditions: 100% power with CEDM MG set #1 out of service, TCB-9 is closed.
A momentary partial loss of DC causes some RPS TCBs to change state.
The following pattern of TCB status lights is displayed on the CEDS at the top of the RPS panels:

MG #1		TCB-9	MG #2
TCB-2 Red	TCB-6 Red	TCB-3 Green	TCB-7 Green
TCB-1 Red	TCB-5 Red	TCB-4 Green	TCB-8 Green

Based on these indications, what is the status of the CEDS?

A Both CEDM power busses are energized and all CEAs are at their initial position. ☑

B CEDM power bus #2 is de-energized, half of the CEAs are inserted, the RO must manually trip the other TCBs. ☐

C CEDM power bus #2 is de-energized, half of the CEAs are inserted, An RPS LPD trip should have opened the other TCBs. ☐

D Both CEDM power busses are de-energized and all CEAs are fully inserted. ☐

Justification A: correct, with x-tie breaker TCB-9 closed, the output from either MG set will power up both CEDS busses via either set of TCBs; B: credible if examinee assumes all power to CEDM power bus #2 goes through right hand set of TCBs; C: credible if examinee assumes all power to CEDM power bus #2 goes through right hand set of TCBs, then dropping CEAs should generate LPD condition; D: credible if examinee doesn't credit TCB-9 being closed, however TCB-9 is a manual breaker so the DC transient won't affect it.

Reference MP2*LOIT CEDS, TCB, ATWS, 2302A, MB-02251

NRC K/A System/E/A

System 029 Anticipated Transient Without Scram (ATWS)

Number EA2.07

Ability to determine or interpret the following as they apply to a ATWS: Reactor trip breaker indicating lights

Importance RO/SRO 4.2 4.3

10CFR Link (CFR 43.5 / 45.13)

NRC K/A Generic

25 | ☑ RO ☑ SRO | Question ID: **1000044** | **Origin: New** | ☑ Memory? (Check=Yes)

Which of the following indicates a loss of high voltage to the detectors for the 'A' wide range NI channel?

A Channel 'A' wide range NI meter on panel C04 drops to the bottom of the scale. ☑

B Channel 'A' wide range NI meter on panel C04 shifts to % power as indicated by "% Power" lit on the indicator above the meter. ☐

C Annunciator "CH 'A' Wide Range Extended Range CPS" on panel C04 clears. ☐

D "Non-OPR" light flashing on the Channel 'A' RPS wide range NI drawer. ☐

Justification A: correct, although the meter would still have power the detector would not generate any pulses; B: this occurs when the extended range bistable de-energizes, examinees may chose if they believe that the channel would default to the linear detector; C: this alarm clears at 1000 cps increasing, examinees may chose if they believe that the alarm power is derived from the detector; D: all of the 'alarm' lights on the NI drawers flash when they clear, solid when they are activated, examinees may chose if they don't recall this

Reference MP2*LOIT, 2380, NIS, MB-01436

NRC K/A System/E/A

System 033 Loss of Intermediate Range Nuclear Instrumentation

Number AA1.01

Ability to operate and / or monitor the following as they apply to the Loss of Intermediate Range Nuclear Instrumentation: Power-available indicators in cabinets or equipment drawers

Importance RO/SRO 2.9 3.1

10CFR Link (CFR 41.7 / 45.5 / 45.6)

NRC K/A Generic

# 26	☑ RO	☑ SRO	Question ID: 1000023	Origin: New	☑ Memory? (Check=Yes)

When an annunciator is received, indicating that the Steam Generator Blowdown (SGBD) Sample radmonitor has detected high SG activity, several automatic actions occur.

Which of the following sets is correct in regard to the automatic action and the reason for it?

A SGBD Quench Tank outlet 2-MS-135 gets a close signal. This prevents exceeding the processing capacity of the Aerated Radwaste System. ☐

B SGBD Tank outlet 2-MS-15 gets a close signal. This diverts the contaminated blowdown to the Aerated Radwaste System ☐

C SGBD sample valves, 2-MS-191A & B, get a close signal. This prevents an unprocessed discharge. ☐

D SGBD sample to secondary sample sink isolations HV-4287 & 4288 get a close signal. This prevents a non-permitted discharge. ☑

Justification D: correct, contaminated SGBD leaving the plant is considered a discharge and must be documented with a discharge permit, A & B are valid signals, but neither one goes to ARWS; C is false in that the sample valves only get a close signal on CIAS.

Reference MP2*LOIT, SGTL, SGBD, 2569, MB-05773

NRC K/A System/E/A

NRC K/A Generic

System 037 Steam Generator (S/G) Tube Leak

Number AK3.10

Knowledge of the reasons for the following responses as they apply to the Steam Generator Tube Leak: Automatic actions associated with high radioactivity in S/G sample lines

Importance RO/SRO 3.3 3.7

10CFR Link (CFR 41.5,41.10 / 45.6 / 45.13)

# 27	☑ RO	☑ SRO	Question ID: **1000045**	Origin: **New**	☑ Memory? (Check=Yes)

Given: An SGTR in #1 SG concurrent with a loss of off-site power has occurred.
Initial cooldown on both RCS loops has been completed and #1 SG has been completely isolated.

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

A #1 SG pressure 50# or more greater than #2 SG pressure. ☐

B #1 Th 10° F or more higher than #2 Th. ☑

C #1 loop delta-P 5# or more less than #2 loop delta-P. ☐

D #1 loop Tc 5° F or more lower than #2 loop Tc. ☐

Justification B: correct, Note 2 on page 26 of EOP 2534 SGTR; A: isolated SG pressure remains elevated as part of success strategy to minimize pri-to-sec leakage; C: natural circ delta-P is ~1/2 # or less in loop #2, can't get 5# less; D: once #1 SG is completely isolated there is no way for its Tc to be lower

Reference MP2*LOIT, 2534, SGTR, N/C, MB-05785

NRC K/A System/E/A

System 038 Steam Generator Tube Rupture (SGTR)

Number EK1.03

Knowledge of the operational implications of the following concepts as they apply to the SGTR: Natural circulation

Importance RO/SRO 3.9 4.2

10CFR Link (CFR 41.8 / 41.10 / 45.3)

NRC K/A Generic

# 28	☑ RO	☑ SRO	Question ID: 1000011	Origin: New	☐ Memory? (Check=Yes)

Initial Conditions: 100% power, 'B' Auxiliary Feedwater (AFW) pump is the only equipment Out of Service. The main feeder breaker on Vital DC distribution panel faults open, de-energizing DV-10 resulting in a plant trip on high pressurizer pressure due to closure of the MSIVs. Main feedwater is lost due to no steam supply.
EOP 2525, Standard Post Trip Actions, directs you to establish adequate feedwater flow to at least one Steam Generator.

Which of the following actions will establish an adequate and controllable supply of AFW to at least one Steam Generator?

A Start the 'A' AFW pump, close 2-FW-44, and feed only #1 SG with its AFW regulating valve in local manual. ☐

B Start the 'A' AFW pump, close 2-FW-44, and feed only #2 SG with its AFW regulating valve in Manual on C05. ☐

C Shift Turbine Driven AFW pump control power to Facility 2, close 2-FW-44, and feed only #1 SG with its AFW regulating valve in local manual. ☐

D Shift Turbine Driven AFW pump control power to Facility 2, close 2-FW-44, and feed only #2 SG with its AFW regulating valve in Manual on C05. ☑

Justification	D: correct, DV-10 is the supply for Facility 1 TDAFP control power, FW-44 isolates the discharge header to #1 SG; A: 150 gpm per SG is within the pump's capacity, but DV-10 supplies control power to the pump breaker; B: 150 gpm per SG is within the pump's capacity, but DV-10 supplies control power to the pump breaker, also this addresses the wrong side of FW-44; C: wrong only in the fact that TDAFP is on the wrong side of FW-44
Reference	MP2*LOIT, 2537, TDAFP, DV10, MB-05726

NRC K/A System/E/A

System E06 Loss of Feedwater

Number EA1.1

Ability to operate and / or monitor the following as they apply to the (Loss of Feedwater)
Components, and functions of control and safety systems, including instrumentation, signals, interlocks, failure modes, and automatic and manual features.

Importance RO/SRO 4.0 3.9

10CFR Link (CFR: 41.7 / 45.5 / 45.6)

NRC K/A Generic

# 29	✔ RO	✔ SRO	Question ID: 1000106	Origin: New	✔ Memory? (Check=Yes)

While operating at 100% power, the plant experiences a loss of DV-20. All equipment operates as expected.

In addition to performing the actions of EOP 2525, Standard Post Trip Actions, which of the following additional actions must be performed to prevent equipment damage?

A - Dispatch an operator to manually trip the "B" D/G and isolate starting air. ☑
- Adjust 2-FW-11B, AFW Regulating Valve (Isolation Valve) locally to the desired flow rate.
- Secure F-39B, RM-8262A and B Sample Fan.

B - Locally adjust 2-FW-11B, AFW Regulating Valve (Isolation Valve) to the desired flow rate. ☐
- Dispatch an operator to secure the Turbine Driven Auxiliary Feedwater Pump.
- Trip all facility two 480 volt, 4160 volt, and 6900 volt AC breakers locally.

C - Dispatch an operator to secure the Turbine Driven Auxiliary Feedwater Pump. ☐
- Dispatch an operator to manually trip the "B" D/G and isolate starting air.
- Place all facility two RBCCW air operated valves in local, manual control.

D - Trip all facility two 480 volt, 4160 volt, and 6900 volt AC breakers locally. ☐
- Place all facility two RBCCW air operated valves in local, manual control.
- Dispatch an operator to manually operate the #2 Atmospheric Dump Valve.

Justification On a loss of DV-20, the "B" D/G will start, but will have no control or protection other than mechanical overspeed. The "B" DG must be tripped to prevent damage. A loss of DV-20 will also cause the "B" AFW Reg Valve to fail open. An operator must control feed flow to #2 S/G locally to prevent overfilling the S/G. Additionally, the flow path for F-39B will isolate due to loss of DC control power to the isolation valves.
"B" is incorrect for 2 reasons: The Turbine Driven Aux Feed Pump does NOT automatically start and will NOT need to be secured locally. Tripping the AC breakers is NOT necessary. An older revision to this procedure required tripping the AC breakers because they have NO tripping power on a loss of DC; therefore, there was NO way to trip them either remotely or automatically.
"C" is incorrect for the same reason as "B" with regard to the TDAFP and because Facility 2 RBCCW valves lose DC control power, but fail 'as is'. Therefore, they do NOT need to be placed in local, manual unless they require a change in position.
"D" is incorrect for the same reasons in "B" and "C", plus the #2 Atmospheric Dump Valve has NOT lost control power; therefore there is NO need to operate the valve locally.

Reference LOIT, A06-01-C, DC, 2345C, 2525, 2506B, MB-05725

NRC K/A System/E/A

System 058 Loss of DC Power

Number AA1.03

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

Importance RO/SRO 3.1 3.3

10CFR Link (CFR 41.7 / 45.5 / 45.6)

NRC K/A Generic

# 30	☑ RO	☑ SRO	Question ID: 1000047	Origin: New	☐ Memory? (Check=Yes)

The approved discharge permit for "A" CWMT authorizes a discharge flow rate of 100 gpm.
The Aux. Building PEO initiates the discharge of the "A" CWMT with an initial tank level of 87%.
At the end of exactly 16 minutes the PEO records the "A" CWMT level at 82%.
Flow recorder FR-9050 indicates that 1150 gallons have been discharged.
The PEO checks the flow rate using the following formula from the procedure:
Flow Rate = [Previous level (%) - Current level (%)] x 320 gallons per % level divided by "Time interval between recording levels (minutes)"
The PEO requests that you perform an independent check of his calculations.

Based on your calculation you would direct the PEO to:

A Readjust the discharge flow control valve to raise the discharge rate accordingly. ☐

B Readjust the discharge flow control valve to lower the discharge rate accordingly. ☐

C Secure the discharge, then recommence by controlling the discharge flow rate based on tank level change. ☑

D Continue the discharge and recheck FR-9050 versus "A" CWMT delta-level at the end of one hour. ☐

Justification C: correct, the flow instrument must be considered inop, 2617A directs securing the discharge and recommencing using delta-level method; A: examinees may chose this distractor if they believe actual flow is too low based on FR-9050 reading; B: examinees may chose this distractor if they believe actual flow is too high based on delta-level calculation; D: examinees may chose this distractor if they feel that 16 minutes is too short a duration for valid data

Reference MP2*LOIT, 2617A, CLRWS, MB-04398

NRC K/A System/E/A

NRC K/A Generic

System 059 Accidental Liquid Radwaste Release

Number AA1.03

Ability to operate and / or monitor the following as they apply to the Accidental Liquid Radwaste Release: Flow rate controller

Importance RO/SRO 3.0 2.9

10CFR Link (CFR 41.7 / 45.5 / 45.6)

# 31	☑ RO	☑ SRO	Question ID: 1000107	Origin: New	☐ Memory? (Check=Yes)

Two days prior to shutdown for a refueling outage, an alarm is received on R8997, Charging Pump Area Ventilation Radiation Monitor. The radiation monitor is reading just above the alarm setpoint.

The following radiation monitors also indicate a relatively small, but steady, unexplained rise:

- R8434B, Aux Building Gaseous Radiation Monitor
- R8998, VCT Area Ventilation Radiation Monitor
- R8132B, U2 Stack Gas Radiation Monitor

The response of these radiation monitors was caused by which of the following:

A A rupture of the waste gas surge tank during RCS degasification. ☐

B A pinhole leak in the degassifier after cooler. ☑

C Evaporation of water in the SFP lowers level by 18 inches. ☐

D Rupture of a piping section during a spent resin transfer to the Spent Resin Tank. ☐

Justification	"A" is incorrect because a rupture of the waste gas surge tank would result in nearly instantaneous alarms on the listed Radiation Monitors, plus others. "C" is incorrect because a reduction in SFP level will result in the SFP walls drying out. This will cause a gradual rise in particulate activity which would be seen on R8145A, SFP Exhaust Particulate Radiation Monitor and R8132A, U2 Stack Particulate Radiation Monitor. "D" is incorrect because a rupture of a spent resin line would cause an immediate jump in associated RMs.
Reference	LOIT, RMS-00-C, RM, gaseous, 2617B, MB-00685

NRC K/A System/E/A

System 060 Accidental Gaseous Radwaste Release

Number AA2.01

Ability to determine and interpret the following as they apply to the Accidental Gaseous Radwaste: A radiation-level alarm, as to whether the cause was due to a gradual (in time) signal increase or due to a sudden increase (a spike), including the use of strip-chart recorders, meter and alarm observations

Importance RO/SRO 3.1 3.7

10CFR Link (CFR: 43.5 / 45.13)

NRC K/A Generic

32 | ☑ RO ☑ SRO | Question ID: **0054838** | **Origin: Modified** | ☐ Memory? (Check=Yes)

Which of the following must be verified in response to an alarm on the Unit 2 Stack Gaseous and Particulate High Range (Kaman) Radiation Monitor (RM-8168) and why must it be verified?

A All running Main Exhaust fans tripped; to ensure the release limits associated with Unit 2 are NOT exceeded. ☐

B Control Room Ventilation in Recirculation mode; to prevent airborne exposure to the Control Room inhabitants. ☐

C Closure of containment Hydrogen Purge Valves (2-EB-91/92/99/100); to limit the release to the environment from a subsequent LOCA. ☐

D Purge of the MP2 Stack Gaseous Radiation Monitor (RM-8132B); to prevent self contamination of the radiation monitor. ☑

Justification D: correct, ARP 2590E; A: ME fans trip in response to CIAS; B: RM-9799A/B alarming causes CRACS in recirc; C: RM-8240/8241 alarming causes closure of H2 purge valves if open

Reference MP2*LOIT*2088 [072 RMS-01-C 5046] (8/27/96) RM, 2383, NRC, APP

NRC K/A System/E/A

System 061 Area Radiation Monitoring (ARM) System Alarms

Number AK3.02

Knowledge of the reasons for the following responses as they apply to the Area Radiation Monitoring (ARM) System Alarms: Guidance contained in alarm response for ARM system

Importance RO/SRO 3.4 3.6

10CFR Link (CFR 41.5,41.10 / 45.6 / 45.13)

NRC K/A Generic

33 | ☑ RO ☑ SRO | Question ID: 1000074 | Origin: New | ☐ Memory? (Check=Yes)

The plant experienced a small break LOCA concurrent with an ESDE.
On the trip, off-site power was lost and the 'A' EDG output breaker failed to close.
All Facility 2 equipment responded as designed.
The crew completed 2525, diagnosed 2 events and entered EOP 2540.
Two of the 'B' header HPSI valves have been throttled shut and the 'B' CS pump has been secured.
After the 'A' EDG output breaker was repaired the SPO is restoring vital auxiliaries using EOP 2540B, MVA-AC-3.
The EDG was started, closed onto bus 24C, and the 'A' SW pump has been started.

With respect to Facility 1 RBCCW, what is the correct action to be performed?

