Test Sheet 100

Form No. 243532

Revised from #95679

KEY ID (A) (B) (C) (D)

SCORING & PRINTING OPTIONS: RESCORE | MULTIPLE ANSWER SCORING | CORRECT ANSWER | MARK X | TOTAL ONLY | MARK ONLY ONE

FEED IN THIS DIRECTION

#	Answer	#	Answer	#	Answer	#	Answer
1	B	26	C	51	D	76	
2	A	27	C	52	B	77	
3	D	28	B	53	B	78	
4	C	29	B	54	B	79	
5	B	30	D	55	B	80	
6	C	31	C	56	A	81	
7	B	32	D	57	B	82	
8	D	33	C	58	B	83	
9	A	34	D	59	B	84	
10	D	35	C	60	D	85	
11	A	36	B	61	D	86	
12	A	37	D	62	B	87	
13	B	38	D	63	A	88	
14	C	39	A	64	C	89	
15	D	40	D	65	C	90	
16	B	41	C	66	B	91	
17	B	42	A	67	B	92	
18	B	43	C	68	C	93	
19	D	44	D	69	A	94	
20	A	45	B	70	D	95	
21	B	46	B	71	A	96	
22	A	47	A	72	C	97	
23	D	48	A	73	A	98	
24	D	49	C	74	C	99	
25	D	50	B	75	A	100	

ANSWER KEY INFO. # OF KEYS | ITEM COUNT: 0 7 5

PERFORMANCE ASSESSMENT % OF TOTAL SCORE (00 = 100%) | POINTS EARNED | EQUAL PT VALUE

CERTIFICATION: I have reviewed all questions which were missed, have had an opportunity to ask questions, and understand the correct answer to each question. All work on this examination is my own, I have neither given or received help.

SIGNATURE

DATE

NUMBER CORRECT	75
PERCENT CORRECT	100
ROSTER NUMBER	KEY
SCORE	
RESCORE	

COMBINED POINTS EARNED	
COMBINED PERCENT CORRECT	
LETTER GRADE	
SCORE	
RESCORE	

CONFIDENTIAL AFTER SSN

ID/SSN

NAME 2019 PVNGS NRC WRITTEN EXAM

COURSE EXAM — RO KEY —

DATE

EMPLOYEE ID

MARKING INSTRUCTIONS

Use a No. 2 Pencil or blue or black ink pen only.

Fill oval completely

Erase cleanly

Test Sheet 100

1

Form No. 243532

Revised from #95679

KEY ID Ⓐ Ⓑ Ⓒ Ⓓ

SCORING & PRINTING OPTIONS: RESCORE · MULTIPLE ANSWER SCORING · CORRECT ANSWER · MARK X · TOTAL ONLY — MARK ONLY ONE

FEED IN THIS DIRECTION

Q	Ans	Q	Ans	Q	Ans	Q	Ans
1	B	26	C	51	D	76	C
2	A	27	C	52	B	77	D
3	D	28	B	53	B	78	B
4	C	29	B	54	B	79	A
5	B	30	D	55	B	80	A
6	C	31	C	56	A	81	B
7	B	32	D	57	B	82	C
8	D	33	C	58	B	83	A
9	A	34	D	59	B	84	A
10	D	35	C	60	D	85	D
11	A	36	B	61	D	86	C
12	A	37	D	62	B	87	D
13	B	38	D	63	A	88	A
14	C	39	A	64	C	89	B
15	D	40	D	65	C	90	~~90 Ⓐ Ⓑ Ⓒ Ⓓ~~ deleted
16	B	41	C	66	B	91	B
17	B	42	A	67	B	92	D
18	B	43	C	68	C	93	D
19	D	44	D	69	A	94	D
20	A	45	B	70	D	95	C
21	B	46	B	71	A	96	A
22	A	47	A	72	C	97	B
23	D	48	A	73	A	98	B
24	D	49	C	74	C	99	A — A or C correct
25	D	50	B	75	A	100	C

ANSWER KEY INFO. — # OF KEYS — ITEM COUNT: 099

PERFORMANCE ASSESSMENT — % OF TOTAL SCORE (00 = 100%) — POINTS EARNED — EQUAL PT VALUE

CERTIFICATION: I have reviewed all questions which were missed, have had an opportunity to ask questions, and understand the correct answer to each question. All work on this examination is my own, I have neither given or received help.

SIGNATURE

DATE

NUMBER CORRECT	99
PERCENT CORRECT	100
ROSTER NUMBER	KEY
SCORE	
RESCORE	

COMBINED POINTS EARNED	
COMBINED PERCENT CORRECT	
LETTER GRADE	
SCORE	
RESCORE	

CONFIDENTIAL AFTER SSN

MARKING INSTRUCTIONS

Use a No. 2 Pencil or blue or black ink pen only.

Fill oval completely

Erase cleanly

ID/SSN

NAME 2019 PWGS NRC WRITTEN EXAM

COURSE EXAM - SRO KEY -

DATE Q90 REMOVED

EMPLOYEE ID Q99 - A

KEY ID Ⓐ Ⓑ Ⓒ Ⓓ

SCORING & PRINTING OPTIONS: RESCORE · MULTIPLE ANSWER SCORING · CORRECT ANSWER · MARK X · TOTAL ONLY · MARK ONLY ONE

Test Sheet 100

Form No. 243532

Revised from #95679

FEED IN THIS DIRECTION

Item	Mark	Item	Mark	Item	Mark	Item	Mark
1	B	26	C	51	D	76	C
2	A	27	C	52	B	77	D
3	D	28	B	53	B	78	B
4	C	29	B	54	B	79	A
5	B	30	D	55	B	80	A
6	C	31	C	56	A	81	B
7	B	32	D	57	B	82	C
8	D	33	C	58	B	83	A
9	A	34	D	59	B	84	A
10	D	35	C	60	D	85	D
11	A	36	B	61	D	86	C
12	A	37	D	62	B	87	D
13	B	38	D	63	A	88	A
14	C	39	A	64	C	89	B
15	D	40	D	65	C	~~90~~	delete
16	B	41	C	66	B	91	B
17	B	42	A	67	B	92	D
18	B	43	C	68	C	93	D
19	D	44	D	69	A	94	D
20	A	45	B	70	D	95	C
21	B	46	B	71	A	96	A
22	A	47	A	72	C	97	B
23	D	48	A	73	A	98	B
24	D	49	C	74	C	99	C — A or C correct
25	D	50	B	75	A	100	C

ANSWER KEY INFO. — # OF KEYS — ITEM COUNT: 099

PERFORMANCE ASSESSMENT — % OF TOTAL SCORE (60 = 100%) — POINTS EARNED — EQUAL PT VALUE

CERTIFICATION: I have reviewed all questions which were missed, have had an opportunity to ask questions, and understand the correct answer to each question. All work on this examination is my own, I have neither given or received help.

DATE

SIGNATURE

NUMBER CORRECT	99
PERCENT CORRECT	100
ROSTER NUMBER	KEY
SCORE	
RESCORE	

COMBINED POINTS EARNED	
COMBINED PERCENT CORRECT	
LETTER GRADE	
SCORE	
RESCORE	

CONFIDENTIAL AFTER SSN

MARKING INSTRUCTIONS

Use a No. 2 Pencil or blue or black ink pen only.

Fill oval completely

Erase cleanly

ID/SSN

NAME 2019 PVNGS NRC WRITTEN EXAM

COURSE EXAM - SRO KEY -

DATE 990 REMOVED

EMPLOYEE ID 999 - C

Examination Outline Cross-Reference:	Level	RO		SRO
K/A: Reactor Coolant Pump: Knowledge of the physical connections and/or cause effect relationship between the RCPS and the following system: CVCS	Tier	2		
	Group	1		
	K/A	003 K1.04		
	IR	2.6		

Question 1

RCP Seal Injection is supplied to the RCPs from the discharge of the ___(1)___ and the normal discharge path for RCP Controlled Bleedoff is to the ___(2)___ .

A. (1) Charging Pumps
   (2) Reactor Drain Tank

B. (1) Charging Pumps
   (2) Volume Control Tank

C. (1) Nuclear Cooling Water Pumps
   (2) Reactor Drain Tank

D. (1) Nuclear Cooling Water Pumps
   (2) Volume Control Tank

Proposed Answer:	**B**

Explanations:	
A.	First part is correct. Second part is plausible since bleedoff relief valves discharge to the RDT, however normal bleedoff flow is returned to the VCT.
B.	Correct.
C.	First part is plausible since NC flow provides cooling to the RCP seals, however seal injection is provided by a portion of Charging Pump discharge. Second part is plausible since bleedoff relief valves discharge to the RDT, however normal bleedoff flow is returned to the VCT.
D.	First part is plausible since NC flow provides cooling to the RCP seals, however seal injection is provided by a portion of Charging Pump discharge. Second part is correct.

Question Source:	**X**	**New**	
		Bank	
		Modified	
		Previous NRC Exam	

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

Level of Difficultly:	**2**	
10CFR55.41:	**3**	
Reference Provided:	**N**	
Learning Objective:	**66937 - Describe how the RCS is supported by the following systems: CVCS, Nuclear Cooling Water System**	

Examination Outline Cross-Reference:	Level	RO		SRO
K/A: Chemical and Volume Control: Knowledge of the effect that a loss or malfunction of the CVCS will have on the following: RCS temperature and pressure	**Tier**	**2**		
	Group	**1**		
	K/A	**004 K3.06**		
	IR	**3.4**		

Question 2

Given the following conditions:

- Unit 2 is operating at 100% power
- Letdown Heat Exchanger Outlet Temperature Controller, CHN-TIC-223, setpoint has just failed from 115°F to 100°F

Over the next hour, if NO operator action is taken, RCS temperature will ___(1)___ and RCS pressure will ___(2)___ .

A. (1) rise
(2) rise, then lower to the initial RCS pressure

B. (1) rise
(2) rise, then stabilize at a higher than initial RCS pressure

C. (1) lower
(2) lower, then rise to the initial RCS pressure

D. (1) lower
(2) lower, then stabilize at a lower than initial RCS pressure

Proposed Answer:	**A**

Explanations:	
A.	Correct.
B.	First part is correct. Second part is plausible since RCS temperature will rise, however the PPCS will adjust proportional heater output to maintain a steady state pressure constant at 2250 psia.
C.	First part is plausible since letdown temperature will lower due to the lower setpoint on CHN-TIC-223, however when letdown temperature into the ion exchangers goes down, more boron is absorbed, diluting the RCS which will cause RCS temperature to rise. Second part is plausible if thought that RCS temperature will lower, and the concept is correct since RCS pressure will return to 2250 psia.
D.	First part is plausible since letdown temperature will lower due to the lower setpoint on CHN-TIC-223, however when letdown temperature into the ion exchangers goes down, more boron is absorbed, diluting the RCS which will cause RCS temperature to rise. Second part is plausible if thought that RCS temperature will go down, however the PPCS will adjust proportional heater output to maintain a steady state pressure constant at 2250 psia.

Question Source:	**X**	**New**	
		Bank	
		Modified	
		Previous NRC Exam	

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

Level of Difficultly:	**3**
10CFR55.41:	**5**
Reference Provided:	**N**
Learning Objective:	**67541 – Explain the operation of the Letdown Heat Exchanger under normal operating conditions**

Examination Outline Cross-Reference:	Level	RO	[redacted]	SRO
K/A: Chemical and Volume Control: Ability to manually operate and/or monitor in the control room: Boration/dilution	Tier	2	[redacted]	
	Group	1	[redacted]	
	K/A	004 A4.07		
	IR	3.9	[redacted]	

Question 3

Given the following conditions:

- Unit 1 is operating at 100% power, preparing to commence a downpower
- The CRS directs the OATC to commence a 1200 gallon boration to the suction of the Charging Pumps at a rate of 40 gpm per 40OP-9CH01, CVCS Normal Operations, Section 6.33, Makeup – Borate Mode
- Charging flow is 88 gpm
- Letdown is in service
- Initial VCT level is 43%

(1) If NO operator action is taken during the boration, the boration should take approximately…

(2) When the boration stops, VCT level will be between…

A. (1) 14 minutes
(2) 34 – 44%

B. (1) 14 minutes
(2) 58 – 60%

C. (1) 30 minutes
(2) 34 – 44%

D. (1) 30 minutes
(2) 58 – 60%

Proposed Answer:	D

Explanations:	
A.	First part is plausible since 1200 gallons at a rate of 88 gpm will be completed in 13.63 minutes, however the 1200 gallon boration requires 1200 gallons of borated water from the Refueling Water Tank, not 1200 gallons of borated water from the Charging Pumps (the Charging Pumps are pumping a mixture of water from the VCT – 48 gpm, and RWT – 40 gpm). Second part is plausible since the VCT is maintained between 34 and 44% via VCT Auto Makeup, however during a boration, VCT auto makeup is disabled, therefore the VCT will be maintained between 58 and 60% by the letdown diversion valve cycling to send letdown flow to the Hold Up Tank (at 60% VCT level) and back to the VCT (at 58%).
B.	First part is plausible since 1200 gallons at a rate of 88 gpm will be completed in 13.63 minutes, however the 1200 gallon boration requires 1200 gallons of borated water from the Refueling Water Tank, not 1200 gallons of borated water from the Charging Pumps (the Charging Pumps are pumping a mixture of water from the VCT – 48 gpm, and RWT – 40 gpm). Second part is correct.
C.	First part is correct. Second part is plausible since the VCT is maintained between 34 and 44% via VCT Auto Makeup, however during a boration, VCT auto makeup is disabled, therefore the VCT will be maintained between 58 and 60% by the letdown diversion valve cycling to send letdown flow to the Hold Up Tank (at 60% VCT level) and back to the VCT (at 58%).
D.	Correct.

Question Source:	X	**New**	
		Bank	
		Modified	
		Previous NRC Exam	

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

Level of Difficultly:	**3**	
10CFR55.41:	**5**	
Reference Provided:	**N**	
Learning Objective:	**68026 – Describe the Control Room controls and indications associated with the Volume Control Tank**	

Examination Outline Cross-Reference:	Level	RO		SRO
K/A: Residual Heat Removal: Knowledge of bus power supplies to the following: RCS pressure boundary motor-operated valves	**Tier**	**2**		
	Group	**1**		
	K/A	**005 K2.03**		
	IR	**2.7**		

Question 4

(1) What is the power supply to Loop 1 SDC Isolation Valve, SIA-UV-651?

(2) What is the power supply to Loop 1 SDC Isolation Valve, SIC-UV-653?

A. (1) Class 125 VDC Power
   (2) Class 125 VDC Power

B. (1) Class 125 VDC Power
   (2) Class 480 VAC Power

C. (1) Class 480 VAC Power
   (2) Class 125 VDC Power

D. (1) Class 480 VAC Power
   (2) Class 480 VAC Power

Proposed Answer:	C

Explanations: **The Loop 1 and Loop 2 SDC Isolation Valves are the only motor-operated RCS Pressure Boundary Valves at PVNGS. The reason for asking if these valves are AC or DC powered, is because the nomenclature for the actual power panels include the letter designator (i.e. PHA-M35 and PKC-M43), which could be construed as cueing.**

A.	Plausible since SDC is a vital cooling system and it could be thought that both valves would be DC powered to ensure SDC valves could still be operated remotely on a loss of all AC power, however SIA-UV-651 is an AC powered valve.
B.	Plausible since there is one AC and one DC powered Loop 1 SDC Isolation Valve, however SIA-UV-651 is AC powered and SIC-UV-653 is DC powered.
C.	Correct.
D.	Plausible that both motor-operated valves would be AC powered since there is an EDG for each Class AC bus (as well as a Station Blackout Generator) to provide power to vital AC components on a loss of normal AC power, however SIC-UV-653 is a DC powered valve.

Question Source:	X	New	
		Bank	
		Modified	
		Previous NRC Exam	

Cognitive Level:	X	Memory or Fundamental Knowledge
		Comprehension or Analysis

Level of Difficultly:	2	
10CFR55.41:	8	
Reference Provided:	N	
Learning Objective:	65136 – Identify the power supplies to SI related equipment	

Examination Outline Cross-Reference:	Level	RO		SRO
K/A: Emergency Diesel Generator: Ability to interpret control room indications to verify the status and operation of a system, and understand how operator actions and directives affect plant and system conditions	**Tier**	**2**		
	Group	**1**		
	K/A	**064 G 2.2.44**		
	IR	**4.2**		

Question 5

Given the following conditions:

- The ‘A’ EDG was just paralleled with the grid for a load run
- ‘A’ EDG indications:
  - Red light is ON, green light is OFF on the ‘A’ EDG Output Breaker
  - 1.5 MW
  - 2.6 MVAR

Subsequently:

- Multiple alarms annunciate in the control room
- ‘A’ EDG indications:
  - Both ‘A’ EDG Output Breaker lights are OFF
  - 0 MW
  - > 8 MVAR

Based on the provided indications, a loss of ___(1)___ has occurred and per 40AO-9ZZ13, Loss of Class Instrument or Control Power, the OATC should direct an AO to ___(2)___ .

A. (1) PKA-M41
   (2) emergency stop the ‘A’ EDG

B. (1) PKA-M41
   (2) open the ‘A’ EDG Output Breaker

C. (1) PNA-D25
   (2) emergency stop the ‘A’ EDG

D. (1) PNA-D25
   (2) open the ‘A’ EDG Output Breaker

Proposed Answer:	**B**

Explanations:	
A.	First part is correct. Second part is plausible the EDG is indicating that MVARs have more than doubled, however the EDG is tripped but the breaker is still closed so the indicated MVARs are the load the EDG is placing on the grid, therefore locally opening the EDG output breaker is the correct action to direct.
B.	Correct.
C.	First part is plausible since a loss of PNA-D25 does cause a loss of indication and/or breaker control for some components, however a loss of indicating lights on the EDG output breaker occurs only on a loss of PKA-M41. Second part is plausible the EDG is indicating that MVARs have more than doubled, however the EDG is tripped but the breaker is still closed so the indicated MVARs are the load the EDG is placing on the grid, therefore locally opening the EDG output breaker is the correct action to direct.
D.	First part is plausible since a loss of PNA-D25 does cause a loss of indication and/or breaker control for some components, however a loss of indicating lights on the EDG output breaker occurs only on a loss of PKA-M41. Second part is correct.

Question Source:	**X**	**New**	
		Bank	
		Modified	
		Previous NRC Exam	

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

Level of Difficultly:	**3**	
10CFR55.41:	**7**	
Reference Provided:	**N**	
Learning Objective:	**11081 – Given a loss of PKA or PKB with a SG that is connected to offsite power, describe how a loss of its associated 125 VDC control power impacts the DG operation, including operator action required to mitigate this impact**	

Examination Outline Cross-Reference:	Level	RO		SRO
K/A: Emergency Core Cooling: Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating the ECCS controls, including: Reactor vessel level	Tier	2		
	Group	1		
	K/A	006 A1.14		
	IR	3.6		

Question 6

Given the following conditions:

- Unit 1 was tripped from 100% power due to a LOCA
- The crew has performed SPTAs and the CRS has entered 40EP-9EO03, Loss of Coolant Accident
- RCS Subcooling is 35°F subcooled and slowly degrading
- Pressurizer Level is 13% and rising slowly
- Both SGs are 20% NR and rising slowly, being fed by AFB-P01
- RVLMS indicates 73% in the Plenum
- Containment Temperature is 140° and rising slowly

Per 40EP-9EO03, LOCA, which of the following parameters is PREVENTING the crew from throttling HPSI flow?

A. RCS Subcooling

B. Pressurizer Level

C. Reactor Vessel Level

D. Steam Generator Level

Proposed Answer:	C

Explanations:	
A.	This value meets the condition to throttle HPSI flow. However, this value would not be true if the it was determined if conditions in containment were “harsh”. The operator will evaluate whether containment is “harsh” (> 170°F) and determine that the non-bracketed value is applicable ($\geq$ 24°F)
B.	This value meets the condition to throttle HPSI flow. However, this value would not be true if the it was determined if conditions in containment were “harsh”. The operator will evaluate whether containment is “harsh” (> 170°F) and determine that the non-bracketed value is applicable ($\geq$ 10%)
C.	Correct.
D.	Plausible because SG levels either needs to be in band (45-60% NR) or being restored to the band. The operator may recognize that SG Level is not in band and therefore SI Throttle Criteria is not met.

Question Source:	X	New	
		Bank	
		Modified	
		Previous NRC Exam	

Cognitive Level:		Memory or Fundamental Knowledge
	X	Comprehension or Analysis

Level of Difficultly:	3	
10CFR55.41:	10	
Reference Provided:	N	
Learning Objective:	55998 – Analyze whether it is permissible to throttle HPSI flow	

Examination Outline Cross-Reference:	Level	RO		SRO
K/A: Emergency Core Cooling: Ability to monitor automatic operation of the ECCS, including: Cooling water systems	Tier	2		
	Group	1		
	K/A	006 A3.04		
	IR	3.8		

Question 7

Given the following conditions:

- An automatic SIAS actuation has just occurred
- Class buses are all powered from off-site power

As SIAS actuated equipment starts, the crew should expect to see the Spray Pond Pumps start ___(1)___ the EDGs and should expect to see the Essential Cooling Water Pumps start ___(2)___ the Essential Chillers.

A. (1) after
   (2) after

B. (1) after
   (2) before

C. (1) before
   (2) after

D. (1) before
   (2) before

Proposed Answer:	B

Explanations:	
A.	First part is correct. Second part is plausible since several SIAS actuated components start prior to their cooling source (i.e., the EDGs and SI Pumps), however the Essential Chillers start after their cooling source, the Essential Cooling Water Pumps.
B.	Correct.
C.	First part is plausible since all class buses are powered from offsite and the EDGs have a very limited amount of time they can run without cooling water (SP Pumps), however the EDGs start prior to the Spray Pond Pumps. Second part is plausible since several SIAS actuated components start prior to their cooling source (i.e., the EDGs and SI Pumps), however the Essential Chillers start after their cooling source, the Essential Cooling Water Pumps.
D.	First part is plausible since all class buses are powered from offsite and the EDGs have a very limited amount of time they can run without cooling water (SP Pumps), however the EDGs start prior to the Spray Pond Pumps. Second part is correct.

Question Source:		New	
	X	Bank	
		Modified	
	X	Previous NRC Exam	2018 NRC Exam Q51

Cognitive Level:		Memory or Fundamental Knowledge
	X	Comprehension or Analysis

Level of Difficultly:	3	
10CFR55.41:	7	
Reference Provided:	N	
Learning Objective:	65060 – Explain the operation of the ESF load sequencer	

Examination Outline Cross-Reference:	Level	RO	[redacted]	SRO
K/A: Pressurizer Relief/Quench Tank: Knowledge of the effect that a loss or malfunction of the PRTS will have on the following: Containment	Tier	2	[redacted]	
	Group	1	[redacted]	
	K/A	007 K3.01		
	IR	3.3	[redacted]	

Question 8

The RDT rupture disk will burst if RDT pressure reaches a MINIMUM of ___(1)___ psig and when the rupture disks bursts, level will begin to rise in the ___(2)___ .

A. (1) 60
(2) Hold Up Tank

B. (1) 60
(2) Containment Sump

C. (1) 120
(2) Hold Up Tank

D. (1) 120
(2) Containment Sump

Proposed Answer:	D

Explanations:	
A.	First part is plausible because the design pressure of containment is 60 psig. Second part is plausible since the RDT is normally pumped to the Hold Up Tank, however when the rupture disk blows, the water empties onto the containment floor.
B.	First part is plausible because the design pressure of containment is 60 psig. Second part is correct.
C.	First part is correct. Second part is plausible since the RDT is normally pumped to the Hold Up Tank, however when the rupture disk blows, the water empties onto the containment floor.
D.	Correct.

Question Source:	X	New	
		Bank	
		Modified	
		Previous NRC Exam	

Cognitive Level:	X	Memory or Fundamental Knowledge
		Comprehension or Analysis

Level of Difficultly:	3	
10CFR55.41:	3	
Reference Provided:	N	
Learning Objective:	68062 – Describe the Control Room controls and indications associated with the Reactor Drain Tank	

Examination Outline Cross-Reference:	Level	RO	[redacted]	SRO
K/A: Component Cooling Water: Knowledge of bus power supplies to the following: CCW pump, including backup	**Tier**	**2**	[redacted]	
	Group	**1**	[redacted]	
	K/A	**008 K2.02**		
	IR	**3.0**	[redacted]	

Question 9

Given the following conditions:

- Unit 1 is operating at 100% power
- House loads are aligned to Unit Aux Transformer, MAN-X02
- The ‘A’ NC Pump is running
- The ‘B’ NC Pump is in standby

Subsequently:

- 13.8KV Bus, NAN-S05, Normal Feeder Breaker trips on 86 lockout

One minute after the 86 lockout on the NAN-S05 Normal Feeder Breaker, the ___(1)___ NC Pump will be running, and the ‘A’ EW Pump will be ___(2)___ .

A. (1) ‘A’
(2) running

B. (1) ‘A’
(2) stopped

C. (1) ‘B’
(2) running

D. (1) ‘B’
(2) stopped

Proposed Answer:	A

Explanations:	**At PVNGS, there is no backup power supply for the NC pumps, however EW is used as the class backup cooling water system on a loss of NC, therefore to meet the spirit of the KA, we asked the status of the NC system on a loss of power as well as the status of the "backup NC system", EW.**
A.	Correct
B.	The first part is correct. The second part is plausible because the operator must know that a loss of NAN-S05 causes a LOP on PBA-S03 and that the bus will not transfer to ESF Transformer NBN-X04. It also requires understanding that the Load Sequencer will start the EW Pump Pump 20 seconds after the EDG starts.
C.	The first part is plausible because the alternate power supply to NAN-S01 that feeds NBN-S01 (NC Pump 'A' power supply) is NAN-S05. House loads are aligned to Unit Aux Transformer MAN-X02, therefore the power supply to NC Pump 'A' is not affected. The second part is correct.
D.	The first part is plausible because the alternate power supply to NAN-S01 that feeds NBN-S01 (NC Pump 'A' power supply) is NAN-S05. House loads are aligned to Unit Aux Transformer MAN-X02, therefore the power supply to NC Pump 'A' is not affected. The second part is plausible because the operator must know that a loss of NAN-S05 causes a LOP on PBA-S03 and that the bus will not transfer to ESF Transformer NBN-X04. It also requires understanding that the Load Sequencer will start the EW Pump Pump 20 seconds after the EDG starts.

Question Source:	X	**New**	
		Bank	
		Modified	
		Previous NRC Exam	

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

Level of Difficultly:	**3**	
10CFR55.41:	**4**	
Reference Provided:	**N**	
Learning Objective:	**65015 – Describe the automatic features associated with the NC pumps**	

Examination Outline Cross-Reference:	Level	RO	[redacted]	SRO
K/A: Pressurizer Pressure Control: Knowledge of the PZR PCS design feature(s) and/or interlocks which provide for the following: over pressure control	**Tier**	**2**	[redacted]	
	Group	**1**	[redacted]	
	K/A	**010 K4.03**		
	IR	**3.8**	[redacted]	

Question 10

Given the following conditions:

- Unit 3 is operating at 100% power
- Pressure Control Channel Selector, RCN-HS-100, is selected to Channel X
- Pressurizer Proportional Heaters are both energized
- One bank of Non-Class Pressurizer Backup Heaters are energized and in SETPOINT OVERRIDE

(1) If OUTPUT on Pressurizer Pressure Controller, RCN-PIC-100, RISES, proportional heater output will…

(2) If the NON-SELECTED Pressurizer Pressure Transmitter, PI-100Y, fails high, the energized Non-Class Pressurizer Backup Heater bank will…

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

B. (1) rise
(2) remain energized

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

D. (1) lower
(2) remain energized

Proposed Answer:	D

Explanations:	
A.	First part is plausible since controller output directly correlates to component output on several control room systems (SBCS for example), however RNC-PIC-100 is reverse acting as it relates to proportional heater output. Second part is plausible since heaters trip on a low pressurizer level on either pressurizer level control transmitter during normal operations, however heaters only trip on high pressure on the selected pressure transmitter.
B.	First part is plausible since controller output directly correlates to component output on several control room systems (SBCS for example), however RNC-PIC-100 is reverse acting as it relates to proportional heater output. Second part is correct.
C.	First part is correct. Second part is plausible since heaters trip on a low pressurizer level on either pressurizer level control transmitter during normal operations, however heaters only trip on high pressure on the selected pressure transmitter.
D.	Correct.

Question Source:	**X**	**New**	
		Bank	
		Modified	
		Previous NRC Exam	

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

Level of Difficultly:	**3**	
10CFR55.41:	**3**	
Reference Provided:	**N**	
Learning Objective:	**75241 – Describe the function and operation of the Pressurizer Heaters to the PPCS**	

Examination Outline Cross-Reference:	Level	RO	[redacted]	SRO
K/A: Knowledge of the operational implications of the following concepts as they apply to the AFW: Relationship between the AFW flow and RCS heat transfer	**Tier**	**2**	[redacted]	
	Group	**1**	[redacted]	
	K/A	**061 K5.01**		
	IR	**3.6**	[redacted]	

Question 11

Given the following conditions:

- Unit 2 tripped from 100% power due to a trip of the 2B RCP
- BOTH Main Feedwater Pumps tripped on the Reactor trip
- Standard Post Trip Actions are in progress
- The BOP is feeding both SGs at 500 gpm using AFN-P01

If the crew maintains the current feed rate throughout SPTAs, SG level will rise ___(1)___, and the crew should ___(2)___ .

A. (1) faster in SG #2
(2) maintain 3 RCPs in operation until SPTAs have been completed

B. (1) faster in SG #2
(2) trip an RCP in the opposite loop prior to the completion of SPTAs

C. (1) at the same rate in both SGs
(2) maintain 3 RCPs in operation until SPTAs have been completed

D. (1) at the same rate in both SGs
(2) trip an RCP in the opposite loop prior to the completion of SPTAs

Proposed Answer:	A

Explanations: **The operational implication of the relationship between AFW Flow and RCS Heat Transfer is most impactful in a situation in which there is unbalanced flow in the RCS, therefore to best match the spirit of the KA, we asked about how SG levels would be impacted if we have equal AFW flow to each SG with different flowrates in the RCS loops.**	
A.	Correct.
B.	First part is correct. Second part is plausible since we do trip an RCP in the opposite loop in circumstances in which RCS level or pressure is challenged, however if one RCP trips and there are no challenges to RCS inventory or pressure, the other 3 RCPs are left in operation.
C.	First part is plausible since both SGs are being fed at the same rate and forced circulation is still in effect with 3 RCPs running, however with the flow rate being higher in loop 1, the amount of heat transfer in SG #1 will be higher, resulting in SG #2 level rising at a faster rate. Second part is correct.
D.	First part is plausible since both SGs are being fed at the same rate and forced circulation is still in effect with 3 RCPs running, however with the flow rate being higher in loop 1, the amount of heat transfer in SG #1 will be higher, resulting in SG #2 level rising at a faster rate. Second part is plausible since we do trip an RCP in the opposite loop in circumstances in which RCS level or pressure is challenged, however if one RCP trips and there are no challenges to RCS inventory or pressure, the other 3 RCPs are left in operation.

Question Source:	**X**	**New**	
		Bank	
		Modified	
		Previous NRC Exam	

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

Level of Difficultly:	**3**
10CFR55.41:	**14**
Reference Provided:	**N**
Learning Objective:	**10431 – Describe SG response when unbalanced RCS flow is established**

Examination Outline Cross-Reference:	Level	RO		SRO
K/A: Pressurizer Vapor Space Accident: Knowledge of the operational implications of the following concepts as they apply to a pressurizer vapor space accident: Thermodynamics and flow characteristics of open or leaking valves	Tier	1		
	Group	1		
	K/A	008 AK1.01		
	IR	3.2		

Question 12

Given the following conditions:

- The RDT is being pumped to the Hold-up Tank to lower level in the RDT per 40OP-9CH06, CVCS Miscellaneous Operations, Section 6.8, Pumping the Reactor Drain Tank to the Holdup Tank Bypassing the Gas Stripper

Subsequently:

- Pressurizer Safety Valve, RCE-PSV-200, begins leaking
- RDT pressure is 8 psig and slowly rising
- Pressurizer pressure is 2250 psia and stable

Assuming NO operator action has been taken:

(1) CHA-UV-560, Reactor Drain Tank Outlet Isolation Valve, is CURRENTLY…

(2) Assuming RDT pressure continues to rise and Pressurizer pressure remains constant, tailpipe temperature for RCE-PSV-200 will…

A. (1) open
(2) rise

B. (1) open
(2) remain constant

C. (1) closed
(2) rise

D. (1) closed
(2) remain constant

Proposed Answer:	A

Explanations: **The KA has three parts to it – operational implication (addressed in part 1), thermodynamics (addressed in part 2), and flow characteristics. Since 3 part questions have inherent psychometric flaws, we matched the KA by addressing the thermodynamic aspect as well as the operational implication of the failed PSV.**	
A.	Correct.
B.	First part is correct. Second part is plausible since enthalpy is constant (measured from the pressure at the source of the leak), however temperature in the tailpipe is based on the pressure where the steam is being relieved to (assuming constant enthalpy).
C.	First part is plausible since the EDT (Equipment Drain Tank) isolates at 7 psig, however the RDT isolates (via an auto closure of CHA-UV-560) at 10 psig. Second part is correct.
D.	First part is plausible since the EDT (Equipment Drain Tank) isolates at 7 psig, however the RDT isolates (via an auto closure of CHA-UV-560) at 10 psig. Second part is plausible since enthalpy is constant (measured from the pressure at the source of the leak), however temperature in the tailpipe is based on the pressure where the steam is being relieved to (assuming constant enthalpy).

Question Source:	X	New	
		Bank	
		Modified	
		Previous NRC Exam	

Cognitive Level:		Memory or Fundamental Knowledge
	X	Comprehension or Analysis

Level of Difficultly:	3	
10CFR55.41:	14	
Reference Provided:	N	
Learning Objective:	68062 – Describe the Control Room controls and indications associated with the Reactor Drain Tank	

Examination Outline Cross-Reference:	Level	RO		SRO
K/A: Small Break LOCA: Knowledge of the reasons for the following responses as they apply to the small break LOCA and the following: Actions contained in the EOP for a SBLOCA/leak	**Tier**	**1**		
	Group	**1**		
	K/A	**009 EK3.21**		
	IR	**4.2**		

Question 13

Given the following conditions:

- Unit 3 was manually tripped due to a small break LOCA
- SIAS and CIAS were manually actuated on the trip
- Pressurizer pressure is 1700 psia and stable
- Pressurizer level is 15% and slowly rising
- Containment pressure is 2.1 psig and rising at a rate of 0.1 psig every 5 minutes
- Refueling Water Tank level is 92% and slowly lowering
- The CRS has transitioned to 40EP-9EO03, Loss of Coolant Accident

Regarding Containment Spray Pump operation, per 40DP-9AP08, Loss of Coolant Accident Technical Guideline, the crew should…

A. trip both Containment Spray Pumps to conserve inventory in the RWT

B. trip both Containment Spray Pumps to prevent pump damage due to overheating

C. leave both Containment Spray Pumps running until the SIAS actuation is reset

D. leave both Containment Spray Pumps running until Containment pressure stops rising

Proposed Answer:	B

Explanations:	
A.	Plausible since the CS Pumps take a suction on the RWT and CS flow is not required due to being below the CS setpoint, however when the CS pumps are running on miniflow, they pump water back to the RWT, therefore inventory in the RWT is not impacted.
B.	Correct.
C.	Plausible since the CS pump started on the SIAS actuation, therefore it is plausible that the CS pumps would not be stopped until the SIAS signal was reset. The SIAS signal is not reset until SIAS is no longer needed, and given the listed conditions, SIAS is still required to be in service.
D.	Plausible since direction in the LOCA EOP requires pressure to be lowering to stop CS pumps, however that is only applicable if CSAS has actuated and in this case, it has not.

Question Source:	**X**	**New**	
		Bank	
		Modified	
		Previous NRC Exam	

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

Level of Difficultly:	**2**	
10CFR55.41:	**10**	
Reference Provided:	**N**	
Learning Objective:	**10423 – Describe why two RCPs are tripped when pressure remains below the SIAS setpoint**	

Examination Outline Cross-Reference:	Level	RO		SRO
K/A: Large Break LOCA: Ability to determine or interpret the following as they apply to a Large Break LOCA: Difference between overcooling and LOCA indications	**Tier**	**1**		
	Group	**1**		
	K/A	**011 EA2.13**		
	IR	**3.7**		

Question 14

Given the following conditions:

- Unit 2 automatically tripped from 100% power
- The following indications exist:
  - Pressurizer Level is 5% and lowering
  - Pressurizer Pressure is 1000 psia and lowering
  - RCS Tave is 535°F and slowly lowering
  - Radiation levels in Containment are slowly rising
- No operator actions have been taken

Based on the listed indications, which of the following events is in progress?

A. Steam Generator Tube Rupture

B. Pressurizer Steam Space LOCA

C. RCS Cold Leg Break inside Containment

D. Main Steam Line Break inside Containment

Proposed Answer:	C

Explanations:	
A.	Plausible since Pressurizer level and pressure would be lowering on SGTR, and low RCS subcooling would be correct, however on a SGTR, containment rad levels would not be rising.
B.	Plausible since Pressurizer pressure would be lowering, RCS subcooling would be degraded, and rad levels would be rising in containment, however Pressurizer level would be rising on a Pzr Steam Space LOCA.
C.	Correct.
D.	Plausible since a Main Steam Line break would result in lowering pressurizer level and pressure, however RCS subcooling would be rising and containment rad levels would be stable.

Question Source:	X	New	
		Bank	
		Modified	
		Previous NRC Exam	

Cognitive Level:		Memory or Fundamental Knowledge
	X	Comprehension or Analysis

Level of Difficultly:	3	
10CFR55.41:	5	
Reference Provided:	N	
Learning Objective:	97093 – Diagnose the event and determine the cause	

Examination Outline Cross-Reference:	Level	RO		SRO
K/A: Reactor Coolant Pump Malfunctions: Ability to operate and/or monitor the following as they apply to the reactor coolant pump malfunctions (Loss of RC Flow): RCP seal water injection subsystem	Tier	1		
	Group	1		
	K/A	015 AA1.07		
	IR	3.5		

Question 15

Given the following conditions:

- Unit 3 tripped from 100% power due to an 86 lockout trip of RCP 1B
- During SPTAs, Seal Injection was lost to all 4 RCPs and cannot be restored

Per 40AO-9ZZ04, Reactor Coolant Pump Emergencies, Controlled Bleedoff Flow from RCP 1B should be isolated prior to ___(1)___ exceeding a MAXIMUM of 250°F.

The loss of Seal Injection ___(2)___ cause HP Seal Cooler inlet temperature to exceed RCP trip criteria on the three operating RCPs.

A. (1) Seal #1 inlet temperature
   (2) WILL

B. (1) Seal #1 inlet temperature
   (2) will NOT

C. (1) Seal #2 outlet temperature
   (2) WILL

D. (1) Seal #2 outlet temperature
   (2) will NOT

Proposed Answer:	D

Explanations:	
A.	First part is plausible since 250°F is the RCP trip setpoint for Seal 1 inlet temperature, however isolation of CBO is based on Seal 2 outlet temp. Second part is plausible since temperatures will rise at the HP Seal Cooler inlet on a loss of Seal Injection, however since NC is still in service, HP Seal Cooler inlet will stabilize to 200-220°F and the trip criteria is > 250°F.
B.	First part is plausible since 250°F is the RCP trip setpoint for Seal 1 inlet temperature, however isolation of CBO is based on Seal 2 outlet temp. Second part is correct.
C.	First part is correct. Second part is plausible since temperatures will rise at the HP Seal Cooler inlet on a loss of Seal Injection, however since NC is still in service, HP Seal Cooler inlet will stabilize to 200-220°F and the trip criteria is > 250°F.
D.	Correct.

Question Source:	X	New	
		Bank	
		Modified	
		Previous NRC Exam	

Cognitive Level:		Memory or Fundamental Knowledge
	X	Comprehension or Analysis

Level of Difficultly:	3	
10CFR55.41:	3	
Reference Provided:	N	
Learning Objective:	12077 – Determine the appropriate action to take based on RCP motor amps and temperatures	

Examination Outline Cross-Reference:	Level	RO		SRO
K/A: Loss of Reactor Coolant Makeup: Ability to perform specific system and integrated plant procedures during all modes of plant operations	Tier	1		
	Group	1		
	K/A	022 G 2.1.23		
	IR	4.3		

Question 16

Given the following conditions:

- Unit 3 is operating at 100% power
- The Charging Pump Mode Selector Switch, CHN-HS-4, is in the 1-2-3 position
- The ‘E’ Charging Pump is aligned to Train ‘B’

Subsequently:

- The ‘A’ Charging Pump tripped on 86 lockout

Per 40AL-9RK3A, Window 3A08A, CHG HDR SYS TRBL, the ‘E’ Charging Pump should…

A. remain aligned to Train ‘B’ and be manually started by taking the ‘E’ Charging Pump handswitch, CHB-HS-218, to START

B. remain aligned to Train ‘B’ and be auto-started by taking the Charging Pump Mode Selector Switch, CHN-HS-4, to the 2-3-1 position

C. be transferred to Train ‘A’, then be manually started by taking the ‘E’ Charging Pump handswitch, CHA-HS-218A, to START

D. be transferred to Train ‘A’, then be auto-started by taking the Charging Pump Mode Selector Switch, CHN-HS-4, to the 2-3-1 position

Proposed Answer:	B

Explanations:	
A.	Plausible since the ‘E’ Charging Pump will remain powered from Train ‘B’ and the ‘E’ Charging Pump will be restarted, however the pump is started using the mode selector switch to ensure the auto start and stop features of the pump are still enabled.
B.	Correct.
C.	Plausible that the ‘E’ Charging Pump would be transferred to Train ‘A’ so there would be one charging pump powered from each train of power, however it is more urgent to restart the ‘E’ pump than it is to have one powered from each train.
D.	Plausible that the ‘E’ Charging Pump would be transferred to Train ‘A’ so there would be one charging pump powered from each train of power, however it is more urgent to restart the ‘E’ pump than it is to have one powered from each train.

Question Source:	X	New	
		Bank	
		Modified	
		Previous NRC Exam	

Cognitive Level:		Memory or Fundamental Knowledge
	X	Comprehension or Analysis

Level of Difficultly:	3	
10CFR55.41:	10	
Reference Provided:	N	
Learning Objective:	16689 – Switch the running order of the Charging Pumps	

Examination Outline Cross-Reference:	Level	RO	[redacted]	SRO
K/A: Loss of Residual Heat Removal System: Knowledge of the interrelations between the loss of the Residual Heat Removal System and the following: service water or closed cooling water pumps	Tier	1	[redacted]	
	Group	1	[redacted]	
	K/A	025 AK2.03		
	IR	2.7	[redacted]	

Question 17

Given the following conditions:

- Unit 3 is cooling down for a refueling outage
- Train ‘B’ SDC is in service using the ‘B’ LPSI Pump

Subsequently:

- The ‘B’ EW Pump tripped on 86 lockout

Per 40EP-9EO11, Lower Mode Functional Recovery, which of the following pumps can be aligned to provide cooling to the ‘B’ SDCHX in order to restore shutdown cooling using the ‘B’ LPSI Pump?

1. ‘B’ Spray Pond Pump
2. ‘B’ Nuclear Cooling Water Pump
3. ‘A’ Essential Cooling Water Pump

A. 1 ONLY

B. 2 ONLY

C. 1 and 3 ONLY

D. 2 and 3 ONLY

Proposed Answer:	B

Explanations:	
A.	Plausible since the Spray Pond Pump is used to cool the EW Heat Exchanger, however it cannot be used to supply flow through the SDCHX.
B.	Correct.
C.	Plausible since the ‘A’ EW Pump can be used with the ‘B’ LPSI Pump, however the ‘A’ SDCHX would have to be used instead of the ‘B’ SDCHX. Also plausible since the Spray Pond Pump is used to cool the EW Heat Exchanger, however it cannot be used to supply flow through the SDCHX.
D.	Plausible since the ‘B’ NC Pump is correct, however the ‘A’ EW Pump can be used with the ‘B’ LPSI Pump, but the ‘A’ SDCHX would have to be used instead of the ‘B’ SDCHX.

Question Source:	X	New	
		Bank	
		Modified	
		Previous NRC Exam	

Cognitive Level:		Memory or Fundamental Knowledge
	X	Comprehension or Analysis

Level of Difficultly:	3
10CFR55.41:	7
Reference Provided:	N
Learning Objective:	65074 – Describe how the SI/SDC system is supported by the following systems: Essential Cooling Water, Nuclear Cooling Water

Examination Outline Cross-Reference:	**Level**	**RO**		**SRO**
K/A: Loss of Component Cooling Water: Ability to determine and interpret the following as they apply to the loss of Component Cooling Water: the length of time after the loss of CCW flow to a component before that component may be damaged	**Tier**	**1**		
	Group	**1**		
	K/A	**026 AA2.06**		
	IR	**2.8**		

Question 18

Given the following conditions:

- Unit 1 is operating at 100% power
- All Charging Pumps are in Pull to Lock due to gas binding

Subsequently:

- A complete loss of NC flow has occurred

(1) Per 40AO-9ZZ03, Loss of Cooling Water, to avoid being procedurally required to trip the Reactor, the crew must re-establish cooling water to the RCPs within a MAXIMUM of…

(2) Per 40DP-9ZZ04, Time Critical Action Program, RCP damage may occur if the RCPs are allowed to operate without cooling water for a MINIMUM of…

A. (1) 3 minutes
   (2) 15 minutes

B. (1) 3 minutes
   (2) 30 minutes

C. (1) 10 minutes
   (2) 15 minutes

D. (1) 10 minutes
   (2) 30 minutes

Proposed Answer:	**B**

Explanations:	
A.	First part is correct. Second part is plausible since 15 minutes is the maximum time an EDG can run without cooling water before damage may occur, however for RCPs, the time limit is 30 minutes.
B.	Correct.
C.	First part is plausible as 10 minutes is the time limit on a loss of cooling water without a concurrent loss of seal injection. Second part is plausible since 15 minutes is the maximum time an EDG can run without cooling water before damage may occur, however for RCPs, the time limit is 30 minutes.
D.	First part is plausible as 10 minutes is the time limit on a loss of cooling water without a concurrent loss of seal injection.

Question Source:	**X**	**New**	
		Bank	
		Modified	
		Previous NRC Exam	

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

Level of Difficultly:	**3**	
10CFR55.41:	**3**	
Reference Provided:	**N**	
Learning Objective:	**12079 – Describe when seal damage can be experienced when seal injection and nuclear cooling water are removed from service**	

Examination Outline Cross-Reference:	Level	RO		SRO
K/A: Reactor Trip: Ability to operate and monitor the following as they apply to a reactor trip: MFW System	Tier	1		
	Group	1		
	K/A	007 EA1.02		
	IR	3.8		

Question 19

Given the following condition:

- Unit 2 was manually tripped from 20% power in preparation for a refueling outage

(1) How can the BOP verify the DFWCS shifted to the proper post-trip mode of operation?

(2) If the BOP needed to lower feed flow to control RCS temperature, he/she would…

A. (1) “1E” will be displayed on the DFWCS screen
(2) lower MFP speed by adjusting the speed bias controller on B06

B. (1) “1E” will be displayed on the DFWCS screen
(2) take manual control of Downcomer control valves and lower output

C. (1) “RTO” will be displayed on the DFWCS screen
(2) lower MFP speed by adjusting the speed bias controller on B06

D. (1) “RTO” will be displayed on the DFWCS screen
(2) take manual control of Downcomer control valves and lower output

Proposed Answer:	D

Explanations:	
A.	First part is plausible as 1E is displayed on the DFWCS following a reactor trip and the system does shift to one-element control, however RTO is confirmed by RTO being displayed (there are other reasons 1E would be displayed so it could not be conclusively determined that RTO is in effect with 1E displayed). Second part is plausible since feed flow could be lowered by lowering the speed bias on a MFP, however the MFPs lower to minimum speed on the reactor trip so lowering speed bias will have no effect on feed flow.
B.	First part is plausible as 1E is displayed on the DFWCS following a reactor trip and the system does shift to one-element control, however RTO is confirmed by RTO being displayed (there are other reasons 1E would be displayed so it could not be conclusively determined that RTO is in effect with 1E displayed). Second part is correct.
C.	First part is correct. Second part is plausible since feed flow could be lowered by lowering the speed bias on a MFP, however the MFPs lower to minimum speed on the reactor trip so lowering speed bias will have no effect on feed flow.
D.	Correct.

Question Source:	X	New	
		Bank	
		Modified	
		Previous NRC Exam	

Cognitive Level:		Memory or Fundamental Knowledge
	X	Comprehension or Analysis

Level of Difficultly:	2	
10CFR55.41:	7	
Reference Provided:	N	
Learning Objective:	10439 – Describe the EOP expectation concerning the operation of RTO	

Examination Outline Cross-Reference:	Level	RO		SRO
K/A: Anticipated Transient Without Scram: Knowledge of system set points, interlocks, and automatic actions associated with EOP entry conditions	**Tier**	**1**		
	Group	**1**		
	K/A	**029 G 2.4.2**		
	IR	**4.5**		

Question 20

Given the following conditions:

- Unit 1 is operating at 100% power
- Pressurizer level is 15% and lowering
- Containment pressure is 3.2 psig and rising
- Both SG pressures are 980 psig and lowering
- The Reactor failed to automatically trip and pressing the manual pushbuttons on B05 also failed

An automatic Reactor trip should have initiated on ___(1)___ and entry conditions to SPTAs are ___(2)___.

A. (1) High Containment pressure
(2) MET

B. (1) Low SG pressure
(2) MET

C. (1) High Containment pressure
(2) NOT met

D. (1) Low SG pressure
(2) NOT met

Proposed Answer:	A

Explanations:	
A.	Correct
B.	First part is a plausible because the Reactor will trip on Low SG pressure. However the setpoint is 960 psig. Second part is correct.
C.	First part is correct. Second part is plausible because the title of the procedure is “Standard *Post* Trip Actions”. An ATWS will not trip the Reactor so the Unit will not be in a trip condition when taking actions to mitigate the ATWS in step 1 of the procedure.
D.	First part is a plausible because the Reactor will trip on Low SG pressure. However the setpoint is 960 psig. Second part is plausible because the title of the procedure is “Standard *Post* Trip Actions”. An ATWS will not trip the Reactor so the Unit will not be in a trip condition when taking actions to mitigate the ATWS in step 1 of the procedure.

Question Source:	X	New	
		Bank	
		Modified	
		Previous NRC Exam	

Cognitive Level:		Memory or Fundamental Knowledge
	X	Comprehension or Analysis

Level of Difficultly:	2	
10CFR55.41:	7	
Reference Provided:	N	
Learning Objective:	76810 – List the parameters and setpoints that will cause a PPS actuation	

Examination Outline Cross-Reference:	Level	RO		SRO
K/A: Steam Generator Tube Rupture: Knowledge of the reasons for the following responses as they apply to SGTR: Criteria for securing RCP	**Tier**	**1**		
	Group	**1**		
	K/A	**038 EK3.08**		
	IR	**4.1**		

Question 21

Given the following conditions:

- Unit 1 was tripped due to a SGTR on SG #2
- SIAS and CIAS were automatically actuated
- One RCP in each loop has been stopped
- SG #2 has just been isolated
- The crew is preparing to depressurize the RCS
- Current RCS parameters are as follows:
    - Thot = 535°F
    - Tcold = 532°F
    - RCS pressure = 1050 psia
    - SG pressures = 930 psia

Based on current plant conditions, the crew should…

A. trip the two running RCPs to minimize heat input into the RCS

B. trip the two running RCPs due to insufficient subcooling margin

C. maintain two RCPs running to facilitate the RCS depressurization using Main Spray

D. maintain two RCPs running to minimize the effects of the RCS dilution during the depressurization

Proposed Answer:	B

Explanations:	
A.	Plausible since tripping the two RCPs is correct and since cooldown of the RCS is required and the lower heat input will aid in the cooldown, however the RCPs are tripped due to the RCS being ~ 18°F subcooled.
B.	Correct.
C.	Plausible that the RCPs would be kept running since the RCS is still 18°F subcooled and continued operation of the two RCPs is desired (in part to facilitate the use of Main Spray), however when RCS subcooling is less than 24°, the RCPs are required to be tripped.
D.	Plausible that the RCPs would be kept running since the RCS is still 18°F subcooled and continued operation of the two RCPs is desired (in part to minimize the adverse effects of dilution when RCS pressure is lowered to less than SG pressure), however when RCS subcooling is less than 24°, the RCPs are required to be tripped.

Question Source:	X	New	
		Bank	
		Modified	
		Previous NRC Exam	

Cognitive Level:		Memory or Fundamental Knowledge
	X	Comprehension or Analysis

Level of Difficultly:	3
10CFR55.41:	3
Reference Provided:	N
Learning Objective:	10420 – Describe the EOP expectation concerning the operation of the RCPs when subcooling is lost

Examination Outline Cross-Reference:	Level	RO		SRO
K/A: Steam Line Rupture – Excessive Heat Transfer: Knowledge of the operational implications of the following concepts as they apply to an ESD: components, capacities, and functions of emergency systems	**Tier**	**1**	[redacted]	
	Group	**1**	[redacted]	
	K/A		**040 EK1.1**	
	IR	**3.0**	[redacted]	

Question 22

Given the following conditions:

- Unit 2 tripped from 100% power due to an ESD inside containment
- Current plant conditions are as follows:
    - Pressurizer pressure is 1500 psia
    - SG #1 level is 25% WR
    - SG #1 pressure is 700 psia
    - SG #2 level is 45% WR
    - SG #2 pressure is 1000 psia

With NO operator action, ___(1)___ is/are running, and ___(2)___ is currently being fed.

A. (1) ONLY AFB-P01
(2) neither SG

B. (1) ONLY AFB-P01
(2) ONLY SG #2

C. (1) AFA-P01 AND AFB-P01
(2) neither SG

D. (1) AFA-P01 AND AFB-P01
(2) ONLY SG #2

Proposed Answer:	A

Explanations:	
A.	Correct.
B.	First part is correct. Second part is plausible since an AFW pump is running and SG #2 is not faulted, however the MSIS has stopped all main feed and the D/P lockout has actuated due to SG #1 being > 185# less than SG #2, therefore AFAS has not actuated even though SG #1 level is below the AFAS setpoint.
C.	First part is plausible since SG #1 level is below the AFAS setpoint, however due to the D/P lockout on SG #1, AFAS has not actuated. Second part is correct.
D.	First part is plausible since SG #1 level is below the AFAS setpoint, however due to the D/P lockout on SG #1, AFAS has not actuated. Second part is plausible since an AFW pump is running and SG #2 is not faulted, however the MSIS has stopped all main feed and the D/P lockout has actuated due to SG #1 being > 185# less than SG #2, therefore AFAS has not actuated even though SG #1 level is below the AFAS setpoint.

Question Source:	X	New	
		Bank	
		Modified	
		Previous NRC Exam	

Cognitive Level:		Memory or Fundamental Knowledge
	X	Comprehension or Analysis

Level of Difficultly:	4	
10CFR55.41:	8	
Reference Provided:	N	
Learning Objective:	77188 – Describe how the AFAS lockout functions to block AFAS	

Examination Outline Cross-Reference:	Level	RO	[redacted]	SRO
K/A: Loss of Main Feedwater: Knowledge of the reasons for the following responses as they apply to the Loss of Main Feedwater (MFW): Reactor and/or turbine trip, manual and automatic	Tier	1	[redacted]	
	Group	1	[redacted]	
	K/A	054 AK3.01		
	IR	4.1	[redacted]	

Question 23

Given the following conditions:

- Unit 1 is operating at 50% power
- The ‘B’ MFP is running
- The ‘A’ MFP is in hot standby

Subsequenty:

- The ‘B’ MFP tripped

With NO operator action, the Reactor will automatically trip as soon as SG levels lower to ___(1)___ in order to ensure ___(2)___ .

A. (1) 23.5% Narrow Range
   (2) the Reactor is tripped prior to the top of the U-tubes becoming uncovered

B. (1) 23.5% Narrow Range
   (2) sufficient SG inventory to steam for at least 10 minutes before AFAS actuates

C. (1) 44.2% Wide Range
   (2) the Reactor is tripped prior to the top of the U-tubes becoming uncovered

D. (1) 44.2% Wide Range
   (2) sufficient SG inventory to steam for at least 10 minutes before AFAS actuates

Proposed Answer:	D

Explanations:	
A.	First part is plausible since 23.5% NR is well below the normal full-power SG level setpoint of 50% NR, however the reactor trips at 44.2% WR. Second part is plausible since the top of the SG U-tubes is 23.5% and it is plausible to not want to steam a SG with portions of the U-tubes uncovered to prevent thermal stresses on the tubes, however the basis for the SG level trip setpoint is to ensure at least 10 minutes of inventory is available in the SGs prior to an AFAS actutation.
B.	First part is plausible since 23.5% NR is well below the normal full-power SG level setpoint of 50% NR, however the reactor trips at 44.2% WR. Second part is correct.
C.	First part is correct. Second part is plausible since the top of the SG U-tubes is 23.5% and it is plausible to not want to steam a SG with portions of the U-tubes uncovered to prevent thermal stresses on the tubes, however the basis for the SG level trip setpoint is to ensure at least 10 minutes of inventory is available in the SGs prior to an AFAS actutation.
D.	Correct.

Question Source:	X	New	
		Bank	
		Modified	
		Previous NRC Exam	

Cognitive Level:	X	Memory or Fundamental Knowledge
		Comprehension or Analysis

Level of Difficultly:	3	
10CFR55.41:	4	
Reference Provided:	N	
Learning Objective:	77058 – Describe the PPS instrumentation associated with wide range SG level including its function, bases, and setpoint	

Examination Outline Cross-Reference:	Level	RO		SRO
K/A: Station Blackout: Ability to determine and interpret the following as they apply to the Station Blackout: Faults and lockouts that must be cleared prior to re-energizing buses	Tier	1		
	Group	1		
	K/A	055 EA2.06		
	IR	3.7		

Question 24

During a station blackout on Unit 1, which of the following faults/lockouts, INDIVIDUALLY, MUST be cleared/reset prior to re-energizing PBB-S04 from an SBOG?

1. Bus fault on 13.8kV Bus, NAN-S04
2. Bus fault on 125 VDC Class Instrument Bus PKB-M42
3. 86 lockout trip of PBB-S04L, PBB-S04 to PBA-S03 Alternate Supply Breaker

A. 1 and 2 ONLY

B. 1 and 3 ONLY

C. 2 ONLY

D. 3 ONLY

Proposed Answer:	D

Explanations:	
A.	Plausible since NAN-S04 is the normal supply bus to PBB-S04, however the SBOG taps into PBB-S04 downstream of NBN-X04 transformer, therefore a fault on NAN-S04 will not prevent the SBOG from being aligned to PBB-S04. Plausible that PKB-M42 would need to have the fault corrected as PKB-M42 supplies control power for PBB-S04 breakers, however those breakers can be closed locally by manually charging the charging springs.
B.	Plausible since NAN-S04 is the normal supply bus to PBB-S04, however the SBOG taps into PBB-S04 downstream of NBN-X04 transformer, therefore a fault on NAN-S04 will not prevent the SBOG from being aligned to PBB-S04. Item #3 is correct.
C.	Plausible that PKB-M42 would need to have the fault corrected as PKB-M42 supplies control power for PBB-S04 breakers, however those breakers can be closed locally by manually charging the charging springs.
D.	Correct.

Question Source:	X	New	
		Bank	
		Modified	
		Previous NRC Exam	

Cognitive Level:		Memory or Fundamental Knowledge
	X	Comprehension or Analysis

Level of Difficultly:	4	
10CFR55.41:	7	
Reference Provided:	N	
Learning Objective:	74398 – Describe the circuit paths to include these major components: ESF Service Transformers, 4kV switchgear	

Examination Outline Cross-Reference:	Level	RO		SRO
K/A: Loss of Offsite Power: Knowledge of the reasons for the following responses as they apply to the Loss of Offsite Power: Order and time to initiation of power for the load sequencer	**Tier**	**1**		
	Group	**1**		
	K/A	**056 AK3.01**		
	IR	**3.5**		

Question 25

Unit 1 was operating at 100% power when a Loss of Offsite Power occurred.

In response to the Loss of Offsite Power:

(1) The LOP/LS module will generate a Load Shed pulse PRIOR TO the LOP signal to ensure…

(2) The LOP signal remains locked for 60 seconds after the class buses are re-energized to ensure…

A. (1) previously running loads re-started by the sequencer are not anti-pumped
(2) a double sequencing condition does not occur

B. (1) previously running loads re-started by the sequencer are not anti-pumped
(2) the sequencer completes load sequencing prior to the LOP signal being reset

C. (1) the Emergency Diesel Generator is not overloaded during load sequencing
(2) a double sequencing condition does not occur

D. (1) the Emergency Diesel Generator is not overloaded during load sequencing
(2) the sequencer completes load sequencing prior to the LOP signal being reset

Proposed Answer:	D

Explanations:	
A.	First part is plausible since a running load that trips with a locked in start signal will be anti-pumped, however the purpose of the load shed pulse is to prevent overloading of the EDG as loads sequence on. Second part is plausible since the one of the purposes of the load sequencer is to prevent double sequencing, however that is only a concern during a LOP concurrently with a SIAS signal.
B.	First part is plausible since a running load that trips with a locked in start signal will be anti-pumped, however the purpose of the load shed pulse is to prevent overloading of the EDG as loads sequence on. Second part is correct.
C.	First part is correct. Second part is plausible since the one of the purposes of the load sequencer is to prevent double sequencing, however that is only a concern during a LOP concurrently with a SIAS signal.
D.	Correct.