A Throttle the 'A' RBCCW pump discharge to 10%, start the pump, and throttle the discharge open. ☑

B Close RBCCW Supply to "A" Shutdown Cooling Heat Exchanger, 2-RB-13.1A. ☐

C Start and run both Facility 1 Containment Air Recirculation fans >15 minutes prior to starting Facility 1 RBCCW. ☐

D Check RBCCW surge tank level >40% then start Facility 1 RBCCW pump at full flow. ☐

Justification A: correct, CTMT pressure is <20# (CS PP off), pp has been off >5 mins requires throttling discharge on start; B: valve will NOT receive an open signal on the SIAS; therefore it does NOT need to be closed. Student may believe it needs to be closed to limit RBCCW flow through the Facility 1 header.; C: area of concern for water hammer is hot RBCCW in idle CAR cooler flashing on pp start, running fans would cool the water; D: ensuring surge tank level >40% addresses subcooled margin for heated water pocket in CAR coolers

Reference MP2*LOIT, 2540, FR, RBCCW, MB-05925

NRC K/A System/E/A

System E09 Functional Recovery

Number EK2.1

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

Importance RO/SRO 3.6 3.9

10CFR Link (CFR: 41.7 / 45.7)

NRC K/A Generic

 # 34 ☑ RO ☑ SRO Question ID: **0164580** **Origin: Modified** ☐ Memory? (Check=Yes)

The following conditions exist:
The plant is at 100% power
The 'C' Charging pump is operating with normal letdown flow
Pressurizer level control is selected to Channel "Y"

If Bus 22F was then lost, which one of the following describes the condition of charging and letdown approximately 3 minutes following the bus loss, with all controls in Auto and NO operator action?

A No charging pumps operating and no letdown flow ☑

B No charging pumps operating and maximum letdown flow ☐

C First backup charging pump operating and maximum letdown flow ☐

D First backup charging pump operating and no letdown flow ☐

Justification A: Correct, with the loss of Bus 22F, "C" charging pump is lost. With 40 gpm letdown flow and no charging, letdown will rapidly isolate due to high temperature; B & C: without isolation of letdown on high temperature, either answer would be plausible; D: could be selected if examinee recognized letdown loss on high temperature, but didn't fully understand backup charging pump start logic.

Reference MP2*LORT MB-00236 C98503, 2503F, MB-05632

NRC K/A System/E/A

System 028 Pressurizer (PZR) Level Control Malfunction

Number AA1.02

Ability to operate and / or monitor the following as they apply to the Pressurizer Level Control Malfunctions: CVCS

Importance RO/SRO 3.4 3.4

10CFR Link (CFR 41.7 / 45.5 / 45.6)

NRC K/A Generic

# 35	☑ RO	☑ SRO	Question ID: 1000012	Origin: New	☐ Memory? (Check=Yes)

The plant is at 100% power, the 'A' Instrument Air Compressor is out of service, otherwise all systems are aligned normally.
The 'C' Instrument Air Compressor is in service, maintaining header pressure at 120 psig.
A fault in the 345 kV switchyard causes a plant trip and a loss of all off-site power.
While performing Standard Post Trip Actions the SPO notices instrument air header pressure at 105 psig and decreasing slowly.

What action, (if any), must the operator take to ensure a continued supply of instrument air?

A The controller for the 'C' Instrument Air Compressor must be reset due to the momentary loss of power. ☐

B No action required, the 'B' Instrument Air Compressor will auto-start at 91 psig decreasing. ☐

C The controller for the 'B' Instrument Air Compressor must be reset and valve 2-SW-3.2A overridden open to supply cooling to TBCCW. ☐

D Station Air must be x-tied from unit 3 and handswitch SA-10.1, Station Air to Instrument Air X-tie on C06 must be placed to open. ☑

Justification D: correct; A: the power supply for 'C' IAC is de-energized on a loss of all off-site power; B: the 'B' IAC has power and its auto-start setpoint is 91 psig, but its controller drops out on loss of power and must be manually reset; C: all 3 TBCCW pumps are powered from non-vital busses, therefore they are de-energized, although the 'B' IAC can be restarted it will shutdown very shortly due to high temperature

Reference MP2*LOIT AOP 2563 Loss of IA, MB-05431

NRC K/A System/E/A

System 065 Loss of Instrument Air

Number GA

SEE GENERIC K/A

Importance RO/SRO 3.5 3.8

10CFR Link (CFR: 43.5 / 45.12)

NRC K/A Generic

2.4 Emergency Procedures /Plan

2.4.48

"Ability to interpret control room indications to verify the status and operation of system, and understand how operator actions and directives affect plant and system conditions."

 # 36 | ☑ RO ☑ SRO | Question ID: **0156778** | **Origin: Modified** | ☑ Memory? (Check=Yes)

Initial Conditions: 100% power, no equipment out of service, all systems aligned normally.
The crew detects a 3 gpm RCS leak and enters AOP 2568.
During the performance of AOP 2568, the SPO determines a steady rise in RBCCW surge tank level of ~3 gpm.

Which of the following lists contains only components which must be considered as potential sources of leakage for the stated condition?

A Letdown Heat Exchanger, RCS Sample Cooler, Quench Tank/Primary Drain Tank Cooler ☐

B Letdown Heat Exchanger, RCS Sample Cooler, RCP thermal barrier and seal coolers ☑

C Letdown Heat Exchanger, Quench Tank/Primary Drain Tank Cooler, RCP thermal barrier and seal coolers ☐

D RCS Sample Cooler, PDT and Quench Tank Heat Exchanger, RCP thermal barrier and seal coolers ☐

Justification B: correct, the 3 listed components have a higher pressure on the side exposed to primary water; the QT/PDT cooler is normally not pressurized on the primary side and even when it is the pressure is significantly lower than RBCCW presure.

Reference MP2*LOIT*4218 [000 568-01-B 1488] (9/9/96) 2568, AOP, NRC, APP, MB-05505

NRC K/A System/E/A

System A16 Excess RCS Leakage

Number AK2.1

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.

Importance RO/SRO 3.2 3.5

10CFR Link (CFR: 41.7 / 45.7)

NRC K/A Generic

# 37	☐ RO	☑ SRO	Question ID: 1000002	Origin: New	☐ Memory? (Check=Yes)

The unit is shutdown and cooling down for refueling. The RCS is at 280°F when a number of alarms come in on C08, including: "Inverter INV-3 Trouble" and "120 VAC Reg Inst VR-11 Trouble". Channel 'C' of safety systems' instrumentation and channel 'C' of the RPS are de-energized.

Based on the "equipment" made INOPERABLE due to the above conditions and indications, what is the most restrictive time limit for a Tech Specs Action Statement that must be entered? (When determining "most restrictive", which applicable TSAS requires a Mode change in the shortest allowable time)

A Restore the INOPERABLE "equipment" within 8 hours or be in Cold Shutdown within the next 36 hours. ☑

B Restore the INOPERABLE "equipment" within 24 hours or be in Cold Shutdown within the next 36 hours. ☐

C Restore the INOPERABLE "equipment" within 48 hours or be in Cold Shutdown within the next 36 hours. ☐

D Restore the INOPERABLE "equipment" within 72 hours or be in Cold Shutdown within the next 36 hours. ☐

Justification Candidate must determine VA30 is lost and plant is in Mode 4, then evaluate Tech Specs for applicability to determine A is correct based on TSAS 3.8.2.1
B: there are no 24 hour TSAS's for affected equipment; C:this applies for the ESAS sensor module power supplies, but is longer than A; D: there are no 72 hour TSAS's for affected equipment

Reference MP2*LOIT/LOUT, SRO, VIAC, (CFR 55.43.b.2), MB-05743
Requires the use of Tech Specs

NRC K/A System/E/A

System 057 Loss of Vital AC Electrical Instrument Bus

Number GA

SEE GENERIC K/A

Importance RO/SRO

10CFR Link

NRC K/A Generic

2.1 Conduct of Operations

2.1.33

Ability to recognize indications for system operating parameters which are entry-level conditions for technical specifications.

3.4 4.0

(CFR: 43.2 / 43.3 / 45.3)

38 | ☑ RO ☑ SRO | Question ID: 0153900 | Origin: Modified | ☐ Memory? (Check=Yes)

The plant had operated at 100% for 45 days when the "A" SGFP sprung an oil leak.
Power was reduced to remove the 'A' steam generator feed pump from service for repair.
Reactor Engineering has established an ESI of 0.0 as read on channel 'D'.
Channel 'D' ASI currently indicates +0.022.
Reactor power has just reached 55%.
Group 7 CEAs are currently at 165 steps.

As xenon builds in, which of the following actions should the PPO perform to maintain ASI within the allowable band over the next 4 hours?

A Dilute the RCS to maintain power; withdraw CEAs to control ASI. ☑

B Dilute the RCS to maintain power; ASI will move in the direction of the ESI as the boron is diluted. ☐

C Dilute the RCS to maintain power; insert CEAs to control ASI. ☐

D Insert CEAs to maintain power and control ASI. ☐

Justification OP 2393, section 5.4, requires a band of plus or minus 0.03 around the ESI once the power has been stabilized. In this case the ASI must be maintained between 0.03 and -0.03. The voltmeter reading +0.022 is a factor of ten higher than ASI (precaution 4.7); therefore, ASI is +0.0022. This value is well within the allowable band. However, the axial flux distribution is slightly bottom peaked. Over the next few hours, the Xenon will build up faster in the top of the core due to the lower relative flux. ASI will then shift even more to the bottom of the core. This requires CEA withdrawal to move the flux shape back to the ESI. Also, in order to counter the overall increase in Xenon concentration in the core, the operators will need to dilute boron to maintain a constant reactor power.

Reference MP2*LOIT*5042 [152 117-01-C 165] (10/16/97) 2393, ASI, ESI, MB-02082

NRC K/A System/E/A

System 001 Control Rod Drive System

Number GS

SEE GENERIC K/A

Importance RO/SRO

10CFR Link

NRC K/A Generic

2.2 Equipment Control

2.2.34

Knowledge of the process for determining the internal and external effects on core reactivity.

2.8 3.2

(CFR: 43.6)

# 39	☐ RO	☑ SRO	Question ID: 1000057	Origin: New	☐ Memory? (Check=Yes)

During an outage the following notes related to Containment Integrity are carried on the turnover sheet:
- Refuel pool is filled and the transfer tube isolation valve (2-RW-280) is open.
- Containment Purge is secured while I&C calibrates radmonitors RM-8123A&B and RM-8262A&B.
- Both personnel access hatch doors are Operable and open with a dedicated individual assigned to close the hatch if required.
- Both MSIVs, (2-MS-64A & B), and the TDAFP steam isolations, (2-MS-201 & 202), are closed.
- The turbine #2 Main Steam Stop Valve is disassembled for seat repair.
- The TDAFP steam admission valve, (SV-4188) is disassembled.
- An electrical penetration has been removed and a blank flange has been bolted over the hole.

Based on the conditions noted above, what must be performed prior to authorizing fuel movement?

A Restore radmonitors RM-8123A&B ~~and~~ and/or RM-8262A&B to OPERABLE and initiate Containment Purge. ☑

B Disable the Containment Purge Valves and ensure air flow through the personnel access hatch is to Containment. ☐

C Ensure the TDAFP steam admission valve, (SV-4188) has been reassembled, leak tested, and closed. ☐

D Reinstall the electrical penetration and ensure a satisfactory local leak rate test has been performed. ☐

Justification	A: correct, both doors of the hatch may be left open provided at least one door is Operable and capable of being closed under administrative control, and Containment Purge is in operation and it must be capable of being secured by an Operable CPVIS system; B: this opening in the main steam header is downstream of the MSIVs; B: Disabling the Containment Puge valves will NOT satisfy the requirements for Core Alterations with the personnel access doors open; D: an electrical penetration sleeve may be isolated by a blank flange and satisfy Conatainment Integrity
Reference	MP2*LOIT, LOUT, SRO, 2515, containment integrity, (CFR 55.43.b.5), MB-05561

NRC K/A System/E/A

System 069 Loss of Containment Integrity

Number AA2.02

Ability to determine and interpret the following as they apply to the Loss of Containment Integrity: Verification of automatic and manual means of restoring integrity

Importance RO/SRO 3.9 4.4

10CFR Link (CFR: 43.5 / 45.13)

NRC K/A Generic

# 40	☑ RO	☑ SRO	Question ID: **0154360**	**Origin: Modified**	☐ Memory? (Check=Yes)

Initial Conditions: 100% power, 2250 psia, no equipment out of service, all systems aligned normally
Annunciator C02/3*BA26 "RCP C MID SEAL PRES HI" alarm actuates.
The PPO goes to C-04R and obtains the following readings:

Vapor seal: 60 psig and steady
Upper seal: 1050 psig and steady
Middle seal: 1950 psig and steady

Based on these readings, which "C" RCP seal has failed?

A Lower ☑

B Middle ☐

C Upper ☐

D Vapor ☐

Justification OP 2301C, Section 4.13; An RCP seal is considered to have failed when the D/P across that stage is less than or equal to 500 psia and the RCS is between 2200 and 2300 psia. With the lower seal dropping 300 psid, the middle seal dropping 900 psid, and the upper seal dropping 990 psid; the lower seal meets the procedural criteria to be considered failed.

Reference MP2*LORT*6592 [003 RCS-01-C 4933] (2/26/97) RCP, OP2301C, MB-03038

NRC K/A System/E/A

System 003 Reactor Coolant Pump System (RCPS)

Number A4.04

Ability to manually operate and/or monitor in the control room: RCP seal differential pressure instrumentation

Importance RO/SRO 3.1 3.0

10CFR Link (CFR: 41.7 / 45.5 to 45.8)

NRC K/A Generic

# 41	☑ RO	☑ SRO	Question ID: **1000121**	**Origin: New**	☐ Memory? (Check=Yes)

Due to the loss of the "A" RCP, the crew is required to initiate shutdown cooling (SDC) WITHOUT concurrent reactor coolant pump (RCP) operations. The following conditions exist:

- Pressurizer pressure is 350 psia
- Pressurizer steam space temperature, T109, is 432°F
- The final 2 RCPs have been secured

Auxiliary spray must be initiated to reduce RCS pressure to allow the initiation of SDC.

Which of the following will result in exceeding the maximum spray line differential temperature allowed by the Technical Requirements Manual?

A Spray line temperatures, T-103 and T-104, indicate 225°F ☐

B Charging header temperature, T-229, indicates 195°F ☐

C Volume control tank (VCT) temperature, T-225 indicates 75°F ☐

D Containment temperature, CVCONTEMP, indicates 78°F ☑

Justification The maximum spray line differential temperature allowed by the TRM is 350°F to limit thermal stress on the spray nozzle. Transient Temperature Verification, SP 2602B, states, "If RCPs are NOT operating, Containment average temperature, CVCONTEMP, or positions 5 and 6 of TEMP SEL SW (C-01) is used to calculate differential temperature when spray flow is initiated." (SP 2602B provides an administrative limit of 200°F differential temperature on the pressurizer spray nozzle.)
"A" is incorrect because spray line temperatures are used to calculate differential temperature only while RCPs are running.
"B" is incorrect because charging header temperature is used only AFTER auxiliary spray has been initiated.
"C" is incorrect because VCT temperature is NOT used to calculate spray nozzle differential temperature.

Reference LOIT, CVS-00-C, CVCS, SDC, 2304C, 2207, 2310, SP 2602B, MB-05322

NRC K/A System/E/A

System 004 Chemical and Volume Control System

Number K5.11

Knowledge of the operational implications of the following concepts as they apply to the CVCS: Thermal stress, brittle fracture, pressurized thermal shock

Importance RO/SRO 3.6 3.9

10CFR Link (CFR: 41.5/45.7)

NRC K/A Generic

# 42	☐ RO	☑ SRO	Question ID: 1000004	Origin: New	☑ Memory? (Check=Yes)

In EOP 2525 the SPO is directed to check that at least one SG has BOTH:
a.) 10 to 80% level.
b.) MFW or TWO MDAFPs operating to restore level to 40 to 70%.

This action is credited in the Small Break LOCA analysis for which of the following reasons?

A Ensures that stable, sub-cooled Natural Circulation can be established when RCPs complete coasting down. ☐

B Ensures SG tubes are re-covered for iodine scrubbing in the event of a subsequent SGTR. ☐

C Ensures adequate inventory to maintain secondary side pressure such that SG tube sheet maximum delta-P is not exceeded. ☐

D Ensures adequate core cooling via reflux circulation under minimal safety injection conditions. ☑

Justification	D: correct, under worst case SBLOCA spectrum the injection flow is inadequate to prevent core uncovery. Reflux circulation removes heat w/o inventory loss; A: SBLOCA analysis is for limiting cases, stable NC is not worst case; B: A factor for SGTR, but not a consideration for SBLOCA; C: Max SG DP is only a concern for high RCS pressure.
Reference	MP2*LOIT, SBLOCA, reflux circulation 10CFR55.43(b)(1) (STA/SRO ELO #01609), MB-05940

NRC K/A System/E/A

System 074 Inadequate Core Cooling

Number EK3.07

Knowledge of the reasons for the following responses as the apply to the Inadequate Core Cooling: Starting up emergency feedwater and RCPs

Importance RO/SRO 4.0 4.4

10CFR Link (CFR 41.5 / 41.10 / 45.6 / 45.13)

NRC K/A Generic

# 43	RO	SRO	Question ID: 1000058	Origin: New	Memory? (Check=Yes)

Initial Conditions:
- 35% power increasing at 3% per hour.
- 'A' Condensate pump and 'A' SGFP in service with 'B' Condensate pump in standby.
- 'B' AFW pump is out of service for bearing replacement.

DC bus 201A is lost when its feeder breaker D0103 opens on ground fault.
The plant trips and EOP 2525 is being performed.
The SPO reports that he has no feed to either steam generator.