Question Source:	**X**	**New**	
		Bank	
		Modified	
		Previous NRC Exam	

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

Level of Difficultly:	**3**	
10CFR55.41:	**8**	
Reference Provided:	**N**	
Learning Objective:	**65056 – Describe the LOP/LS controls including indications**	

Examination Outline Cross-Reference:	Level	RO		SRO
K/A: Loss of Vital AC Instrument Bus: Ability to operate and/or monitor the following as they apply to the Loss of Vital AC Instrument Bus: Manual Inverter swapping	Tier	1		
	Group	1		
	K/A	057 AA1.01		
	IR	3.7		

Question 26

Given the following conditions:

- Unit 3 is operating at 100% power
- Channel ‘A’ 120 VAC Class Instrument Bus, PNA-D25, is being powered from Channel ‘A’ Inverter, PNA-N11
- Inverter, PNE-N15, is not supplying PNA-D25 or PNC-D27

Subsequently:

- The feeder breaker from 125 VDC DC Control Center, PKA-M41, to Inverter PNA-N11, tripped open

With NO operator action, PNA-D25 will automatically transfer to ___(1)___ , and when the feeder breaker from PKA-M41 to PNA-N11 is reclosed, PNA-D25 can be manually transferred back to Channel ‘A’ Inverter, PNA-N11, by depressing the ___(2)___ pushbutton.

A. (1) Inverter, PNE-N15
(2) INVERTER TO LOAD

B. (1) Inverter, PNE-N15
(2) BYPASS SOURCE TO LOAD

C. (1) Voltage Regulator, PNA-V25
(2) INVERTER TO LOAD

D. (1) Voltage Regulator, PNA-V25
(2) BYPASS SOURCE TO LOAD

Proposed Answer:	C

Explanations:	
A.	First part is plausible since the swing inverter is an available power source to re-energize PNA-D25, however PNA will automatically transfer to the voltage regulator. Second part is correct.
B.	First part is plausible since the swing inverter is an available power source to re-energize PNA-D25, however PNA will automatically transfer to the voltage regulator. Second part is plausible since the BYPASS SOURCE TO LOAD pushbutton would be used to transfer from inverter PNA-N11 to the Voltage Regulator, however when transferring from the VR back to the inverter, the INVERTER TO LOAD pushbutton is used.
C.	Correct.
D.	First part is correct. Second part is plausible since the BYPASS SOURCE TO LOAD pushbutton would be used to transfer from inverter PNA-N11 to the Voltage Regulator, however when transferring from the VR back to the inverter, the INVERTER TO LOAD pushbutton is used.

Question Source:		**New**	
		Bank	
	X	**Modified**	
	X	**Previous NRC Exam**	**Modified from 2016 NRC Exam Q15 (equipment was modified changing the correct answer)**

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

Level of Difficultly:	**3**	
10CFR55.41:	**7**	
Reference Provided:	**N**	
Learning Objective:	**74139 – Explain the operation of the Class 1E Inverters under normal operating conditions**	

Examination Outline Cross-Reference:	Level	RO	[redacted]	SRO
K/A: Loss of DC Power: Knowledge of the operational implications of the following concepts as they apply to Loss of DC Power: Battery charger equipment and instrumentation	Tier	1	[redacted]	
	Group	1	[redacted]	
	K/A	058 AK1.01		
	IR	2.8	[redacted]	

Question 27

Given the following conditions:

- Unit 1 is operating at 100% power

Subsequently:

- A fault on Class 125 VDC Bus, PKA-M41, caused the following breakers to open on PKA-M41:
    - PKA-M4102, ‘A’ Battery Output Breaker
    - PKA-M4104, ‘A’ Battery Charger DC Output Breaker

Which of the following describes the status of control power to AFN-P01?

A. Control power to AFN-P01 is remains energized

B. Control power to AFN-P01 is lost and can be restored by transferring to the output of the ‘A’ Battery

C. Control power to AFN-P01 is lost and can be restored by transferring to the output of the ‘A’ Battery Charger

D. Control power to AFN-P01 is lost and cannot be restored until the fault on PKA-M41 is cleared

Proposed Answer:	C

Explanations:	
A.	Plausible that AFN control power would still be energized since AFN can get its control power from the output of the ‘A’ battery charger, however it is normally powered directly from the PKA bus which would be de-energized with the battery and battery charger breakers open.
B.	Plausible since AFN control power is lost and it can be restored, however the alternate source is the output of the battery charger, not the battery.
C.	Correct.
D.	Plausible since AFN control power is lost, and it could be though that the alternate source is downstream of the battery charger breaker to PKA, however the alternate control power taps in upstream of the battery charger output breaker on PKA-M41.

Question Source:	X	New	
		Bank	
		Modified	
		Previous NRC Exam	

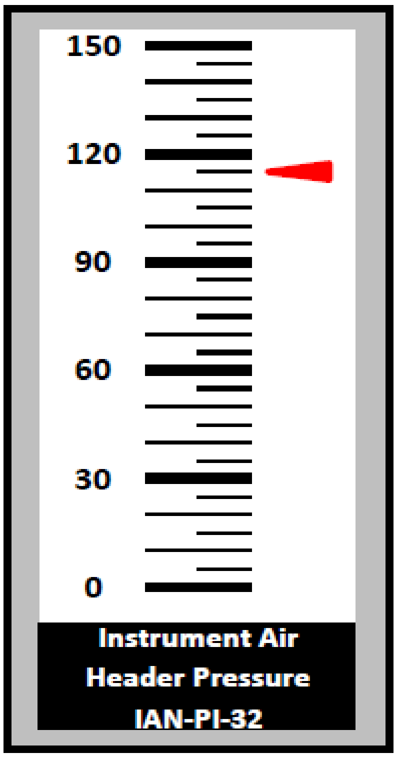
Cognitive Level:		Memory or Fundamental Knowledge
	X	Comprehension or Analysis

Level of Difficultly:	3	
10CFR55.41:	7	
Reference Provided:	N	
Learning Objective:	78314 – Describe how the AFW System is supported by the following systems: Class 125 VDC Power System	

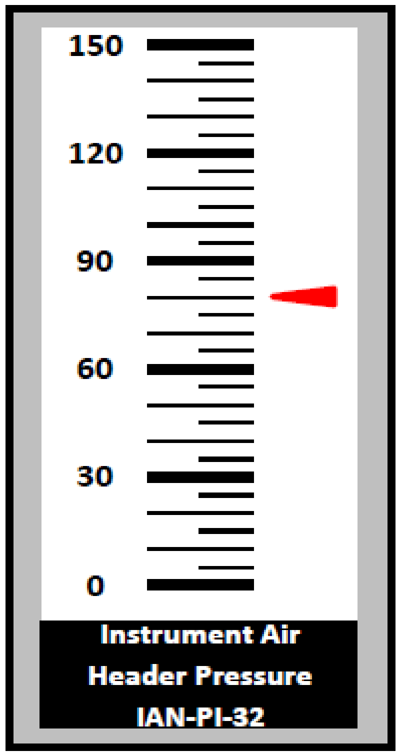
Examination Outline Cross-Reference:	Level	RO		SRO
K/A: Loss of Instrument Air: Ability to interpret control room indications to verify the status and operation of a system, and understand how operator actions and directives affect plant and system conditions	Tier			
	Group			
	K/A	065 G 2.2.44		
	IR	4.2		

Question 28

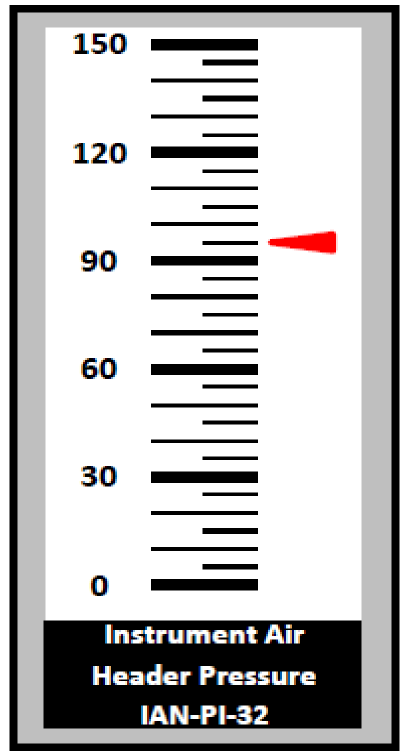
Given the following Instrument Air Header Pressure indications on **UNIT 3**:



At time = 0100



At time = 0110
(lowest pressure reached)



At time = 0120

With NO operator action, at time = 0120, the Nitrogen Backup Valve will be ___(1)___ and letdown will ___(2)___ .

A. (1) open
(2) be isolated

B. (1) open
(2) remain in service

C. (1) closed
(2) be isolated

D. (1) closed
   (2) remain in service

Proposed Answer:	B

Explanations:	
A.	First part is correct. Second part is plausible since letdown did isolate when IA pressure dropped below 90 psig in Unit 3 until Spring of 2018 when the IA failure setpoint on NCN-TV-223, Letdown HX Outlet Temp Control Valve was changed from failing closed at 90 psig to failing closed between 38-48 psig.
B.	Correct.
C.	First part is plausible since the N2 backup valve opens at 85 psig and the low IA pressure alarm setpoint is 95 psig which would be a logical point at which the N2 backup valve would re-close, however the N2 backup valve doesn't re-close until 105 psig. Second part is plausible since letdown did isolate when IA pressure dropped below 90 psig until 2018 when the IA failure setpoint on NCN-TV-223, Letdown HX Outlet Temp Control Valve was changed from failing closed at 90 psig to failing closed between 38-48 psig.
D.	First part is plausible since the N2 backup valve opens at 85 psig and the low IA pressure alarm setpoint is 95 psig which would be a logical point at which the N2 backup valve would re-close, however the N2 backup valve doesn't re-close until 105 psig. Second part is correct.

Question Source:		New	
	X	Bank	
		Modified	
	X	Previous NRC Exam	2018 NRC Exam Q54

Cognitive Level:		Memory or Fundamental Knowledge
	X	Comprehension or Analysis

Level of Difficultly:	3
10CFR55.41:	4
Reference Provided:	N
Learning Objective:	56751 – Determine the major effects on plant operation as instrument air pressure degrades

Examination Outline Cross-Reference:	Level	RO	[redacted]	SRO
K/A: Generator Voltage and Electric Grid Disturbances: Knowledge of the interrelations between Generator Voltage and Electric Grid Disturbances and the following: Turbine/Generator Control	Tier	1	[redacted]	
	Group	1	[redacted]	
	K/A	077 AK2.07		
	IR	3.6	[redacted]	

Question 29

Given the following conditions:

- Unit 1 is operating at 100% power
- The Main Generator is boosting 150 MVAR

Subsequently:

- A grid disturbance has resulted in the Main Generator now boosting only 100 MVAR
- The ECC has directed Unit 1 to take action to resume boosting 150 MVAR

In order to accomplish this, the crew will need to adjust Main Generator ___(1)___ using the ___(2)___ .

A. (1) voltage
   (2) Load Limit Potentiometer

B. (1) voltage
   (2) EX2100e digital control screen

C. (1) frequency
   (2) Load Limit Potentiometer

D. (1) frequency
   (2) EX2100e digital control screen

Proposed Answer:	B

Explanations:	
A.	Plausible since voltage is adjusted to adjust MVAR loading, however voltage adjustments are made at the EX2100e control screen, not the load set potentiometer.
B.	Correct.
C.	Plausible since adjusting frequency will change loading, however it will primarily change MW, not MVAR.
D.	Plausible since the adjustment will be made using the EX2100e control screen, however voltage will be adjusted, not frequency.

Question Source:	X	**New**	
		Bank	
		Modified	
		Previous NRC Exam	

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

Level of Difficultly:	**3**	
10CFR55.41:	**5**	
Reference Provided:	**N**	
Learning Objective:	**75025 – Describe the Control Room controls and indications associated with the Main Generator Excitation and Regulation System**	

Examination Outline Cross-Reference:	**Level**	**RO**		**SRO**
K/A: Main and Reheat Steam System: Ability to (a) predict the impacts of the following malfunctions or operations on the MRSS; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: Indications and alarms for main steam and area radiation monitors (during SGTR)	**Tier**	**2**		
	Group	**1**		
	K/A	**039 A2.03**		
	IR	**3.4**		

Question 30

Given the following conditions:

- Unit 3 is operating at 100% power
- A SGTL is in progress on SG #1
- RU-142, Main Steam Line N-16 Radiation Monitor, indicates a stable leakrate of 500 gpd
- The crew is preparing to commence a downpower

During the downpower, the INDICATED leakrate on RU-142 will ___(1)___ and following the completion of SPTAs, the CRS should transition to ___(2)___ .

A. (1) rise
(2) 40EP-9EO02, Reactor Trip

B. (1) rise
(2) 40EP-9EO04, Steam Generator Tube Rupture

C. (1) lower
(2) 40EP-9EO02, Reactor Trip

D. (1) lower
(2) 40EP-9EO04, Steam Generator Tube Rupture

Proposed Answer:	D

Explanations: **Due to the fact that a SGTR would result in a procedurally directed reactor trip immediately and the fact that the N-16 RMs at PVNGS decay to 0 in ~ 35 seconds post trip, the question was written for a SGTL instead to improve the operational validity while keeping with the spirit of the KA.**

A.	First part is plausible if thought that the leak rate is calculated based on the amount of radioactivity in the SG, which will rise as reactor coolant continues to leak into the SG, however the leakrate is based on N-16 which decays away quickly (~ 7 second half-life) and is power dependent, so as power is reduced, the indicated leakrate will also go down. Second part is plausible since a SG tube rupture is when the leakrate exceeds available charging pump capacity (132 gpm), however with any indicated tube leakage, the SG Tube Rupture EOP is entered following SPTAs.
B.	First part is plausible if thought that the leak rate is calculated based on the amount of radioactivity in the SG, which will rise as reactor coolant continues to leak into the SG, however the leakrate is based on N-16 which decays away quickly (~ 7 second half-life) and is power dependent, so as power is reduced, the indicated leakrate will also go down. Second part is correct.
C.	First part is correct. Second part is plausible since a SG tube rupture is when the leakrate exceeds available charging pump capacity (132 gpm), however with any indicated tube leakage, the SG Tube Rupture EOP is entered following SPTAs.
D.	Correct.

Question Source:	X	New	
		Bank	
		Modified	
		Previous NRC Exam	

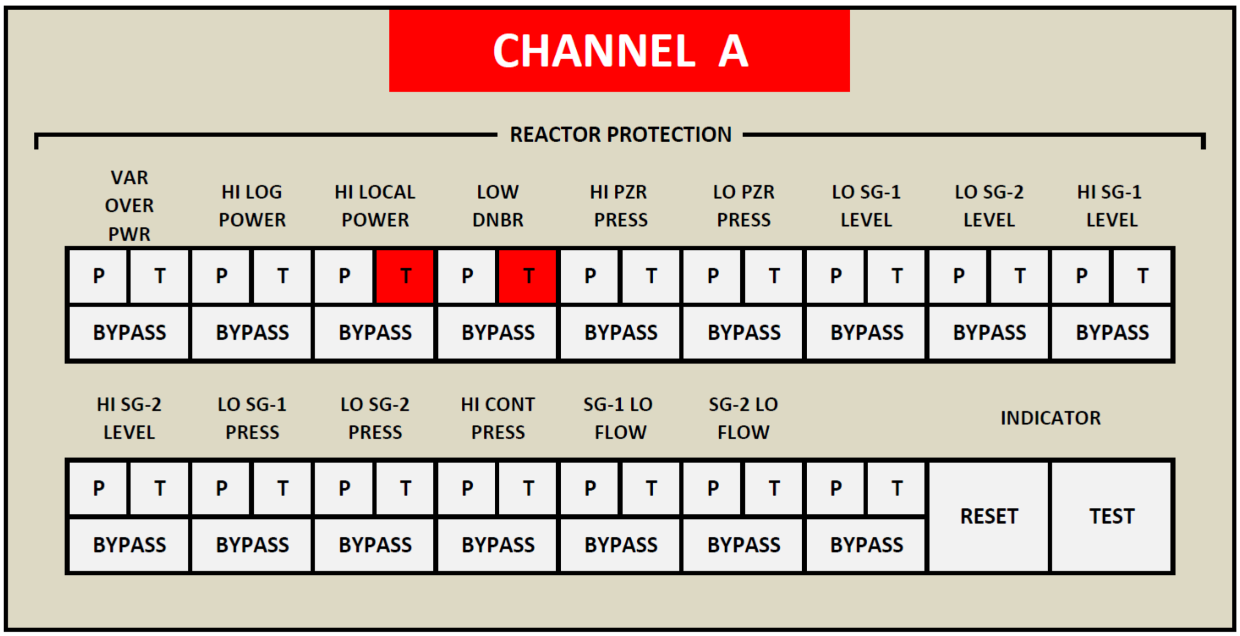
Cognitive Level:		Memory or Fundamental Knowledge
	X	Comprehension or Analysis

Level of Difficultly:	3	
10CFR55.41:	11	
Reference Provided:	N	
Learning Objective:	66729 – Describe the Control Room indications associated with the Radiation Monitoring System	

Examination Outline Cross-Reference:	Level	RO	[redacted]	SRO
K/A: Reactor Protection: Ability to verify that alarms are consistent with the plant conditions	Tier	2	[redacted]	
	Group	1	[redacted]	
	K/A	012 G 2.4.46		
	IR	4.2	[redacted]	

Question 31

Given the following indications (assume Channels B, C, and D have no lights lit):



Which of the following events/conditions are consistent with the provided indications?

A. A dropped CEA in the ‘A’ quadrant

B. Channel ‘A’ DNBR reading of 1.32

C. Channel ‘A’ CPC calculated ASI of -0.5

D. Channel ‘A’ Safety Channel NI failed off-scale high

Proposed Answer:	C

Explanations:	
A.	Plausible because a dropped CEA will impact LPD and DNBR in the affected quadrant, however if the trip setpoint was reached, the pre-trip light would also be illuminated.
B.	Plausible since the DNBR alarm could also cause the LPD trip (depending on what parameter(s) were causing DNBR to reach the trip setpoint - <1.34), however LPD and DNBR pre-trips would also be illuminated.
C.	Correct. CPC Aux Trips do not cause pre-trip alarms for LPD and DNBR on the RPS ROMs.
D.	Plausible since the safety channel NIs feed both LPD and DNBR, however if trips were received, the pre-trip lights would also be illuminated.

Question Source:	**X**	**New**	
		Bank	
		Modified	
		Previous NRC Exam	

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

Level of Difficultly:	**3**	
10CFR55.41:	**7**	
Reference Provided:	**Y**	**The picture in the question stem**
Learning Objective:	**78311 – Describe the outputs of the Core Protection Calculators**	

Examination Outline Cross-Reference:	Level	RO		SRO
K/A: Engineered Safety Features Actuation: Knowledge of the effect of a loss or malfunction of the following will have on the ESFAS system: Sensors and detectors	**Tier**	**2**		
	Group	**1**		
	K/A	**013 K6.01**		
	IR	**2.7**		

Question 32

Given the following conditions:

- Unit 3 is operating at 100% power
- **At time = 1300:** The Channel 'C' RWT bypass pushbutton was depressed at the PPS cabinet in preparation for I&C testing scheduled to start at 1330
- **At time = 1305:** (Prior to the start of I&C testing), Channel 'B' RWT level transmitter, CHB-LI-203B, failed to 0%
- **At time = 1310:** The BOP depressed the bypass pushbutton for the Channel 'B' RWT bistable at the PPS cabinet

(1) **At time =1306**, the coincidence logic for RAS was….

(2) **At time = 1311**, the coincidence logic for RAS was…

A. (1) 1 out of 1
(2) 2 out of 2

B. (1) 1 out of 1
(2) 2 out of 3

C. (1) 1 out of 2
(2) 2 out of 2

D. (1) 1 out of 2
(2) 2 out of 3

Proposed Answer:	D

Explanations:	
A.	First part is plausible since only the 'A' and 'D' bistables are available for a trip, however if thought that specific channels were required to actuate together to actuate a PPS signal (like RTCBs – A and C or B and D RTCBs both open would not trip the reactor), then only the 'A' RWT bistable could cause a RAS actuation, however any two PPS signals will actuate an ESFAS actuation. Second part is plausible since both bypass pushbuttons have been depressed, however when one channel is in bypass, if a higher level channel (A-D, in that order) bypass pushbutton is depressed, the lower channel is automatically removed from bypass, therefore coincidence would not be 2 of 3.
B.	First part is plausible since only the 'A' and 'D' bistables are available for a trip, however if thought that specific channels were required to actuate together to actuate a PPS signal (like RTCBs – A and C or B and D RTCBs both open would not trip the reactor), then only the 'A' RWT bistable could cause a RAS actuation, however any two PPS signals will actuate an ESFAS actuation. Second part is correct.
C.	First part is correct. Second part is plausible since both bypass pushbuttons have been depressed, however when one channel is in bypass, if a higher level channel (A-D, in that order) bypass pushbutton is depressed, the lower channel is automatically removed from bypass, therefore coincidence would not be 2 of 3.
D.	Correct.

Question Source:	X	New	
		Bank	
		Modified	
		Previous NRC Exam	

Cognitive Level:		Memory or Fundamental Knowledge
	X	Comprehension or Analysis

Level of Difficultly:	3	
10CFR55.41:	7	
Reference Provided:	N	
Learning Objective:	77071 – Describe how Coincident Matrix Logic functions to cause a PPS trip	

Examination Outline Cross-Reference:	Level	RO		SRO
K/A: Engineered Safety Features Actuation: Ability to manually operate and/or monitor in the control room: Reset of ESFAS channels	Tier	2		
	Group	1		
	K/A	013 A4.02		
	IR	4.3		

Question 33

Given the following conditions:

- A Train ‘A’ and a Train ‘B’ MSIS have automatically actuated due to an ESD in the Turbine Building
- Steam Generator pressures have both been returned to their normal post-trip bands
- The CRS has directed the BOP to reset the Train ‘A’ and the Train ‘B’ MSIS actuations
- The RESET pushbutton on all four channels has been pressed on B05

Per 40EP-9EO10-028, Appendix 28 – MSIS Check and Reset, which of the following describes the MINIMUM actions required at the ESFAS and PPS Cabinets to reset the MSIS?

A MINIMUM of___(1)___ Trip Path Reset Pushbuttons for MSIS must be depressed at the PPS Cabinets, and a MINIMUM of ___(2)___ LOCKOUT RESET pushbuttons at the ESFAS Auxiliary Relay Cabinets must be depressed.

A. (1) ONLY two (either A or B, AND either C or D)
   (2) ONLY one (one lockout reset pushbutton per train)

B. (1) ONLY two (either A or B, AND either C or D)
   (2) BOTH (both lockout reset pushbuttons on Train ‘A’ and both lockout reset pushbuttons on Train ‘B’)

C. (1) ALL four (channels A, B, C, and D)
   (2) ONLY one (one lockout reset pushbutton per train)

D. (1) ALL four (channels A, B, C, and D)
   (2) BOTH (both lockout reset pushbuttons on Train ‘A’ and both lockout reset pushbuttons on Train ‘B’)

Proposed Answer:	**C**

Explanations:	
A.	First part is plausible since you only have to depress one reset pushbutton on each aux relay cabinet, however all four trip path reset pushbuttons have to be depressed to reset an MSIS. Second part is correct.
B.	First part is plausible since you only have to depress one reset pushbutton on each aux relay cabinet, however all four trip path reset pushbuttons have to be depressed to reset an MSIS. Second part is plausible since you have to depress all four trip path reset pushbuttons to reset an MSIS, however you only have to depress one lockout reset pushbutton on each train to reset and MSIS.
C.	Correct.
D.	First part is correct. Second part is plausible since you have to depress all four trip path reset pushbuttons to reset an MSIS, however you only have to depress one lockout reset pushbutton on each train to reset and MSIS.

Question Source:	**X**	**New**	
		Bank	
		Modified	
		Previous NRC Exam	

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

Level of Difficultly:	**3**	
10CFR55.41:	**7**	
Reference Provided:	**N**	
Learning Objective:	**77239 – Describe how an ESFAS subsystem can be manually actuated and manually reset from the Aux Relay Cabinets**	

Examination Outline Cross-Reference:	Level	RO		SRO
K/A: Containment Cooling: Knowledge of the effect that a loss or malfunction of the CCS will have on the following: Containment equipment subject to damage by high or low temperature, humidity, and pressure	**Tier**	**2**		
	Group	**1**		
	K/A	**022 K3.01**		
	IR	**2.9**		

Question 34

Given the following conditions:

- Unit 2 is operating at 100% power
- A complete loss of CEDM Cooling has just occurred
- 40AO-9ZZ20, Loss of HVAC, Section 10.0, Loss of Containment Building HVAC – CEDM, has been entered

Assuming all efforts to restore at least one CEDM Cooling Fan are unsuccessful, Unit 2 must be shutdown within a MAXIMUM of ___(1)___ minutes and the RCS must be cooled down to a MAXIMUM of ___(2)___ to prevent damage to the CEDM coils.

A. (1) 30
(2) 210°F

B. (1) 30
(2) 300°F

C. (1) 40
(2) 210°F

D. (1) 40
(2) 300°F

Proposed Answer:	D

Explanations:	
A.	First part is plausible since the crew has a maximum of 30 minutes to take the unit offline, however the 30 minute clock doesn't start until CEDM cooling has been lost for 10 minutes for a total time to shutdown of 40 minutes. First part is plausible since the crew has a maximum of 30 minutes to take the unit offline, however the 30 minute clock doesn't start until CEDM cooling has been lost for 10 minutes for a total time to shutdown of 40 minutes.
B.	First part is plausible since the crew has a maximum of 30 minutes to take the unit offline, however the 30 minute clock doesn't start until CEDM cooling has been lost for 10 minutes for a total time to shutdown of 40 minutes. Second part is correct.
C.	First part is correct. First part is plausible since the crew has a maximum of 30 minutes to take the unit offline, however the 30 minute clock doesn't start until CEDM cooling has been lost for 10 minutes for a total time to shutdown of 40 minutes.
D.	Correct.

Question Source:		New	
		Bank	
	X	Modified	
	X	Previous NRC Exam	Modified from 2013 RO Exam question

Cognitive Level:	X	Memory or Fundamental Knowledge
		Comprehension or Analysis

Level of Difficultly:	3
10CFR55.41:	9
Reference Provided:	N
Learning Objective:	56879 – Determine the required actions and time frames to protect plant equipment if a loss of CEDM Coolers exists

Examination Outline Cross-Reference:	Level	RO		SRO
K/A: Containment Spray: Ability to (a) predict the impacts of the following malfunctions or operations on the CCS; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: failure of spray pump	**Tier**	**2**		
	Group	**1**		
	K/A	**026 A2.04**		
	IR	**3.9**		

Question 35

Given the following conditions:

- Unit 3 tripped from 100% power due to an ESD inside Containment
- SIAS, CIAS, MSIS, and CSAS have all automatically actuated
- The Train ‘A’ Containment Spray Pump tripped immediately upon starting
- Train ‘B’ Containment Spray Header Isolation Valve, SIB-UV-671, failed to auto open and could NOT be opened from the control room or locally at the valve

Following SPTAs, the crew should transition to ___(1)___ and align the ___(2)___ to provide Containment Spray through the Train ‘A’ Containment Spray Header Isolation Valve, SIA-UV-672.

A. (1) 40EP-9EO05, Excess Steam Demand
(2) Train ‘A’ LPSI Pump

B. (1) 40EP-9EO05, Excess Steam Demand
(2) Train ‘B’ Containment Spray Pump

C. (1) 40EP-9EO09, Functional Recovery
(2) Train ‘A’ LPSI Pump

D. (1) 40EP-9EO09, Functional Recovery
(2) Train ‘B’ Containment Spray Pump

Proposed Answer:	C

Explanations:	
A.	First part is plausible since there is only one event in progress and ESD would normally be the correct EOP to enter, however with the loss of all containment spray, transition to the Functional Recovery procedure is required to align alternate CS. Second part is correct.
B.	First part is plausible since there is only one event in progress and ESD would normally be the correct EOP to enter, however with the loss of all containment spray, transition to the Functional Recovery procedure is required to align alternate CS. Second part is plausible since the CS Pumps are normally used to provide CS flow, however in this situation, the Train 'A' LPSI Pump is used to provide alternate CS flow.
C.	Correct.
D.	First part is correct. Second part is plausible since the CS Pumps are normally used to provide CS flow, however in this situation, the Train 'A' LPSI Pump is used to provide alternate CS flow.

Question Source:	X	New	
		Bank	
		Modified	
		Previous NRC Exam	

Cognitive Level:		Memory or Fundamental Knowledge
	X	Comprehension or Analysis

Level of Difficultly:	3
10CFR55.41:	7
Reference Provided:	N
Learning Objective:	56390 – Describe the requirements that must be satisfied in order to align a LPSI pump as a containment spray pump

Examination Outline Cross-Reference:	Level	RO		SRO
K/A: Main and Reheat Steam: Knowledge of the operational implications of the following concepts as they apply to MRSS: Bases for RCS cooldown limits	**Tier**	**2**		
	Group	**1**		
	K/A	**039 K5.05**		
	IR	**2.9**		

Question 36

Per 40DP-9AP09, SG Tube Rupture Technical Guideline, during a natural circulation cooldown with one SG isolated, the administrative cooldown rate limit is ___(1)___ to ensure ___(2)___ during the cooldown.

A. (1) 30°F/hr
(2) the heat removal capacity of a single SG is not exceeded

B. (1) 30°F/hr
(2) the two SGs do not become thermodynamically uncoupled

C. (1) 50°F/hr
(2) the heat removal capacity of a single SG is not exceeded

D. (1) 50°F/hr
(2) the two SGs do not become thermodynamically uncoupled

Proposed Answer:	B

Explanations:	
A.	First part is correct. Second part is plausible since only one SG is available to remove heat from the RCS via steaming and feeding, however the basis for this administrative limit is to maintain the SGs coupled.
B.	Correct.
C.	First part is plausible since the normal cooldown rate limit is 100°F/hr, and half the SGs available would logically result in half the cooldown rate, however the administrative cooldown rate during an asymmetrical natural circulation cooldown is 30°F/hr. Second part is plausible since only one SG is available to remove heat from the RCS via steaming and feeding, however the basis for this administrative limit is to maintain the SGs coupled.
D.	First part is plausible since the normal cooldown rate limit is 100°F/hr, and half the SGs available would logically result in half the cooldown rate, however the administrative cooldown rate during an asymmetrical natural circulation cooldown is 30°F/hr. Second part is correct.

Question Source:	X	New	
		Bank	
		Modified	
		Previous NRC Exam	

Cognitive Level:	X	Memory or Fundamental Knowledge
		Comprehension or Analysis

Level of Difficultly:	2	
10CFR55.41:	5	
Reference Provided:	N	
Learning Objective:	11239 – Describe how and at what rate the cooldown will be performed	

Examination Outline Cross-Reference:	Level	RO		SRO
K/A: Main Feedwater: Knowledge of the design feature(s) and/or interlocks which provide for the following: Automatic trips for MFW pumps	**Tier**	**2**		
	Group	**1**		
	K/A	**059 K4.16**		
	IR	**3.1**		

Question 37

Given the following conditions:

- Unit 3 is operating at 100% power
- MFP Suction Pressure on BOTH MFPs is 300 psig and lowering

By design, if MFP suction pressure continues to lower, the ___(1)___ will trip first, due to a ___(2)___ .

A. (1) ‘A’
(2) higher low suction pressure trip setpoint

B. (1) ‘A’
(2) shorter low suction pressure trip time delay

C. (1) ‘B’
(2) higher low suction pressure trip setpoint

D. (1) ‘B’
(2) shorter low suction pressure trip time delay

Proposed Answer:	D

Explanations:	
A.	First part is plausible since one pump will trip first, and A comes before B, however the 'B' MFP trips first. Second part is plausible since there is a design feature which causes one pump to trip before the other, and a more conservative setpoint would accomplish this objective, however the staggered trips are controlled via different length trip time delays.
B.	First part is plausible since one pump will trip first, and A comes before B, however the 'B' MFP trips first. Second part is correct.
C.	First part is correct. Second part is plausible since there is a design feature which causes one pump to trip before the other, and a more conservative setpoint would accomplish this objective, however the staggered trips are controlled via different length trip time delays.
D.	Correct.

Question Source:	**X**	**New**	
		Bank	
		Modified	
		Previous NRC Exam	

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

Level of Difficultly:	**3**	
10CFR55.41:	**4**	
Reference Provided:	**N**	
Learning Objective:	**74627 – Describe the conditions required to generate the following annunciator: FWPT Trip**	

Examination Outline Cross-Reference:	Level	RO		SRO
K/A: Auxiliary/Emergency Feedwater: Knowledge of conditions and limitations in the facility license	**Tier**	**2**		
	Group	**1**		
	K/A	**061 G 2.2.38**		
	IR	**3.6**		

Question 38

Per LCO 3.7.5, Auxiliary Feedwater System, in MODE 1, the AFW Pumps required to be OPERABLE are ___(1)___ .

During a shutdown, LCO 3.7.5 is no longer applicable AS SOON AS ___(2)___ .

A. (1) AFA-P01 and AFB-P01 ONLY
   (2) MODE 4 is entered

B. (1) AFA-P01 and AFB-P01 ONLY
   (2) SDC is placed in service

C. (1) AFA-P01, AFB-P01, AND AFN-P01
   (2) MODE 4 is entered

D. (1) AFA-P01, AFB-P01, AND AFN-P01
   (2) SDC is placed in service

Proposed Answer:	D

Explanations:	
A.	First part is plausible since AFN-P01 is the non-essential AFW Pump and is the only AFW Pump which does NOT get an auto start signal on an AFAS, however all three pumps are required to be operable in MODE 1. Second part is plausible since AFA-P01 is not required to be operable when MODE 4 is entered, however LCO 3.7.5 is applicable until SGs are no longer required for RCS heat removal.
B.	First part is plausible since AFN-P01 is the non-essential AFW Pump and is the only AFW Pump which does NOT get an auto start signal on an AFAS, however all three pumps are required to be operable in MODE 1. Second part is correct.
C.	First part is correct. Second part is plausible since AFA-P01 is not required to be operable when MODE 4 is entered, however LCO 3.7.5 is applicable until SGs are no longer required for RCS heat removal.
D.	Correct.

Question Source:	X	**New**	
		Bank	
		Modified	
		Previous NRC Exam	

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

Level of Difficultly:	**3**	
10CFR55.41:	**4**	
Reference Provided:	**N**	
Learning Objective:	**78323 – State the LCO for the Auxiliary Feedwater System**	

Examination Outline Cross-Reference:	Level	RO	[redacted]	SRO
K/A: AC Electrical Distribution: Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating the AC distribution system controls, including: Significance of D/G load limits	Tier	2	[redacted]	
	Group	1	[redacted]	
	K/A	062 A1.01		
	IR	3.4	[redacted]	

Question 39

Given the following conditions:

- Unit 3 is operating at 100% power
- The 'B' EDG is paralleled with the grid for a load run

Subsequently:

- A transient on the grid has just resulted in 'B' EDG loading rising to 5.8 MW and 3.2 MVAR

The crew must reduce ___(1)___ EDG loading within a MAXIMUM of 2 hours to prevent damage to the 'B' EDG due to ___(2)___ .

A. (1) MW
(2) overheating due to exceeding air intake and exhaust capabilities

B. (1) MW
(2) fire potential from gum and varnish deposits on the intake and exhaust valves

C. (1) MVAR
(2) overheating due to exceeding air intake and exhaust capabilities

D. (1) MVAR
(2) fire potential from gum and varnish deposits on the intake and exhaust valves

Proposed Answer:	A

Explanations:	
A.	Correct. The rated MW limit is 5.5 MW and the MVAR limit is based on MW loading. For 5.8 MW, the MVAR limit is 3.7 MVAR.
B.	First part is correct. Second part is plausible as this is a hazard for the EDG based on loading, however deposits on the intake and exhaust valves is a result of low loading on the EDG (< 25%).
C.	First part is plausible since 3.2 MVAR is the loading limit for the EDG when MW are above the rated load limit, however 3.2 MVAR is the limit when the EDG is at its 110% design limit of 6.05 MW. Second part is correct.
D.	First part is plausible since 3.2 MVAR is the loading limit for the EDG when MW are above the rated load limit, however 3.2 MVAR is the limit when the EDG is at its 110% design limit of 6.05 MW. Second part is plausible as this is a hazard for the EDG based on loading, however deposits on the intake and exhaust valves is a result of low loading on the EDG (< 25%).

Question Source:	X	**New**	
		Bank	
		Modified	
		Previous NRC Exam	

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

Level of Difficultly:	**3**	
10CFR55.41:	**8**	
Reference Provided:	**N**	
Learning Objective:	**75050 – Discuss the purpose and conditions under which the Diesel Generator System is designed to function**	

Examination Outline Cross-Reference:	Level	RO	[redacted]	SRO
K/A: DC Electrical Distribution: Knowledge of DC electrical system design feature(s) and/or interlock(s) which provide for the following: Manual/automatic transfers of control	Tier	2	[redacted]	
	Group	1	[redacted]	
	K/A	063 K4.01		
	IR	2.7	[redacted]	

Question 40

Unit 2 is preparing to remove the ‘E’ Battery Charger from service and align the ‘EF’ Battery Charger to NKN-M45 for preventative maintenance on the ‘E’ Battery Charger.

Per 40OP-9NK01, 125 VDC Non-Class 1E Electrical System, the PREFERRED method for aligning the ‘EF’ Battery Charger NKN-M45 is to ___(1)___ , and after the ‘EF’ Battery Charger is aligned to NKN-M45, it CANNOT simultaneously be aligned to NKN-M46 due to a ___(2)___ interlock.

A. (1) open the ‘E’ Battery Charger output breaker before closing the ‘EF’ Battery Charger output breaker
   (2) Kirk-Key

B. (1) open the ‘E’ Battery Charger output breaker before closing the ‘EF’ Battery Charger output breaker
   (2) Mechanical Bar

C. (1) Close the ‘EF’ Battery Charger output breaker before opening the ‘E’ Battery Charger output breaker
   (2) Kirk-Key

D. (1) Close the ‘EF’ Battery Charger output breaker before opening the ‘E’ Battery Charger output breaker
   (2) Mechanical Bar

Proposed Answer:	D

Explanations:	
A.	First part is plausible since the class chargers are not placed in parallel when putting the swing charger is service, but it is preferred to parallel the chargers before taking the off-going charging off line when shifting non-class chargers. Second part is plausible since a kirk-key interlock is used in some electrical applications in which both breakers cannot be simultaneously closed, however on the EF Charger, a mechanical bar interlock is used.
B.	First part is plausible since the class chargers are not placed in parallel when putting the swing charger is service, but it is preferred to parallel the chargers before taking the off-going charging off line when shifting non-class chargers. Second part is correct.
C.	First part is correct. Second part is plausible since a kirk-key interlock is used in some electrical applications in which both breakers cannot be simultaneously closed, however on the EF Charger, a mechanical bar interlock is used.
D.	Correct.

Question Source:	**X**	**New**	
		Bank	
		Modified	
		Previous NRC Exam	

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

Level of Difficultly:	**3**	
10CFR55.41:	**7**	
Reference Provided:	**N**	
Learning Objective:	**68077 – Explain the operation of the Non-Class Battery Chargers under normal operating conditions**	

Examination Outline Cross-Reference:	Level	RO	[redacted]	SRO
K/A: Emergency Diesel Generator: Knowledge of the effect of a loss or malfunction of the following will have on the EDG system: Fuel oil storage tanks	**Tier**	**2**	[redacted]	
	Group	**1**	[redacted]	
	K/A	**064 K6.08**		
	IR	**3.2**	[redacted]	

Question 41

Given the following conditions:

- The ‘A’ EDG is operating at rated load
- An auto makeup to the ‘A’ Fuel Oil Day Tank is in progress

Subsequently:

- The associated Fuel Oil Transfer Pump tripped
- The ‘A’ EDG Fuel Oil Day Tank level is currently 800 gallons

Approximately how much longer can the ‘A’ EDG continue to operate at rated load?

A. ~ 0.5 hours

B. ~ 1 hour

C. ~ 2 hours

D. ~ 4 hours

Proposed Answer:	C

Explanations:	
A.	Plausible if thought that the EDG consumes 25 gpm at rated load (800 gallons / 25 gpm = 32 minutes), however 25 gpm is the capacity of the Fuel Oil Transfer Pump, not fuel consumption at rated load.
B.	Plausible if thought that 800 gallons in the day tank could provide 2 hours total run time for both EDGs, thus could only provide 1 hour of operation for each EDG.
C.	Correct. At rated load, the EDG consumes ~ 6.55 gpm, therefore 800 gallons / 6.55 gpm = 122 minutes).
D.	Plausible if thought that 800 gallons could provide for each EDG to run for 2 hours, thus could provide a single EDG at rated load for 4 hours.

Question Source:		**New**	
		Bank	
	X	**Modified**	
	X	**Previous NRC Exam**	**Modified from 2016 RO Exam Q50**

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

Level of Difficultly:	3	
10CFR55.41:	8	
Reference Provided:	N	
Learning Objective:	**75052 – Describe how the Diesel Generator System is supported by the following systems: Diesel Fuel Oil and Transfer System**	

Examination Outline Cross-Reference:	Level	RO		SRO
K/A: Process Radiation Monitoring: Knowledge of the physical connections and/or cause-effect relationships between the PRM system and the following systems: Those systems served by PRMs	Tier	2		
	Group	1		
	K/A	073 K1.01		
	IR	3.6		

Question 42

Given the following conditions:

- Unit 2 is operating at 100% power
- Train ‘A’ Essential Cooling Water is supplying cooling water to NC priority loads following a complete loss of Nuclear Cooling Water

Subsequently:

- A small leak occurred in an RCP High Pressure Seal Cooler

In this condition, which of the following process radiation monitors will be able to detect the resultant activity?

1. RU-2, Train ‘A’ Essential Cooling Water
2. RU-3, Train ‘B’ Essential Cooling Water
3. RU-6, Nuclear Cooling Water

A. 1 ONLY

B. 1 and 2 ONLY

C. 1 and 3 ONLY

D. 1, 2, and 3

Proposed Answer:	A

Explanations:	
A.	Correct
B.	RU-3 is plausible if thought that the trains of Essential Cooling Water shared a common header, however when one train of EW is supplying priority loads, only the associated train will detect activity due to RCS leakage.
C.	Plausible since RU-2 will be able to detect activity from an RCS leak, and plausible that RU-6 is located upstream of the NC-EW cross-tie valves, however RU-6 is isolated when the cross-tie is performed.
D.	RU-2 is correct. RU-3 is plausible if thought that the trains of Essential Cooling Water shared a common header, however when one train of EW is supplying priority loads, only the associated train will detect activity due to RCS leakage, and plausible that RU-6 is located upstream of the NC-EW cross-tie valves, however RU-6 is isolated when the cross-tie is performed.

Question Source:		New	
	X	Bank	
		Modified	
		Previous NRC Exam	

Cognitive Level:		Memory or Fundamental Knowledge
	X	Comprehension or Analysis

Level of Difficultly:	3	
10CFR55.41:	11	
Reference Provided:	N	
Learning Objective:	66723 – Given a Radiation Monitor number and name, describe the purposes and sample points of the Radiation Monitors at PVNGS	

Examination Outline Cross-Reference:	Level	RO		SRO
K/A: Service Water: Knowledge of bus power supplies to the following: Service water pump	Tier	2		
	Group	1		
	K/A	076 K2.01		
	IR	2.7		

Question 43

The ‘A’ Plant Cooling Water Pump feeder breaker is located on…

A. NAN-S01

B. NAN-S02

C. NBN-S01

D. NBN-S02

Proposed Answer:	C

Explanations:	
A.	Plausible since a loss of NAN-S01 will result in a loss of the ‘A’ Plant Cooling Water Pump, however that is because NAN-S01 supplies power to NBN-S01, which is where the ‘A’ Plant Cooling Water Pump is powered from (directly)
B.	Plausible since a loss of NAN-S02 will result in a loss of power to the ‘B’ Plant Cooling Water Pump, and it could be thought that the PW Pumps are “cross-powered” like the Heater Drain Pumps, however the ‘A’ PW Pump is powered from NBN-S01.
C.	Correct.
D.	Plausible since PW Pumps are powered from NBN, however (unlike the Heater Drain Pumps), the ‘A’ PW Pump is powered from NBN-S01.

Question Source:	X	New	
		Bank	
		Modified	
		Previous NRC Exam	

Cognitive Level:	X	Memory or Fundamental Knowledge
		Comprehension or Analysis

Level of Difficultly:	2
10CFR55.41:	4
Reference Provided:	N
Learning Objective:	73544 – Describe the circuit paths of the Non-Class Distribution System

Examination Outline Cross-Reference:	Level	RO		SRO
K/A: Instrument Air: Knowledge of the physical connections and/or cause-effect relationships between the IAS system and the following systems: MSIV air	**Tier**	**2**		
	Group	**1**		
	K/A	**078 K1.05**		
	IR	**3.4**		

Question 44

Given the following conditions:

- Unit 2 is operating at 100% power
- An Instrument Air rupture has occurred just downstream of the IA compressors
- IA pressure is at atmospheric pressure throughout the system
- The nitrogen backup supply valve has failed closed

Based on these conditions, the Main Steam Isolation Valves will…

A. slow close due to the loss of IA

B. fast close due to the loss of IA

C. remain open and can only be slow closed

D. remain open and can only be fast closed

Proposed Answer:	D

Explanations:	
A.	Plausible that the MSIVs would fail closed as this is the fail safe position, and the valves are stoked open in slow speed and can be closed in slow speed, however the MSIVs remain open on a loss of instrument air
B.	Plausible that the MSIVs would fail closed as this is the fail safe position, and the valves are normally closed in fast speed, however the MSIVs remain open on a loss of instrument air.
C.	Plausible since the MSIVs will remain open, however slow close is not available on a loss of instrument air.
D.	Correct.

Question Source:		New	
	X	Bank	
		Modified	
	X	Previous NRC Exam	2016 NRC Exam Q54

Cognitive Level:		Memory or Fundamental Knowledge
	X	Comprehension or Analysis

Level of Difficultly:	3	
10CFR55.41:	4	
Reference Provided:	N	
Learning Objective:	56751 – Determine the major effects on plant operation as instrument air pressure degrades	

Examination Outline Cross-Reference:	Level	RO		SRO
K/A: Containment: Ability to monitor automatic operation of the containment system, including: Containment isolation	Tier	2		
	Group	1		
	K/A	103 A3.01		
	IR	3.9		

Question 45

Given the following conditions:

- Unit 3 was manually tripped from 100% power due to an ESD inside Containment
- Current plant conditions are as follows:
  - Pressurizer level is 15% and lowering
  - Pressurizer pressure is 1900 psia and lowering
  - SG #1 level is 10% NR and rising
  - SG #2 level is 50% WR and lowering
  - SG #1 pressure is 1100 psia and rising
  - SG #2 pressure is 1000 psia and lowering
  - Containment pressure is 5 psig and rising

Based on current plant conditions, which of the following Containment Isolation Valves should be closed?

1. SG Blowdown Containment Isolation Valve, SGA-UV-500P
2. NC Containment Downstream Return Header Isolation Valve, NCA-UV-402
3. Regenerative Heat Exchanger Outlet Isolation Valve, CHB-UV-523

A. 1 and 2 ONLY

B. 1 and 3 ONLY

C. 2 and 3 ONLY

D. 1, 2, and 3

Proposed Answer:	B

Explanations:	
A.	1 is correct. 2 is plausible since CIAS has actuated (CIAS is “Phase A” at PVNGS), however the NC CIVs do not close until Phase B CI is actuated (CSAS is “Phase B” at PVNGS). CSAS does not actuate until 8.5 psia in containment.
B.	Correct.
C.	3 is correct. 2 is plausible since CIAS has actuated (CIAS is “Phase A” at PVNGS), however the NC CIVs do not close until Phase B CI is actuated (CSAS is “Phase B” at PVNGS). CSAS does not actuate until 8.5 psia in containment.
D.	1 and 3 are correct. 2 is plausible since CIAS has actuated (CIAS is “Phase A” at PVNGS), however the NC CIVs do not close until Phase B CI is actuated (CSAS is “Phase B” at PVNGS). CSAS does not actuate until 8.5 psia in containment.

Question Source:	**X**	**New**	
		Bank	
		Modified	
		Previous NRC Exam	

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

Level of Difficultly:	**3**	
10CFR55.41:	**9**	
Reference Provided:	**N**	
Learning Objective:	**77167 – Describe what automatically initiates the CIAS and its function**	

Examination Outline Cross-Reference:	Level	RO		SRO
K/A: RCS Overcooling: Ability to evaluate plant performance and make operational judgments based on operating characteristics, reactor behavior, and instrument interpretation	**Tier**	**1**		
	Group	**2**		
	K/A	**CE A11 G 2.1.7**		
	IR	**4.4**		

Question 46

Per PVNGS EOP Operations Expectations, following an ESD, dryout is declared as soon as…

A. RCS pressure begins to rise

B. RCS temperatures begin to rise

C. Affected SG level indicates 0% wide range

D. Affected SG pressure lowers to atmospheric pressure

Proposed Answer:	B

Explanations:	
A.	Plausible as a rising RCS pressure could indicate that the decay heat in the RCS exceeds the heat removal due to the ESD, however per EOP Ops Expectations, dryout is declared when RCS temperatures begin to rise.
B.	Correct.
C.	Plausible as 0% WR indicates a complete loss of indicated inventory, however dryout is declared when RCS temperatures begin to rise.
D.	Plausible since steam leaking from the SG will effectively be zero when pressure is equalized with outside pressure (either outside pressure or containment pressure), and thus stop forcibly removing heat via the steam leak, however dryout is declared when RCS temperatures begin to rise.

Question Source:	X	New	
		Bank	
		Modified	
		Previous NRC Exam	

Cognitive Level:	X	Memory or Fundamental Knowledge
		Comprehension or Analysis

Level of Difficultly:	2	
10CFR55.41:	5	
Reference Provided:	N	
Learning Objective:	11204 – Analyze plant parameters to detect plant temperature rebound	

Examination Outline Cross-Reference:	Level	RO		SRO
K/A: Emergency Boration: Knowledge of the operational implications of the following concepts as they apply to emergency boration: Relationship between boron addition and change in Tave	Tier	1		
	Group	2		
	K/A	024 AK1.01		
	IR	3.4		

Question 47

Given the following conditions:

- Unit 1 is operating at 100% power
- Current core conditions are as follows:
  - 250 EFPD
  - RCS Boron concentration is 825 ppm
  - RCS Tavg is 587°F

Subsequently:

- Chemistry reported that RCS boron concentration is 20 ppm less than expected based on the previous sample
- The CRS directs the crew to perform an emergency boration of 500 gallons per 40AO-9ZZ01, Emergency Boration, to raise RCS boron concentration
- Turbine load will be reduced to keep Tcold on program

Following the boration and associated load reduction, the crew should expect Reactor power to be approximately ___(1)___ and Tave to be ___(2)___ than 587°F.

A. (1) 91%
   (2) lower

B. (1) 91%
   (2) higher

C. (1) 97%
   (2) lower

D. (1) 97%
   (2) higher

Proposed Answer:	A

Explanations:	
A.	Correct. 500 gallons / 53 gallons/1% = 9.4%.
B.	First part is correct. Second part is plausible since Tcold rises as power is lowered, however since Thot lowers at a faster rate than Tcold as power is lowered, Tavg will lower.
C.	First part is plausible if the gallons/ 1% power change for boron is confused with the gallons/ 1% power change for dilution. Second part is correct.
D.	First part is plausible if the gallons/ 1% power change for boron is confused with the gallons/ 1% power change for dilution. Second part is plausible since Tcold rises as power is lowered, however since Thot lowers at a faster rate than Tcold as power is lowered, Tavg will lower.

Question Source:	**X**	**New**	
		Bank	
		Modified	
		Previous NRC Exam	

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

Level of Difficultly:	**2**	
10CFR55.41:	**1**	
Reference Provided:	**N**	
Learning Objective:	**10009 – Calculate the required boration or dilution using a power change worksheet**	

Examination Outline Cross-Reference:	Level	RO		SRO
K/A: Loss of the Intermediate Range Nuclear Instrumentation: Knowledge of the reasons for the following responses as they apply to the Loss of the Intermediate Range Nuclear Instrumentation: Termination of the startup following loss of intermediate range instrumentation	Tier	1		
	Group	2		
	K/A	033 AK3.01		
	IR	3.2		

Question 48

Given the following conditions:

- Unit 1 is making preparations to commence a reactor startup per 40OP-9ZZ03, Reactor Startup, following a short notice outage
- The unit was maintained in MODE 4 during the shutdown
- Startup Channel NI #1 has just failed high, rendering it inoperable

With Startup Channel NI #1 inoperable, what is the impact, if any, to the Reactor startup?

Per 40OP-9ZZ03, Reactor Startup, the Reactor startup ___(1)___ commence because a MINIMUM of ___(2)___ in order to commence the startup.

A. (1) can NOT
(2) TWO channels of BDAS are required to be operable

B. (1) can NOT
(2) FOUR channels of Log Power High trip bistables are required to be operable

C. (1) CAN
(2) ONE channel of BDAS is required to be operable

D. (1) CAN
(2) THREE channels of Log Power High trip bistables are required to be operable

Proposed Answer:	A

Explanations: **The intent of the KA is met here by asking what would prevent the startup from commencing rather than terminating since at PVNGS, a loss of a startup or safety channel NI during the startup does not require the startup to be terminated (although it likely would be). The only NI failure which would impact the startup is the failure of a startup NI prior to commencing the startup, which is why we asked the question in this fashion.**

A.	Correct.
B.	Plausible since four channels of log power high trip bistables are required in MODE 4, however since the unit was never taken down to MODE 5, entry into MODE 2 is still allowed prior to the channel being restored to operable. Additionally, the startup channel is used for BDAS, the safety channel NIs are used for the high log power trips.
C.	Plausible since there are redundant channels of BDAS, however both channels of BDAS are required to be operable. Also plausible since a failure of a single safety channel NI would not prevent the startup from commencing, however the failure of a single startup channel NI does prevent the startup from commencing.
D.	Plausible since the failure of one channel of high log power would not prevent the startup from commencing, however the startup channel NI is used for BDAS, not high log power trips.

Question Source:	X	New	
		Bank	
		Modified	
		Previous NRC Exam	

Cognitive Level:		Memory or Fundamental Knowledge
	X	Comprehension or Analysis

Level of Difficultly:	4	
10CFR55.41:	2	
Reference Provided:	N	
Learning Objective:	60641 – Describe the actions required if a Startup Channel fails during a Reactor Startup	

Examination Outline Cross-Reference:	Level	RO		SRO
K/A: Accidental Liquid Radwaste Release: Ability to determine and interpret the following as they apply to Accidental Liquid Radwaste Release: The occurrence of automatic safety actions as a result of high PRM signal	Tier	1		
	Group	2		
	K/A	059 AA2.05		
	IR	3.6		

Question 49

Given the following conditions:

- Unit 3 is operating at 100% power
- The Evaporator is running
- The Aux Steam Cross-Tie Header is out of service

Subsequently:

- A SGTL develops on SG #2

The FIRST Radwaste System Process Radiation Monitor which will detect the increase in radiation due to the SGTL is ___(1)___ which will cause an automatic ___(2)___ .

A. (1) RU-12, Waste Gas Decay Tank Discharge Monitor
   (2) closure of the Waste Gas Discharge Valves

B. (1) RU-12, Waste Gas Decay Tank Discharge Monitor
   (2) closure of Aux Steam Condensate Receiver Tank Outlet Valves

C. (1) RU-7, Aux Steam Condensate Receiver Tank Inlet Monitor
   (2) diversion of condensate to the Liquid Radwaste System

D. (1) RU-7, Aux Steam Condensate Receiver Tank Inlet Monitor
   (2) diversion of Aux Steam to the Gaseous Radwaste System

Proposed Answer:	C

Explanations: **Since there are no Rad Monitors in any liquid radwaste storage tanks, the diversion of condensate (triggered by a RM auto function) to the radwaste system is the closest we can come to matching this KA.**	
A.	Plausible that RU-12 would detect the radiation from the SGTL if thought that the steam from the upper section of the evaporator vents to the Waste Gas Decay Tanks, and high radiation on RU-12 does close the Waste Gas Discharge Valves, however the radiation from the SGTL will be detected on RU-7.
B.	Plausible that RU-12 would detect the radiation from the SGTL if thought that the steam from the upper section of the evaporator vents to the Waste Gas Decay Tanks, and it is plausible that high radiation on RU-12 would close the Aux Steam Condensate Receiver Tank Outlet Valves to prevent further contamination of the secondary plant, however the radiation from the SGTL will be detected on RU-7.
C.	Correct.
D.	RU-7 is the first radwaste PRM which will sense the increasing radiation from the SGTL, and it is plausible that the contaminated aux steam would be sent to the Gaseous Radwaste System, however RU-7 does not automatically re-route the aux steam to the GRS.

Question Source:	X	**New**	
		Bank	
		Modified	
		Previous NRC Exam	

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

Level of Difficultly:	3	
10CFR55.41:	11	
Reference Provided:	N	
Learning Objective:	**78948 – Describe the process flowpaths and components of the Liquid Radwaste Evaporator subsystem**	

Examination Outline Cross-Reference:	Level	RO	[redacted]	SRO
K/A: Pressurizer Level Control Malfunction: Ability to predict and/or monitor the following as they apply to the Pressurizer Level Control Malfunction: Regenerative heat exchanger and temperature limits	**Tier**	**1**	[redacted]	
	Group	**2**	[redacted]	
	K/A	**028 AA1.04**		
	IR	**2.7**	[redacted]	

Question 50

Given the following conditions:

- Unit 2 is operating at 100% power
- A failure of the selected Pressurizer Level Control Channel has resulted in rising letdown flow

Letdown will auto isolate on high temperature by closing Letdown to Regen HX Isolation Valve ___(1)___ if temperature at the outlet of the Regenerative Heat Exchanger rises to a MINIMUM of ___(2)___ .

A. (1) CHB-UV-515
(2) 395°F

B. (1) CHB-UV-515
(2) 413°F

C. (1) CHA-UV-516
(2) 395°F

D. (1) CHA-UV-516
(2) 413°F

Proposed Answer:	B

Explanations:	
A.	First part is correct. Second part is plausible since 395°F will actuate the Regenerative HX Outlet Temp HI alarm, however letdown isolates at 413°F.
B.	Correct.
C.	First part is plausible since CHA-UV-516 will auto isolate letdown, however it auto closes on a SIAS or CIAS, not on a high temperature. Second part is plausible since 395°F will actuate the Regenerative HX Outlet Temp HI alarm, however letdown isolates at 413°F.
D.	First part is plausible since CHA-UV-516 will auto isolate letdown, however it auto closes on a SIAS or CIAS, not on a high temperature. Second part is correct.

Question Source:	X	New	
		Bank	
		Modified	
		Previous NRC Exam	

Cognitive Level:	X	Memory or Fundamental Knowledge
		Comprehension or Analysis

Level of Difficultly:	3	
10CFR55.41:	10	
Reference Provided:	N	
Learning Objective:	65886 – Describe the automatic functions associated with the Letdown Isolation Valves	

Examination Outline Cross-Reference:	Level	RO		SRO
K/A: High Reactor Coolant Activity: Knowledge of the interrelations between the High Reactor Coolant Activity and the following: Process radiation monitors	Tier	1		
	Group	2		
	K/A	076 AK2.01		
	IR	2.6		

Question 51

While operating at power, high reactor coolant activity indicative of potential fuel cladding failure is primarily monitored by ___(1)___ and a high alarm on this RM ___(2)___ automatically isolate letdown.

A. (1) Primary Coolant Activity Monitors, RU-150/151
   (2) WILL

B. (1) Primary Coolant Activity Monitors, RU-150/151
   (2) will NOT

C. (1) Reactor Coolant Letdown Line Radiation Monitor, RU-155D
   (2) WILL

D. (1) Reactor Coolant Letdown Line Radiation Monitor, RU-155D
   (2) will NOT

Proposed Answer:	D

Explanations:	
A.	First part is plausible since RU-150/151 do monitor the activity levels of the RCS, however their primary function is to do so during post-accident conditions. Second part is plausible since high activity in the RCS would cause high radiation levels in the aux building, which would be mitigated by letdown isolating, however letdown does not auto isolate due to high RCS activity.
B.	First part is plausible since RU-150/151 do monitor the activity levels of the RCS, however their primary function is to do so during post-accident conditions. Second part is correct.
C.	First part is correct. Second part is plausible since high activity in the RCS would cause high radiation levels in the aux building, which would be mitigated by letdown isolating, however letdown does not auto isolate due to high RCS activity.
D.	Correct.