Based on the above, what actions will the US direct to provide core cooling?

A Start the 'B' SGFP being supplied by the 'B' Condensate pump which auto-started when the 'A' was lost. ☐

B Align bus 24C to a 4160v supply from unit 3 and start the 'A' AFW pump. ☐

C Ensure that the TDAFP is aligned for DV20 control power and start the TDAFP. ☑

D No feed source is available. Initiate Once-Through-Cooling. ☐

Justification C: correct, control power for the TDAFP can be aligned from either DV10 or DV20; A: the 'A' & 'B' condensate are both from 25A which is lost. Per procedure, vacuum is broken when condensate flow is lost, the 'C' condensate could be started and vacuum re-established but this would take much too long; B: without DC control power for bus 24C breakers this is not an option; D: With the TDAFP available, OTC should not be used since it is considered the means of last resort

Reference MP2*LOIT/LOUT, SRO, 2525, LOAF, (CFR 55.43.b.5), MB-05615

NRC K/A System/E/A

NRC K/A Generic

System 074 Inadequate Core Cooling

Number EA2.02

Ability to determine or interpret the following as they apply to a Inadequate Core Cooling:
Availability of main or auxiliary feedwater

Importance RO/SRO 4.3 4.6

10CFR Link (CFR 43.5 / 45.13)

44 | ☑ RO ☐ SRO | Question ID: 0054764 | Origin: Bank | ☑ Memory? (Check=Yes)

Which one of the following conditions will initiate an Auxiliary Feedwater Actuation Signal (AFAS)?

A Channels "A" and "C" of ESAS sense PZR pressure at 2410 psia for 15 seconds. ☐

B Channel "C" and "D" level detectors on #1 S/G sense water level at 10% for 3 minutes and 30 seconds. ☑

C Channel "B" and "D" of RPS sense PZR pressure at 2410 psia AND delta T power at 18% for 12 seconds. ☐

D NI Control Channels "9" and "10" sense power at 25% for 3 minutes and 30 seconds. ☐

Justification Auto Aux Feedwater will start if S/G level is < 27% for 3 minutes & 25 seconds. "A" not correct because need Control Channel NI of > 20% along with the high pressure and time delay. "C" NOT correct because we use Control Channel NI power (NOT delta T power) and it's less than 20% anyway.

Reference MP2*LOIT*2012 [061 AFW-01-C 2530] (8/19/96) 2322, AFAS, ATWS, MB-02470

NRC K/A System/E/A

System 013 Engineered Safety Features Actuation System (ESFAS)

Number A3.01

Ability to monitor automatic operation of the ESFAS including: Input channels and logic

Importance RO/SRO 3.7 3.9

10CFR Link (CFR: 41.7 / 45.5)

NRC K/A Generic

 # 45 ☑ RO ☐ SRO Question ID: **1000017** **Origin: New** ☐ Memory? (Check=Yes)

Initial Conditions: 100% power, steady-state, ASI 0.01 as read on RPS channel 'A'.
Channel 'B' linear range NI lower detector fails to 15% .
Channel 'B' linear range NI upper detector remains at 51%.

What effect will this have on the Reactor Protection System (RPS)?

A Channel 'B' RPS will trip on LPD due to a large negative offset, TM/LP setpoint will go to minimum, comparator averager Hi alarm will actuate on channel 'B' RPS.. ☐

B Channel 'B' RPS will trip on LPD due to a large positive offset, TM/LP setpoint will go to minimum, comparator averager Hi alarm will actuate on channel 'B' RPS. ☐

C Channel 'B' RPS will trip on LPD due to a large positive offset, TM/LP setpoint will increase, comparator averager Hi & Hi-Hi alarms will actuate on channel 'B' RPS. ☐

D Channel 'B' RPS will trip on LPD due to a large negative offset, TM/LP setpoint will increase, comparator averager Hi & Hi-Hi alarms will actuate on channel 'B' RPS. ☑

Justification D: correct ASI is L-U/L+U, ASI becomes ~ -0.5, drop in indicated power tends to lower TM/LP setpoint, but ASI effect more than offsets the effect, comparator averager Hi & Hi-Hi alarms will actuate on channel 'B' RPS; distractors may be chosen based on math sign error in evaluating ASI, neglecting to consider the effect of ASI on TM/LP, and underestimating the affect on channel 'B' versus the average

Reference MP2*LOIT RPS, 2381, TM/LP, ASI, NI, MB-01437

NRC K/A System/E/A

System 015 Nuclear Instrumentation System

Number K3.01

Knowledge of the effect that a loss or malfunction of the NIS will have on the following: RPS

Importance RO/SRO 3.9 4.3

10CFR Link (CFR: 41.7 / 45.6)

NRC K/A Generic

 # 46 ☑ RO ☑ SRO Question ID: 0153297 Origin Modified ☐ Memory? (Check=Yes)

A reactor start up is in progress.
An ECP has been performed for Group 7 @ 60 steps.
The PPO stops Manual Sequential CEA withdrawal with Group 5 at 60 steps to fully withdraw Group 4 CEAs in Manual Individual.
The SPO notes that the Level 1 and Level 2 bistables red lights are on solid, (not flashing), on all 4 RPS channels.

Based on the above conditions, which one of the following is the correct course of action?

A Level 1 and 2 bistable lights lit is expected, RE must perform I/M plot for Group 4 CEAs fully withdrawn. ☐

B Immediately fully insert all regulating CEAs. ☑

C Verify the wide range meters on C-04 have shifted from "CPS" to "%". ☐

D The RPS wide range drawers were not properly initialized, use toggle switches to reset the level 1 and 2 bistables. ☐

Justification B: correct, Level 1 and 2 bistables lights energize at 10-4% power, criticality occurs ~10-5%, with 2 CEA groups to go before reaching critical rod height there is a reactivity imbalance. The reactor startup procedure requires that the regulating CEAs be inserted and a new ECP be calculated.;
A: RE normally performs 1/M at CEA group top, but bistable lights are not expected at this point in startup and CEA insertion takes precedence over 1/M; C: CPS to % change is indicated by a single red light on wide range drawer labeled extended range; D: if the drawer had not been properly initialized the bistable lights would be flashing, lights flash when resetting, solid indicates bistable is armed

Reference MP2*LORT*1954 [015 NIS-01-C 4713] (1/9/97) 2202, ECP, SDM, CEA, MB-04065

NRC K/A System/E/A NRC K/A Generic

System 015 Nuclear Instrumentation System

Number A3.01

Ability to monitor automatic operation of the NIS, including: Console and cabinet indications

Importance RO/SRO 3.8 3.8

10CFR Link (CFR: 41.7 / 45.5)

 # 47 ☑ RO ☑ SRO Question ID: **1000018** **Origin: New** ☐ Memory? (Check=Yes)

During a Large Break LOCA which of the following sets of data provide definite indication that a portion of the core height is uncovered?

A Pressurizer pressure: 750 psia; RVLMS level: 0%; Maximum HJTC temperature: 712° F ☐

B Pressurizer pressure: 900 psia; RVLMS level: 0%; Maximum CET temperature: 532° F ☐

C Pressurizer pressure: 750 psia; Maximum HJTC temperature: 750° F; Maximum CET temperature: 525° F ☑

D Pressurizer pressure: 900 psia; Maximum HJTC temperature: 800° F; Loop 1 & 2 Th 530° F ☐

Justification C: correct, for 750 psia CET @ 525 indicates ~14° F superheat; A: RVLMS @ 0% only means the lowest RVLMS thermocouple (at 7%) is uncovered, the heated junction thermocouple (HJTC) would be expected to read >200° F above saturation temperature of 511° F; B: RVLMS @ 0% only means the lowest RVLMS thermocouple (at 7%) is uncovered, P/T relationship is saturated; D: HJTC reading is within reason for uncovered in a saturated environment, P/T relationship is saturated.

Reference MP2*LOIT, ICCS, CET, SCM, 2387, MB-08084
Requires use of Steam Tables

NRC K/A System/E/A

System 017 In-Core Temperature Monitor System (ITM)

Number A1.01

Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating the ITM system controls including: Core exit temperature

Importance RO/SRO 3.7 3.9

10CFR Link (CFR: 41.5 / 45.7)

NRC K/A Generic

 # 48 ☑ RO ☐ SRO Question ID: **1000019** Origin: **New** ☐ Memory? (Check=Yes)

Initial Conditions: 100% power, 'A' EDG is out for PMs, 'A', 'B', and 'C' CAR fans running in Fast.
A small break LOCA develops. When the plant is tripped, the RSST is lost due to a fault.
All other plant equipment operates as expected.
SIAS has NOT actuated, but containment pressure is >1.0 psig, contingency actions in EOP 2525 direct the operator to:
-Ensure at least 2 CAR fans operating with RBCCW cooling
-Shift all available Containment Aux. Circ. Fans to SLOW
-Start all available PIR fans

What must the operator perform to accomplish the directed actions?

A Verify 'B' & 'D' CAR fans in Slow, neither Containment Aux. Circ. Fan is available, start 'B' PIR fan ☑

B Verify 'B' CAR fan in Fast start 'D' in Fast, neither Containment Aux. Circ. Fan available, start 'B' PIR fan ☐

C Verify 'B' & 'D' CAR fans in Slow, shift 'B' Containment Aux. Circ. Fan to Slow, start 'B' PIR fan ☐

D Verify 'B' CAR fan in Fast start 'D' in Fast, shift 'B' Containment Aux. Circ. Fan to Slow, start 'B' PIR fan ☐

Justification	A: correct, only B & D CAR fans powered due to no 'A' DG and CAR fans start in Slow or shift to Slow on SIAS or UV, CTMT Aux Circ fans are non-vital power, only 'B' PIR fan has power to star and doesn't auto-start on any signal ; B: chosen if examinee thinks CAR fans only start/shift to Slow on SIAS; C: chosen if examinee thinks Aux Circ fans are vital powered; D: chosen if examinee thinks CAR fans only start/shift to Slow on SIAS and Aux Circ fans are vital powered
Reference	MP2*LOIT, CAR, CCS, 2313A, MB-05425

NRC K/A System/E/A

NRC K/A Generic

System 022 Containment Cooling System (CCS)

Number K2.01

Knowledge of power supplies to the following:
Containment cooling fans

Importance RO/SRO 3.0 3.1

10CFR Link (CFR:41.7)

 # 49 ☑ RO ☑ SRO Question ID: **1000110** Origin: **New** ☐ Memory? (Check=Yes)

A reactor trip occurred from 100% power. During the performance of EOP 2525, Standard Post Trip Actions, the SPO notes that only the 6900 volt AC buses are deenergized due to a failure to transfer to the RSST. All other electrical buses are energized from their normal source.

Which of the following describes the effect of the loss of power on the secondary system and the appropriate subsequent actions?

A The loss of condensate flow to the main turbine seals will cause a loss of condenser vacuum. Per EOP 2526, Reactor Trip Recovery, the SPO must immediately open the atmospheric dumps in MANUAL. ☐

B Condenser vacuum will be lost due to the loss of cooling to the steam jet air ejector. Per EOP 2525, Standard Post Trip Actions, the SPO must close the MSIVs and open 2-AR-17, Condenser Vacuum Breaker. ☑

C Severe water hammer will occur in the feedwater heaters due the to loss of cooling by condensate. Per OP 2320, Feedwater System, the SPO must close the steam supply valves to the feedwater heaters. ☐

D The condensate surge tank will overflow resulting in a chemical release to the environment. Per OP 2319B, Condensate Storage and Surge System, the reject valve to the surge tank must be isolated. ☐

Justification A loss of 6900 Volt AC buses results in a loss of condensate pumps. The loss of condensate will result in a loss of condenser vacuum due to the loss of cooling for the SJAE and the loss of flow to the feed pump seals. EOP 2525, step 11 states that if offsite power is lost or the condenser is NOT available, then close both MSIVs and open 2-AR-17, condenser vacuum breaker.
"A" is incorrect because turbine seals will still be maintained by gland seal steam (NOT condensate) until the MSIVs are closed. Closing the MSIVs will result in automatic opening of the atmospheric dump valves This is credible if the student does not remember what supplies the turbine seals. Also, the student may incorrectly believe that the ADVs must be immediately opened manually.
"C" is incorrect; although cooling is lost to the feedwater heaters, closing the steam supply valves will do no good. There is no extraction steam from the turbine to supply the heaters.
"D" is incorrect because condensate pump discharge pressure provides flow to the CST. A loss of 6900 volt AC buses causes a loss of condensate pumps; therefore the CST will NOT fill up.

Reference LOIT, E25-00-C, 6.9Kv, Condensate, 2319A, 2525, MB-05431

NRC K/A System/E/A

NRC K/A Generic

System 056 Condensate System

Number A2.04

Ability to (a) predict the impacts of the following malfunctions or operations on the Condensate System; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations
Loss of condensate pumps

Importance RO/SRO 2.6 2.8

10CFR Link (CFR: 41.5/43.5/45.3/45.13)

# 50	RO	SRO	Question ID: 1000060	Origin: New	Memory? (Check=Yes)

Of two Containment Spray trains or two Containment Cooling trains inoperable, which is the more limiting in Tech Specs and what is the basis for that one being more limiting than the other?

A 2 Containment Spray trains, 2 Containment Cooling trains inoperable would still leave 2 CAR cooling units operable. ☐

B 2 Containment Cooling trains, lack of CAR cooling units would result in containment pressure > 54 psig on a DBA LOCA. ☐

C 2 Containment Spray trains, spray is required to de-superheat containment atmosphere on worst-case MSLB. ☑

D Equally limiting, 2 Containment Spray pumps or 4 CAR Cooling units both require entry into LCO 3.0.3 ☐

Justification C: correct, certain spectra of MSLBs can release superheated steam ~420° F into the containment atmosphere, the containment structure is only rated for 289° F, spray is required to de-superheat the steam to prevent exceeding the 289° F limit; A: the choice is correct, but the basis is wrong; B: 2 spray trains are capable of limiting CTMT pressure to <54 psig; D: 2 Containment Cooling trains, (each consisting of 2 CAR cooling units), is specifically addressed in TS, allowing 48 hours, 2 CS trains falls under the heading of "All other combinations"

Reference MP2*LOIT/LOUT, SRO, CAR, CSS, TS 3.6.2.1, (CFR 55.43.b.2), MB-02223

NRC K/A System/E/A

System 013 Engineered Safety Features Actuation System (ESFAS)

Number K3.03

Knowledge of the effect that a loss or malfunction of the ESFAS will have on the following: Containment

Importance RO/SRO 4.3 4.7

10CFR Link (CFR: 41.7 / 45.6)

NRC K/A Generic

# 51	RO	☑ SRO	Question ID: 1000061	Origin: New	Memory? (Check=Yes)

A plant trip has occurred on lowering pressurizer pressure.
In-house electrical buses successfully transferred to the RSST.
VR-11 attempted to transfer to its emergency source, but the transfer failed. VR-11 is de-energized.
SIAS actuated on low pressurizer pressure.
EOP 2525 is complete, a small break LOCA is diagnosed, and EOP 2532 is entered.

The US directs the PPO to verify adequate Safety Injection flow.
The PPO reports that:
- Pressurizer pressure is 950 psia.
- 2 HPSI and 2 LPSI pumps are running.
- 1A and 1B HPSI header flow meters are both deenergized.
- 2A and 2B HPSI header flow meters are reading 125 gpm and 140 gpm respectively.
- No indicated LPSI flow.

Based on this information, the US will direct the PPO to:

A Dispatch a PEO to throttle open the 2A HPSI header injection valve to raise indicated flow for the 2A header to 140 gpm. ☐

B Move on to the next step in the EOP since Safety Injection flow is acceptable for the present conditions. ☑

C Initiate auxiliary spray to lower pressuirzer pressure in order to raise safety injection flow. ☐

D Throttle the 2A and 2B HPSI injection valves to maintain 40 gpm total safety injection flow. ☐

Justification	B: correct, with VR-11 de-energized the 2 header flows must be doubled to approximate total HPSI flow, (the 2A is slightly lower but within acceptable range), required flow per the curve is ~280 gpm, doubling the indicated yields 530 gpm; A: HPSI injection valves are pre-set for balanced flow to avoid unacceptable injection loss in the event of Tc break; C: spraying moves us lower on the curve, but does little to change the head to flow relationship; D: throttling the injection flow to 40 gpm would result in being below the required SI flow
Reference	MP2*LOIT/LOUT, SRO, HPSI, VR-11, 2632, 2504A, (CFR-55.43.b.5), MB-05738 **Requires the use of EOP 2541 Appendix 2 Figure 3**

NRC K/A System/E/A

System 013 Engineered Safety Features Actuation System (ESFAS)

Number A4.03

Ability to manually operate and/or monitor in the control room: ESFAS initiation

Importance RO/SRO 4.5 4.7

10CFR Link (CFR: 41.7 / 45.5 to 45.8)

NRC K/A Generic

52 | ✔ RO | ✔ SRO | Question ID: 1000112 | Origin: New | ✔ Memory? (Check=Yes)

The following conditions exist:

- Plant is stable at 87% power.
- "A" and "B" condensate pumps are in service.
- The "C" condensate pump hand switch is in Pull-To-Lock.
- All other equipment is operating as expected.

The CONDENSATE PUMP DIS PRES LO alarm is suddenly annunciated on C-05 and remains locked in.

What is the required response to this alarm?

A If condensate header pressure is less than 460 psig, then start the "C" condensate pump. ☑

B Manually raise speed on the main feed pumps until the low pressure alarm clears. ☐

C Because both main feed pumps will trip within 5 seconds, manually trip the reactor. ☐

D Manually lower the speed on the main feed pumps until the low pressure alarm clears. ☐

Justification ARP 2590D for B-11, CONDENSATE PUMP DIS PRES LO, states that if a condensate pump tripped, then verify the standby pump is running or start the standby pump. Additionally, the procedure requires starting tadditional condensate pumps if condensate header discharge pressure is less than 460 psig. The annunciator is alarmed at 400 psig. A low feed pump suction pressure will cause a pump trip at 245 psig sustained for greater than 5 seconds. A condensate header pressure of 400 psig is approximately equal to 260 psig at the suction of the feed pumps (Approximately 140 psid across the feedwater heaters and CPF).
"B" is incorrect because raising the speed on the affected pump will result in more feed flow causing condensate header pressure to lower even morer.
"C" is incorrect because the main feed pumps will NOT trip in 5 seconds at the alarm setpoint (corresponding to 260 psig suction pressure); therefore a reactor trip is NOT required.
"D" is incorrect because lowering the speed on the main feed pumps will result in higher condensate header pressure, but only temporarily until the feed regulating valves open to maintain S/G level.

Reference LOIT, MFW-00-C, MFW, 2321, MB-02269

NRC K/A System/E/A

System 059 Main Feedwater (MFW) System

Number GS

SEE GENERIC K/A

Importance RO/SRO

10CFR Link

NRC K/A Generic

2.4 Emergency Procedures /Plan

2.4.50

Ability to verify system alarm setpoints and operate controls identified in the alarm response manual.

3.3 3.3

(CFR: 45.3)

# 53	✔ RO	✔ SRO	Question ID: 1000113	Origin: New	Memory? (Check=Yes)

While operating at 100% power, with the "B" auxiliary feed pump out of service for maintenance, the plant experiences an excess steam demand (ESD) event on the #1 Steam Generator (SG) immediately followed by a loss of VA-10 . An automatic reactor trip is actuated followed by SIAS and MSI. During the performance of EOP 2525, Standard Post Trip Actions, the SPO is directed to isolate #1 SG and feed only the #2 SG using Aux Feed Water (AFW). The SPO has secured the "A" auxiliary feedwater pump and is attempting to start the turbine driven auxiliary feedwater pump.

Which one of the following additional actions will prevent feeding #1 SG while maintaining feedwater flow to #2 SG during the combined loss of VA-10/ESD event?

A Dispatch a PEO to locally close 2-FW-43A, "A" auxiliary feed regulating valve. ☑

B Swap the turbine driven auxiliary feed pump control power supply to Facility 2. ☐

C Place #1 OVERRIDE/MAN/START/RESET switch in 'Pull-To-Lock'. ☐

D Place 2-FW-43A, "A" auxiliary feed regulating valve controller, in MANUAL and closed. ☐

Justification The loss of VA-10 will cause the #1 aux feed regulating valve to fail open. In order to maintain feedwater flow to #2 SG and prevent feeding #1 SG, the turbine driven auxiliary feedwater pump must be in service with the cross-tie valve, 2-FW-44 closed. With 2-FW-44 supplied by Facility 2, the valve may be closed from C-05.
"C" is incorrect. Placing #1 OVERRIDE/MAN/START/RESET switch in 'Pull-To-Lock' will NOT prevent feeding #1 SG because the #1 aux feed regulating valve fails open on loss of VA-10.
"B" is incorrect because the control power supply to the turbine driven auxiliary feedwater pump is NOT affected; i.e., swapping power supplies will have NO impact on the turbine driven auxiliary feedwater pump or which S/G has feedwater flow.
"D" is incorrect because 2-FW-43A fails open on loss of power (VA-10) and CANNOT be closed from C-05.

Reference LOIT, AFW-00-C, AFW, 2534, 2322, MB-05737

NRC K/A System/E/A

System 061 Auxiliary / Emergency Feedwater (AFW) System

Number K2.01

Knowledge of bus power supplies to the following: AFW System MOVs.

Importance RO/SRO 3.2 3.3

10CFR Link (CFR: 41.7)

NRC K/A Generic

# 54	☐ RO	☑ SRO	Question ID: 1000062	Origin: New	☐ Memory? (Check=Yes)

The unit is at 100% power.
The 'A' EDG is out for on-line maintenance in accordance with TSAS 3.8.1.1.b.4.
Surveillance is scheduled on the 'D' CAR cooling unit.
During performance of the surveillance, the CAR fan trips when a start in slow speed is attempted.
RBCCW flow through the unit is acceptable and it is verified that the unit will run in high speed.

For this set of conditions you must:

A Restore the 'D' CAR cooling unit to Operable within 7 days or be in Hot Shutdown within the next 12 hours. ☐

B Initiate action within 1 hour to place the unit in Hot Standby within the next 6 hours and in Hot Shutdown with pressurizer pressure < 1750 psia within the following 6 hours. ☐

C Restore the 'A' EDG or the 'D' CAR cooling unit to Operable within 2 hours or place the unit in Hot Standby within the next 6 hours and in Hot Shutdown within the following 6 hours. ☐

D Restore the 'D' CAR cooling unit or the 'A' EDG to Operable status within 48 hours or be in Hot Shutdown within the next 12 hours. ☑

Justification	D: correct, the facility 1 CAR cooling train must be considered inop IAW provisions of TS 3.0.5 since emergency power for the 'A' & 'C' is OOS , but TS 3.6.2.1.d specifically addresses 2 inop CAR trains, allowing a greater time than 3.0.5; A: chosen if examinees think only 'D' CAR fan must be considered inop; B: chosen if examinees think TS 3.0.3 applies; C: chosen if examinees think TS 3.0.5 applies
Reference	MP2*LOIT/LOUT, SRO, 2313A, TS, (CFR-55.43.b.2), MB-01862 *Requires the use of Tech Specs**

NRC K/A System/E/A

NRC K/A Generic

System 022 Containment Cooling System (CCS)

Number K2.01

Knowledge of power supplies to the following:
Containment cooling fans

Importance RO/SRO 3.0 3.1

10CFR Link (CFR:41.7)

Delete from SRO exam.
No Correct answer.
See deletion justification.
RNS 11/1/02

 # 55 | ✔ RO ✔ SRO | Question ID: **0155565** | **Origin: Modified** | ✔ Memory? (Check=Yes)

The plant is operating at 100% power, with the following conditions present:
* Letdown is being diverted to Clean Liquid Radwaste (CLRW).
* The OFF-LINE CLRW Receiver Tank (CWRT) is FULL.
* The IN-SERVICE CWRT level has just reached 95% and the tank HI LEVEL alarm has actuated.

To prevent an overfill condition and potential spill situation, how will the CLRW System respond to this condition?

A Letdown will automatically realign to the VCT. ☐

B The in-service CWRT will realign to the EDST. ☐

C Influent to the in-service CWRT will automatically be realigned to the in-service CWMT. ☑

D Influent to the in-service CWRT will automatically be realigned to the in-service AWDT. ☐

Justification C: correct, CWRT to CWMT swap occurs at 95% level going up. Purpose of the Receiver Tank Auto-Bypass; A: this will prevent overfill, but won't address the need for L/D; B & D: plausible as they are receptacles for other sources of radwaste

Reference MP2*LOIT*2916 [068 CLR-04-C 3002] (8/22/96) 2335A, CLRW, MB-00581

NRC K/A System/E/A

System 068 Liquid Radwaste System (LRS)

Number K4.01

Knowledge of design feature(s) and/or interlock(s) which provide for the following: Safety and environmental precautions for handling hot, acidic, and radioactive liquids

Importance RO/SRO 3.4 4.1

10CFR Link (CFR: 41.7)

NRC K/A Generic

# 56	RO	✔ SRO	Question ID: 1000063	Origin: New	Memory? (Check=Yes)

Initial Conditions:
- 'A', 'B', & 'C' CAR fans running in fast with their normal & emergency RBCCW outlets open; 'D' CAR fan is off with only the normal outlet open.
- 'A', 'B', & 'C' CAR cooling unit indicated RBCCW flow is 2000 gpm per unit; 'D' CAR cooling unit indicated flow is 500 gpm.
- 'A' RBCCW header indicated total flow on C06 is 7500 gpm. The 'A' SFPC heat exchanger is in standby with no flow through either side.
- 'B' RBCCW header indicated total flow on C06 is 7000 gpm. This includes 850 gpm flow through the 'B' SFPC heat exchanger.

Surveillance must be run on the facility 2 CAR cooling units. This includes verifying acceptable RBCCW flow with the emergency outlet open.

When the US directs the PPO to perform this surveillance on the 'D' CAR cooling unit, which of the following actions will prevent exceeding any RBCCW flow limits specified in the RBCCW operating procedure?

A Secure all RBCCW flow through the 'B' and 'D' CAR cooling units prior to opening the emergency outlet on the 'D' CAR cooling unit. ☐

B Close the emergency outlet on the 'A' or 'C' CAR cooling unit, transfer SFP cooling to the 'A' SFPC heat exchanger, then open the emergency outlet on the 'D' CAR cooling unit. ☑

C Close the emergency outlet on the 'B' CAR cooling unit, then open the emergency outlet on the 'D' CAR cooling unit. ☐

D Transfer SFP cooling to the 'A' SFPC heat exchanger, then open the emergency outlet on the 'D' CAR cooling unit. ☐

Justification	B: correct, to avoid excessive vibration the RBCCW procedure cautions that flow should be maintained >6000 gpm per header and no more than 8000 gpm to avoid pump runout, CAR cooling units are throttled using a valve downstream of the combined outlets to limit total unit flow to 2000 gpm, this will be the flow whether only the emergency valve is open or if both are open, the normal valve opens to a throttled position where flow will be 500 gpm, this series of actions lowers 'A' header flow to 6000 gpm, then 'B' header to 6150 gpm, then raises 'B' header to 7650 gpm; A: this would lower 'B' header flow to 4500 gpm; C: this would result in 8500 gpm on the 'B' header; D: this would raise 'A' header to 8350 gpm
Reference	MP2*LOIT/LOUT, SRO, 2313A, 2330A, (CFR-55.43.b.5), MB-03019

NRC K/A System/E/A

System 022 Containment Cooling System (CCS)

Number A1.04

Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating the CCS controls including: Cooling water flow

Importance RO/SRO 3.2 3.3

10CFR Link (CFR: 41.5 / 45.5)

NRC K/A Generic

# 57	RO	☑ SRO	Question ID: 1000064	Origin: New	☑ Memory? (Check=Yes)

A small break LOCA with plant trip occurs at 1310.
SIAS actuates at 1317 with CSAS actuating 3 minutes later at 1320.
All equipment responds properly and the crew performs the actions of EOP 2532 correctly.

The time is now 1450:
RCS temperature and pressure are 410°F and 430 psia.
A & C HPSI and A & B CS pumps are running with LPSI secured.
Containment pressure is 6.5 psig.

The PPO requests permission to secure Containment Spray.

As the US, what would your response be?

A The CSAS signal may be reset and Containment Spray may be secured since containment pressure is below 7 psig. ☐

B Maintain Containment Spray running for a minimum of an additional 30 minutes for Iodine scrubbing of the containment atmosphere. ☑

C Containment Spray may be secured now and CSAS must be reset when containment pressure decreases below 4.42 psig. ☐

D Maintain Containment Spray running for a minimum of an additional 90 minutes to ensure that all TSP is fully dissolved. ☐

Justification B: correct, CTMT pressure is below the allowable reset pressure of 7 psig, but is procedurally required to be run for a total of 2 hours minimum to scavenge Iodine from the CTMT atmosphere. A: selected if examinee neglects Iodine scrubbing requirement; C: combines procedural securing pressure with CTMT pressure for SIAS vice CSAS; D: dissolving TSP only requires baskets being covered vice any "rain" effect

Reference MP2*LOIT/LOUT, CSS, (CFR-55.43.b.5)

NRC K/A System/E/A

System 026 Containment Spray System (CSS)

Number K4.02

Knowledge of CSS design feature(s) and/or interlock(s) which provide for the following: Neutralized boric acid to reduce corrosion and remove inorganic fission product iodine from steam (NAOH) in containment spray

Importance RO/SRO 3.1 3.6

10CFR Link (CFR: 41.7)

NRC K/A Generic

 # 58 ☑ RO ☑ SRO Question ID: **0156044** **Origin: Modified** ☑ Memory? (Check=Yes)

A discharge of the "A" Waste Gas Decay Tank is in progress when the Aux. Building PEO calls to report that the Waste Gas Discharge Flow Recorder FR 9097 is NOT working.

What action will you direct the PEO to take?

A No action other than submitting a TR is required. ☐

B Commence logging the "A" WGDT pressure every 15 minutes for the duration of the discharge. ☐

C Secure the discharge immediately. ☑

D Contact Chemistry to draw a grab sample for counting and repeat hourly until the discharge is complete. ☐

Justification C: correct, satisfying limits on activity discharge rates requires documentation of flow rate, securing discharge on loss of flow recorder is procedurally required; A: TR will be submitted, but it is not the only action required; B: the pressure decay method is acceptable when the flow recorder is out, but it is performed as a pre-planned evolution; D: grab samples can be used when radmonitors are inop (not flow monitors).

Reference MP2*NLO*1821 [071 GRW-04-C 3897] (6/3/97) 2337, MC, MB-00508

NRC K/A System/E/A

System 071 Waste Gas Disposal System (WGDS)

Number GS

SEE GENERIC K/A

Importance RO/SRO

10CFR Link

NRC K/A Generic

2.1 Conduct of Operations

2.1.8

Ability to coordinate personnel activities outside the control room.

3.8 3.6

(CFR: 45.5 / 45.12 / 45.13)

 # 59 ☑ RO ☑ SRO Question ID: **1000081** Origin: **New** ☑ Memory? (Check=Yes)

An operator is monitoring RCS level locally during a mid-loop drain-down operation.

Which of the following radiation sources contributes the most dose to the operator's TEDE?

A Neutron exposure from the spent core, (no off-load yet). ☐

B Alpha emitters coating the inside of the RCS piping. ☐

C Beta contamination on the step-off pad inside the SG access tent. ☐

D Gamma radiation from a crud trap located 4 feet away. ☑

Justification D: correct, gamma radiation is the only type of radiation present which is not totally attenuated by the conditions specified; A: not critical, no neutrons; B: RCS piping blocks all alpha; C: Beta radiation from inside tent is blocked by tent material.

Reference MP2*LOIT/LOUT, RW

NRC K/A System/E/A

System 072 Area Radiation Monitoring (ARM) System

Number K5.01

Knowledge of the operational implications of the following concepts as they apply to the ARM system: Radiation theory, including sources, types, units, and effects

Importance RO/SRO 2.7 3.0

10CFR Link (CFR: 41.5 / 45.7)

NRC K/A Generic

# 60	RO	☑ SRO	Question ID: 1000070	Origin: New	☑ Memory? (Check=Yes)

To improve refuel pool clarity and lower activities, management directs that CVCS Additional Purification be placed in service at the maximum flow rate.

To accomplish this the US will direct which of the following actions?

A Operate letdown flow control valves to establish 128 gpm letdown from the LPSI pump discharge and run 3 charging pumps to return the purified water. ☐

B Operate letdown flow control valves to establish 128 gpm letdown from the LPSI pump discharge and return the purified water to the suction of the LPSI pumps. ☐

C Operate backpressure control valves to establish 128 gpm letdown from the LPSI pump discharge and run 3 charging pumps to return the purified water. ☐

D Operate backpressure control valves to establish 128 gpm letdown from the LPSI pump discharge and return the purified water to the suction of the LPSI pumps. ☑

Justification	D: correct, per OP 2304F, the letdown flow control valve outlets are closed to prevent backflow to the RCS from the LPSI discharge, TS allows a maximum of 2 charging pumps in modes 5 & 6; A & B: may be chosen by examinees based on incorrect CVCS system knowledge; C: may be chosen if examinees are not aware of TS restriction.
Reference	MP2*LOIT/LOUT, SRO, 2304F, CVCS, SDC, (CFR-55.43.b.2 & 5), MB-02334

NRC K/A System/E/A

System 004 Chemical and Volume Control System

Number K1.24

Knowledge of the physical connections and/or cause-effect relationships between the CVCS and the following systems: RHRS

Importance RO/SRO 3.4 3.9

10CFR Link (CFR: 41.2 to 41.9 / 45.7 to 45.8)

NRC K/A Generic

 # 61 ☑ RO ☑ SRO Question ID: **1000020** **Origin: New** ☑ Memory? (Check=Yes)

With the plant in a normal 100% configuration, which of the following describes an interlock or design feature that ensures that HPSI will provide balanced injection flow adequate to ensure core cooling on a design basis Large Break LOCA regardless of potential cold leg break location?