Question Source:	X	New	
		Bank	
		Modified	
		Previous NRC Exam	

Cognitive Level:	X	Memory or Fundamental Knowledge
		Comprehension or Analysis

Level of Difficultly:	2	
10CFR55.41:	11	
Reference Provided:	N	
Learning Objective:	67128 – Explain the operation of the Process Radiation Monitors under normal operating conditions	

Examination Outline Cross-Reference:	Level	RO		SRO
K/A: Excess RCS Leakage: Knowledge of the operational implications of the following concepts as they apply to Excessive RCS Leakage: Annunciators and conditions, indicating signals, and remedial actions associated with the Excess RCS Leakage	Tier	1		
	Group	2		
	K/A	CE A16 AK1.3		
	IR	3.2		

Question 52

Given the following conditions:

- Unit 2 is operating at 100% power
- At time = 1200, 3A10B, LD PROCESS MON TRBL, went into alarm
  - RJ Point ID CHFS204, Letdown Radiation Monitor Outlet Flow Hi-Lo, is indicating 0 gpm
- At time = 1202, the Aux Building Operator reports a ~ 10 gpm leak at the in-service Backpressure Control Valve

Per the 3A10B Alarm Response Procedure, the crew must close CHB-UV-515, Letdown Regen HX Isolation Valve, within a MAXIMUM of ___(1)___ minutes, and the leakage from the Backpressure Control Valve ___(2)___ considered RCS LEAKAGE per Technical Specifications.

A. (1) 10
   (2) IS

B. (1) 10
   (2) is NOT

C. (1) 20
   (2) IS

D. (1) 20
   (2) is NOT

Proposed Answer:	**B**

Explanations:	
A.	First part is correct. Second part is plausible since it is reactor coolant leaking into the Aux Building, however for the purpose of determining TS RCS leakage, the leak is NOT considered RCS leakage.
B.	Correct.
C.	First part is plausible as 20 minutes is the time limit for closing CHB-UV-515 during a control room fire (per the Time Critical Action Catalog), however for a letdown line leak, 10 minutes is the time requirement for closing UV-515. Second part is plausible since it is reactor coolant leaking into the Aux Building, however for the purpose of determining TS RCS leakage, the leak is NOT considered RCS leakage.
D.	First part is plausible as 20 minutes is the time limit for closing CHB-UV-515 during a control room fire (per the Time Critical Action Catalog), however for a letdown line leak, 10 minutes is the time requirement for closing UV-515. Second part is correct.

Question Source:	**X**	**New**	
		Bank	
		Modified	
		Previous NRC Exam	

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

Level of Difficultly:	**4**	
10CFR55.41:	**10**	
Reference Provided:	**N**	
Learning Objective:	**10167 – Given a description of an RCS “leak” state whether or not this is considered RCS leakage**	

Examination Outline Cross-Reference:	Level	RO		SRO
K/A: Control Room Evacuation: Knowledge of the interrelationships between the Control Room Evacuation and the following: Auxiliary shutdown panel layout	Tier	1		
	Group	2		
	K/A	068 AK2.01		
	IR	3.9		

Question 53

Which of the following ESFAS actuations can be DIRECTLY actuated from the Remote Shutdown Panels?

1. AFAS
2. MSIS
3. SIAS

A. 1 ONLY

B. 2 ONLY

C. 1 and 3 ONLY

D. 2 and 3 ONLY

Proposed Answer:	B

Explanations:	
A.	Plausible since auxiliary feedwater is the ultimate source of core heat removal, and MSIS is directed to be actuated for a control room fire (but not for a shutdown from outside of the control room), and SIAS not being able to be actuated from the RSP is correct.
B.	Correct.
C.	Plausible since controls are available for SITs as well as AFA-P01 at the RSP (which are actuated by SIAS and AFAS), however only MSIS can be actuated from the RSP. Also plausible that MSIS would NOT be able to be actuated from the RSP since the Control Room Fire AOP directs manually initiating MSIS prior to exiting the control room (therefore you wouldn't need to be able to actuate from the RSP), however the Shutdown Outside the Control Room AOP does not direct MSIS to be actuated prior to leaving.
D.	Plausible since MSIS and SIAS would be the major mitigating actuations for a large energy release, and MSIS can be actuated from the RSP, however SIAS cannot.

Question Source:	X	New	
		Bank	
		Modified	
		Previous NRC Exam	

Cognitive Level:	X	Memory or Fundamental Knowledge
		Comprehension or Analysis

Level of Difficultly:	3	
10CFR55.41:	7	
Reference Provided:	N	
Learning Objective:	11131 – State the components that can be operated from the Remote Shutdown Panel	

Examination Outline Cross-Reference:	Level	RO		SRO
K/A: Loss of Forced Circulation/LOOP/Blackout: (multi-unit license) Ability to explain the variations in control board/control room layouts, systems, instrumentation, and procedural actions between units at a facility	Tier	1		
	Group	2		
	K/A	CE E13 G 2.2.4		
	IR	3.6		

Question 54

Given the following conditions:

- All 3 units have tripped due to a loss of offsite power
- Unit 2 had a failure of both EDGs and is in a blackout condition
- An SBOG has been aligned to Unit 2 and is powering PBA-S03

If either or both of the other units were to also experience a blackout condition, what SBOG alignments, if any, are procedurally allowed?

A. No additional units can be powered from an SBOG while Unit 2 is being powered from an SBOG

B. ONLY Unit 1 can be powered from an SBOG while Unit 2 is being powered from an SBOG

C. ONLY Unit 3 can be powered from an SBOG while Unit 2 is being powered from an SBOG

D. Both Units 1 and 3 can be powered from an SBOG while Unit 2 is being powered from an SBOG

Proposed Answer:	B

Explanations:	
A.	Plausible since loading on a single SBOG is limited to only slightly more than needed coping loads, however two Units can be powered from an SBOG simultaneously.
B.	Correct.
C.	Plausible since two units can be simultaneously powered from an SBOG, however Units 2 and 3 cannot be simultaneously powered from an SBOG due to the line losses in the cabling that would be required for this alignement.
D.	Plausible that all 3 units could be powered from the SBOGs since multiple units can be powered from the SBOGs, however only units 1 and 2 or units 1 and 3 can be powered at the same time.

Question Source:	X	New	
		Bank	
		Modified	
		Previous NRC Exam	

Cognitive Level:	X	Memory or Fundamental Knowledge
		Comprehension or Analysis

Level of Difficultly:	2	
10CFR55.41:	10	
Reference Provided:	N	
Learning Objective:	56332 – Describe what units can be energized by the GTGs	

Examination Outline Cross-Reference:	Level	RO		SRO
K/A: Reactor Coolant Pump: Ability to (a) predict the impacts of the following malfunctions or operations on the RCPS; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: problems with RCP seals, especially rates of seal leak-off	Tier	2		
	Group	1		
	K/A	003 A2.01		
	IR	3.5		

Question 55

Given the following conditions:

- Unit 3 is operating at 100% power
- The following indications are present on RCP 1B:
  - Seal 2 Inlet Pressure is 2100 psig
  - Seal 2 Outlet Pressure is 300 psig
  - Controlled Bleedoff Flow is 10 gpm

Per 40AO-9ZZ04, RCP Emergencies, the crew should ___(1)___ due to ___(2)___ .

A. (1) immediately trip the Reactor
(2) failures of Seal 1 and Seal 3

B. (1) immediately trip the Reactor
(2) excessive Controlled Bleedoff Flow

C. (1) commence a controlled plant shutdown
(2) failures of Seal 1 and Seal 3

D. (1) commence a controlled plant shutdown
(2) excessive Controlled Bleedoff Flow

Proposed Answer:	B

Explanations:	
A.	First part is correct. Second part is plausible since seals 1 and 3 are failed, however the required action for two failed seals is to commence a controlled shutdown which would not be the correct action in this situation.
B.	Correct.
C.	First part is plausible as this is the correct action for two failed seals, and two seals are failed in the provided conditions, however a reactor trip is required due to bleedoff flow > 9.5 gpm. Second part is plausible since seals 1 and 3 are failed, however the required action for two failed seals is to commence a controlled shutdown which would not be the correct action in this situation.
D.	First part is plausible as this is the correct action for two failed seals, and two seals are failed in the provided conditions, however a reactor trip is required due to bleedoff flow > 9.5 gpm. Second part is correct.

Question Source:	X	New	
		Bank	
		Modified	
		Previous NRC Exam	

Cognitive Level:		Memory or Fundamental Knowledge
	X	Comprehension or Analysis

Level of Difficultly:	3	
10CFR55.41:	3	
Reference Provided:	N	
Learning Objective:	12083 – Given RCP seal staging pressures, determine the required actions per 40AO-9ZZ04, RCP Emergencies	

Examination Outline Cross-Reference:	Level	RO	[redacted]	SRO
K/A: Reactor Coolant: Knowledge of the operational implications of the following concepts as they apply to the RCS: Why PZR level should be kept within the program band	Tier	2	[redacted]	
	Group	2	[redacted]	
	K/A	002 K5.08		
	IR	3.4	[redacted]	

Question 56

What is the basis for the Pressurizer level control band of 33-53% while AT POWER?

The low end of the band is set high enough to ensure ___(1)___ and the high end of the band is set low enough to ensure ___(2)___ .

A. (1) the Pressurizer heaters remain covered
(2) the Main and Auxiliary Spray nozzle is not submerged

B. (1) the Pressurizer heaters remain covered
(2) the proportional heaters can heat the water mass enough to maintain 2250 psia

C. (1) Pressurizer pressure does not lower to the SIAS setpoint on an uncomplicated Reactor trip
(2) the Main and Auxiliary Spray nozzle is not submerged

D. (1) Pressurizer pressure does not lower to the SIAS setpoint on an uncomplicated Reactor trip
(2) the proportional heaters can heat the water mass enough to maintain 2250 psia

Proposed Answer:	A

Explanations:	
A.	Correct.
B.	First part is correct. Second part if plausible since only the proportional heaters are normally used to maintain pressure while at power, and a larger water mass in the pressurizer could require more or larger heaters to maintain 2250 psia, however this is not the basis for 53%.
C.	Plausible that a minimum level of 33% will prevent reaching the SIAS setpoint on an uncomplicated trip since the Pressurizer pressure bottoms out at a lower pressure from a lower starting level at the same power level, however this is not the design basis for 33%. Second part is correct.
D.	Plausible that a minimum level of 33% will prevent reaching the SIAS setpoint on an uncomplicated trip since the Pressurizer pressure bottoms out at a lower pressure from a lower starting level at the same power level, however this is not the design basis for 33%. Second part if plausible since only the proportional heaters are normally used to maintain pressure while at power, and a larger water mass in the pressurizer could require more or larger heaters to maintain 2250 psia, however this is not the basis for 53%.

Question Source:		New	
	X	Bank	
		Modified	
	X	Previous NRC Exam	2016 NRC Exam Q 56

Cognitive Level:	X	Memory or Fundamental Knowledge
		Comprehension or Analysis

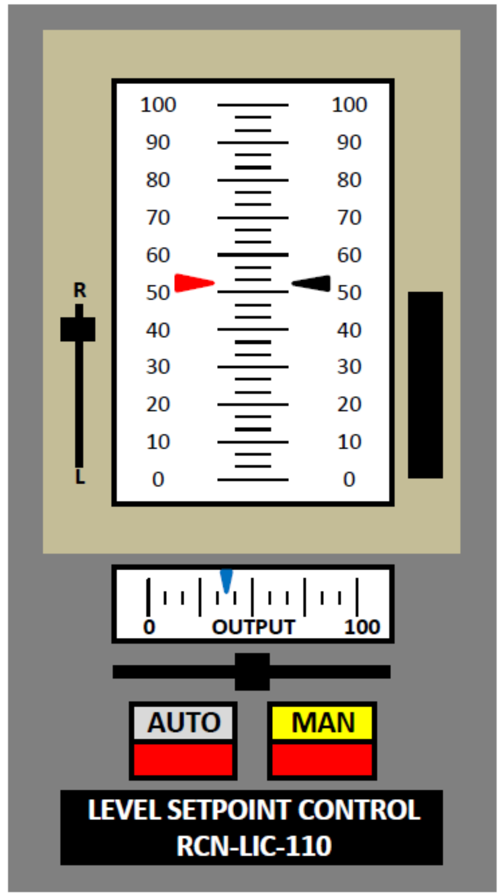
Level of Difficultly:	2	
10CFR55.41:	5	
Reference Provided:	N	
Learning Objective:	66871 – Explain the design basis of the RCS components including: Pressurizer	

Examination Outline Cross-Reference:	Level	RO	[redacted]	SRO
K/A: Pressurizer Level Control: Knowledge of the effect of a loss or malfunction of the following will have on the PZR LCS: Function of PZR level gauges as post-accident monitors	Tier	2	[redacted]	
	Group	2	[redacted]	
	K/A		011 K6.05	
	IR	3.1	[redacted]	

Question 57

Given the following conditions:

- Unit 1 is operating at 100% power
- Pressurizer Level Setpoint Controller, RCN-LIC-110, is aligned as seen to the right
- Level Control Channel X/Y Selector, RCN-HS-110, is selected to Channel X
- Charging Pump Mode Selector, CHN-HS-4, is in the 1-2-3 position
- All Charging Pumps are in the auto after-stop green flagged position



Subsequently:

- Level Control Channel X, RCA-LI-110X, failed to 0%

With NO operator action, the ‘E’ Charging Pump will ___(1)___ and the in-service Letdown Control Valve ___(2)___ modulate in response to the Level Control Channel failure.

A. (1) auto start
(2) WILL

B. (1) auto start
(2) will NOT

C. (1) remain off
(2) WILL

D. (1) remain off
(2) will NOT

Proposed Answer:	B

Explanations: **RCA-LI-110X is a post-accident monitoring level instrument and it's failure is impacting level control to match the KA**	
A.	First part is correct. Second part is plausible since pressurizer level setpoint will be ~ 53% higher than the selected level transmitter, however with LIC-110 in MANUAL, the letdown flow control valve will not modulate automatically.
B.	Correct.
C.	First part is plausible since LIC-110 is in MANUAL, and level deviations between setpoint and indicated level feed the charging pump start bistable circuitry, however the start signal for the standby charging pump does not come from LIC-110. Second part is plausible since pressurizer level setpoint will be ~ 53% higher than the selected level transmitter, however with LIC-110 in MANUAL, the letdown flow control valve will not modulate automatically.
D.	First part is plausible since LIC-110 is in MANUAL, and level deviations between setpoint and indicated level feed the charging pump start bistable circuitry, however the start signal for the standby charging pump does not come from LIC-110. Second part is correct.

Question Source:	X	**New**	
		Bank	
		Modified	
		Previous NRC Exam	

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

Level of Difficultly:	3	
10CFR55.41:	7	
Reference Provided:	N	
Learning Objective:	**75122 – Describe the response of the PLCS to a failure of a Pressurizer Level Transmitter**	

Examination Outline Cross-Reference:	Level	RO		SRO
K/A: Rod Position Indication: Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating the RPIS controls, including: Axial and radial power distribution	**Tier**	**2**		
	Group	**2**		
	K/A	**014 A1.04**		
	IR	**3.5**		

Question 58

(1) Per 40OP-9ZZ05, Power Operations, during a power descension from 100% to 80% ASI should be monitored using CPC Point ID…

(2) B05A alarm window 5A12B, CPC AUX PRE-TRIP, will annunciate AS SOON AS ASI goes outside the band of…

A. (1) 0187
(2) -0.18 to 0.17

B. (1) 0187
(2) -0.45 to 0.45

C. (1) 0266
(2) -0.18 to 0.17

D. (1) 0266
(2) -0.45 to 0.45

Proposed Answer:	B

Explanations:	
A.	First part is correct. Second part is plausible since -0.18 to 0.17 is the required band for ASI when COLSS is operable, however the pre-trip alarm for ASI comes in if ASI exceeds -0.45 to 0.45.
B.	Correct.
C.	First part is plausible since CPC point ID 0266 is used when the sum of the excores is less than 51% on a power ascension and less than 45% on a power descension, however on a down power from 100% to 80%, only CPC point ID 0187 would be used to monitor ASI. Second part is plausible since -0.18 to 0.17 is the required band for ASI when COLSS is operable, however the pre-trip alarm for ASI comes in if ASI exceeds -0.45 to 0.45.
D.	First part is plausible since CPC point ID 0266 is used when the sum of the excores is less than 51% on a power ascension and less than 45% on a power descension, however on a down power from 100% to 80%, only CPC point ID 0187 would be used to monitor ASI. Second part is correct.

Question Source:	X	New	
		Bank	
		Modified	
		Previous NRC Exam	

Cognitive Level:	X	Memory or Fundamental Knowledge
		Comprehension or Analysis

Level of Difficultly:	3	
10CFR55.41:	7	
Reference Provided:	N	
Learning Objective:	78309 – Describe the Control Room indications associated with the CPCs	

Examination Outline Cross-Reference:	**Level**	**RO**		**SRO**
K/A: Steam Dump/Turbine Bypass Control: Knowledge of SDS design feature(s) and/or interlock(s) which provide for the following: Reactor trip	**Tier**	**2**		
	Group	**2**		
	K/A	**041 K4.17**		
	IR	**3.7**		

Question 59

Which of the following describes the INITIAL Steam Bypass Control System response to a spurious Reactor trip from 100% power?

A. All eight SBCS valves will quick open

B. ONLY the Group X SBCS valves will quick open

C. ONLY the Group Y SBCS valves will quick open

D. None of the SBCS valves will quick open

Proposed Answer:	B

Explanations:	
A.	Plausible that all 8 valves will quick open since a full load rejection has occurred and steam will need to diverted quickly, however only the Group X valves will receive a quick open signal.
B.	Correct.
C.	Plausible since only 4 valves will receive a quick open signal on a Reactor trip from 100% power, however it is the Group X valves that will quick open.
D.	Plausible that a quick open signal would be blocked on all 8 SBCS valves since a full load rejection is a significant transient and following it immediately with another large transient could place significant opposing stresses on plant equipment, however four of the SBCS valves will quick open to accept the steam from the load rejection.

Question Source:		**New**	
	X	**Bank**	
		Modified	
		Previous NRC Exam	

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

Level of Difficultly:	**2**	
10CFR55.41:	**6**	
Reference Provided:	**N**	
Learning Objective:	**65683 – Describe how the SBCS generates a quick open signal including: Quick Open Block**	

Examination Outline Cross-Reference:	**Level**	**RO**		**SRO**
K/A: Containment Iodine Removal: Knowledge of the physical connections and/or cause-effect relationships between the CIRS system and the following systems: CSS	**Tier**	**2**		
	Group	**2**		
	K/A	**027 K1.01**		
	IR	**3.4**		

Question 60

What chemical is stored on the 80' level of Containment to aid in mitigating a LOCA inside Containment and what function does this chemical perform?

___(1)___ is stored in the 80' level of Containment in order to ___(2)___ following a RAS actuation.

A. (1) Charcoal
   (2) prevent boric acid precipitation in the Containment Spray nozzles

B. (1) Charcoal
   (2) aid the Containment Spray system to maintain iodine in solution

C. (1) Trisodium Phosphate
   (2) prevent boric acid precipitation in the Containment Spray nozzles

D. (1) Trisodium Phosphate
   (2) aid the Containment Spray system to maintain iodine in solution

Proposed Answer:	**D**

Explanations:	
A.	Plausible that charcoal would be used in the containment floor as charcoal is used in water filters to filter out particulate, which would make sense in order to prevent boron precipitation from clogging spray nozzles, however TSP is used and is used to keep iodine in solution.
B.	Plausible that charcoal would be used as it is used in containment ventilation to filter iodine, however TSP is used to keep iodine in solution.
C.	Plausible since TSP is stored in the containment floor, however the purpose is to keep iodine in solution, not to prevent boron precipitation in the spray nozzles.
D.	Correct.

Question Source:	**X**	**New**	
		Bank	
		Modified	
		Previous NRC Exam	

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

Level of Difficultly:	**2**	
10CFR55.41:	**9**	
Reference Provided:	**N**	
Learning Objective:	**59383 – Describe the Recirculation Sumps and Trisodium Phosphate baskets**	

Examination Outline Cross-Reference:	Level	RO		SRO
K/A: Spent Fuel Pool Cooling: Knowledge of the effect that a loss or malfunction of the SFPCS will have on the following: Area and ventilation radiation monitoring systems	**Tier**	**2**		
	Group	**2**		
	K/A	**033 K3.02**		
	IR	**2.8**		

Question 61

Given the following conditions:

- Unit 3 is operating at 100% power
- A complete loss of Spent Fuel Pool Cooling has occurred
- Radiation levels are rising in the Fuel Building

With NO operator action, Train ‘A’ and Train ‘B’ FBEVAS will automatically actuate if the setpoint is reached on ___(1)___ and a Train ‘A’ and Train ‘B’ CREFAS will automatically actuate if the setpoint is reached on ___(2)___ .

NOTE:

- RU-31, Fuel Pool Area Radiation Monitor
- RU-145, Fuel Building Ventilation Exhaust Radiation Monitor
- RU-146, Fuel Building Ventilation Exhaust High Range Radiation Monitor

A. (1) RU-145 ONLY
(2) RU-146 ONLY

B. (1) RU-145 ONLY
(2) either RU-31 OR RU-145

C. (1) either RU-31 OR RU-145
(2) RU-146 ONLY

D. (1) either RU-31 OR RU-145
(2) either RU-31 OR RU-145

Proposed Answer:	D

Explanations:	
A.	First part is plausible since RU-145 is a process RM and RU-31 is an area RM, however a high alarm on either RM will actuate both a Train ‘A’ and a Train ‘B’ FBEVAS. Second part is plausible since the high radiation is in the fuel building and a CREFAS will isolate ventilation in the Control Room, therefore it makes sense that rad levels would have to be significantly higher to warrant an automatic CREFAS, however a Train ‘A’ and Train ‘B’ CREFAS will actuate on either RU-31 or RU-145.
B.	First part is plausible since RU-145 is a process RM and RU-31 is an area RM, however a high alarm on either RM will actuate both a Train ‘A’ and a Train ‘B’ FBEVAS. Second part is correct.
C.	First part is correct. Second part is plausible since the high radiation is in the fuel building and a CREFAS will isolate ventilation in the Control Room, therefore it makes sense that rad levels would have to be significantly higher to warrant an automatic CREFAS, however a Train ‘A’ and Train ‘B’ CREFAS will actuate on either RU-31 or RU-145.
D.	Correct.

Question Source:	X	New	
		Bank	
		Modified	
		Previous NRC Exam	

Cognitive Level:	X	Memory or Fundamental Knowledge
		Comprehension or Analysis

Level of Difficultly:	2	
10CFR55.41:	11	
Reference Provided:	N	
Learning Objective:	65036 – Describe the conditions required to generate the following annunciators: FBEVAS A(B), CREFAS A(B)	

Examination Outline Cross-Reference:	Level	RO		SRO
K/A: Steam Generator: Knowledge of the design, procedural, and operational differences between units	**Tier**	**2**		
	Group	**2**		
	K/A	**035 G 2.2.3**		
	IR	**3.8**		

Question 62

A Self-Reading Dosimeter (SRD) is required when locally aligning SG Blowdown for frequent swapping on which of the following PVNGS Units?

A. Unit 1 ONLY

B. Unit 2 ONLY

C. Unit 3 ONLY

D. All 3 Units

Proposed Answer:	B

Explanations: While unit differences did exist between SG during the RSG project, SGs have been replaced on all three units so those unit differences no longer exist.	
A.	Plausible since only one unit requires a SRD at the blowdown station, however it is only required on Unit 2.
B.	Correct.
C.	Plausible since only one unit requires a SRD at the blowdown station, however it is only required on Unit 2.
D.	Plausible since a SRD is required on Unit 2, however it is not required on Units 1 or 3.

Question Source:	X	**New**	
		Bank	
		Modified	
		Previous NRC Exam	

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

Level of Difficultly:	**2**	
10CFR55.41:	**12**	
Reference Provided:	**N**	
Learning Objective:	**Comply with the requirements of an RWP**	

Examination Outline Cross-Reference:	Level	RO	[redacted]	SRO
K/A: Main Turbine Generator: Ability to (a) predict the impacts of the following malfunctions or operations on the MTG; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: Malfunction of electrohydraulic control	**Tier**	**2**	[redacted]	
	Group	**2**	[redacted]	
	K/A		**045 A2.17**	
	IR	**2.7**	[redacted]	

Question 63

Given the following conditions:

- Unit 2 is operating at 30% power
- CEDMCS Mode Selector Switch in in AUTO
- The BOP reports EHC pressure is 1500 psig and slowly lowering

If EHC pressure continues to lower, the crew should anticipate an automatic Main Turbine trip AS SOON AS EHC pressure lowers to ___(1)___ and following the Main Turbine trip, the CRS should enter ___(2)___ .

A. (1) 1100 psig
(2) 40AO-9ZZ08, Load Rejection

B. (1) 1100 psig
(2) 40EP-9EO01, Standard Post Trip Actions

C. (1) 1300 psig
(2) 40AO-9ZZ08, Load Rejection

D. (1) 1300 psig
(2) 40EP-9EO01, Standard Post Trip Actions

Proposed Answer:	A

Explanations:	
A.	Correct.
B.	First part is correct. Second part is plausible since Reactor Power Cutback is not in service at 30% power, however SBCS is capable or accepting the load rejection from 30% and preventing an automatic reactor trip.
C.	First part is plausible since 1300 psig is the setpoint for the EHC low pressure alarm and the pressure at which the standby EHC pump will start, however the Main Turbine will trip at 1100 psig. Second part is correct.
D.	First part is plausible since 1300 psig is the setpoint for the EHC low pressure alarm and the pressure at which the standby EHC pump will start, however the Main Turbine will trip at 1100 psig. Second part is plausible since Reactor Power Cutback is not in service at 30% power, however SBCS is capable or accepting the load rejection from 30% and preventing an automatic reactor trip.

Question Source:	X	New	
		Bank	
		Modified	
		Previous NRC Exam	

Cognitive Level:		Memory or Fundamental Knowledge
	X	Comprehension or Analysis

Level of Difficultly:	3
10CFR55.41:	10
Reference Provided:	N
Learning Objective:	77391 – Describe the conditions that will result in a trip of the Main Turbine

Examination Outline Cross-Reference:	Level	RO		SRO
K/A: Containment Purge System: Ability to monitor automatic operation of the Containment Purge System including: CPS isolation	Tier	2		
	Group	2		
	K/A	029 A3.01		
	IR	3.8		

Question 64

Given the following conditions:

- Unit 3 is operating at 100% power
- A Containment Purge is in progress in preparation for a Containment entry

Subsequently :

- RU-37, Power Access Purge Monitor 'A', failed high

With NO operator action, which of the following describes the expected status of the listed Containment Purge components one minute after the failure of RU-37?

The Power Access Purge Containment Isolation Valves will be closed on Train ___(1)___ and the Power Access Purge Supply and Exhaust Fans will ___(2)___ .

A. (1) 'A' ONLY
(2) be tripped

B. (1) 'A' ONLY
(2) remain running

C. (1) 'A' AND 'B'
(2) be tripped

D. (1) 'A' AND 'B'
(2) remain running

Proposed Answer:	C

Explanations:	
A.	First part is plausible since CPIAS does not send a cross-trip signal if the CPIAS is manually actuated, however since the CPIAS was automatic, a cross-trip signal is sent to CREFAS. Second part is correct.
B.	First part is plausible since CPIAS does not send a cross-trip signal if the CPIAS is manually actuated, however since the CPIAS was automatic, a cross-trip signal is sent to CREFAS. Second part is plausible since the fans do not receive a stop signal on a CPIAS, however the fans will stop due to the CIVs closing which will in turn stop the purge supply and exhaust fans.
C.	Correct.
D.	First part is correct. Second part is plausible since the fans do not receive a stop signal on a CPIAS, however the fans will stop due to the CIVs closing which will in turn stop the purge supply and exhaust fans.

Question Source:	**X**	**New**	
		Bank	
		Modified	
		Previous NRC Exam	

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

Level of Difficultly:	**3**
10CFR55.41:	**7**
Reference Provided:	**N**
Learning Objective:	**65048 – Explain what happens during a CPIAS actuation**

Examination Outline Cross-Reference:	Level	RO		SRO
K/A: Fire Protection: Ability to manually operate and/or monitor in the control room: Fire detection panels	Tier	2		
	Group	2		
	K/A	086 A4.02		
	IR	3.5		

Question 65

A fire in the Main Generator Exciter Power Conversion Room (PCR) Building will cause an alarm to annunciate on the Fire Detection Panel ___(1)___, and upon receipt of the alarm(s), the Control Room should dispatch an AO to ___(2)___ the STAT-X fire suppression system.

A. (1) ONLY
(2) manually actuate

B. (1) ONLY
(2) verify automatic actuation of

C. (1) AND B06
(2) manually actuate

D. (1) AND B06
(2) verify automatic actuation of

Proposed Answer:	**C**

Explanations:	
A.	First part is plausible that only the Fire Detection Panel would annunciate since this is the sole Control Room indication for fires in most areas of the plant, however a fire in the PCR Building will annunciate on Board 6 as well. Second part is correct.
B.	First part is plausible that only the Fire Detection Panel would annunciate since this is the sole Control Room indication for fires in most areas of the plant, however a fire in the PCR Building will annunciate on Board 6 as well. Second part is plausible since automatic fire suppression occurs in most areas of the plant, however the STAT-X suppression system requires manual actution.
C.	Correct.
D.	First part is correct. Second part is plausible since automatic fire suppression occurs in most areas of the plant, however the STAT-X suppression system requires manual actution.

Question Source:	**X**	**New**	
		Bank	
		Modified	
		Previous NRC Exam	

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

Level of Difficultly:	**3**	
10CFR55.41:	**4**	
Reference Provided:	**N**	
Learning Objective:	**Describe the basic components that make up the Main Generator Excitation and Regulation System**	

Examination Outline Cross-Reference:	Level	RO	[redacted]	SRO
K/A: Knowledge of individual licensed operator responsibilities related to shift staffing, such as medical requirements, “no-solo” operation, maintenance of license status, 10CFR55, etc.	**Tier**	**3**	[redacted]	
	Group		[redacted]	
	K/A	**G 2.1.4**		
	IR	**3.3**	[redacted]	

Question 66

Given the following conditions:

- A Reactor Operator stood five 12-hour shifts as OATC from Feb 1 to Feb 5
- The same operator stood one 12-hour shift as OATC and four 12-hour shifts as Area 2 from April 18 to April 22

Per 40DP-9OP02, Conduct of Operations, assuming all other license requirements remain satisfied, if the RO stands no other watches, when is EARLIEST date they will NO LONGER BE ALLOWED to stand watch as the OATC?

A. May 9

B. July 1

C. July 24

D. October 1

Proposed Answer:	B

Explanations:	
A.	Plausible since a quarter is considered to be 92 days (for surveillance testing frequency), and it is a quarterly requirement to stand 5 12-hours shifts in a tech spec required licensed operator position, however it is based on a calendar quarter, not a rolling quarter.
B.	Correct. Since the RO stood 5 12-hour shifts in a tech spec required licensed operator position in the first calendar quarter, they are eligible to stand a licensed RO position until the end of the second calendar quarter.
C.	Plausible since a quarter is considered to be 92 days (for surveillance testing frequency), and SROs can stand a lower level watch station to credit hours towards maintain their proficiency (up to 4 of the required 5 watches can be in an RO position), however ROs must stand all of their proficiency watched in a licensed position to maintain their license current for the next quarter.
D.	Plausible since license proficiency is based on calendar quarters, and they stood five 12-hours shifts in the second calendar quarter, however only an SRO may stand four of their proficiency watches in a lower level position (and it still has to be in a licensed operator position).