A A SIAS open signal will not drive the injection valves beyond their maintained throttled position ensuring balanced flow. ☑

B A SIAS will cause the injection valves to open to a throttled position which ensures balanced flow. ☐

C The injection valves are sized to pass the correct balanced flow when in the full open position. ☐

D Each injection header is equipped with a flow orifice which is sized to pass the correct balanced flow. ☐

Justification A: correct, the open position for the HPSI injection header stops are tested and set to pass a balanced flow per header such that the total doesn't exceed pump runout, thereby ensuring that a rupture on any one cold leg will NOT rob core cooling flow from the intact legs; B: the valves receive a SIAS, but are already open; C & D: either would work if true

Reference MP2*LOIT, 2307, LPSI, MB-00168

NRC K/A System/E/A

System 006 Emergency Core Cooling System (ECCS)

Number K4.17

Knowledge of ECCS design feature(s) and/or interlock(s) which provide for the following: Safety Injection valve interlocks

Importance RO/SRO 3.8 4.1

10CFR Link (CFR: 41.7)

NRC K/A Generic

62 | RO ☑ SRO | Question ID: 0062764 | Origin: Bank | ☐ Memory? (Check=Yes)

After pumping the Containment sump, 2-SSP-16.1 and 2-SSP-16.2, Containment Sump Inboard and Outboard Isolation Valves, indicate that they are NOT fully closed.
The Containment Sump Outboard Isolation Valve, 2-SSP 16.2 was determined to be partially open by a PEO. The valve will NOT close and must be disassembled for repair.
Simultaneously, a Containment entry is made to visually inspect the Containment Sump Inboard Isolation Valve, 2-SSP-16.1.
The inner Containment door has been open 30 minutes while personnel are in Containment.
The valve will NOT fully close and must be disassembled for repair.

Which of the following actions must be taken?

A 1. Restore CONTAINMENT INTEGRITY within one hour or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the next 30 hours. ☐
2. Immediately initiate action to evaluate overall containment leakage rate and verify an air lock door is closed within 30 minutes. Restore the air lock to OPERABLE status within 24 hours.

B 1. Ensure the other two required leakage detection systems are OPERABLE and obtain and analyze grab samples at least once per 24 hours; otherwise, be in COLD SHUTDOWN within the next 36 hours. ☐
2. Restore CONTAINMENT INTEGRITY within one hour or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the next 30 hours.

C 1. Immediately initiate action to evaluate overall containment leakage rate and verify an air lock door is closed within 30 minutes. Restore the air lock to OPERABLE status within 24 hours. ☐
2. Restore the inoperable valve to OPERABLE status, or isolate the affected penetration within 3.5 hours, or be in COLD SHUTDOWN within the next 36 hours.

D 1. Restore CONTAINMENT INTEGRITY within one hour or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the next 30 hours. ☑
2. Restore the inoperable valve to OPERABLE status, or isolate the affected penetration within 3.5 hours, or be in COLD SHUTDOWN within the next 36 hours.

Justification D is correct, CTMT Isolation Valves 2-SSP-16.1 and 16.2 are NOT OPERABLE in that they do NOT go full closed (LCO 3.6.3.1). At least one of the valves must be OPERABLE to satisfy the definition of CONTAINMENT INTEGRITY (3.6.1.1) (Note: examinees must recognize that failure to meet 3.6.3.1 is the basis for considering the surveillance criteria of 3.6.1.1 NOT met.)
A is incorrect. The Containment Air Lock is OPERABLE. (LCO 3.6.1.3)
B is incorrect The containment sump level monitoring system is OPERABLE (LCO 3.4.6.1)
C is incorrect. The Containment Air Lock is OPERABLE. (LCO 3.6.1.3)

Reference MP2*LOIT/LOUT, SRO, CI, TS, (CFR-55.43.b.2), MB-03236
Requires the use of Tech Specs

NRC K/A System/E/A

System 103 Containment System

Number A3.01

Ability to monitor automatic operation of the containment system, including: Containment isolation

Importance RO/SRO 3.9 4.2

10CFR Link (CFR: 41.7 / 45.5)

NRC K/A Generic

# 63	✔ RO	☑ SRO	Question ID: **0153363**	Origin: **Modified**	☐ Memory? (Check=Yes)

The plant is at 100% power with all parameters normal when:
- The selected pressurizer level controller slowly degrades such that pressurizer level rises to approximately 69%.
- Pressurizer pressure peaks at approximately 2310 psia.
- All backup heaters energize ON.

The PPO correctly diagnoses the problem and shifts to the alternate pressurizer level controller which responds correctly to restore pressurizer level.

Based on this information, which one of the following is the correct action to be taken in regard to pressurizer pressure?

A Monitor the system to ensure automatic operation restores pressurizer pressure. ☑

B De-energize the backup heaters by placing their control switches in the PULL-TO-LOCK position. ☐

C De-energize the backup heaters by placing their control switches in OFF then return to AUTO. ☐

D Take MANUAL control of PZR sprays using the selected pressure controller and return pressure to normal. ☐

Justification A: correct, The control system is responding normally to this event and though B, C, and D seem to be reasonable actions these distractors would only compound the problem when PZR level is returned to normal or if another transient occurred.

Reference MP2*LORT*2435 [011 PLC-01-C 4813] (3/4/97) 2304A, RCS, PLPCS, MB02325

NRC K/A System/E/A

System 011 Pressurizer Level Control System (PZR LCS)

Number K3.03

Knowledge of the effect that a loss or malfunction of the PZR LCS will have on the following: PZR PCS

Importance RO/SRO 3.2 3.7

10CFR Link (CFR: 41.7 / 45.6)

NRC K/A Generic

# 64	☑ RO	☑ SRO	Question ID: 1000022	Origin: New	☐ Memory? (Check=Yes)

Daily RPS surveillance 2601D is in progress on channel 'A' of the RPS. The PPO is at the point in the procedure where the 'Nuclear Pwr Calibrate' potentiometer is adjusted to match the calculated voltage when vital instrument bus VA-30 is lost.

Based on the above, what is the resulting condition of the RPS?

A The K3 relay has de-energized, tripping open TCB 3 and 7, but the reactor has NOT tripped. ☑

B RPS channel 'C' is de-energized, but all TCBs remain closed. ☐

C The reactor has just tripped due to two coincident High Power Trip signals. ☐

D The RPS is placed in a 1 out of 3 logic when channel 'A' High Power trips due to loss of power to the Bypass circuit. ☐

Justification A: correct, the K3 relay is powered by vital AC (VA30) therefore the associated TCBs (3 & 7) open; B: RPS channel C is de-energized, but due to the power loss to the K3 relay the associated TCBs open; C: only the C channel provides an input, A channel is bypassed; D: bypass power is provided by the same source as the channel's normal power

Reference MP2*LOIT, RPS, 2380, VIAC, TCB, MB-03144

NRC K/A System/E/A

System 012 Reactor Protection System

Number K1.01

Knowledge of the physical connections and/or cause effect relationships between the RPS and the following systems: 120V vital/instrument power system

Importance RO/SRO 3.4 3.7

10CFR Link (CFR: 41.2 to 41.9 / 45.7 to 45.8)

NRC K/A Generic

# 65	☑ RO	☑ SRO	Question ID: 1000027	Origin: New	☑ Memory? (Check=Yes)

A reactor startup was in progress when a valve packing leak is reported in the RCS loop area.
As a safety precaution, to allow RCS loop area entry for packing leak repair, all CEAs are driven into the core.

As soon as the workers have left containment the US directs you to perform necessary actions to have all CEAs read "0" steps on the computer and CEAPDS.

What must you do to accomplish this?

A Using the "CEA Position Editor" on the PPC, set all CEAs to "0" steps, all CEA positions on CEAPDS will already be at "0" steps. ☐

B Fully insert each CEA in "MI" mode, then using the "CEA Position Editor" on the PPC, set all CEAs to "0" steps. ☐

C Trip open and then reclose TCBs 1 through 8. All CEA positions on CEAPDS and the PPC will be at "0" steps. ☑

D All CEAPDS CEA positions are already at "0" steps. Verify all PPC CEA positions at"0" steps. Use "CEA Position Editor" to correct any individual CEAs not at "0". ☐

Justification C: correct, CEAs cannot be driven to "0" steps, they must be tripped, "0" step reed switch re-zeroes the PPC; A: "Editor" can change PPC position, but can't change reed switch position on CEAPDS; B: CEAs cannot be driven to "0" steps; D: since TCBs were not opened, all CEAs are reading 1 to 2 steps withdrawn.

Reference MP2*LOIT, 2302A, 2202, RPI, CEAPDS, MB-02263

NRC K/A System/E/A

System 014 Rod Position Indication System (RPIS)

Number A4.04

Ability to manually operate and/or monitor in the control room: Re-zeroing of rod position prior to startup

Importance RO/SRO 2.7 2.7

10CFR Link (CFR: 41.7 / 45.5 to 45.8)

NRC K/A Generic

66 | ☑ RO ☑ SRO | Question ID: **1000026** | Origin: **New** | ☐ Memory? (Check=Yes)

Initial Conditions: 100% power, no equipment out of service, all systems aligned normally.
RCS loop 2 hot leg temperature detector T-121X fails high, (615° F).
(T-121X provides the hot leg temperature input to Channel 'Y' Tavg calculator.)

What impact will this failure have on plant operations and what action(s) will be required?

A All backup charging pumps would start and letdown goes to minimum. Stop backup charging pumps, place letdown controller in Manual and balance letdown with charging. ☐

B Steam Dump & Bypass Valves Tavg controller HIC-4165 will open the SD&BVs. HIC-4165 must be placed in Manual and the SD&BVs reclosed. ☐

C SD&BVs and ADVs will cause an excessive RCS cooldown on a plant trip. The Reactor Regulating System must be shifted to Channel 'X'. ☑

D The Q-power signal to CEAPDS will go to maximum. CEAPDS must be shifted to Channel 'X' RRS to allow the PPDIL and PDIL setpoints to lower as power is decreased. ☐

Justification C: correct, Channel 'Y' RRS is normally in service due to the Quick-Open relay being removed in Channel 'X', the high calculated Tavg would keep the steam dumps open, over-cooling the RCS, shifting to 'X' (w/o the relay) would prevent this; A: pzr level is max at a Tavg equal to ~85% power, raising Tavg has no further effect on pzr level; B: a Quick-open signal is processed for the SD&BVs, but a turbine tripped relay closure is required to pass the signal to the controller; D: Q-power signal for CEAPDS is from RPS safety channels

Reference MP2*LOIT, 2386, RRS, Tavg, MB-03170

NRC K/A System/E/A

System 016 Non-Nuclear Instrumentation System (NNIS)

Number A2.01

Ability to (a) predict the impacts of the following malfunctions or operations on the NNIS; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: Detector failure

Importance RO/SRO 3.0 3.1

10CFR Link (CFR: 41.5 / 43.5 / 45.3 / 45.5)

NRC K/A Generic

# 67	RO	✓ SRO	Question ID: 1000065	Origin: New	Memory? (Check=Yes)

The Aux Building PEO reports an instrument air leak in the -5' 6" level of the Aux. Building. Due to vibration, a hole has been worn in the side of an instrument air line where it goes around a support column. The compressors are presently able to keep up with the leak, but it is worsening and will soon exceed the system's capacity to keep up. The leak may be isolated and repaired by closing a local branch isolation. The following valves will be without air when the isolation is closed:

- RCP Bleedoff to VCT, 2-CH-505 and RCP Bleedoff to EDST, 2-CH-198
- Letdown header isolation, 2-CH-089 and letdown flow control valves 2-CH-110P & Q
- SG sample isolations, 2-MS-191A & B
- Primary sample isolation, 2-RC-045
- PDT discharge to CLRW isolation, 2-LRR-43.2
- 'B' CAR cooler RBCCW inlet and both outlets, 2-RB-28.1B, 2B, & 3B
- 'D' CAR cooler RBCCW inlet and both outlets, 2-RB-28.1D, 2D, & 3D

Chemistry has okayed the loss of SG and RCS sampling for the time required to effect repairs.

What system alignments must the US direct for this repair to be performed with the plant at power?

A Pump PDT to minimum level. ☑
Ensure RCP bleedoff relief is open to PDT.
Operate on 1st backup charging pump with letdown isolated.
Align 'B' RBCCW header flows such that full flow on the 'B' & 'D' CAR coolers won't exceed flow limit.

B PDT level is unaffected provided no draining in containment is permitted until repairs are complete. ☐
Ensure RCP bleedoff controller is selected to EDST and in Manual.
Operate on 1st backup charging pump with letdown isolated.
Align 'B' RBCCW header flows such that full flow on the 'B' & 'D' CAR coolers won't exceed flow limit.

C Pump PDT to minimum level. ☐
Ensure RCP bleedoff relief is open to PDT.
Engage the manual operator for 2-CH-089 in the open position and operate letdown flow controller in Manual.
Place 'B' & 'D' CAR cooler emergency outlets in Manual closed.

D PDT level is unaffected provided no draining in containment is permitted until repairs are complete. ☐
Ensure RCP bleedoff controller is selected to EDST and in Manual.
Operate on 1st backup charging pump with letdown isolated.
Place 'B' & 'D' CAR cooler emergency outlets in Manual closed.

Justification	A: correct, RCP bleedoff will relieve to the PDT which cannot be pumped, letdown will be isolated so the backup charging pump will be used to maintain pzr level, the CAR cooler valves all fail wide open so header flow must be preset to allow for 2000 gpm per cooler; B: PDT receives RCP bleedoff & CH-505 & 198 don't have manual operators; C: CH-089, 110P & Q all fail closed with no manual operators, placing CAR cooler flow outlets in manual would make that CAR cooling train inop; D: PDT receives RCP bleedoff & CH-505 & 198 don't have manual operators, placing CAR cooler flow outlets in manual would make that CAR cooling train inop
Reference	MP2*LOIT/LOUT, SRO, 2563, (CFR-55.43.b.5), MB-02636

NRC K/A System/E/A

NRC K/A Generic

System 078 Instrument Air System (IAS)

Number K3.02

Knowledge of the effect that a loss or malfunction of the IAS will have on the following: Systems having pneumatic valves and controls

Importance RO/SRO 3.4 3.6

10CFR Link (CFR: 41.7 / 45.6)

 # 68 ☑ RO ☑ SRO Question ID: **0055404** Origin: **Bank** ☐ Memory? (Check=Yes)

The ESAS automatic test inserter (ATI) module has a key-switch labeled "CTMT PURGE VALVE ATI BYPASS".

The switch has two positions: "OPERATE" and "BYPASS".

With the plant operating normally in MODE 1, what two functions does the switch perform when placed in the "BYPASS" position?

A Blocks the Containment Purge input to the ATI fault alarm on C-01 and removes the ATI test pulse from each Containment Purge Valve Initiation channel ☑

B Removes the ATI test pulse from the CTMT RAD MONITORS and from the Containment Purge Valve Initiation portion of the ATI ☐

C Initiates an ATI fault alarm on Panel C-01 and removes the ATI test pulse from each Containment Purge Valve Initiation channel ☐

D Generates a signal to the Containment Purge Valve Initiation portion of the ATI and removes the ATI test pulse from the CTMT RAD MONITORS ☐

Justification A is correct. SP-2604I, OPS Form 2619A-1, OP-2384 state, "CTMT PURGE VALVE ATI BY-PASS" switch removes ATI test pulse from each of the 4 ESAS channels of Containment Purge Valve Isolation. It also generates a signal to sensor channel "CONTAINMENT RADN" group of ATI, ensuring NO ATI fault alarm is generated.
B is incorrect. The CTMT RAD MONITORS do NOT receive an ATI test pulse.
C is incorrect. The ATI fault alarm is blocked.
D is incorrect. See B.

Reference MP2*LOIT[013 ESA-01-C] 2384, ESAS, 2314B, Purge

NRC K/A System/E/A

NRC K/A Generic

System 029 Containment Purge System (CPS)

Number K1.03

Knowledge of the physical connections and/or cause- effect relationships between the Containment Purge System and the following systems: Engineered safeguards

Importance RO/SRO 3.6 3.8

10CFR Link (CFR: 41.2 to 41.9 / 45.7 to 45.8)

69 | ☑ RO ☑ SRO | Question ID: 0055281 | Origin: Bank | ☑ Memory? (Check=Yes)

Which one of the following statements describes the design feature that prevents inadvertent draining of the spent fuel pool through the spent fuel pool cooling (SPFC) System?

A SPFC pumps will automatically trip when the low SFP level alarm is annunciated. ☐

B Deepest SFPC suction piping extends only halfway down into the SFP. ☐

C SFPC suction piping has a siphon breaker slightly below the normal water level. ☑

D Primary makeup valve to the SFP automatically opens on a low level in the SFP. ☐

Justification SFPC suction piping has a siphon breaker near the normal water level. Suction to the SFP cooling pumps will be lost when level is approximately 1 foot below the alarm at 36'.
"A" is incorrect because there is NO automatic trip of the SFP cooling pumps.
"B" is incorrect because, although the deepest suction piping extends to one foot below the top of the fuel racks and is normally in service, the normal suction piping siphon breaker will stop flow through the suction pipe.
"D" is incorrect because the makeup valve to the SFP does NOT automatically open for any reason.

Reference LOIT, [033 SFP-01-C), 2305, SFP, MB-10518

NRC K/A System/E/A

System 033 Spent Fuel Pool Cooling System (SFPCS)

Number K4.03

Knowledge of design feature(s) and/or interlock(s) which provide for the following: Anti-siphon devices

Importance RO/SRO 2.6 2.9

10CFR Link (CFR: 41.7)

NRC K/A Generic

# 70	☑ RO	☑ SRO	Question ID: **1000050**	Origin: **New**	☐ Memory? (Check=Yes)

The SPO hears tones signifying alarms coming in.
As he looks up to scan the alarm lights he notices a number of valves going closed on panel C05, among them are the SG Blowdown Tank outlet, 2-MS-15 and the SGBD Quench Tank discharge, 2-MS-135.

What alarm and condition would cause these valves to close?

A "Blowdown Rad Mon Flow Hi" due to a failure of the flow detector. ☐

B "Blowdown Tk Level Hi/Lo" due to a low level in the Blowdown Tank ☐

C "Main Steamline Hi-Rad/Inst. Fail" due to power loss to the radmonitor. ☐

D "Process Mon Rad Hi-Hi/Fail" due to SG tube leakage. ☑

Justification D: correct, an SGTL would alarm the SJAE RM which causes the common alarm drop "Process Mon Rad Hi-Hi/Fail" on C06/7.
A is incorrect. There is NO Blowdown Tk Level Hi.Lo annunciator.
B is incorrect. There is NO Blowdown Rad Monitor Flow Hi annunciator.
C is incorrect. Most RMs on fail cause same actions as high alarm, but this RM doesn't affect SGBD.

Reference MP2*LOIT, 2569, SGBD RM, 2383, MB-02895

NRC K/A System/E/A

System 035 Steam Generator System (S/GS)

Number A4.08

Ability to manually operate and/or monitor in the control room: Recognition that increasing radiation levels in secondary systems may mean leaking and possibly ruptured S/G tubes

Importance RO/SRO 4.1 4.4

10CFR Link (CFR: 41.7 / 45.5 to 45.8)

NRC K/A Generic

# 71	☑ RO	☑ SRO	Question ID: 0070221	Origin: Bank	☑ Memory? (Check=Yes)

Which of the following 2 barriers are a design feature to prevent Steam Generator #1 from blowing down through a break on the Steam Generator #2 steam header in containment?

A Only the main steam isolation valves on both #1 and #2 SGs. ☐

B The main steam header non-return valve on #2 SG and the main steam isolation valve on #1 SG. ☑

C Only the main steam header non-return valves on both #1 and #2 SG. ☐

D The main steam header non-return valve on #1 SG and the main steam isolation valve on #2 SG. ☐

Justification A non-return check valve (2-MS-1A, 2-MS-1B) is welded to the downstream portion of each of the MSIV trip valves. The non-return valve is opened by the steam flowing through it. The availability of both valves ensures that a failure of either the non-return header valve or the isolation valve will allow the intact SG to be isolated. The presence of the non-return valve on the SG with the lowest pressure, in conjunction with the main steam isolation valve on the SG with the highest pressure, prevents the S/G with the highest pressure from blowing down through a broken main steam line in containment even if the air-operated disk on the intact SG fails to close.
"A" is incorrect because a failure of the #1 main steam isolation valve will allow steam flow through #2 main steam isolation valve and out through the break.
"C" is incorrect because the #1 main steam header non-return valve will NOT prevent the flow of higher pressure steam from #1 SG to #2 SG should the #2 SG main steam header non-return valve fail..
"D" is incorrect because the #1 main steam header non-return valve will NOT prevent the flow of higher pressure steam from #1 SG to #2 SG should the #2 SG main steam isolation valve fail.

Reference MP2 LOIT MSS 2316A, MB-02884

NRC K/A System/E/A

System 039 Main and Reheat Steam System (MRSS)

Number K4.05

Knowledge of MRSS design feature(s) and/or interlock(s) which provide for the following: Automatic isolation of steam line

Importance RO/SRO 3.7 3.7

10CFR Link (CFR: 41.7)

NRC K/A Generic

# 72	☑ RO	☑ SRO	Question ID: 1000051	Origin: New	☐ Memory? (Check=Yes)

Due to existing minor steam generator tube leakage the SJAE radmonitor is reading 50 cpm.

The SPO identifies a slight rise in condenser backpressure and dispatches a PEO to Condenser Air Removal System operation.
The PEO reports that the Steam Jet Air Ejectors are operating properly, but indicated Condenser Air Removal System flow has doubled.

With the Condenser Air Removal System flow doubled and the SG tube leakage constant, how will the SJAE radmonitor reading respond and why?

A The SJAE radmonitor reading will be one half of the initial. Concentration of the off-gas is diluted by the additional air. ☐

B The SJAE radmonitor reading will be the same as the initial. Slipstream flow to the radmonitor is based on sample fan flow, therefore constant. ☐

C The SJAE radmonitor reading will be the same as the initial. Half the concentration at twice the flow rate equals the same cpm. ☑

D The SJAE radmonitor reading will be twice as much as the initial. Twice the number of radioactive molecules will pass the radmonitor each minute. ☐

Justification C: correct for the reason stated; A: concentration is diluted, but flow rate doubles; B: radmonitor is attached to off-gas piping, not slip-streamed; D: flow rate doubles, but concentration is halved

Reference MP2*LOIT, 2329, SJAE, air removal, MB-00339

NRC K/A System/E/A

System 055 Condenser Air Removal System (CARS)

Number K1.06

Knowledge of the physical connections and/or cause-effect relationships between the CARS and the following systems: PRM system

Importance RO/SRO 2.6 2.6

10CFR Link (CFR: 41.2 to 41.9 / 45.7 to 45.8)

NRC K/A Generic

# 73	☑ RO	☑ SRO	Question ID: **1000114**	Origin: **New**	☐ Memory? (Check=Yes)

The plant has sustained a station blackout. The crew has energized bus 24E from the Unit 3 RSST and are about to energize bus 24C from bus 24E.

A voltage of _____ volts and a current of _____ amps will prevent exceeding the 3 MVA electrical limit.

The limit is imposed to prevent _____.

A 4180 ; 412; exceeding the maximum Unit 2 load assumed in the worst case event. ☑ RJA

B 4140; 422; exceeding the overcurrent rating on 24E/34B TIE BKR, 34B-24E-2 (A505). ☐

C 4160; 300; overheating of the cable between bus 24E and bus 24C. ☑

D 4060; 431; overheating of the cable between bus 24E and bus 34B. ☐

Justification Per Attachment 23U of EOP 2541, a combination of 4180 volts and 412 amps falls into the acceptable region. Analysis shows that Unit 2 will require no more than 3 MVA in the worst case scenario.
"B" is incorrect because a combination of 4140 volts and 422 amps exceeds the 3 MVA limit. Also, the over current rating on the 24E/24B cross tie breaker is 1200 amps.
"C" is incorrect. While a combination of 4140 volts and 422 amps is within the 3 MVA limit, there is no cable overheating concern. There was a concern at one time, but the problem was resolved.
"D" is incorrect because a combination of 4060 volts and 431 amps exceeds the 3 MVA limit. Also, there is no cable over heating concern.

Reference LOIT, E30-00-C, 2530, 23E, MVA, 2541, MB-03540
Requires the use of EOP 2541, Attachment 23U

NRC K/A System/E/A

System 062 A.C. Electrical Distribution

Number GS

SEE GENERIC K/A

Importance RO/SRO 3.4 3.8

10CFR Link (CFR: 41.10 / 43.2 / 45.12)

NRC K/A Generic

2.1 Conduct of Operations

2.1.32

Ability to explain and apply all system limits and precautions

 # 74 | ☑ RO ☑ SRO | Question ID: **1000078** | **Origin: New** | ☐ Memory? (Check=Yes)

The US is in EOP 2540B directing the SPO to verify that at least one vital DC bus is available and powered from its associated battery charger.

The SPO refers to the 3 meters associated with bus 201A, "Battery Volts", "Battery Amps", and "Bus Amps".

Which of the following sets of readings indicates that bus 201A is supplying Facility 1 DC loads and is powered from its associated charger?

A "Battery Volts" 126 "Battery Amps" +20 "Bus Amps" +20 ☐

B "Battery Volts" 132 "Battery Amps" +20 "Bus Amps" +20 ☐

C "Battery Volts" 134 "Battery Amps" -5 "Bus Amps" 0 ☐

D "Battery Volts" 134 "Battery Amps" -5 "Bus Amps" +15 ☑

Justification D: correct, 134volts indicates a battery on float charge with an indicated 5 amp float and 15 amps worth of load on the bus; A: 126 volts is the low voltage alarm setpoint and both ammeters at +20 indicates a 20 amp drain on the battery; B: 132 volts is a fully charged battery, but without any float charge, both ammeters at +20 indicates a 20 amp drain on the battery; C: 134volts indicates a battery on float charge with an indicated 5 amp float, but there is no load indicated on the DC bus indicating it is stripped or the tie breaker is open

Reference MP2*LOIT, 2345A, 125 VDC, MB-04880

NRC K/A System/E/A

NRC K/A Generic

System 063 DC Electrical Distribution System

Number A3.01

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

Importance RO/SRO 2.7 3.1

10CFR Link (CFR: 41.7 / 45.5)

# 75	☑ RO	☑ SRO	Question ID: 0053376	Origin: Bank	☐ Memory? (Check=Yes)

The Maintenance Department has just completed replacing a service water vent valve on the "B" Emergency Diesel Generator (EDG) jacket cooling heat exchanger. The on-shift Plant Equipment Operator (PEO) performs the required pre-start checks and completes all necessary valve alignments. When the final tag is cleared, the PEO informs the US that the "B" EDG is ready for the surveillance test.
The SPO then notes that the "DIESEL GEN, 13U DISABLED" annunciator on C-08 is still lit.

Which one of the following statements describes the status of the "B" EDG?

A The EDG CANNOT be test run AND will NOT auto start on an LNP until the STARTING AIR PRESSURE LOW alarm is acknowledged. ☐

B The EDG will auto start on an LNP, but CANNOT be test run prior to pressing the skid mounted alarm reset button. ☐

C The EDG can be test run AND can auto start on an LNP, but the skid mounted alarm reset button must be pressed to clear the disabled alarm. ☐

D The EDG CANNOT be test run AND will NOT auto start on an LNP until the skid mounted alarm reset button is pressed. ☑

Justification	Closing the air start valves isolates the air receivers from the DG which will prevent the DG from starting. The shutdown relay, which also prevents the diesel from manual or auto starting, is energized by a low air pressure condition when the air isolation valves are closed and tagged. When air pressure is restored, the shutdown relay must be reset, which is done by pressing the 'alarm reset' button on the skid mounted gageboard. "A" is incorrect because the local low pressure alarm will only clear the D/G trouble alarm on C-08, but has no impact on starting the D/G. "B incorrect because the skid mounted alarm reset button must be pressed to allow the D/G to auto start or start for a test. "C" is incorrect for the same reason as "B".
Reference	LOIT, [064 EDG-01-C 3619] (11/25/97), EDG, 2346A, MB-02449

NRC K/A System/E/A

System 064 Emergency Diesel Generators (ED/G)

Number K6.07

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

Importance RO/SRO 2.7 2.9

10CFR Link (CFR: 41.7 / 45.7)

NRC K/A Generic

 # 76 ☑ RO ☑ SRO Question ID: **0054923** **Origin: Modified** ☐ Memory? (Check=Yes)

A high alarm on containment gaseous radiation monitor, RM-8262B, will cause which of the following automatic actions?

A If open for containment venting, the Hydrogen Purge valves will close. ☐

B Control Room ventilation system automatically shifts to recirculation mode. ☐

C Closure of the containment purge isolation valves during containment purge operations. ☑

D Containment isolation when a second containment radiation monitor alarm is received. ☐

Justification When any 1 of these 4 RMs reaches its setpoint, the Containment Purge Valves, AC-4, AC-5, AC-6, & AC-7, receive a close signal and will close if they are open. These valves are only allowed to be open during Modes 5 and 6.

A High Rad of 7 E4 cpm or Instrument Failure on RM-8262A or B will give the common alarm on C-06/07, DA-24, and also the alarm on C-01, C-36: CTMT RAD ACTUATION SIG CH 1 TRIP.
"A" is incorrect because these valves close on alarm of the containment high range area radmonitors, RM-8240 & 8241
"B" is incorrect because the control room ventilation will shift to recirculation when control room ventilation radiation monitor, RM-9799A or 9799B alarms; not containment radiation monitors.
"D" is incorrect because a containment isolation will not be generated when a second containment atmospheric radiation monitor is alarmed. Containment isolation is not impacted by any radiation monitors.

Reference LOIT, [072 RMS-04-C 5064] (6/3/97), 2383, MB-03075

NRC K/A System/E/A

NRC K/A Generic

System 073 Process Radiation Monitoring

Number K4.01

Knowledge of design feature(s) and/or interlocks which provide for the following: Release termination when radiation exceeds setpoint

Importance RO/SRO 4.0 4.3

10CFR Link (CFR: 41.7)

77 | ☑ RO ☑ SRO | Question ID: **0156702** | **Origin: Modified** | ☑ Memory? (Check=Yes)

The plant is in normal operation at 55% power, when Bus 24A is deenergized due to an electrical malfunction.

After cross tying the 480 volt load centers, the US directs you to use the water box cross tie design feature to maintain the main condenser as a heat sink.

Which of the following describes the appropriate final condition of the Circulating Water (CW) System?

A 'A' CW Pump is supplying 'A' and 'B' Water Boxes and 'C' CW Pump is supplying 'C' and 'D' Water Boxes. ☐

B 'B' CW Pump is supplying 'A' and 'C' Water Boxes and 'D' CW Pump is supplying 'B' and 'D' Water Boxes. ☐

C 'A' CW Pump is supplying 'A' and 'C' Water Boxes and 'C' CW Pump is supplying 'B' and 'D' Water Boxes. ☐

D 'B' CW Pump is supplying 'A' and 'B' Water Boxes and 'D' CW Pump is supplying 'C' and 'D' Water Boxes.' ☑

Justification 'A' and 'C' CW Pumps are deenergized and the 'B' CW Pump cannot supply the 'C' Water Box and the 'D' CW Pump cannot supply the 'B' Water Box.
"A" is incorrect because the 'A' and 'C' Circ pumps are deenergized due to the loss of bus 24A.
'C' is incorrect for the same reason as 'A'. Additionally the 'A' pump cannot supply the 'B' water box and 'C' pump cannot supply the 'B' water box.
"D" is incorrect because the 'B' pump cannot supply the 'C' water box and the 'D' pump cannot supply the 'B' water box.

Reference MP2*LOIT*4132 [CWS-01-C], CW, Circ, 2325, MB-01172

NRC K/A System/E/A

NRC K/A Generic

System 075 Circulating Water System

Number K4.01

Knowledge of circulating water system design feature(s) and interlock(s) which provide for the following: Heat sink

Importance RO/SRO 2.5 2.8

10CFR Link (CFR: 41.7)

# 78	☑ RO	☑ SRO	Question ID: **1000202**	**Origin: New**	☐ Memory? (Check=Yes)

The instrument air supply to the Containment Air Receiver must be isolated to repair an air leak on the supply piping. In order to maintain air to Containment for valve operation, the Station Air System must be aligned to the Containment Air Receiver. A dedicated operator has been selected and briefed.

Crosstying Station Air to supply the Containment Instrument Air Receiver _____.

A must be minimized to prevent moisture build up in the Containment Instrument Air System which may impact the operation of air operated valves in Containment ☑

B must be limited to one hour to ensure the CONTAINMENT INTEGRITY Technical Specification action statement is NOT exceeded ☐

C will result in a lower supply pressure to air operated valves in Containment which may cause the valves to operate more slowly during an event ☐

D will require the Containment Instrument Air System to be purged prior to use for breathing air due to the oil vapor contained in the Station Air System ☐

Justification A is correct. Caution prior to step 4.4.1 in OP 2332A, Station Air, states, "Station Air System has NO air dryer, crosstying Station Air to supply the Containment Instrument Air Receiver should be minimized to prevent moisture build up in the Containment portion of the Instrument Air System."
B is incorrect. With a dedicated operator stationed, there is NO limit on the CONTAINMENT INTEGRITY Tech Spec LCO.
C is incorrect. The Station Air System operates at roughly the same pressure as the Instrument Air System. Additionally, air pressure is regulated at the individual components at a much lower pressure than the system.
D is incorrect. There is NO requirement to purge the Instrument Air System after crosstying to the Station Air System.

Reference MP2*LOIT (SAS-01-C) 2332A, SA, IA, CTMT

NRC K/A System/E/A

System 079 Station Air System (SAS)

Number GS

SEE GENERIC K/A

Importance RO/SRO

10CFR Link

NRC K/A Generic

Conduct of Operations

2.1.32

Ability to explain and apply all system limits and precautions

3.4 3.8

(CFR: 41.10 / 43.2 / 45.12)

79 | ✔ RO ✔ SRO | Question ID: 1000124 | Origin: New | ✔ Memory? (Check=Yes)

Which of the following will cause an automatic start of a fire pump?

A A single high temperature actuation of a heat detector for the main transformer. ☑

B Operation of the local manual actuation station for the main generator exciter. ☐

C A single heat detector in the "B" D/G room fails indicating a high temperature. ☐

D Actuation of 1 ion and 1 photoelectric smoke detector in the East DC switchgear room ☐

Justification Any single heat detector actuation in the main transformer deluge will result in the actuation of the associated deluge system. When the deluge system activates, the fire water header pressure will lower and cause an automatic start of at least one fire pump.
"B" is incorrect because, although the main generator exciter fire suppression system will activate, the fire suppression system is Carbon Dioxide.
"C" is incorrect because, although a single heat detector will activate the D/G room deluge valve, a fusible link must melt in at least one of the sprinkler heads to actually start fire water flow.
"D" is incorrect because, although 1 ion and 1 photoelectric smoke detector will actuate the East DC switchgear room fire suppression system, the system is Halon.