Question Source:	X	New	
		Bank	
		Modified	
		Previous NRC Exam	

Cognitive Level:		Memory or Fundamental Knowledge
	X	Comprehension or Analysis

Level of Difficultly:	3	
10CFR55.41:	10	
Reference Provided:	N	
Learning Objective:	97235 – State the required actions when you believe that your license has become inactive	

Examination Outline Cross-Reference:	Level	RO	[redacted]	SRO
K/A: Knowledge of administrative requirements for temporary management directives, such as standing orders, night orders, Operations Memos, etc.	**Tier**	**3**	[redacted]	
	Group		[redacted]	
	K/A	**G 2.1.15**		
	IR	**2.7**	[redacted]	

Question 67

Per 40DP-9OP33, Shift Turnover, oncoming Reactor Operators are required to review Night Orders ___(1)___ turnover, and review Standing Orders ___(2)___ turnover .

A. (1) before
(2) before

B. (1) before
(2) after

C. (1) after
(2) before

D. (1) after
(2) after

Proposed Answer:	B

Explanations:	
A.	First part is correct. Second part is plausible since Night Orders are reviewed prior to turnover, however Standing Orders are reviewed after turnover.
B.	Correct.
C.	First part is plausible since Statnding Orders are reviewed after turnover, however Night Orders are reviews before turnover. Second part is plausible since Night Orders are reviewed prior to turnover, however Standing Orders are reviewed after turnover.
D.	First part is plausible since Statnding Orders are reviewed after turnover, however Night Orders are reviews before turnover. Second part is correct.

Question Source:	X	New	
		Bank	
		Modified	
		Previous NRC Exam	

Cognitive Level:	X	Memory or Fundamental Knowledge
		Comprehension or Analysis

Level of Difficultly:	2	
10CFR55.41:	10	
Reference Provided:	N	
Learning Objective:	Describe the required review of operating logs prior to relief	

Examination Outline Cross-Reference:	Level	RO		SRO
K/A: Knowledge of the process for conducting special or infrequent tests	**Tier**	**3**		
	Group			
	K/A	**G 2.2.7**		
	IR	**2.9**		

Question 68

Per 01DP-01AP57, Management of Critical Evolutions and Infrequently Performed Tests or Evolutions, which one of the following Critical Evolutions is classified as IPTE and REQUIRES Senior Line Manager oversight?

A. Reducing power from 100 to 85%

B. Swapping trains of Shutdown Cooling

C. Synchronizing the Main Generator to the grid

D. Shifting from Auxiliary Feedwater to Main Feedwater

Proposed Answer:	C

Explanations:	
A.	Plausible since power reductions of > 10% is considered a Critical Evolution, and it does require an Operations Manager to be present, however it is not considered IPTE.
B.	Plausible since transferring the source of core heat removal is considered a Critical Evolution, however it is not considered IPTE.
C.	Correct.
D.	Plausible since transferring from AFW to MFW is considered a Critical Evolution, and it does require an Operations Manager to be present, however it is not considered IPTE.

Question Source:	**X**	**New**	
		Bank	
		Modified	
		Previous NRC Exam	

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

Level of Difficultly:	**3**	
10CFR55.41:	**10**	
Reference Provided:	**N**	
Learning Objective:	**99115 – Identify general roles and responsibilities for categorizing risk and assuring only approved unit configurations are entered into**	

Examination Outline Cross-Reference:	Level	RO		SRO
K/A: Knowledge of pre- and post-maintenance operability requirements	Tier	3		
	Group			
	K/A	G 2.2.21		
	IR	2.9		

Question 69

Given the following conditions:

- The crew is preparing to perform a quarterly timed valve stroke in-service test (IST)
- Two days before performing the quarterly valve stroke, maintenance completed the scheduled annual motor lubrication PM on the valve's motor operator
- During the valve stroke, a VPI light burned out and the IST was suspended
- The light was replaced and the valve stroke IST was successfully re-performed

Per 73DP-9ZZ14, Surveillance Testing:

Lubrication of the valve's motor operator two days before the valve stroke would be considered ___(1)___ preconditioning.

The suspended valve stroke conducted prior to the completed timed valve stroke would be considered ___(2)___ preconditioning.

A. (1) acceptable
(2) acceptable

B. (1) acceptable
(2) unacceptable

C. (1) unacceptable
(2) acceptable

D. (1) unacceptable
(2) unacceptable

Proposed Answer:	A

Explanations:	
A.	Correct.
B.	First part is correct. Second part is plausible since the valve was stroked once just prior to the “official” IST, however since the initial valve stroke was aborted due to an unforeseen issue, re-performance of the IST is considered acceptable preconditioning.
C.	First part is plausible since lubricating a valve motor operator just prior to stroking the valve for an IST would normally be considered unacceptable preconditioning, however since the valve is stroked 4 times a year, and 3 of those ISTs are done without the annual motor operator lubrication, this is considered acceptable preconditioning. Second part is correct.
D.	First part is plausible since lubricating a valve motor operator just prior to stroking the valve for an IST would normally be considered unacceptable preconditioning, however since the valve is stroked 4 times a year, and 3 of those ISTs are done without the annual motor operator lubrication, this is considered acceptable preconditioning. Second part is plausible since the valve was stroked once just prior to the “official” IST, however since the initial valve stroke was aborted due to an unforeseen issue, re-performance of the IST is considered acceptable preconditioning.

Question Source:	**X**	**New**	
		Bank	
		Modified	
		Previous NRC Exam	

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

Level of Difficultly:	**3**	
10CFR55.41:	**10**	
Reference Provided:	**N**	
Learning Objective:	**10516 – State the definition of preconditioning**	

Examination Outline Cross-Reference:	Level	RO		SRO
K/A: Ability to determine Technical Specification Mode of Operation	**Tier**	**3**		
	Group			
	K/A		**G 2.2.35**	
	IR	**3.6**		

Question 70

(1) During the INITIAL Reactor startup following refueling, MODE 2 is declared when...

(2) During a cooldown for a refueling outage, MODE 4 is declared when…

A. (1) the Reactor goes critical
(2) Shutdown Cooling is placed in service

B. (1) the Reactor goes critical
(2) RCS cold leg temperature lowers to less than 350°F

C. (1) CEAs have been withdrawn to the ECRP -750 pcm position
(2) Shutdown Cooling is placed in service

D. (1) CEAs have been withdrawn to the ECRP -750 pcm position
(2) RCS cold leg temperature lowers to less than 350°F

Proposed Answer:	D

Explanations:	
A.	First part is plausible as MODE 2 is defined in tech specs as ≥ 0.99 Keff and ≤ 5% power, which are both met when the reactor goes critical, however per 40OP-9ZZ02, Initial Reactor Startup Following Refuelings, MODE 2 is declared when CEAs have been withdrawn to the ECRP – 750 pcm position. Second part is plausible since MODE 4 is defined in tech specs as ≤ 0.99 Keff and between 350 and 210°F, and preparations to place SDC in service begin when Tcold < 350°F, however per 40OP-9ZZ23, Outage GOP, SDC is not placed in service until Tcold is ≤ 300°F. Additionally, since MODE 3 is called "Hot Standby" and MODE 4 is called "Hot Shutdown", it is plausible that the transition from SGs to SDC for RCS heat removal would be the point at which the MODE change would occur, however this is not correct.
B.	First part is plausible as MODE 2 is defined in tech specs as ≥ 0.99 Keff and ≤ 5% power, which are both met when the reactor goes critical, however per 40OP-9ZZ02, Initial Reactor Startup Following Refuelings, MODE 2 is declared when CEAs have been withdrawn to the ECRP – 750 pcm position. Second part is correct.
C.	First part is correct. Second part is plausible since MODE 4 is defined in tech specs as ≤ 0.99 Keff and between 350 and 210°F, and preparations to place SDC in service begin when Tcold < 350°F, however per 40OP-9ZZ23, Outage GOP, SDC is not placed in service until Tcold is ≤ 300°F. Additionally, since MODE 3 is called "Hot Standby" and MODE 4 is called "Hot Shutdown", it is plausible that the transition from SGs to SDC for RCS heat removal would be the point at which the MODE change would occur, however this is not correct.
D.	Correct.

Question Source:	**X**	**New**	
		Bank	
		Modified	
		Previous NRC Exam	

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

Level of Difficultly:	**3**	
10CFR55.41:	**10**	
Reference Provided:	**N**	
Learning Objective:	**11401 – Determine the MODE of operation**	

Examination Outline Cross-Reference:	Level	RO		SRO
K/A: Knowledge of radiation exposure limits under normal or emergency conditions	Tier	3		
	Group			
	K/A	G 2.3.4		
	IR	3.2		

Question 71

Per 10CFR20.1201, Occupational Dose Limits, the annual limit for TEDE for adults is ___(1)___ .

Per 75DP-9RP01, Radiation Exposure and Access Control, the INITIAL administrative exposure hold point for TEDE at PVNGS is ___(2)___ .

A. (1) 5 rem
   (2) 1.5 rem

B. (1) 5 rem
   (2) 2.5 rem

C. (1) 15 rem
   (2) 1.5 rem

D. (1) 15 rem
   (2) 2.5 rem

Proposed Answer:	**A**

Explanations:	
A.	Correct.
B.	First part is correct. Second part is plausible since 2.5 rem is the limit for dose at both PV and other utilities combined, however an increase to that level requires management approval of a higher hold point. It is also plausible since 2.5 rem is 50% of the CFR limit for TEDE to an adult.
C.	First part is plausible since 15 rem is a rem limit in the CFR, however 15 rem is the limit to the lens of the eye, not TEDE. Also plausible since 1.5 rem is the initial administrative limit at PV and 1.,5 rem is 10% of 15 rem, however 15 rem is incorrect. Second part is correct.
D.	First part is plausible since 15 rem is a rem limit in the CFR, however 15 rem is the limit to the lens of the eye, not TEDE. Second part is plausible since 2.5 rem is the limit for dose at both PV and other utilities combined, however an increase to that level requires management approval of a higher hold point.

Question Source:	**X**	**New**	
		Bank	
		Modified	
		Previous NRC Exam	

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

Level of Difficultly:	**2**	
10CFR55.41:	**12**	
Reference Provided:	**N**	
Learning Objective:	**State the federal dose limits for TEDE**	

Examination Outline Cross-Reference:	Level	RO		SRO
K/A: Knowledge of radiological safety principles pertaining to licensed operator duties, such as containment entry requirements, fuel handling responsibilities, access to locked high-radiation areas, aligning filters, etc.	**Tier**	**3**		
	Group			
	K/A	**G 2.3.12**		
	IR	**3.2**		

Question 72

Given the following conditions:

- The CRS has directed adjusting the position of a locked throttle valve
- The adjustment is required to be checked by a second operator
- The dose rate in the area of the valve is 1200 mrem/hr (the highest dose rate in the room)

Per 75RP-0RP01, Radiological Posting and Labeling, the room the valve is located in should be posted as a ___(1)___ .

Per 40AC-0ZZ06, Locked Valve, Breaker, and Component Control, the second check of the valve position should be done using ___(2)___ verification.

A. (1) High Radiation Area
(2) concurrent

B. (1) High Radiation Area
(2) independent

C. (1) Locked High Radiation Area
(2) concurrent

D. (1) Locked High Radiation Area
(2) independent

Proposed Answer:	C

Explanations:	
A.	First part is plausible since > 100 mrem/hr is a high radiation area, however a locked high radiation area is > 1000 mrem/hr. Second part is correct.
B.	First part is plausible since > 100 mrem/hr is a high radiation area, however a locked high radiation area is > 1000 mrem/hr. Second part is plausible since repositioning of valves is verified using independent verification in most cases, however when checking the position of a throttle valve, concurrent verification is used.
C.	Correct.
D.	First part is correct. Second part is plausible since repositioning of valves is verified using independent verification in most cases, however when checking the position of a throttle valve, concurrent verification is used.

Question Source:		New	
	X	Bank	
		Modified	
		Previous NRC Exam	

Cognitive Level:	X	Memory or Fundamental Knowledge
		Comprehension or Analysis

Level of Difficultly:	2	
10CFR55.41:	12	
Reference Provided:	N	
Learning Objective:	Define the following radiological areas: High Radiation Area/Locked High Radiation Area	

Examination Outline Cross-Reference:	Level	RO	[redacted]	SRO
K/A: Knowledge of EOP terms and definitions	Tier	3	[redacted]	
	Group		[redacted]	
	K/A	G 2.4.17		
	IR	3.9	[redacted]	

Question 73

Per 01DP-0AP09, Procedure and Work Instruction Use and Adherence:

(1) When a procedure says, “ENSURE that the pump is running”, the word “ENSURE” means to check that the pump is running, and if not, …

(2) When a procedure says, “GO TO 40OP-9XX01”, the phrase “GO TO” means to…

A. (1) attempt to start it
(2) exit the procedure in use and perform 40OP-9XX01

B. (1) attempt to start it
(2) perform 40OP-9XX01 concurrently with the procedure in use

C. (1) do NOT attempt to start it
(2) exit the procedure in use and perform 40OP-9XX01

D. (1) do NOT attempt to start it
(2) perform 40OP-9XX01 concurrently with the procedure in use

Proposed Answer:	A

Explanations:	
A.	Correct.
B.	First part is correct. Second part is plausible since this would be true if the action verb was “REFER TO”, however when an EOP says “GO TO”, this means to exit the procedure in use and perform the newly directed procedure.
C.	First part is plausible since this would be true if the action verb was “CHECK”, however when an EOP says to “ENSURE” something, it means to check the component in a certain condition, and if not in that state, attempt to place it in the directed condition. Second part is correct.
D.	First part is plausible since this would be true if the action verb was “CHECK”, however when an EOP says to “ENSURE” something, it means to check the component in a certain condition, and if not in that state, attempt to place it in the directed condition. Second part is plausible since this would be true if the action verb was “REFER TO”, however when an EOP says “GO TO”, this means to exit the procedure in use and perform the newly directed procedure.

Question Source:		New	
		Bank	
	X	Modified	
	X	Previous NRC Exam	Modified from 2018 NRC Exam Q67 (new question on the 2018 exam)

Cognitive Level:	X	Memory or Fundamental Knowledge
		Comprehension or Analysis

Level of Difficultly:	2
10CFR55.41:	10
Reference Provided:	N
Learning Objective:	74715 – Identify operators responsibilities concerning procedure use

Examination Outline Cross-Reference:	Level	RO		SRO
K/A: Knowledge of EOP layout, symbols, and icons	Tier	3		
	Group			
	K/A	G 2.4.19		
	IR	3.4		

Question 74

Per 40DP-9AP15, Emergency and Abnormal Operating Procedure Writer's Guide:

(1) An asterisk to the left of a step indicates that the step is a…

(2) Parameter values to be used when Containment conditions are harsh are annotated by the use of…

A. (1) hold point
(2) brackets

B. (1) hold point
(2) bolded text

C. (1) trigger step
(2) brackets

D. (1) trigger step
(2) bolded text

Proposed Answer:	**C**

Explanations:	
A.	First part is plausible since hold points are used in the EOPs, however hold points are annotated either by the words “Hold Point” preceeding the step or via a note indicating that a step must be completed prior to moving on. Second part is correct.
B.	First part is plausible since hold points are used in the EOPs, however hold points are annotated either by the words “Hold Point” preceeding the step or via a note indicating that a step must be completed prior to moving on. Second part is plausible since bolded text is used to annotate a variety of items in EOPs such as Notes, Cautions, and logical operators, however harsh containment values are annotated via the use of brackets.
C.	Correct.
D.	First part is correct. Second part is plausible since bolded text is used to annotate a variety of items in EOPs such as Notes, Cautions, and logical operators, however harsh containment values are annotated via the use of brackets.

Question Source:	**X**	**New**	
		Bank	
		Modified	
		Previous NRC Exam	

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

Level of Difficultly:	**2**	
10CFR55.41:	**10**	
Reference Provided:	**N**	
Learning Objective:	**10338 – Discuss why bracketed values are provided for certain indicators**	

Examination Outline Cross-Reference:	Level	RO		SRO
K/A: Knowledge of annunciator alarms, indications, or response procedures	**Tier**	**3**		
	Group			
	K/A	**G 2.4.31**		
	IR	**4.2**		

Question 75

Regarding the RK annunciator system, the HIGHEST priority alarm color is ___(1)___ and the SECOND HIGHEST priority alarm color is ___(2)___ .

A. (1) red
   (2) green

B. (1) red
   (2) amber

C. (1) white
   (2) green

D. (1) white
   (2) amber

Proposed Answer:	A

Explanations:	
A.	Correct.
B.	First part is correct. Second part is plausible since amber is the indicated color on a pump which has auto started following a low discharge pressure condition or pump trip, however green is the second highest priority alarm color for an RK alarm.
C.	First part is plausible since a white alarm on the SESS panel indicates a class piece of equipment is inoperable (i.e. breaker open/tripped), however on the RK system red is the highest priority alarm color. Second part is correct.
D.	First part is plausible since a white alarm on the SESS panel indicates a class piece of equipment is inoperable (i.e. breaker open/tripped), however on the RK system red is the highest priority alarm color. Second part is plausible since amber is the indicated color on a pump which has auto started following a low discharge pressure condition or pump trip, however green is the second highest priority alarm color for an RK alarm.

Question Source:	X	New	
		Bank	
		Modified	
		Previous NRC Exam	

Cognitive Level:	X	Memory or Fundamental Knowledge
		Comprehension or Analysis

Level of Difficultly:	2	
10CFR55.41:	10	
Reference Provided:	N	
Learning Objective:	77099 – Discuss the purpose and conditions under which the Plant Annunciator System is designed to function	

Examination Outline Cross-Reference:	Level	RO		SRO
K/A: Small Break LOCA: Ability to perform specific system and integrated plant procedures during all modes of plant operation	Tier			1
	Group			1
	K/A	009 G 2.1.23		
	IR			4.4

Question 76

Given the following conditions:

- Unit 2 was tripped from 100% power due to a 150 gpm RCS leak into Containment
- The crew manually tripped the Reactor and manually initiated SIAS and CIAS
- SPTAs have been completed and the CRS has entered 40EP-9EO03, LOCA
- The crew has just commenced a cooldown and depressurization
- Containment Level transmitter, SIB-LI-707 (B02), is indicating off-scale low
- Containment Sump East/West transmitter, RDN-LI-410 (B07), is indicating 35” and slowly rising

Per 40EP-9EO03, Loss of Coolant Accident, which of the following Standard Appendices should the CRS direct the crew to implement?

1. Appendix 6, Spray Valve Actuation Data Sheet
2. Appendix 17, Restoration of Containment Cooling
3. Appendix 14, Aligning Charging Pump Discharge to the HPSI Header

A. 2 ONLY

B. 3 ONLY

C. 1 and 2 ONLY

D. 1 and 3 ONLY

Proposed Answer:	C

Explanations:	
A.	Plausible since Appendix 17 should be implemented, and it could be determined that spray will not be used for the depressurization since SGs are available for the cooldown and RCS pressure will lower via the break in the RCS and the shrinkage from the cooldown, however the break size is not large enough to depressurize adequately without the use of pressurizer spray.
B.	Appendix 14 is plausible since all charging pumps inject into the RCS in Cold Leg 2A, it could be thought that aligning charging flow to the HPSI header is a better idea so the flow goes to all four cold leg loops, however Appendix 14 is only performed if the normal charging discharge header is unavailable.
C.	Correct.
D.	Appendix 6 is correct. Appendix 14 is plausible since all charging pumps inject into the RCS in Cold Leg 2A, it could be thought that aligning charging flow to the HPSI header is a better idea so the flow goes to all four cold leg loops, however Appendix 14 is only performed if the normal charging discharge header is unavailable. Also plausible that Appendix 17 would not be performed since it is only performed if containment level is not indicated, and there is indication of containment sump levels rising, however the transmitter used to determine if appendix 17 should be implemented is LI-707.

Question Source:	**X**	**New**	
		Bank	
		Modified	
		Previous NRC Exam	

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

Level of Difficultly:	**3**
10CFR55.43:	**5**
Reference Provided:	**N**
Learning Objective:	**10451 – Describe how the plant would respond to various types of RCS leaks**

Examination Outline Cross-Reference:	Level	RO		SRO
K/A: Large Break LOCA: Ability to determine or interpret the following as they apply to a Large Break LOCA: Verification of adequate core cooling	Tier			1
	Group			1
	K/A	011 EA2.10		
	IR			4.7

Question 77

Given the following conditions:

- Unit 2 was tripped due to a LOCA
- The CRS has entered 40EP-9EO03, LOCA
- The following conditions exist:
  - All RCPs have been stopped
  - Thot is 335°F and slowly lowering
  - Tcold is 325°F and slowly lowering
  - REPCET is 350°F and slowly lowering
  - RCS pressure is 50 psia and slowly lowering
  - SI flow is meeting Appendix 2 requirements
  - QSPDS indicates 16% in the Reactor Vessel Head
  - Containment temperature is 190°F and stable

Per 40EP-9EO03, Loss of Coolant Accident, the RCS Inventory Control Safety Function ___(1)___ satisfied, and the Core Heat Removal Safety Function ___(2)___ satisfied.

A. (1) IS
(2) IS

B. (1) IS
(2) is NOT

C. (1) is NOT
(2) IS

D. (1) is NOT
(2) is NOT

Proposed Answer:	D

Explanations:	
A.	First part is plausible since SI flow is adequate, however inventory control also requires the RCS to be < 60°F superheated and in this condition the RCS is ~65°F superheated. If the examinee uses Thot or Tcold to determine superheating, they will get the question wrong as both values indicate < 60°F superheated. Second part also requires < 60°F superheat, therefore same plausibility as part 1 minus the SI flow requirements.
B.	First part is plausible since SI flow is adequate, however inventory control also requires the RCS to be < 60°F superheated and in this condition the RCS is ~65°F superheated. If the examinee uses Thot or Tcold to determine superheating, they will get the question wrong as both values indicate < 60°F superheated. Second part is correct.
C.	First part is correct. Second part is plausible since the Core Heat Removal safety function requires the RCS to be < 60°F superheated and in this condition the RCS is ~65°F superheated. If the examinee uses Thot or Tcold to determine superheating, they will get the question wrong as both values indicate < 60°F superheated.
D.	Correct.

Question Source:	X	New	
		Bank	
		Modified	
		Previous NRC Exam	

Cognitive Level:		Memory or Fundamental Knowledge
	X	Comprehension or Analysis

Level of Difficultly:	3	
10CFR55.43:	5	
Reference Provided:	N	
Learning Objective:	10457/10459 – Analyze RCS Inventory Control/Core Heat Removal to determine if the SFSC acceptance criteria is satisfied	

Examination Outline Cross-Reference:	Level	RO		SRO
K/A: Pressurizer Pressure Control System Malfunction: Ability to determine and interpret the following as they apply to the Pressurizer Pressure Control Malfunctions: Conditions requiring plant shutdown	Tier			1
	Group			1
	K/A	027 AA2.06		
	IR			3.9

Question 78

Given the following conditions:

- Unit 3 is operating at 100% power
- RCE-PV-100E, Pressurizer Spray Control Valve from RCS Loop 1A, indicates mid-position
- All attempts to close RCE-PV-100E have failed
- All Pressurizer heaters have been energized
- All PPCS control systems have been confirmed to be operating properly
- Pressurizer pressure is 2200 psia and lowering at a rate of 5 psia/min

The CRS should direct the crew to…

A. immediately trip the Reactor per 40AO-9ZZ16, RRS Malfunctions

B. immediately trip the Reactor per 40AL-9KR4A, B04A Alarm Response Procedure

C. commence a rapid shutdown per 40OP-9ZZ05, Power Operations, Section 6.5, Rapid Shut Down – Rapid Down Power

D. commence a rapid shutdown per 40OP-9ZZ07, Plant Shutdown Mode 1 to Mode 3, Section 6.1, Reactor Shutdown By Opening Reactor Trip Switchgear Breakers

Proposed Answer:	B

Explanations:	
A.	Plausible since several RRS malfunctions impact the Pressurizer for which 40AO-9ZZ16 would be the correct procedure to mitigate the event, however for a failed open spray valve, the mitigating actions are contained in the B04 ARP.
B.	Correct.
C.	Plausible since the rate of depressurization could be mitigated by performing a rapid shutdown, and 40OP-9ZZ05 is the correct procedure to perform a rapid shutdown, however for a failed open spray valve, the mitigating actions are contained in the B04 ARP.
D.	Plausible since tripping the reactor is the correct action to take, and 40OP-9ZZ07 can be used to shutdown the reactor, however reactor power must be between 18 and 22% in order to use Section 6.1 of ZZ07 to shutdown the reactor.

Question Source:	X	New	
		Bank	
		Modified	
		Previous NRC Exam	

Cognitive Level:		Memory or Fundamental Knowledge
	X	Comprehension or Analysis

Level of Difficultly:	3	
10CFR55.43:	5	
Reference Provided:	N	
Learning Objective:	75291 – Describe the Control Room controls associated with the Pressurizer Main and Auxiliary Spray Valves including indications	

Examination Outline Cross-Reference:	Level	RO	[redacted]	SRO
K/A: Steam Generator Tube Rupture: Knowledge of the emergency action level thresholds and classifications	Tier		[redacted]	1
	Group		[redacted]	1
	K/A	038 G 2.4.41		
	IR		[redacted]	4.6

Question 79

Given the following conditions:

- The Reactor was tripped from 100% power due to a SGTR on SG #2
- The following conditions are present during SPTAs:
    - Fast Bus Transfer failed on NAN-S01 and NAN-S02
    - A complete loss of Condenser vacuum has occurred
    - Pressurizer level is 5% and lowering
    - Pressurizer pressure is 1300 psia and slowly lowering
    - RCS subcooling is 27°F and slowly degrading
    - CET subcooling is 21°F and slowly degrading
    - Containment temperature is 118°F and slowly rising
    - Containment pressure is 0.5 psig and slowly rising
    - Containment humidity is stable

Per the EAL Hot Chart, the Containment Barrier is ___(1)___ and the Fuel Cladding Barrier is ___(2)___ .

A. (1) intact
(2) intact

B. (1) intact
(2) potentially lost

C. (1) lost
(2) intact

D. (1) lost
(2) potentially lost

Proposed Answer:	A

Explanations:	
A.	Correct.
B.	First part is correct. Second part is plausible since there is a loss of all RCPs due to the fast bus transfer failures and subcooling is < 24°F subcooled, so it could be determined that RCS heat removal cannot be established and subcooling is < 24°F, however with the use of SGs for steaming, RCS heat removal is still available.
C.	First part is plausible since the containment barrier is considered lost if either of the following conditions are present: A ruptured SG is faulted outside containment (the failure of fast bus transfer and the loss of condenser vacuum require the use of either ADVs, Main Steam Safety Valves, or atmospheric steam dumps could be interpreted as a fault requiring the release of contaminated steam), OR Containment isolation is required and there is a unisolable pathway from containment to environment (since any of the available steam pathways will release contaminated steam to the environment, this would be a plausible conclusion). Second part is correct.
D.	First part is plausible since the containment barrier is considered lost if either of the following conditions are present: A ruptured SG is faulted outside containment (the failure of fast bus transfer and the loss of condenser vacuum require the use of either ADVs, Main Steam Safety Valves, or atmospheric steam dumps could be interpreted as a fault requiring the release of contaminated steam), OR Containment isolation is required and there is a unisolable pathway from containment to environment (since any of the available steam pathways will release contaminated steam to the environment, this would be a plausible conclusion). Second part is plausible since there is a loss of all RCPs due to the fast bus transfer failures and subcooling is < 24°F subcooled, so it could be determined that RCS heat removal cannot be established and subcooling is < 24°F, however with the use of SGs for steaming, RCS heat removal is still available

Question Source:	**X**	**New**	
		Bank	
		Modified	
		Previous NRC Exam	

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

Level of Difficultly:	**3**	
10CFR55.43:	**4**	
Reference Provided:	**Y**	**EAL Hot Chart – Fission Product Barrier Matrix – Fuel Clad Barrier and Containment Barrier ONLY**
Learning Objective:	**58622 – Determine the emergency plan classification**	

Examination Outline Cross-Reference:	Level	RO	[redacted]	SRO
K/A: Station Blackout: Ability to determine and interpret the following as they apply to the Station Blackout: Actions necessary to restore power	**Tier**		[redacted]	**1**
	Group		[redacted]	**1**
	K/A		**055 EA2.03**	
	IR		[redacted]	**4.7**

Question 80

Given the following conditions:

- Unit 1 tripped from 100% power due to a loss of offsite power
- Both EDGs tripped on overspeed and are unavailable
- The CRS has entered 40EP-9EO08, Blackout
- The ECC estimates offsite power will be available in ~ 2 hours
- The crew has started SBOG #1 per Appendix 111, Station Blackout Generator Operation
- The CRS is preparing to direct the crew to perform following appendices:
  - Appendix 53, Align De-energized Buses
  - Appendix 80, Align SBOG to PBA-S03
  - Appendix 54, Energizing Switchyard Loads From the SBOGs

Per 40EP-9EO08, Blackout, the CRS should direct the crew to ___(1)___ , then direct the crew to perform Appendix 54 using ___(2)___ .

A. (1) perform Appendix 53 and Appendix 80 CONCURRENTLY
(2) SBOG #1

B. (1) perform Appendix 53 and Appendix 80 CONCURRENTLY
(2) SBOG #2

C. (1) COMPLETE Appendix 53 prior to performing Appendix 80
(2) SBOG #1

D. (1) COMPLETE Appendix 53 prior to performing Appendix 80
(2) SBOG #2

Proposed Answer:	A

Explanations:	
A.	Correct.
B.	First part is correct. Second part is plausible if thought that each SBOG would be used for separate loads, one for the unit, one for the switchyard, to avoid overloading a single SBOG, however the same SBOG is used to power the unit and re-energize the switchyard.
C.	First part is plausible since Appendix 53 must be completed prior to performance of Appendix 54, however Appendix 53 and 80 should be performed concurrently in order to ensure a vital bus is energized from an SBOG within one hour of the start of the event. Second part is correct.
D.	First part is plausible since Appendix 53 must be completed prior to performance of Appendix 54, however Appendix 53 and 80 should be performed concurrently in order to ensure a vital bus is energized from an SBOG within one hour of the start of the event. Second part is plausible if thought that each SBOG would be used for separate loads, one for the unit, one for the switchyard, to avoid overloading a single SBOG, however the same SBOG is used to power the unit and re-energize the switchyard.