Reference LOIT, (FPS-00-C), Fire, FW, MB-11313

NRC K/A System/E/A

System 086 Fire Protection System (FPS)

Number A3.01

Ability to monitor automatic operation of the Fire Protection System including: Starting mechanisms of fire water pumps

Importance RO/SRO 2.9 3.3

10CFR Link (CFR: 41.7 / 45.5)

NRC K/A Generic

80 | ☑ RO ☑ SRO | Question ID: 0153503 | Origin: Modified | ☐ Memory? (Check=Yes)

A plant cooldown is in progress with RCS temperature at 400°F.

Which of the following describes the status of power to 2-SI-652 (SDC Suction Valve)?

A MCC breaker closed with its opening coil removed. ☐

B MCC breaker key-locked open ☐

C MCC breaker closed, manual disconnect switch open. ☑

D Facility 1 breaker, (B5110), closed; opening and closing coils removed from control cabinet; and manual disconnect closed. ☐

Justification C: correct, too early in cooldown to enable 2-SI-652, manual disconnect in control room prevents Type V LOCA from hot-short or sabotage, MCC breaker closed allows position indication; A: MCC breaker is closed, but opening & closing coils are installed, valve opening prevented by pressure interlock and disconnect; B: key lock on panel C01 used in place of a handswitch for administrative control of valve, but this operates opening & closing coils, MCC breaker is closed; D: this is the normal alignment for 2-SI-651 which serves as the CTMT inside isolation valve for the SDC penetration

Reference MP2*LORT*3471 [005 SIP-01-C 7399] (1/13/97) SDC, 2310, VLV, MB-03187

NRC K/A System/E/A

System 005 Residual Heat Removal System (RHRS)

Number K2.03

Knowledge of bus power supplies to the following: RCS pressure boundary motor-operated valves

Importance RO/SRO 2.7 2.8

10CFR Link (CFR: 41.7)

NRC K/A Generic

# 81	☑ RO	☑ SRO	Question ID: **1000030**	Origin: **New**	☑ Memory? (Check=Yes)

What barrier(s) are in place to prevent transferring the contents of the RCS Quench Tank (QT) to the Primary Drain Tank (PDT) when cooling the QT following the opening of a PORV or Safety?

A A single handswitch opens either the suction & return valves for the QT or for the PDT. ☐

B Suction and return for the QT and PDT is via a pair of two way valves. ☐

C QT and PDT use separate suction and return valves which are interlocked to prevent concurrent opening. ☐

D QT and PDT use separate suction and return valves. Procedure prevents concurrent opening. ☑

Justification D: correct, physically possible, procedurally prevented; A: 2 handswitches, one per suction & return set; B: separate valves and handswitches; C: no interlock

Reference MP2*LOIT, QT & PDT, MB-00581

NRC K/A System/E/A

System 007 Pressurizer Relief Tank/Quench Tank System (PRTS)

Number K4.01

Knowledge of PRTS design feature(s) and/or interlock(s) which provide for the following: Quench tank cooling

Importance RO/SRO 2.6 2.9

10CFR Link (CFR: 41.7)

NRC K/A Generic

# 82	☐ RO	☑ SRO	Question ID: 1000066	Origin: New	☐ Memory? (Check=Yes)

With the plant at 100% power, a single alarm on C04*DB3 "TM-LP Trip CH D" is received.
The PPO reports the instrument on C03 reading 1825 psia.
The US directs the PPO to perform the required bypass(es).

When verifying that he has installed the bypass(es) correctly, which of the following lists all that must be checked?

A TM-LP on RPS 'D'. ☐

B TM-LP on RPS 'D' and low pressurizer pressure SIAS on ESAS 'D'. ☐

C TM-LP on RPS 'D', low pressurizer pressure SIAS on ESAS 'D', and ATWS 'D' on C100. ☐

D TM-LP and High pressurizer pressure on RPS 'D', low pressurizer pressure SIAS on ESAS 'D', and ATWS 'D' on C100. ☑

Justification	D: correct, all functions receiving an input from the failed detector must be bypassed; A: chosen if examinee believes that only the alarming function must be bypassed; B: chosen if examinee believes that since the instrument is failing low, only those bistables that actuate on a low pressure need to be bypassed, C: chosen if examinee remembers that 3 actuation systems need to be bypassed
Reference	MP2*LOIT/LOUT, SRO, 2380, 2384, ARP, (CFR-55.43.b.2), MB-03156

NRC K/A System/E/A

System 2.1 Conduct of Operations

Number G

SEE GENERIC K/A

Importance RO/SRO

10CFR Link

NRC K/A Generic

2.1 Conduct of Operations

2.1.31

"Ability to locate control room switches, controls and indications and to determine that they are correctly reflecting the desired plant lineup."

4.2 3.9

(CFR: 45.12)

# 83	☑ RO	☑ SRO	Question ID: 1000032	Origin: New	☑ Memory? (Check=Yes)

You are on-shift, approximately 24 hours into a Large Break LOCA.
The 'A' H2 Recombiner is already in service.
You have been directed to place the 'B' H2 Recombiner in service.
Normally you would rotate the 'B' H2 Recombiner potentiometer until its kW meter reads the kW you had calculated per the procedure.
However, the kW meter for the 'B' H2 Recombiner, (JI-8723), is malfunctioning.

In order to apply the correct power to the heaters you must rotate the 'B' H2 Recombiner potentiometer until:

A The potentiometer window reads the calculated kW value. ☐

B The potentiometer window reads the same as the 'A' H2 Recombiner. ☐

C The ammeter on C01 reads the calculated amperage for the required power. ☐

D A clamp-on ammeter at the control cabinet reads the calculated amperage for the required power. ☑

Justification D: correct, per the procedure a CTMT pressure corrected kW is calculated then using the existing voltage you calculate the amperage which will give the required power; A: the potentiometer window is only a vernier scale related to percentage of full travel, because of the affect of differing voltage there is no direct correlation between setting and power; B: baseline kW for the 'A' recombiner is 45 while the 'B' uses 53, the 'B' recombiner would not reach sufficient temperature if this method were used. C: There is NO ammeter on C-01 for the H2 Recombiner.

Reference MP2*LOIT, 2313C, recombiner, MB-02539

NRC K/A System/E/A

System 028 Hydrogen Recombiner and Purge Control System (HRPS)

Number K6.01

Knowledge of the effect of a loss or malfunction on the following will have on the HRPS: Hydrogen recombiners

Importance RO/SRO 2.6 3.1

10CFR Link (CFR: 41.7 / 45.7)

NRC K/A Generic

# 84	☐ RO	☑ SRO	Question ID: 1000068	Origin: New	☐ Memory? (Check=Yes)

The main turbine has just been rolled to 1800 rpm during a plant startup.
The PPC has just completed its normally scheduled run of the INPAX program.
The "Fr-T - Tq" alarm on panel C04 annunciates and locks in.
The STA reports that the INPAX value for Fr-T is 1.83 and Tq is 0.04.

Based on the above the US will direct which of the following actions?

A Halt the plant startup until RE provides a Reactivity Management Plan for CEA movement to correct power distribution. ☐

B Refer to TS LCO 3.2.3 and determine a maximum allowable power level using Figure 2.6-1 of the COLR. ☐

C Enter TSAS 3.2.4.a for Tq >0.02 and per TSAS 3.2.3.a determine that Fr-T remains <1.837 while below 70% power. ☐

D Continue the plant startup, manually run INPAX when >20% power and verify acceptable value for Fr-T. ☑

Justification D: correct, examinee must first determine power level (turbine roll ~13% power), Fr-T value not considered valid until core power >20% and Tq not spec'd until >50% power; A: chosen if examinee assumes power distribution data is valid and must be corrected by 'smoothing' core flux distribution; B: chosen if examinee neglects power level determination or TS applicability for Fr-T, but assumes <50% for Tq; C: chosen if examinee neglects power level determination or applicability for both parameters.

Reference MP2*LOIT/LOUT, 2203, TS, (CFR-55.43.b.2, 5)

NRC K/A System/E/A

System 2.2 Equipment Control

Number G

SEE GENERIC K/A

Importance RO/SRO

10CFR Link (CFR: 43.2 / 45.2)

NRC K/A Generic

Equipment Control

2.2.22

Knowledge of conditions for operations and safety limits

3.4 4.1

(CFR: 43.2 / 45.2)

# 85	☑ RO	☑ SRO	Question ID: 1000075	Origin: New	☑ Memory? (Check=Yes)

Which of the following will prevent the "A, B, C, and D Steam Dump & Bypass Valves", (SD&BV), from Quick-Opening on a plant trip from 100% power?

A SD & BV controller HIC-4165 in Manual. ☐

B RRS Channel Select Switch in "X". ☑

C RRS Channel Select Switch in "Y" ☐

D ADV Quick-Open Permissive Switch in OFF. ☐

Justification B: correct, the K-7 relay which sends the Q/O signal has been removed from the 'X' channel of RRS due to induced noise problems; A: the Q/O signal is independent of the controller mode; C: 'Y' is the normally selected channel of RRS when at higher powers in order to have a Q/O signal available; D: this switch will remove the Q/O signal from the ADVs only

Reference MP2*LOIT, 2386, RRS, Q/O, SD&BV, MB-03171

NRC K/A System/E/A

System 041 Steam Dump System (SDS) and Turbine Bypass Control

Number K6.03

Knowledge of the effect of a loss or malfunction on the following will have on the SDS: Controller and positioners, including ICS, S/G, CRDS

Importance RO/SRO 2.7 2.9

10CFR Link (CFR: 41.7 / 45.7)

NRC K/A Generic

# 86	☐ RO	☑ SRO	Question ID: **1000067**	Origin: **New**	☐ Memory? (Check=Yes)

The 'A' Service Water pump passed its monthly surveillance and quarterly IST.
Three days later the strainer delta-P instrument failed.
The 'B' SW pump was placed in service on the 'A' header.
The 'A' SW pump handswitch was placed in pull-to-lock.
The DP switch was isolated using the instrument stops and the DP switch was replaced.

Besides venting the the DP switch, verifying the setpoints, and re-opening the instrument stops, which of the following surveillances, (if any), must be performed to restore the 'A' Service Water pump to Operable?

A None required, the pump may be declared Operable when the DP switch is capable of performing its function. ☑

B The pump must be auto-started on a Facility 1 SIAS actuation signal. ☐

C None required; however, a complete Facility 1 Service Water system valve alignment would be performed. ☐

D A partial Facility 1 Service Water system valve alignment and pump auto-start on SIAS must be performed. ☐

Justification	A: correct, this situation is addressed in OP 2326A, Section 4.7, for 'A' in service to replace 'B' pp., since no header valves were operated, the header is in the same configuration as when it passed its surveillance and the 'A' SW pump breaker was not opened; (Note: examinees must understand the basis for considering a component/system inoperable in order to chose the correct answer.)
Reference	MP2*LOIT/LOUT, SRO, 2326A, 2612, (CFR-55.43.b.2), MB-03264

NRC K/A System/E/A

System 2.2 Equipment Control

Number G

SEE GENERIC K/A

Importance RO/SRO

10CFR Link (CFR: 43.2 / 45.2)

NRC K/A Generic

2.2 Equipment Control

2.2.21

Knowledge of pre- and post-maintenance operability requirements.

2.3 3.5

(CFR: 43.2)

# 87	RO	☑ SRO	Question ID: 1000069	Origin: New	Memory? (Check=Yes)

The plant was tripped and EOP 2536 ESDE entered after EOP 2525 due to a large MSLB on #2 SG inside containment.
#2 SG blew down completely and was isolated as directed in the EOP.
RCS temperature and pressure are stabilized with Th subcooled margin at 94° F.
There are no indications of any fuel clad failures.

Suddenly pressurizer level and sub-cooled margin start lowering.
RCS temperatures are stable.
The STA reports that he suspects an SGTR has occurred in #2 SG.

An alarm on which of the following radmonitors would be used to confirm this diagnosis and what procedural guidance would be directed?

A Containment refueling bridge area radmonitor; transition to EOP 2540, FRP. ☑

B Steam Jet Air Ejector radmonitor; transition to EOP 2534, SGTR. ☐

C Main Steam Line radmonitor RM 4299C; remain in EOP 2536 and refer to AOP 2569, SGTL. ☐

D Steam Generator Blowdown radmonitor; repeat EOP 2525 and re-diagnose the event. ☐

Justification	A: correct, with low RCS activity and the ruptured SG already faulted this RM and the personnel access hatch area RM are the only RMs capable of alarming (SJAE & SGBD RMs isolated by MSIS/CIAS and no steam flow for RM4299C), 2 simultaneous events requires FRP IAW 2260; B: MSIVs are closed, no pathway exists; C: location of RM and 30 mr/hr alarm setpoint would require significant clad failure for alarm to come in; D: SGBD sampling was isolated during SG isolation and/or CIAS, no pathway
Reference	MP2*LOIT/LOUT, SRO, 2534, 2536, 2540, SGTR, ESDE, FRP, (CFR-55-43.b.5), MB-05977

NRC K/A System/E/A

System 2.4 Emergency Procedures /Plan

Number G

SEE GENERIC K/A

Importance RO/SRO

10CFR Link

NRC K/A Generic

2.4 Emergency Procedures /Plan

2.4.46

Ability to verify that the alarms are consistent with the plant conditions.

3.5 3.6

(CFR: 43.5 / 45.3 / 45.12)

# 88	☑ RO	☑ SRO	Question ID: 1000033	Origin: New	☑ Memory? (Check=Yes)

A lamicoid plaque on panel C02 directs you to make a notification when charging flow is raised.

Who needs to be notified and why?

A Aux. Building PEO; throttle position of the in-service ion exchanger outlet valve must be adjusted to establish proper CVCS radmonitor flow. ☐

B HP technician; area around CVCS letdown piping must be resurveyed due to higher letdown flow rate. ☑

C Chemistry technician; the in-service ion exchanger must be checked to ensure higher letdown flow rate doesn't cause channeling. ☐

D CVCS system engineer; CVCS pump run data is required for on-going fatigue-cracking failure study. ☐

Justification	B: correct, higher flow rate transports short-lived activity, (N-16), outside CTMT prior to significant decay; A: previously true regarding effecton radmonitor flow, letdown radmonitor recently retired and valved out; C: letdown IX can handle full flow w/o concern regarding channeling; D: lamicoid clearly specifies HP
Reference	MP2*LOIT, CVCS, 2304, (CFR-55-43.b.4), MB-02356

NRC K/A System/E/A

System 2.1 Conduct of Operations

Number G

SEE GENERIC K/A

Importance RO/SRO

10CFR Link

NRC K/A Generic

2.1 Conduct of Operations

2.1.14

Knowledge of system status criteria which require the notification of plant personnel.

2.5 3.3

(CFR: 43.5 / 45.12)

# 89	☑ RO	☑ SRO	Question ID: 1000034	Origin: New	☐ Memory? (Check=Yes)

Surveillance procedure 2612A 'A' Service Water Pump Tests provides the following formulas to be used when verifying that the pump is capable of generating acceptable delta-P:

Sea level = 14 - Distance from floor to water level
Suction pressure = Sea level x 0.45
Delta-P = Discharge - Suction pressure

A PEO in the intake structure measures the 'Distance from floor to water level' and reads the 'Discharge' pressure from the strainer inlet. He then reports these values to the control room.

Which of the following sets of data meets Acceptance Criteria?

A 4000 gpm header flow, 63 psig discharge pressure, 6 feet from floor to water level ☐

B 5000 gpm header flow, 57 psig discharge pressure, 18 feet from floor to water level ☑

C 6000 gpm header flow, 57 psig discharge pressure, 8 feet from floor to water level ☐

D 7000 gpm header flow, 52 psig discharge pressure, 12 feet from floor to water level ☐

Justification	B: correct, although discharge pressure is below the line the large distance to the water level indicates a very low tide, since the graph is referenced to mean sea level (14') the lower suction head translates to an increase in delta-P correcting to 58.8 psid; A: 63 psi is well above the curve, but the high sea level translates to a negative effect on DP resulting at 59.4 psid (below the curve); C: with a higher flow than B and the same discharge pressure this set looks OK except for the negative effcet of the high water level which corrects to 54.3 psid; D: this pressure is almost right on the curve, but corrects to 51.1 psid due to the elevated sea level
Reference	MP2*LOIT, SW, 2612A, MB-00112 **Requires the use of SP 2612A, Attachment 4**

NRC K/A System/E/A

System 2.1 Conduct of Operations

Number G

SEE GENERIC K/A

Importance RO/SRO

10CFR Link

NRC K/A Generic

2.1 Conduct of Operations

2.1.25

"Ability to obtain and interpret station reference materials such as graphs, monographs, and tables which contain performance data."

2.8 3.1

(CFR: 41.10 / 43.5 / 45.12)

 # 90 ☑ RO ☑ SRO Question ID: **1000203** **Origin: New** ☐ Memory? (Check=Yes)

The plant is in MODE 6 preparing to fill the refuel pool for refueling, with the following conditions:
- The reactor vessel head has been removed.
- The RCS is filled to the top of the vessel flange.
- The refuel pool is completely dry.
- The transfer tube flange has just been removed.
- RWST level is 98%.

If the refuel pool is filled to 10 feet above the vessel flange using only the RWST, what will be the expected indicated level in the RWST?