Question Source:	X	New	
		Bank	
		Modified	
		Previous NRC Exam	

Cognitive Level:		Memory or Fundamental Knowledge
	X	Comprehension or Analysis

Level of Difficultly:	3	
10CFR55.43:	5	
Reference Provided:	N	
Learning Objective:	56411 – Describe the Blackout coping strategy	

Examination Outline Cross-Reference:	Level	RO		SRO
K/A: Loss of Nuclear Service Water: Ability to apply Technical Specifications for a system	**Tier**			**1**
	Group			**1**
	K/A	**062 G 2.2.40**		
	IR			**4.7**

Question 81

Given the following conditions:

- Unit 1 is operating at 100% power
- SPA-P01, Train ‘A’ Spray Pond Pump, has been under clearance for the past 68 hours for corrective maintenance

Subsequently:

- NBN-X04, Train ‘B’ ESF Supply Transformer, tripped on sudden pressure
- The ‘B’ EDG tripped on overspeed upon starting

Per Technical Specifications, if no equipment is returned to service, Unit 1 must be in MODE 3 within a MAXIMUM of…

A. 6 hours

B. 7 hours

C. 8 hours

D. 10 hours

Proposed Answer:	B

Explanations:	
A.	Plausible since the loss of NBN-X04 and the ‘B’ EDG will result in a loss of the ‘B’ SP Pump. The loss of both Spray Pond pumps could be misconstrued as a loss of the UHS since the motive force for the UHS are the Spray Pond pumps, and inoperability of the UHS is a MODE 3 in 6 hour action statement, however the operability of the UHS is not dependent on the operability of the Spray Pond Pumps.
B.	Correct. Inoperability of both Spray Pond pump is an unanalyzed condition which puts the unit in LCO 3.0.3 and therefore must in MODE 3 within a maximum of 7 hours.
C.	Plausible since the loss of the ‘B’ EDG results in a 2 hour action to restore at least one EDG to operable per LCO 3.8.1 and if an EDG is not returned to operable, be in MODE 3 in 6 hours (total of 8 hours)
D.	Plausible since there are four hours remaining on the required action for returning SPA-P01 to operable, which, if not completed, results in a MODE 3 in 6 hour requirement (total of 10 hours).

Question Source:	X	New	
		Bank	
		Modified	
		Previous NRC Exam	

Cognitive Level:		Memory or Fundamental Knowledge
	X	Comprehension or Analysis

Level of Difficultly:	3	
10CFR55.43:	2	
Reference Provided:	N	
Learning Objective:	89795 – Apply the action statements that are greater than one hour for TS 3.7	

Examination Outline Cross-Reference:	Level	RO		SRO
K/A: Continuous Rod Withdrawal: Knowledge of limiting conditions for operations and safety limits	**Tier**			**1**
	Group			**2**
	K/A	**001 G 2.2.22**		
	IR			**4.7**

Question 82

Given the following conditions:

- Unit 1 is operating at 8% power
- CEAs are being withdrawn for a power ascension
- After releasing the CEA Withdraw/Insert switch, Group 5 CEA 15 continued to withdraw with no demand signal
- The CEDMCS Mode Selector Switch was placed in Standby and CEA 15 stopped moving at 39” withdrawn
- All other Group 5 CEAs are 31.5” withdrawn

Per the PVNGS Core Operating Limits Report (COLR), the crew ___(1)___ required to perform a power reduction, and per LCO 3.1.5, CEA Alignment, CEA 15 must be realigned with its group within a MAXIMUM of ___(2)___ hours.

A. (1) IS
(2) 2

B. (1) IS
(2) 6

C. (1) is NOT
(2) 2

D. (1) is NOT
(2) 6

Proposed Answer:	C

Explanations:	
A.	First part is plausible since CEA deviations of > 6.6” do require power reductions, however when Reactor power is < 35%, the COLR does not require power to be reduced. Second part is correct.
B.	First part is plausible since CEA deviations of > 6.6” do require power reductions, however when Reactor power is < 35%, the COLR does not require power to be reduced. Second part is plausible since 6 hours is the completion time in LCO 3.1.5 for inoperability of one CEA position indicator, however a misaligned CEA must be realigned within 2 hours.
C.	Correct.
D.	First part is correct. Second part is plausible since 6 hours is the completion time in LCO 3.1.5 for inoperability of one CEA position indicator, however a misaligned CEA must be realigned within 2 hours.

Question Source:	X	New	
		Bank	
		Modified	
		Previous NRC Exam	

Cognitive Level:		Memory or Fundamental Knowledge
	X	Comprehension or Analysis

Level of Difficultly:	3	
10CFR55.43:	2	
Reference Provided:	N	
Learning Objective:	56649 – Determine the power reduction required	

Examination Outline Cross-Reference:	Level	RO		SRO
K/A: Steam Generator Tube Leak: Ability to determine and interpret the following as they apply to the Steam Generator Tube Leak: Tech-Spec limits for RCS leakage	**Tier**			**1**
	Group			**2**
	K/A	**037 AA2.10**		
	IR			**4.1**

Question 83

Given the following conditions:

- Unit 1 is operating at 100% power
- **At time = 0100:** A 30 gpm SGTL occurred on SG #1
- The leakrate rate of change has been determined to be 0 gpm/hr

Assuming the leak rate remains constant:

Per Technical Specifications, Unit 1 must be in MODE 3 no later than ___(1)___ .

The event in progress ___(2)___ require an EAL to be declared.

A. (1) 0700
   (2) DOES

B. (1) 0700
   (2) does NOT

C. (1) 1100
   (2) DOES

D. (1) 1100
   (2) does NOT

Proposed Answer:	A

Explanations:	
A.	Correct.
B.	First part is correct. Second part is correct since the leakrate does not meet the threshold for a potential loss of the RCS barrier since the standby charging pump would not need to be run for a 30 gpm leak, however since the identified leakrate is > 25 gpm, the event would be classifiable under SU5.1.
C.	First part is plausible since identified leakage allows for 4 hours to reduce leakrate to within limits prior to a 6 hour requirement to be in MODE 3, however if the identified leakage is primary to secondary leakage, the requirement is to be in MODE 3 in 6 hours. Second part is correct.
D.	First part is plausible since identified leakage allows for 4 hours to reduce leakrate to within limits prior to a 6 hour requirement to be in MODE 3, however if the identified leakage is primary to secondary leakage, the requirement is to be in MODE 3 in 6 hours. Second part is correct since the leakrate does not meet the threshold for a potential loss of the RCS barrier since the standby charging pump would not need to be run for a 30 gpm leak, however since the identified leakrate is > 25 gpm, the event would be classifiable under SU5.1.

Question Source:	X	New	
		Bank	
		Modified	
		Previous NRC Exam	

Cognitive Level:		Memory or Fundamental Knowledge
	X	Comprehension or Analysis

Level of Difficultly:	3	
10CFR55.43:	2	
Reference Provided:	N	
Learning Objective:	89778 – Apply the action statements that are greater than one hour for TS 3.4	

Examination Outline Cross-Reference:	Level	RO	[redacted]	SRO
K/A: Loss of Containment Integrity: Knowledge of the bases in Technical Specifications for limiting conditions for operations and safety limits	**Tier**		[redacted]	**1**
	Group		[redacted]	**2**
	K/A	**069 G 2.2.25**		
	IR		[redacted]	**4.2**

Question 84

Which of the following valves, INDIVIDUALLY, would require entry into LCO 3.6.3, Containment Isolation Valves, if the valve was determined to be incapable of automatically closing during MODES 1 through 4?

1. Main Steam Isolation Valve, SGE-UV-170
2. MSIV Bypass Isolation Valve, SGE-UV-169
3. Downcomer Feedwater Isolation Valve, SGA-UV-172

A. 2 ONLY

B. 3 ONLY

C. 1 and 2 ONLY

D. 1 and 3 ONLY

Proposed Answer:	A

Explanations:	
A.	Correct.
B.	Plausible since the MSIVs have their own LCO and it could be assumed that the MSIV Bypass Valve also is tied to the MSIV LCO, however the MSIV Bypass does NOT and the Downcomer FWIV does have it's own LCO, therefore is not covered by LCO 3.6.3.
C.	Plausible since the FWIV has it's own LCO and the MSIV and MSIV Bypass Valves are CIVs, however since the MSIV and FWIV have their own LCOs, only the MSIV Bypass Valve is covered by LCO 3.6.3.
D.	Plausible since the MSIV and FWIV are CIVs, it could be thought that bypass valves are only for D/P equalization and not required to be covered by LCO 3.6.3, however since the MSIV and FWIV have their own LCOs, only the MSIV Bypass Valve is covered by LCO 3.6.3.

Question Source:	X	New	
		Bank	
		Modified	
		Previous NRC Exam	

Cognitive Level:		Memory or Fundamental Knowledge
	X	Comprehension or Analysis

Level of Difficultly:	3	
10CFR55.43:	2	
Reference Provided:	N	
Learning Objective:	89787 – Identify the basis of Technical Specification LCO for section 3.6	

Examination Outline Cross-Reference:	Level	RO		SRO
K/A: Functional Recovery: Ability to determine and interpret the following as they apply to the Functional Recovery: Facility conditions and selection of appropriate procedures during abnormal and emergency operations	Tier			1
	Group			2
	K/A	CE E09 EA2.1		
	IR			4.4

Question 85

Given the following conditions:

- Unit 1 tripped from 100% power due to an ESD inside Containment
- On the trip, NBN-X03 'A' ESF Transformer tripped on ground fault lockout
- The 'A' EDG tripped on Low Lube Oil immediately after starting
- Containment Pressure is 12 psig and rising
- The 'B' LPSI Pump is tagged out for corrective maintenance
- The 'B' CS Pump tripped on overcurrent immediately after starting
- NCB-UV-401, NCW CNTMT UPSTREAM SPLY ISOL VLV, is closed
- NCA-UV-402, NCW CNTMT DOWNSTREAM RETURN ISOL VLV, is open
- NCB-UV-403, NCW CNTMT UPSTREAM RETURN ISOL VLV, is closed

Based on these conditions, the CRS should enter 40EP-9EO09, Functional Recovery, and jeopardize…

NOTE:

MVAC-1: Offsite Power
CI-1: Auto/Man CTMT Isolation
CTPC-2: CS

A. MVAC-1, CI-1 AND CTPC-2

B. MVAC-1 and CI-1 ONLY

C. CI-1 and CTPC-2 ONLY

D. MVAC-1 and CTPC-2 ONLY

Proposed Answer:	D

Explanations:	
A.	MVAC-1 and CTPC-2 are both correct, and CI-1 is plausible since NCA-UV-402 is a Containment Isolation Valve, but as long as NCB-UV-403 is closed, CI-1 is met.
B.	MVAC-1 is correct and CI-1 is plausible since NCA-UV-402 is a containment Isolation Valve, but as long as NCB-UV-403 is closed, CI-1 is met. Its plausible that CTPC-2 would not be jeopardized since one CS Pump is available and the 'B' LPSI Pump is available, however there is no power available to that pump due to the EDG trip.
C.	CTPC-2 is correct and CI-1 is plausible since NCA-UV-402 is a containment Isolation Valve, but as long as NCB-UV-403 is closed, CI-1 is met. It's plausible that MVAC-1 would not be jeopardized since the 'B' Class bus is energized, however, the 'A' Class bus needs to be energized in order to energize CS Pump 'A'.
D.	Correct.

Question Source:		**New**	
	X	**Bank**	
		Modified	
	X	**Previous NRC Exam**	2018 NRC SRO Exam Q90

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

Level of Difficultly:	**3**	
10CFR55.43:	**5**	
Reference Provided:	**N**	
Learning Objective:	**56272 – Determine whether or not a specific selected success path is jeopardized or challenged and how that information will be used**	

Examination Outline Cross-Reference:	Level	RO		SRO
K/A: Residual Heat Removal: Ability to (a) predict the impact of the following malfunctions or operations on the RHRS; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: Pressure transient protection during cold shutdown	Tier			2
	Group			1
	K/A	005 A2.02		
	IR			3.7

Question 86

At time 0100:

- RCS Tcold is 215°F and slowly lowering
- SDC is in service
- RCS cooldown is in progress at a rate of 20°F/hr
- Pressurizer level is 50% and stable

At time 0130:

- The LTOP spuriously lifted, resulting in the RCS heating up at a rate of 1°F/minute

At time 0140:

- The LTOP reseated and RCS temperature began lowering at a rate of 20°F/hr

Based on the listed conditions, the CRS should enter ___(1)___ and the event should be classified as ___(2)___ .

A. (1) 40EP-9EO09, Functional Recovery
(2) CU3.1

B. (1) 40EP-9EO09, Functional Recovery
(2) CA3.1

C. (1) 40EP-9EO11, Lower Mode Functional Recovery
(2) CU3.1

D. (1) 40EP-9EO11, Lower Mode Functional Recovery
(2) CA3.1

Proposed Answer:	C

Explanations:	
A.	First part is plausible since the event resulted in the unit entering MODE 4 (Hot Shutdown), however with the LTOP in service, the CRS would address this event using the lower mode functional recovery procedure. Second part is correct.
B.	First part is plausible since the event resulted in the unit entering MODE 4 (Hot Shutdown), however with the LTOP in service, the CRS would address this event using the lower mode functional recovery procedure. Second part is plausible since CA3.1 would be entered if 210°F was exceeded for greater than the C-4 Table duration, however with the pressurizer at 50% level, the RCS is intact and not in reduced inventory, therefore the heat up would have to last 60 minutes for CA3.1 to be the correct EAL classification.
C.	Correct.
D.	First part is correct. Second part is plausible since CA3.1 would be entered if 210°F was exceeded for greater than the C-4 Table duration, however with the pressurizer at 50% level, the RCS is intact and not in reduced inventory, therefore the heat up would have to last 60 minutes for CA3.1 to be the correct EAL classification.

Question Source:	X	New	
		Bank	
		Modified	
		Previous NRC Exam	

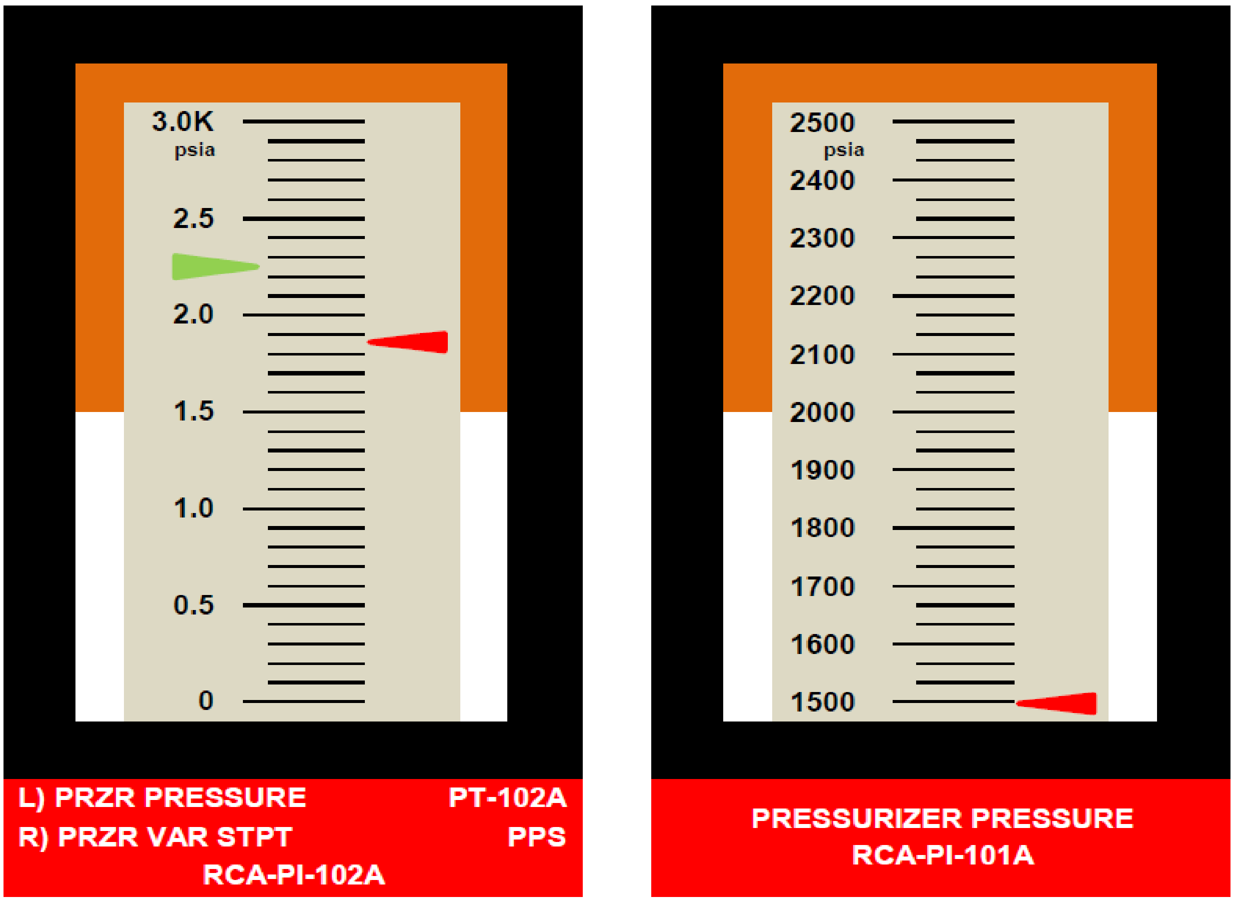
Cognitive Level:		Memory or Fundamental Knowledge
	X	Comprehension or Analysis

Level of Difficultly:	3	
10CFR55.43:	6	
Reference Provided:	Y	EAL Cold Chart
Learning Objective:	58622 – Determine the emergency plan classification	

Examination Outline Cross-Reference:	Level	RO		SRO
K/A: Reactor Protection: Knowledge of the bases in Technical Specifications for limiting conditions for operations and safety limits	Tier			2
	Group			1
	K/A	012 G 2.2.25		
	IR			4.2

Question 87

Given the following indications on B05 while operating at 100% power:



Per the Technical Specification Bases for LCO 3.3.1, RPS Instrumentation – Operating:

(1) The failed instrument is designed to provide protection in the event of a…

(2) Within one hour, the crew must bypass/trip the associated pressure channel…

A. (1) Loss of Coolant Accident
(2) ONLY

B. (1) Loss of Coolant Accident
(2) AND LPD-High and DNBR-Low

C. (1) Main Feedwater Line Break

(2) ONLY

D. (1) Main Feedwater Line Break
(2) AND LPD-High and DNBR-Low

Proposed Answer:	D

Explanations:	
A.	First part is plausible since LOCA is what is protected against for the WR pressurizer transmitter, however the failed transmitter is the NR transmitter. Second part is plausible since for a WR Pzr transmitter failure, only the pressurizer pressure – low bistable is bypassed, however since the NR transmitter is failed, the Prz bistable and the LPD and DNBR bistables have to also by bypassed.
B.	First part is plausible since LOCA is what is protected against for the WR pressurizer transmitter, however the failed transmitter is the NR transmitter. Second part is correct.
C.	First part is correct. Second part is plausible since for a WR Pzr transmitter failure, only the pressurizer pressure – low bistable is bypassed, however since the NR transmitter is failed, the Prz bistable and the LPD and DNBR bistables have to also by bypassed.
D.	Correct.

Question Source:	X	New	
		Bank	
		Modified	
		Previous NRC Exam	

Cognitive Level:		Memory or Fundamental Knowledge
	X	Comprehension or Analysis

Level of Difficultly:	3	
10CFR55.43:	2	
Reference Provided:	N	
Learning Objective:	89771 – Identify the basis of Technical Specification LCOs for section 3.3	

Examination Outline Cross-Reference:	Level	RO		SRO
K/A: Pressurizer Relief / Quench Tank: Ability to apply Technical Specifications for a system	**Tier**			**2**
	Group			**1**
	K/A	**007 G 2.2.40**		
	IR			**4.7**

Question 88

Given the following conditions:

- Unit 2 is operating at 100% power
- **At time = 1200:** Engineering informed the Control Room that 3 Pressurizer Safety Valves on Unit 2 are outside of their TS lift tolerances

Assuming the lift setpoints cannot be adjusted in the next 24 hours, what is the LATEST time that Unit 2 must be in MODE 3 in order to comply with LCO 3.4.10, Pressurizer Safety Valves – MODES 1, 2, and 3?

A. 1800

B. 1815

C. 1900

D. 1915

Proposed Answer:	A

Explanations:	
A.	Correct.
B.	Plausible if the 15 minute time allotment in LCO 3.4.10, Condition A, is applied in addition to the 6 hour time requirement in Condition B, however 3 inop valves is a direct entry into Condition B so MODE 3 is required in 6 hours.
C.	Plausible if LCO 3.0.3 was incorrect applied due to Condition A addressing one inop PSSV and Condition B addressing 2 inop valves, however condition B applies to 2 or more inop PSSVs, therefore LCO 3.0.3 does not apply.
D.	Plausible if the 15 minute time allotment in Condition is applied followed by the application of LCO 3.0.3.

Question Source:		**New**	
	X	**Bank**	
		Modified	
	X	**Previous NRC Exam**	**2016 NRC Exam Q86**

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

Level of Difficultly:	**3**	
10CFR55.43:	**2**	
Reference Provided:	**N**	
Learning Objective:	**89778 – Apply the action statements that are greater than one hour for TS 3.4**	

Examination Outline Cross-Reference:	Level	RO		SRO
K/A: Containment Spray: Ability to (a) predict the impacts of the following malfunctions or operations on the CSS; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: Loss of containment spray pump suction when in recirculation mode, possibly caused by clogged sump screen, pump inlet high temperature exceeded cavitation, voiding, or sump level below cutoff (interlock) limit	Tier			2
	Group			1
	K/A	026 A2.07		
	IR			2.6

Question 89

Given the following conditions:

- A large break LOCA has occurred on Unit 2
- RAS has automatically actuated
- All automatic and manual post-RAS actions have been completed
- The CS and HPSI Pumps are operating as follows:

Pump	Discharge Press	Amps
‘A’ HPSI Pump	Lowering	Erratic
‘A’ CS Pump	Lowering	Erratic
‘B’ HPSI Pump	Stable	Stable
‘B’ CS Pump	Stable	Stable

Per 40EP-9EO03, Loss of Coolant Accident, the CRS should direct the crew to IMMEDIATELY…

A. stop the ‘A’ CS Pump and throttle HPSI flow to ~ 250 gpm

B. stop the ‘A’ CS Pump and monitor performance of the ‘A’ HPSI Pump

C. stop the ‘A’ HPSI Pump and monitor performance of the ‘A’ CS Pump

D. stop BOTH the ‘A’ HPSI and the ‘A’ CS Pumps and monitor performance of the ‘B’ HPSI and CS Pumps

Proposed Answer:	B

Explanations:	
A.	Plausible since stopping the ‘A’ CS Pump is correct, however HPSI flow should not be throttled unless only one HPSI Pump is running and stopping the affected CS Pump doesn’t improve performance.
B.	Correct.
C.	Plausible since one pump is stopped and the other affected pump is monitored, however the CS Pump should be stopped, not the HPSI pump.
D.	Plausible since both ‘A’ pumps have lowering discharge pressure and erratic amps, however in this condition, only the affected CS pump is initially stopped.

Question Source:		**New**	
	X	**Bank**	
		Modified	
		Previous NRC Exam	

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

Level of Difficultly:	**3**	
10CFR55.43:	**5**	
Reference Provided:	**N**	
Learning Objective:	**10450 – Determine the major mitigating strategies contained in 40EP-9EO03**	

Examination Outline Cross-Reference:	Level	RO	[redacted]	SRO
K/A: AC Electrical Distribution: Knowledge of EOP mitigation strategies	**Tier**		[redacted]	**2**
	Group		[redacted]	**1**
	K/A	**062 G 2.4.6**		
	IR		[redacted]	**4.7**

Question 90

Given the timeline of events:

- **At time = 0100:** All three units tripped due to a loss of offsite power following an Operating Basis Earthquake:
- **At time = 0105:** Unit 1 had a loss of both EDGs due to Spray Pond piping ruptures in both EDG rooms
- **At time = 0115:** The Unit 1 CRS entered 40EP-9EO08, Blackout
- **At time = 0120:** Units 2 and 3 each reported that they have lost one EDG and their remaining EDG is supplying their Train 'A' Class 4.16kV Bus
- **At time = 0125:** The ECC reported that an offsite line will be available in ~ 3 hours
- **At time = 0155:** The SBOG operator reports that neither SBOG will start

Deleted

Based on the timeline of events, the Unit 1 CRS should ___(1)___ , and 40MG-9ZZ07, FLEX Support Guidelines ___(2)___ required to be performed.

A. (1) remain in 40EP-9EO08, Blackout
(2) IS

B. (1) remain in 40EP-9EO08, Blackout
(2) is NOT

C. (1) transition to 40EP-9EO09, Functional Recovery
(2) IS

D. (1) transition to 40EP-9EO09, Functional Recovery
(2) is NOT

Proposed Answer:	A

Explanations:	
A.	Correct.
B.	First part is correct. Second part is plausible since off-site power will be available well within the PVNGS blackout coping time of 16 hours, however if AC power will not be restored to a unit within 1 hour, entry into the ELAP procedure is required.
C.	First part is plausible since Unit 1 is operating on battery power and the Vital Auxiliary safety function will not be satisfied indefinitely, however all safety functions are currently met, therefore transition to the functional recovery procedure would not be warranted at this time. Second part is correct.
D.	First part is plausible since Unit 1 is operating on battery power and the Vital Auxiliary safety function will not be satisfied indefinitely, however all safety functions are currently met, therefore transition to the functional recovery procedure would not be warranted at this time. Second part is plausible since off-site power will be available well within the PVNGS blackout coping time of 16 hours, however if AC power will not be restored to a unit within 1 hour, entry into the ELAP procedure is required.

Question Source:	X	New	
		Bank	
		Modified	
		Previous NRC Exam	

Deleted

Cognitive Level:		Memory or Fundamental Knowledge
	X	Comprehension or Analysis

Level of Difficultly:	4
10CFR55.43:	5
Reference Provided:	N
Learning Objective:	10535 – Identify whether or not exit from the Blackout EOP is appropriate

Examination Outline Cross-Reference:	Level	RO		SRO
K/A: Control Rod Drive: Ability to (a) predict the impacts of the following malfunctions or operations on the CRDS; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: Erroneous ECP calculations	Tier			2
	Group			2
	K/A	001 A2.12		
	IR			4.2

Question 91

Given the following conditions:

- The Reactor is being started up per 40OP-9ZZ03, Reactor Startup, following a mid-cycle Reactor trip
- The Reactor was at equilibrium xenon when the startup commenced
- Regulating Group 5 CEAs have been withdrawn to 135” and the Reactor is still subcritical by ~ 150 pcm
- Reactor Engineering has determined that boron concentration was set too high due to an error in the critical boron concentration calculation

Per 40OP-9ZZ03, Reactor Startup, what is the MINIMUM required action the crew must perform to bring the Reactor to criticality?

A. Perform a dilution to achieve a boron concentration which is within 100 pcm of the most recent ACP, then withdraw Group 5 CEAs to criticality

B. Insert Regulating Group CEAs to compensate for the dilution reactivity plus 200 pcm, perform a dilution to achieve the proper boron concentration, then withdraw Regulating Group CEAs to criticality

C. Insert ALL Regulating Group CEAs ONLY to the lower group stop, perform a dilution to achieve the proper boron concentration, then withdraw Regulating Group CEAs to criticality

D. Insert ALL CEAs by tripping the Reactor, perform a dilution to achieve the proper boron concentration, then re-commence CEA withdrawal to criticality

Proposed Answer:	B

Explanations:	
A.	Plausible since a dilution would be required to get closer to criticality prior to withdrawing CEAs to criticality, however Group 5 CEAs may not be withdrawn above 135” prior to criticality.
B.	Correct.
C.	Plausible since CEAs must be inserted to “make room” below Group 5 CEAs at 135” to ensure the reactor will be brought to criticality using CEAs, however CEAs do not need to be inserted the lower group stop to compensate for the required dilution. Additionally, when withdrawing Reg Group CEAs to criticality, if conditions change and it is decided to terminate the startup, all Reg Group CEAs being inserted to the lower group stop is an allowed method to terminate, however in this case, the startup is being modified, not terminated.
D.	Plausible since CEAs must be inserted to “make room” below Group 5 CEAs at 135” to ensure the reactor will be brought to criticality using CEAs, however all CEAs do not need to be inserted to compensate for the required dilution. Additionally, when withdrawing Reg Group CEAs to criticality, if conditions change and it is decided to terminate the startup, tripping the reactor is a procedurally allowed method to terminate, however in this case, the startup is being modified, not terminated. The question is also asking for the minimum required action to establish conditions to bring the reactor critical which would also make D an incorrect answer, even though it is a procedurally allowable action.

Question Source:	X	**New**	
		Bank	
		Modified	
		Previous NRC Exam	

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

Level of Difficultly:	**4**	
10CFR55.43:	**6**	
Reference Provided:	**N**	
Learning Objective:	**11020 – Describe the required actions to continue the reactor startup if criticality is not achieved when Group 5 reaches 135 inches withdrawn**	

Examination Outline Cross-Reference:	Level	RO	[redacted]	SRO
K/A: In-Core Temperature Monitor: Knowledge of the bases in Technical Specifications for limiting conditions for operations and safety limits	Tier		[redacted]	2
	Group		[redacted]	2
	K/A	017 G 2.2.25		
	IR		[redacted]	4.2

Question 92

Per 40ST-9ZZ10, Post Accident Monitoring Instrumentation Channel Checks, QSPDS A and QSPDS B must EACH have a MINIMUM of ___(1)___ OPERABLE CETs in a MINIMUM of ___(2)___ core quadrants to satisfy the requirements of LCO 3.3.10, PAM Instrumentation.

A. (1) 1
(2) 2

B. (1) 1
(2) 4

C. (1) 2
(2) 2

D. (1) 2
(2) 4

Proposed Answer:	D

Explanations:	
A.	First part is plausible since two operable CETs are required in each quadrant, and there are two channels of QSPDS (one per QSPDS would still be 2 per quadrant), however the LCO requires that each channel of QSPDS has two operable CETs. Second part is plausible since there are other PAMI indications with four available instruments which only require 2 of the 4 to be operable to meet LCO 3.3.10 (i.e. SG level and pressure instruments), however all four quadrants must have the minimum number of operable CETs to satisfy LCO 3.3.10.
B.	First part is plausible since two operable CETs are required in each quadrant, and there are two channels of QSPDS (one per QSPDS would still be 2 per quadrant), however the LCO requires that each channel of QSPDS has two operable CETs. Second part is correct.
C.	First part is correct. Second part is plausible since there are other PAMI indications with four available instruments which only require 2 of the 4 to be operable to meet LCO 3.3.10 (i.e. SG level and pressure instruments), however all four quadrants must have the minimum number of operable CETs to satisfy LCO 3.3.10.
D.	Correct.