A 35% ☐

B 46% ☐

C 53% ☑

D 71% ☐

Justification	C is correct. Using attachment 1 of OP 2209A, a total of 212,317 gallons of water will used from the RWST. [28,685 + 54,229 + 403 + (10 x 12,900) = 212,317 gallons] The RWST has a capacity of 475,000 gallons (4,750 gals/%). The present volume is (0.98 x 475,000 =) 465,500 gallons. When the refuel pool is filled, the final volume of the RWST will be (465,500 - 212,317 =) 253,183 gallons. A volume of 253,183 divided by 4,750 gals/% = 53.3% (53%). A is incorrect. If only the volume of the refuel pool above the flange to the 36'6" elevation were used, then the final level in the RWST would be 35%. B is incorrect. If the examinee assumed that there was 212,317 gallons LEFT (instead of removed) in the RWST, then the final level would be 46%. D is incorrect. Using the above method, if the North and South saddle volumes are NOT included, the final RWST level would be 71%
Reference	MP2*LOIT (209-01-C) RWST, Refuel, 2209A **Requires the use of OP 2209A, Attachment 1**

NRC K/A System/E/A

System 2.2 Equipment Control

Number G

SEE GENERIC K/A

Importance RO/SRO

10CFR Link (CFR: 43.2 / 45.2)

NRC K/A Generic

Equipment Control

2.2.27

Knowledge of the refueling process.

2.6 3.5

(CFR: 43.6 / 45.13)

91 | ☑ RO ☑ SRO | Question ID: 1000036 | Origin: New | ☑ Memory? (Check=Yes)

When performing surveillance 2601H (Charging Pump Operability Test, Fac2) on the 'B' charging pump, in order to ensure the pump start is in response to the Facility 2 SIAS start signal, which of the following must be ensured?

A 'B' Charging Pp. Handswitch in Normal-After-Trip ☐

B 'Chg Pp. Override' switch in 'Level 2' position ☐

C 'B' Charging Pp. Handswitch in Pull-To Lock ☑

D 'B' Charging Pp. Handswitch white light not lit ☐

Justification C: correct, in the PTL position only a SIAS signal will start the pp.; A: a low level deviation could start the pp in this case; B: this position of the Override switch starts both b/u chg pps; D: white light not lit indicates inability to start in any case

Reference MP2*LOIT, 2601H, CVCS, MB-02339

NRC K/A System/E/A

System 2.2 Equipment Control

Number G

SEE GENERIC K/A

Importance RO/SRO

10CFR Link (CFR: 43.2 / 45.2)

NRC K/A Generic

2.2 Equipment Control

2.2.12

Knowledge of surveillance procedures.

3.0 3.4

(CFR: 41.10 / 45.13)

# 92	☑ RO	☑ SRO	Question ID: 1000080	Origin: New	☐ Memory? (Check=Yes)

Your team is planning a job to be performed in an area classified as a high-radiation area due to a crud trap.
The dose rate at the component to be worked is 600 mrem/hour.
Installation of temporary shielding on the crud trap will lower the dose rate at the component to 200 mrem/hour
Installation and removal of the temporary shielding will add 500 mrem of exposure.
Using a long-handled tool will reduce the worker's exposure to 1/2 the dose rate at the component.
Records indicate that the job takes 1 1/2 hours without the long-handled tool and 2 hours with it.

Which of the following options satisfies the requirement to perform the job with the least total exposure?

A Install shielding, use the tool. ☐

B Install shielding, do not use the tool. ☐

C Do not install shielding, use the tool. ☑

D Do not install shielding, do not use the tool. ☐

Justification	C: correct, no exposure for the shielding and 300 mr x 2 hrs = 600 mrem; A: shielding 500 mr + 100 mr x 2hrs = 700 mrem; B: shielding 500 mr + 200 mr x 1 1/2 hrs = 800 mrem; D: no exposure for the shielding and 600 mr x 1 1/2 hrs = 900 mrem
Reference	MP2*LOIT/LOUT, 10-CFR-20, ALARA

NRC K/A System/E/A

System 2.3 Radiation Control

Number G

SEE GENERIC K/A

Importance RO/SRO

10CFR Link

NRC K/A Generic

Radiation Control

2.3.1

Knowledge of 10 CFR: 20 and related facility radiation control requirements.

2.6 3.0

(CFR: 41.12 / 43.4. 45.9 / 45.10)

# 93	☑ RO	☑ SRO	Question ID: 1000204	Origin: New	☐ Memory? (Check=Yes)

The plant has been shut down due to a leak in the CVCS Regenerative Heat Exchanger. You have been directed to open and red tag the vents and drains associated with the heat exchanger. The following conditions exist:

- The area around the CVCS Regenerative Heat Exchanger has been posted a 'Locked High Radiation Area'.
- The area is at the MINIMUM required radiation level for the posting.
- Your present annual exposure is 500 mRem.
- All the valves you have been assigned to operate are inside the posted area.

What would be your maximum calculated stay time in this area in order to avoid exceeding the Millstone administrative limit?

A 4.5 hours ☐

B 2.5 hours ☐

C 1 hour ☐

D 30 minutes ☑

Justification	D is correct. The Millstone administrative limit, based on ALARA considerations, is 1,000 mRem/yr; therefore, your maximum allowed exposure is 500 mRem. The minimum radiation level for a 'Locked High Radiation Area' is 1,000 mRem/hr. The maximum allowed time is 30 minutes. (500 mRem divided by 1,000 mRem/hr = 0.5 hr. 0.5 hr x 60 minutes/hr = 30 minutes) A is incorrect. If the administrative limit is assumed to be 5,000 mRem/yr (4,500 mRem left for the year), then the maximum stay time is 4.5 hrs. B is incorrect. If the assumed Millstone administrative limit is 3,000 mRem/yr (2,500 mRem left for the year), then the maximum stay time is 2.5 hrs. C is incorrect. If the lock high radiation area minimum value is assumed to be 500 mRem, then the maximum stay time is 1 hr.
Reference	MP2*LOIT ALARA, radiation

NRC K/A System/E/A

System 2.3 Radiation Control

Number G

SEE GENERIC K/A

Importance RO/SRO

10CFR Link

NRC K/A Generic

Radiation Control

2.3.2

Knowledge of facility ALARA program.

2.5 2.9

(CFR: 41.12 / 43.4. 45.9 / 45.10)

94 | ☑ RO ☑ SRO | Question ID: 1000039 | Origin: New | ☐ Memory? (Check=Yes)

Initial Conditions: The plant has been cooled down.
RCS temperature is presently 95°F.
The RCS is vented to containment.
Containment pressure is 18" water gravity and decreasing due to venting using the H2 purge valves and EBFS to the site stack.

If a release of radioactive Xenon gas were to occur in containment, how would the release be mitigated/terminated?

A The H2 purge valves would be closed in accordance with a containment closure plan. ☑

B The H2 purge valves would close in response to an auto CIAS actuation. ☐

C The H2 purge valves would close in response to an auto CPVIS actuation in 1 of 4 logic. ☐

D The H2 purge valves would close in response to an auto CPVIS actuation in 2 of 4 logic. ☐

Justification	A: correct, in Mode 5 with the RCS vented to containment a containment closure plan is required and closure tags are hung on the H2 purge valves to remind the operator that the valves must be closed manually if containment closure is required; B: auto SIAS/CIAS is blocked except on containment high pressure, with the RCS at 95°F this won't occur; C: 1 of 4 CPVIS will close the CTMT purge valves, not the H2 purge valves; D: same reason as C
Reference	MP2*LOIT, CPVIS, H2 Purge, 2314B, MB-02470

NRC K/A System/E/A

System 2.3 Radiation Control

Number G

SEE GENERIC K/A

Importance RO/SRO

10CFR Link

NRC K/A Generic

2.3 Radiation Control

2.3.9

Knowledge of the process for performing a containment purge.

2.5 3.4

(CFR: 43.4 / 45.10)

# 95	✔ RO	✔ SRO	Question ID: 1000040	Origin: New	✔ Memory? (Check=Yes)

Initial Conditions: 100% power, NO equipment out of service, all systems normal.

An N-16 HIGH radmonitor alarm comes in and is verified to be valid based on other indications.
Primary to secondary leak rate is 165 gpd.
NO other alarms are annunciated.

What operator actions are required in response to the verified alarm?

A The leak rate is less than the Tech Spec limit; therefore, operation may continue indefinitely. ☐

B Refer to OP 2204, Load Changes and be in Hot Standby in less than 24 hours. ☐

C Refer to AOP 2575, Rapid Downpower and be in Hot Standby in less than 6 hours. ☑

D Immediately trip the plant and enter EOP 2525, Standard Post Trip Actions. ☐

Justification	C: correct. The ARP directs entry into AOP 2569 SGTL which directs the operator to verify the alarm based on other indications then refer to AOP 2575 and to be in Hot Standby in less than 6 hours if the primary to secondary leak rate is in excess of 150 gpd. A: 0.035 gpm is the Tech Spec limit for SG leakage; however the N-16 rad monitor indicates a leak rate equivalent to 0.12 gpd; B: OP 2204 would NOT be used if the primary to secondary leak rate is greater than 75 gpd. Additionally, the plant must be in Hot Standby within 6 hours, NOT 24 hours. D: This response is required for a verified main steam line radmonitor alarm.
Reference	MP2*LOIT, 2569, 2575, SGTL, SJAE RM, MB-05773

NRC K/A System/E/A

System 2.3 Radiation Control

Number G

SEE GENERIC K/A

Importance RO/SRO

10CFR Link

NRC K/A Generic

2.3 Radiation Control

2.3.10

Ability to perform procedures to reduce excessive levels of radiation and guard against personnel exposure.

2.9 3.3

(CFR: 43.4 / 45.10)

# 96	☑ RO	☑ SRO	Question ID: 1000041	Origin: New	☑ Memory? (Check=Yes)

A step in EOP 2534 Steam Generator Tube Rupture directs that the most affected steam generator be isolated.

At the completion of this step, what will be the status of the most affected steam generator's atmospheric dump valve?

A C05 controller in Auto with its setpoint at 1000 psia. ☐

B C05 controller in Auto with its setpoint at 920 psia. ☑

C C05 controller in Manual and closed. ☐

D Isolated by closing the upstream manual isolation valve. ☐

Justification B: correct, this setpoint is well above the SG pressure at the point in the procedure where the SG is isolated, remaining in Auto at 920 ensures that an increase in SG pressure will be halted by the ADV vice relying on safeties which industry experience shows may not reseat, thus becoming an unisolable release; A: setpoint is just below the nominal setpoint for the lowest safety, same idea as in B but too close; C: chosen if examinee doesn't recall SGTR success strategy; D: chosen for same reason as C, but more confidence in manual valve than electronic controller

Reference MP2*LOIT, 2534, SGTR, MB-05780

NRC K/A System/E/A

System 2.3 Radiation Control

Number G

SEE GENERIC K/A

Importance RO/SRO

10CFR Link

NRC K/A Generic

2.3 Radiation Control

2.3.11

Ability to control radiation releases.

2.7 3.2

(CFR: 45.9 / 45.10)

97 | ☑ RO ☑ SRO | Question ID: 0055915 | Origin: Bank | ☑ Memory? (Check=Yes)

An event is in progress that requires security safeguards be relaxed to prevent injury to security personnel . This will require a departure from license conditions (invoking 10CFR50.54 x).

Which of the following individuals has the authority to direct this action?

A Station Duty Officer ☐

B Security Shift Supervisor ☐

C Affected Unit Shift Manager ☑

D Any on-shift licensed operator ☐

Justification Under the Operations section of Master Manual 14, Section 2, Responsibilities, the shift manager is only individual listed who can authorize the use of 10CFR50.54x. 10CFR50.54y states, "this section (x) shall be approved, as a minimum, by a senior licensed operator.
"A" is incorrect because the station duty officer is the unaffected shift technical advisor and is NOT the senior individual at the facility. Additionally, the station duty officer is NOT likely to have a senior license.
"B" is incorrect because the security shift supervisor is NOT licensed and is NOT the senior facility representative.
"D" is incorrect because an individual with only a reactor operator license CANNOT authorize the use of 10CFR50.54x.

Reference MP2*LOIT*3161 [119 RLH-O2-C 47] (9/9/96) ADMIN, LICRES, 10CFR, MP-14-MMM

NRC K/A System/E/A

System 2.4 Emergency Procedures /Plan

Number G

SEE GENERIC K/A

Importance RO/SRO

10CFR Link

NRC K/A Generic

2.4 Emergency Procedures /Plan

2.4.12

Knowledge of general operating crew responsibilities during emergency operations.

3.4 3.9

(CFR: 41.10 / 45.12)

98 | ☑ RO ☑ SRO | Question ID: **0156523** | **Origin: Modified** | ☑ Memory? (Check=Yes)

EOP 2540C1, Functional Recovery of RCS Inventory Control, contingency action 7.1 for success path IC-1 states, "If the RCS Inventory Control safety function is NOT satisfied, Go To the next appropriate RCS Inventory Control success path."

When used in this situation, what does the term 'Go To' mean?

A Complete the actions of success path IC-1 and enter success path IC-2. ☐

B Perform the actions of success path IC-1 concurrently with the actions of success path IC-2. ☐

C Use the applicable steps of success path IC-2 , and complete the actions of success path IC-1. ☐

D Leave success path IC-1 and perform the actions of success path IC-2. ☑

Justification OP 2260, Unit 2 EOP User's Guide, states, "The words "Go To" are used to accomplish branching." Branching is used to direct the user to exit the procedure in use and not return unless otherwise directed.
"A" is incorrect because the procedure presently in use does NOT provide instructions for the given condition.
"B" is incorrect for the same reason as "A".
"C" is incorrect because the term requires the user to leave the procedure in use and NOT return unless other wise directed.

Reference LOIT, [121 226-01-C 655] (8/26/96), 2260, EOP, 2537, MB-05269

NRC K/A System/E/A

System 2.4 Emergency Procedures /Plan

Number G

SEE GENERIC K/A

Importance RO/SRO

10CFR Link

NRC K/A Generic

2.4 Emergency Procedures /Plan

2.4.17

Knowledge of EOP terms and definitions.

3.1 3.8

(CFR: 41.10 / 45.13)

99 | ☑ RO ☑ SRO | Question ID: 0153723 | Origin: Modified | ☐ Memory? (Check=Yes)

A fire in Appendix "R" Fire Area R-1 has resulted in the evacuation of the Control Room. Which one of the following actions, as specifically identified in AOP 2579A, "Fire Procedure for Hot Standby Appendix R Fire Area R-1", is required to be completed within the first 30 minutes of the Control Room evacuation?

A Power is established to a vital 4160 Volt bus ☐

B Auxiliary Feed flow is established to a steam generator ☑

C RCS make up is established via a charging pump ☐

D "C" Battery Charger is aligned to Facility 2 ☐

Justification B is correct. The caution prior to step 1 of AOP 2579A states, "Failure to initiate Auxiliary Feedwater flow to any SG within 30 minutes of a loss of normal feedwater may result in that SG boiling dry.
A is incorrect. Power must be restored within 4 hours of the reactor shutdown
C is incorrect. Charging flow is required to be restored within 4 hours of the reactor trip.
D is incorrect. "C" battery Charger is required to be aligned to Facility 2 prior to depletion of the "B" Battery. This is assumed to take longer than 30 minutes.

Reference MP2*LOIT [79R-01-C 1612] Fire, 2579

NRC K/A System/E/A

System 2.4 Emergency Procedures /Plan

Number G

SEE GENERIC K/A

Importance RO/SRO

10CFR Link

NRC K/A Generic

Emergency Procedures /Plan

2.4.25

Knowledge of fire protection procedures.

2.9 3.4

(CFR: 41.10 / 45.13)

100 ☑ RO ☑ SRO Question ID: 0074346 Origin: Bank ☐ Memory? (C

Unit 2 has just experienced an uncomplicated Reactor Trip and the shift is carrying out the actions of EOP 2525, Standard Post Trip Actions. The Primary Plant Operator (PPO) has just finished confirming the status of Containment Combustible Gas Control with the Unit Supervisor (US), when he/she notices the VCT pressure is at 3 psig with level at 70% and trending down.

In accordance with the EOP Implementation Guide, what report would the PPO provide to the Unit Supervisor concerning VCT conditions?

A Subsequent Actions on the Primary Side are completed; VCT level and pressure are in the low end of the band. ☐

B Subsequent Actions on the Primary Side are complete and verified; all conditions are normal ☐

C Aligning charging pump suction to the RWST due to low VCT level and pressure. ☑

D Immediate Actions on the Primary Side are complete and satisfactory; proceeding with Subsequent Actions. ☐

Justification Per the EOP Implementation Guide (dated 7/7/2000): The Unit Supervisor will query the PPO and SPO on their completion of their subsequent actions and need not query individual subsequent action steps, unless an action is in doubt. The PPO and SPO should report the status of their subsequent actions to the US, contingency actions taken, and subsequent actions not able to be completed. Normal response would be "I have completed and verified my subsequent operator actions."
"A" is incorrect because VCT level is just below the normal band prescribed in EOP 2525; therefore the contingency action for that step must be performed and must be reported to the US.
"B" is incorrect for the same reason as "A".
"D" is incorrect because Containment Combustible Gas Control is the last step queried by the US; therefore the US is aware of the status of Immediate Actions.

Reference MP2*LOIT, E25-00-C, VCT, 2304, 2525 Actions, MB-05431

NRC K/A System/E/A

System 2.4 Emergency Procedures /Plan

Number G

SEE GENERIC K/A

Importance RO/SRO

10CFR Link

NRC K/A Generic

2.4 Emergency Procedures /Plan

2.4.47

Ability to diagnose and recognize trends in an accurate and timely manner utilizing the appropriate control room reference material.

3.4 3.7

(CFR: 41.10,43.5 / 45.12)