Question Source:	X	New	
		Bank	
		Modified	
		Previous NRC Exam	

Cognitive Level:		Memory or Fundamental Knowledge
	X	Comprehension or Analysis

Level of Difficultly:	3	
10CFR55.43:	2	
Reference Provided:	N	
Learning Objective:	89771 – Identify the basis of Technical Specification LCOs for section 3.3	

Examination Outline Cross-Reference:	Level	RO	[redacted]	SRO
K/A: Fuel Handling Equipment: Knowledge of design feature(s) and/or interlock(s) which provide for the following: Fuel protection from binding and dropping	Tier		[redacted]	2
	Group		[redacted]	2
	K/A	034 K4.01		
	IR		[redacted]	3.4

Question 93

Per 78OP-9FX01, Refueling Machine Operations:

(1) To prevent fuel assembly grid strap binding, unless otherwise directed by the Refueling SRO, the Refueling Team SHALL use…

(2) If the equipment described in part 1 is out of service, continuation of fuel movements requires the approval of the…

A. (1) Fuel Assembly Guides
(2) Operations Director

B. (1) Fuel Assembly Guides
(2) Shift Manager

C. (1) the Fuel Spreader
(2) Operations Director

D. (1) the Fuel Spreader
(2) Shift Manager

Proposed Answer:	D

Explanations: **This change to the fuel handling procedure stems from 2015 PVNGS OE due to damaged grid straps. The fuel spreader is the design feature used to prevent grid strap binding.**	
A.	First part is plausible as the fuel assembly guides are used to help guide fuel assemblies when difficulty is encountered when inserting or removing assemblies, however they are not required to be used. Second part is plausible as there are evolutions (high risk evolutions) which require Operations Management approval (such as reactor startup), however for this evolution, SM approval is the requirement.
B.	First part is plausible as the fuel assembly guides are used to help guide fuel assemblies when difficulty is encountered when inserting or removing assemblies, however they are not required to be used. Second part is correct.
C.	First part is correct. Second part is plausible as there are evolutions (high risk evolutions) which require Operations Management approval (such as reactor startup), however for this evolution, SM approval is the requirement.
D.	Correct.

Question Source:	X	New	
		Bank	
		Modified	
		Previous NRC Exam	

Cognitive Level:	X	Memory or Fundamental Knowledge
		Comprehension or Analysis

Level of Difficultly:	3	
10CFR55.43:	7	
Reference Provided:	N	
Learning Objective:	114360 – Identify the precautions and limitations concerning the refuel machine	

Examination Outline Cross-Reference:	Level	RO		SRO
K/A: Knowledge of primary and secondary plant chemistry limits	Tier			3
	Group			
	K/A	G 2.1.34		
	IR			3.5

Question 94

Per LCO 3.4.17, RCS Specific Activity, the unit must immediately enter a required action to be in MODE 3 within 6 hours if DOSE EQUIVALENT ___(1)___ exceeds a MINIMUM of ___(2)___ .

A. (1) Xe-133
   (2) 550 μCI/gm

B. (1) Xe-133
   (2) 60 μCI/gm

C. (1) I-131
   (2) 550 μCI/gm

D. (1) I-131
   (2) 60 μCI/gm

Proposed Answer:	D

Explanations:	
A.	Plausible since Xe-133 is controlled by LCO 3.4.17, and 550 μCI/gm is the limit for Xe-133, however an immediate entrance into a MODE 3 in 6 hours action is only required if I-131 exceeds 60 μCI/gm.
B.	Plausible since Xe-133 is controlled by LCO 3.4.17, and 60 μCI/gm is the activity limit which will drive the unit into a MODE 3 in 6 hours action, however this is the limit for I-131, not Xe-133.
C.	Plausible since I-131 is the activity which will drive the unit into a MODE 3 in 6 hours action, however 550 μCI/gm is the limit for Xe-133.
D.	Correct.

Question Source:	**X**	**New**	
		Bank	
		Modified	
		Previous NRC Exam	

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

Level of Difficultly:	**3**	
10CFR55.43:	**2**	
Reference Provided:	**N**	
Learning Objective:	**89778 – Apply the action statements that are greater than one hour for TS 3.4**	

Examination Outline Cross-Reference:	Level	RO		SRO
K/A: Knowledge of procedures and limitations involved in core alterations	Tier			3
	Group			
	K/A	G 2.1.36		
	IR			4.0

Question 95

Given the following conditions:

- On 4/5/19 at 2400: Unit 1 was tripped in preparation for a refueling outage
- On 4/8/19 at 1600: The Reactor Vessel Head was removed
- On 4/9/19 at 2000: The UGS Lift Rig CEA Support Plate was raised with CEAs attached

(1) Per 40OP-9ZZ23, Outage GOP, the CRS should log that Core Alterations commenced when the…

(2) Per the PVNGS Technical Requirements Manual, the core off-load may not commence until the Reactor has been subcritical for a MINIMUM of…

A. (1) Reactor Vessel Head was removed
(2) 100 hours

B. (1) Reactor Vessel Head was removed
(2) 149 hours

C. (1) UGS Lift Rig CEA Support Plate was raised
(2) 100 hours

D. (1) UGS Lift Rig CEA Support Plate was raised
(2) 149 hours

Proposed Answer:	C

Explanations:	
A.	First part is plausible since the vessel is being altered during this refueling activity and an SRO is required to be on station for the head removal as they would be for core alterations, however removal of the vessel head is not considered to be a core alteration per the Outage GOP. Second part is correct.
B.	First part is plausible since the vessel is being altered during this refueling activity and an SRO is required to be on station for the head removal as they would be for core alterations, however removal of the vessel head is not considered to be a core alteration per the Outage GOP. Second part is plausible since the reactor must be subcritical for 149 hours prior to unloading ALL fuel assemblies to the Spent Fuel Pool, however only 100 hours must elapse prior to commencing the core off-load.
C.	Correct.
D.	First part is correct. Second part is plausible since the reactor must be subcritical for 149 hours prior to unloading ALL fuel assemblies to the Spent Fuel Pool, however only 100 hours must elapse prior to commencing the core off-load.

Question Source:	X	New	
		Bank	
		Modified	
		Previous NRC Exam	

Cognitive Level:	X	Memory or Fundamental Knowledge
		Comprehension or Analysis

Level of Difficultly:	3	
10CFR55.43:	6	
Reference Provided:	N	
Learning Objective:	97298 – Define a core alteration and describe the position that PVNGS has taken on core alterations	

Examination Outline Cross-Reference:	Level	RO		SRO
K/A: Knowledge of the process for making design or operating changes to the facility	Tier			3
	Group			
	K/A	G 2.2.5		
	IR			3.2

Question 96

Given the following conditions:

- A design change is being proposed for all three units
- The proposed change is required to be assessed using the 50.59 process

(1) Which part of the 50.59 process will indicate if a 50.59 evaluation is required to be performed?

(2) If a 50.59 evaluation is required, what are the MINIMUM qualifications required to perform the evaluation?

A. (1) Screening
(2) 50.59 Evaluator qualification ONLY

B. (1) Screening
(2) 50.59 Evaluator qualification AND an SRO license

C. (1) Applicability Determination
(2) 50.59 Evaluator qualification ONLY

D. (1) Applicability Determination
(2) 50.59 Evaluator qualification AND an SRO license

Proposed Answer:	A

Explanations:	
A.	Correct.
B.	First part is correct. Second part is plausible since one of the minimum education and experience requirements to qualify as a 50.59 evaluator is an SRO license, however having an SRO license is not a requirement in order to perform a 50.59 evaluation, only the 50.59 evaluator qualification is required.
C.	First part is plausible since the applicability determination is used to determine if 50.59 applies or if the change is covered by another regulation, and is one of the two stages in the three step process that proceeds the evaluation, however the applicability determination indicates if a screening is required, not an evaluation. Second part is correct.
D.	First part is plausible since the applicability determination is used to determine if 50.59 applies or if the change is covered by another regulation, and is one of the two stages in the three step process that proceeds the evaluation, however the applicability determination indicates if a screening is required, not an evaluation. Second part is plausible since one of the minimum education and experience requirements to qualify as a 50.59 evaluator is an SRO license, however having an SRO license is not a requirement in order to perform a 50.59 evaluation, only the 50.59 evaluator qualification is required.

Question Source:	X	New	
		Bank	
		Modified	
		Previous NRC Exam	

Cognitive Level:	X	Memory or Fundamental Knowledge
		Comprehension or Analysis

Level of Difficultly:	3	
10CFR55.43:	3	
Reference Provided:	N	
Learning Objective:	10080 – Describe the purpose of the 50.59 safety screening and evaluation	

Examination Outline Cross-Reference:	**Level**	**RO**		**SRO**
K/A: Ability to control radiation releases	**Tier**			**3**
	Group			
	K/A		**G 2.3.11**	
	IR			**4.3**

Question 97

(1) Per 74RM-9EF20, Gaseous Radioactive Release Permits and Offsite Dose Assessment, how long is a Non-Standard Containment Purge (NSCP) release permit valid for?

(2) Per 40OP-9CP01, Containment Purge System, prior to venting Containment, 74ST-9SQ07, Radiation Monitoring System Shiftly Surveillance Test, is required to be current for...

NOTE:
- RU-34, Containment Purge Ventilation Monitor
- RU-37, Power Access Purge Area Monitor A
- RU-38, Power Access Purge Area Monitor B

A. (1) 1 day
(2) RU-34

B. (1) 1 day
(2) RU-37 and RU-38

C. (1) 7 days
(2) RU-34

D. (1) 7 days
(2) RU-37 and RU-38

Proposed Answer:	B

Explanations:	
A.	First part is correct. Second part is plausible since RU-34 will be placed in service if it available, however only RU-37 and RU-38 are required to have the shiftly surveillance test current prior to the purge.
B.	Correct.
C.	First part is plausible since permits for Power Access Purge or Refueling Purge are good for 7 days, but a Non-Standard Containment Purge permit is good for 1 day. First part is correct. Second part is plausible since RU-34 will be placed in service if it available, however only RU-37 and RU-38 are required to have the shiftly surveillance test current prior to the purge.
D.	First part is plausible since permits for Power Access Purge or Refueling Purge are good for 7 days, but a Non-Standard Containment Purge permit is good for 1 day. Second part is correct.

Question Source:	X	New	
		Bank	
		Modified	
		Previous NRC Exam	

Cognitive Level:	X	Memory or Fundamental Knowledge
		Comprehension or Analysis

Level of Difficultly:	3	
10CFR55.43:	4	
Reference Provided:	N	
Learning Objective:	57255 – Determine when a new release permit must be generated	

Examination Outline Cross-Reference:	Level	RO		SRO
K/A: Knowledge of radiological safety procedures pertaining to licensed operator duties such as response to radiation monitor alarms, containment entry requirements, fuel handling responsibilities, access to locked high radiation areas, aligning filters, etc.	Tier			3
	Group			
	K/A	G 2.3.13		
	IR			3.8

Question 98

Per EP-0905, Protective Actions, when determining who should be selected to perform life-saving efforts during an emergency with the potential to result in high-dose exposures, the Emergency Coordinator should give primary consideration to persons ___(1)___ the age of 45, and those people selected to perform these efforts MUST be volunteers if the expected dose will exceed a MINIMUM of ___(2)___ REM.

A. (1) over
(2) 10

B. (1) over
(2) 25

C. (1) under
(2) 10

D. (1) under
(2) 25

Proposed Answer:	**B**

Explanations:	
A.	First part is correct. Second part is plausible since 10 REM is the limit for protection of valuable property in EP-0905, however a volunteer is only required when the expected dose is greater than 25 REM.
B.	Correct.
C.	First part is plausible since younger workers are generally in better health and would be more equipped to recovery from a high level acute dose, however the radiation effects are more severe in younger bodies, so personnel over the age of 45 are preferred. Second part is plausible since 10 REM is the limit for protection of valuable property in EP-0905, however a volunteer is only required when the expected dose is greater than 25 REM.
D.	First part is plausible since younger workers are generally in better health and would be more equipped to recovery from a high level acute dose, however the radiation effects are more severe in younger bodies, so personnel over the age of 45 are preferred. Second part is correct.

Question Source:	**X**	**New**	
		Bank	
		Modified	
		Previous NRC Exam	

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

Level of Difficultly:	**2**	
10CFR55.43:	**4**	
Reference Provided:	**N**	
Learning Objective:	**92080 – Identify the Emergency Coordinator’s responsibilities associated with Emergency Exposure**	

Examination Outline Cross-Reference:	Level	RO		SRO
K/A: Knowledge of the parameters and logic used to assess the status of safety functions, such as reactivity control, core cooling and heat removal, reactor coolant system integrity, containment conditions, radioactivity release control, etc.	Tier			3
	Group			
	K/A	G 2.4.21		
	IR			4.6

Question 99

(1) Per 40EP-9EO07, LOOP/LOFC, to meet the Containment Temperature and Pressure Control Safety Function following a loss of offsite power, Containment temperature must be less than a MAXIMUM of…

(2) Per 40EP-9EO08, Blackout, to meet the Containment Temperature and Pressure Control Safety Function, Containment temperature must be less than a MAXIMUM of…

A. (1) 117°F
(2) 200°F

B. (1) 117°F
(2) 235°F

C. (1) 125°F
(2) 200°F

D. (1) 125°F
(2) 235°F

Proposed Answer:	**A or C**

Explanations:	
A.	First part is plausible since 117°F is the containment temperature limit per 40EP-9EO07, however only if there is a loss of forced circulation without a loss of offsite power. Second part is correct.
B.	First part is plausible since 117°F is the containment temperature limit per 40EP-9EO07, however only if there is a loss of forced circulation without a loss of offsite power. Second part is plausible since 235°F is the containment temperature limit during a LOCA or if the Functional Recovery procedure is used, however during a blackout, the temperature limit is 200°F.
C.	Correct.
D.	First part is correct. Second part is plausible since 235°F is the containment temperature limit during a LOCA or if the Functional Recovery procedure is used, however during a blackout, the temperature limit is 200°F.

Question Source:	**X**	**New**	
		Bank	
		Modified	
		Previous NRC Exam	

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

Level of Difficultly:	**3**	
10CFR55.43:	**5**	
Reference Provided:	**N**	
Learning Objective:	**10319 – Analyze Containment Temperature and Pressure Control to determine if the SFSC acceptance criteria is satisfied**	

Examination Outline Cross-Reference:	Level	RO		SRO
K/A: Knowledge of events related to system operation/status that must be reported to internal organizations or external agencies, such as the State, the NRC, or the transmission system operator	**Tier**			**3**
	Group			
	K/A	**G 2.4.30**		
	IR			**4.1**

Question 100

Given the following conditions:

- **At time = 1305:** The Shift Manager declared an Alert classification
- **At time = 1315:** State and Local Agencies were notified of the event

Per EP-0902, Notifications, the NRC must be notified NO LATER THAN…

A. 1320

B. 1330

C. 1405

D. 1415

Proposed Answer:	C

Explanations:	
A.	Plausible if thought that the NRC must be notified no later than 15 minutes (like state and local agencies) from the EAL classification, however the NRC must be notified within 1 hour.
B.	Plausible if thought that the NRC must be notified in no later than 15 minutes (like state and local agencies) and that the start time for the notification clock is when state and local agencies are notified, however the NRC must be notified within 1 hour and the start time for that clock is the time of the EAL declaration.
C.	Correct.
D.	Plausible since the maximum time to notify the NRC is 1 hour, however that time starts from the time of the EAL declaration, not from the time state and local agencies are notified.

Question Source:		New	
	X	Bank	
		Modified	
		Previous NRC Exam	

Cognitive Level:	X	Memory or Fundamental Knowledge
		Comprehension or Analysis

Level of Difficultly:	2	
10CFR55.43:	1	
Reference Provided:	N	
Learning Objective:	92711 – Identify the time restrictions for both classification of an emergency and notification of city, state, county, and federal agencies	

References for PV -2019-10 Initial Written Exam

	GENERAL EMERGENCY	SITE AREA EMERGENCY	ALERT	UNUSUAL EVENT

C Cold SD/ Refueling System Malfunct.

1 RCS Level

GENERAL EMERGENCY

Loss of RCS inventory affecting fuel clad integrity with Containment challenged

CG1.1 Modes: 5, 6

RCS level **cannot** be monitored for ≥ 30 min. (Note 1)

AND

Core uncovery is indicated by **any** of the following:

- UNPLANNED increase in **any** Table C-1 sump/tank level of sufficient magnitude to indicate core uncovery
- RU-33 ≥ 9,000 mR/hr (when installed)
- Erratic Excore Monitor indication

AND

Any Containment Challenge indication, Table C-2

SITE AREA EMERGENCY

Loss of RCS inventory affecting core decay heat removal capability

CS1.1 Modes: 5, 6

RCS level cannot be monitored for ≥ 30 min. (Note 1)

AND

Core uncovery is indicated by **any** of the following:

- UNPLANNED increase in **any** Table C-1 sump/tank level of sufficient magnitude to indicate core uncovery
- RU-33 ≥ 9,000 mR/hr (when installed)
- Erratic Excore Monitor indication

ALERT

Loss of RCS inventory

CA1.1 Modes: 5, 6

Loss of RCS inventory as indicated by RCS level < 101 ft. 6 in. (RWLIS NR RCN-LI-752A/RCN-LR-752)

CA1.2 Modes: 5, 6

RCS level cannot be monitored for ≥ 15 min. (Note 1)

AND EITHER

- UNPLANNED increase in **any** Table C-1 Sump / Tank level due to a loss of RCS inventory
- Visual observation of UNISOLABLE RCS leakage

UNUSUAL EVENT

UNPLANNED loss of RCS inventory for 15 minutes or longer

CU1.1 Modes: 5, 6

UNPLANNED loss of reactor coolant results in RCS level less than a required lower limit for ≥ 15 min. (Notes 1, 10)

CU1.2 Modes: 5, 6

RCS level cannot be monitored

AND EITHER:

- UNPLANNED increase in **any** Table C-1 sump/ tank level due to a loss of RCS inventory
- Visual observation of UNISOLABLE RCS leakage

Table C-2 Containment Challenge Indications

- CONTAINMENT CLOSURE **not** established (Note 6)
- Containment hydrogen concentration ≥ 4.9%
- Unplanned rise in containment pressure

Table C-1 Sumps/Tanks

- Containment Sumps
- Reactor Cavity Sumps
- Auxiliary Building Sumps
- CVCS Holdup Tank
- Reactor Drain Tank
- Refueling Water Tank
- Equipment Drain Tank

2 Loss of Emergency AC Power

ALERT

Loss of all offsite power and all onsite AC power capability to emergency buses for 15 minutes or longer

CA2.1 Modes: 5, 6, DEF

Loss of **all** offsite and **all** onsite AC power capability to emergency 4.16KV buses PBA-S03 and PBB-S04 for ≥ 15 min.

UNUSUAL EVENT

Loss of all but one AC power source to emergency buses for 15 minutes or longer

CU2.1 Modes: 5, 6, DEF

AC power capability, Table C-3, to emergency 4.16KV buses PBA-S03 and PBB-S04 reduced to a single power source for ≥ 15 min. (Note 1)

AND

Any additional single power source failure will result in loss of **all** AC power to SAFETY SYSTEMS

Table C-3 AC Power Supplies

Offsite:

- SUT (normal)
- SUT (alternate)
- SBOG #1 (if already aligned)
- SBOG #2 (if already aligned)

Onsite:

- DG A
- DG B

3 RCS Temp.

ALERT

Inability to maintain plant in cold shutdown

CA3.1 Modes: 5, 6

UNPLANNED increase in RCS temperature to > 210°F for > Table C-4 duration (Note 1)

OR

UNPLANNED RCS pressure increase > 10 psia (This criterion does not apply during water-solid plant conditions)

UNUSUAL EVENT

UNPLANNED increase in RCS temperature

CU3.1 Modes: 5, 6

UNPLANNED increase in RCS temperature to > 210°F

CU3.2 Modes: 5, 6

Loss of **all** RCS temperature and RCS level indication for ≥ 15 min. (Note 1)

Table C-4 RCS Heatup Duration Thresholds

* If an RCS heat removal system is in operation within this time frame and RCS temperature is being reduced the EAL is **not** applicable

RCS Status	Containment Closure Status	Heat-up Duration
Intact (but **not** REDUCED INVENTORY)	N/A	60 min. *
Not intact **OR** REDUCED INVENTORY	Established	20 min. *
	Not Established	0 min.

4 Loss of Vital DC Power

UNUSUAL EVENT

Loss of vital DC power for 15 minutes or longer

CU4.1 Modes: 5, 6

Indicated voltage is < 112VDC on vital DC buses required by Technical Specifications for ≥ 15 min. (Note 1)

5 Loss of Comm.

UNUSUAL EVENT

Loss of all onsite or offsite communications capabilities

CU5.1 Modes: 5, 6, DEF

Loss of **all** Table C-5 onsite communication methods

OR

Loss of **all** Table C-5 Offsite Response Organization (ORO) communication methods

OR

Loss of **all** Table C-5 NRC communication methods

Table C-5 Communications Methods

System	Onsite	ORO	NRC
PBX	X	X	X
Plant Page	X		
Two-Way Radio	X		
FTS (ENS)			X
Telephone Ringdown Circuits (NAN)		X	
Cellular Phones		X	X

6 Hazardous Event Affecting Safety Systems

ALERT

Hazardous event affecting a SAFETY SYSTEM needed for the current operating mode

CA6.1 Modes: 5, 6

The occurrence of **any** Table C-6 hazardous event

AND EITHER:

- Event damage has caused indications of degraded performance in at least one train of a SAFETY SYSTEM needed for the current operating mode
- The event has caused VISIBLE DAMAGE to a SAFETY SYSTEM component or structure needed for the current operating mode

UNUSUAL EVENT

None

Table C-6 Hazardous Events

- Seismic event (earthquake)
- Internal or external FLOODING event
- High winds or tornado strike
- FIRE
- EXPLOSION
- Other events with similar hazard characteristics as determined by the Shift Manager

Notes

Note 1: The Emergency Coordinator should declare the event promptly upon determining that time limit has been exceeded, or will likely be exceeded

Note 6: If CONTAINMENT CLOSURE is re-established prior to exceeding the 30-minute time limit, declaration of a General Emergency is **not** required.

Note 10: Variations in RCS boron concentration, temperature and Containment Temperature from those used in RWLIS calibration will induce indication errors. Refer to Operator Assistance Program RWLIS_Spreadsheet.xls

[redacted]

Modes: Power Operation | Startup | Hot Standby | Hot Shutdown | 5 Cold Shutdown | 6 Refueling | DEF Defueled

EP-802 H
EAL Classification Matrix

COLD CONDITIONS (RCS ≤ 210°F)

F Fission Product Barrier Degradation

IC	Modes	Condition
FG1.1	1, 2, 3, 4	Loss of any two barriers **AND** Loss or potential loss of third barrier (Table F-1)
FS1.1	1, 2, 3, 4	Loss or potential loss of any two barriers (Table F-1)
FA1.1	1, 2, 3, 4	Any loss or any potential loss of either Fuel Clad or RCS (Table F-1)

Table F-1 Fission Product Barrier Matrix

Category	Fuel Clad (FC) Barrier – Loss	Fuel Clad (FC) Barrier – Potential Loss	Reactor Coolant System (RCS) Barrier – Loss	Reactor Coolant System (RCS) Barrier – Potential Loss	Containment (CTMT) Barrier – Loss	Containment (CTMT) Barrier – Potential Loss
A RCS or SG Tube Leakage		1. RVLMS < 21% plenum (Detector #8)	1. An automatic or manual ECCS (SIAS) actuation required by **EITHER:** • UNISOLABLE RCS leakage • SG tube RUPTURE	1. With letdown isolated, operation of the standby charging pump is required by **EITHER:** • UNISOLABLE RCS leakage • SG tube leakage 2. Pressurized thermal shock transient in excess of the upper (200ºF) subcooling P/T limit (Note 9) **AND** RCS pressure is rising	1. A leaking or RUPTURED SG is FAULTED outside of containment	
B Inadequate Heat Removal	1. Rep CETs > 1200ºF	1. Rep CETs > 700ºF 2. RCS heat removal cannot be established **AND** RCS subcooling < 24ºF		1. RCS heat removal cannot be established **AND** RCS subcooling < 24ºF		1. Rep CETs > 1200ºF **AND** Functional recovery procedure **not** effective within 15 min. (Note 1)
C CTMT Radiation / RCS Activity	1. Containment radiation RU-148 > 2.1E+05 mR/hr **OR** RU-149 > 2.4E+05 mR/hr 2. Dose equivalent I-131 coolant activity > 300 µCi/gm		1. Containment radiation RU-148 > 5.0E+04 mR/hr **OR** RU-149 > 5.6E+04 mR/hr			1. Containment radiation RU-148 > 6.8E+06 mR/hr **OR** RU-149 > 7.8E+06 mR/hr
D CTMT Integrity or Bypass					1. Containment isolation is required **AND EITHER:** • Containment integrity has been lost based on Emergency Coordinator judgment • UNISOLABLE pathway from Containment to the environment exists 2. Indications of RCS leakage outside of Containment	1. Containment pressure > 60 psig 2. Containment hydrogen concentration ≥ 4.9% 3. Containment pressure > 8.5 psig with < 4350 gpm Containment Spray flow for ≥ 15 min. (Note 1)
E Emergency Coordinator Judgment	1. **Any** condition in the opinion of the Emergency Coordinator that indicates loss of the Fuel Clad barrier	1. **Any** condition in the opinion of the Emergency Coordinator that indicates potential loss of the Fuel Clad barrier	1. **Any** condition in the opinion of the Emergency Coordinator that indicates loss of the RCS barrier	1. **Any** condition in the opinion of the Emergency Coordinator that indicates potential loss of the RCS barrier	1. **Any** condition in the opinion of the Emergency Coordinator that indicates loss of the Containment barrier	1. **Any** condition in the opinion of the Emergency Coordinator that indicates potential loss of the Containment barrier

S System Malfunct.

	GENERAL EMERGENCY	SITE AREA EMERGENCY	ALERT	UNUSUAL EVENT
1 Loss of Emergency AC Power	**Prolonged loss of all offsite and all onsite AC power to emergency buses** **SG1.1** (1, 2, 3, 4) Loss of **all** offsite and **all** onsite AC power capability to emergency 4.16KV buses PBA-S03 and PBB-S04 **AND EITHER:** • Restoration of at least one emergency bus in < 4 hours is **not** likely (Note 1) • Rep CET reading > 1200 ºF **Loss of all AC and vital DC power sources for 15 minutes or longer** **SG1.2** (1, 2, 3, 4) Loss of **all** offsite and **all** onsite AC power capability to emergency 4.16KV buses PBA-S03 and PBB-S04 for ≥ 15 min. **AND** Loss of 125 VDC power based on battery bus voltage indications < 112 VDC on **both** vital DC buses PKA-M41 and PKB-M42 for ≥ 15 min. (Note 1)	**Loss of all offsite and all onsite AC power to emergency buses for 15 minutes or longer** **SS1.1** (1, 2, 3, 4) Loss of **all** offsite and **all** onsite AC power capability to emergency 4.16KV buses PBA-S03 and PBB-S04 for ≥ 15 min. (Note 1)	**Loss of all but one AC power source to emergency buses for 15 minutes or longer** **SA1.1** (1, 2, 3, 4) AC power capability, Table S-1, to emergency 4.16KV buses PBA-S03 and PBB-S04 reduced to a single power source for ≥ 15 min. (Note 1) **AND** **Any** additional single power source failure will result in loss of **all** AC power to SAFETY SYSTEMS	**Loss of all offsite AC power capability to emergency buses for 15 minutes or longer** **SU1.1** (1, 2, 3, 4) Loss of **all** offsite AC power capability, Table S-1, to emergency 4.16KV buses PBA-S03 and PBB-S04 for ≥ 15 min. (Note 1)
2 Loss of Vital DC Power		**Loss of all vital DC power for 15 minutes or longer** **SS2.1** (1, 2, 3, 4) Loss of 125 VDC power based on battery bus voltage indications < 112 VDC on **both** vital DC buses PKA-M41 and PKB-M42 for ≥ 15 min. (Note 1)		
3 Loss of Control Room Indications			**UNPLANNED loss of Control Room indications for 15 minutes or longer with a significant transient in progress** **SA3.1** (1, 2, 3, 4) An UNPLANNED event results in the inability to monitor one or more Table S-2 parameters from within the Control Room for ≥ 15 min. (Note 1) **AND** **Any** significant transient is in progress, Table S-3	**UNPLANNED loss of Control Room indications for 15 minutes or longer** **SU3.1** (1, 2, 3, 4) An UNPLANNED event results in the inability to monitor one or more Table S-2 parameters from within the Control Room for ≥ 15 min. (Note 1)
4 RCS Activity				**Reactor coolant activity greater than Technical Specification allowable limits** **SU4.1** (1, 2, 3, 4) Letdown Monitor RU-155D reading > high alarm **SU4.2** (1, 2, 3, 4) Sample analysis indicates RCS activity > Technical Specification LCO 3.4.17 limits
5 RCS Leakage				**RCS leakage for 15 minutes or longer** **SU5.1** (1, 2, 3, 4) RCS unidentified or pressure boundary leakage > 10 gpm for ≥ 15 min. **OR** RCS identified leakage > 25 gpm for ≥ 15 min. **OR** Reactor coolant leakage to a location outside containment > 25 gpm for ≥ 15 min. (Note 1)
6 RPS Failure		**Inability to shut down the reactor causing a challenge to core cooling or RCS heat removal** **SS6.1** (1) An automatic or manual trip fails to shut down the reactor as indicated by reactor power > 5% **AND** **All** actions to shut down the reactor are **not** successful as indicated by reactor power > 5% **AND EITHER:** • Rep CET > 1200°F • RCS subcooling < 24°F	**Automatic or manual trip fails to shut down the reactor and subsequent manual actions taken at the reactor control consoles are not successful in shutting down the reactor** **SA6.1** (1) An automatic or manual trip fails to shut down the reactor as indicated by reactor power > 5% **AND** Manual trip actions taken at the reactor control consoles (B05 or B01) are **not** successful in shutting down the reactor as indicated by reactor power > 5% (Note 8)	**Automatic or manual trip fails to shut down the reactor** **SU6.1** (1) An automatic trip did **not** shut down the reactor as indicated by reactor power > 5% after **any** RPS setpoint is exceeded **AND** A subsequent automatic trip or manual trip action taken at the reactor control consoles (B05 or B01) is successful in shutting down the reactor as indicated by reactor power ≤ 5% (Note 8) **SU6.2** (1) A manual trip did **not** shut down the reactor as indicated by reactor power > 5% after **any** manual trip action was initiated **AND** A subsequent automatic trip or manual trip action taken at the reactor control consoles (B05 or B01) is successful in shutting down the reactor as indicated by reactor power ≤ 5% (Note 8)
7 Loss of Comm.				**Loss of all onsite or offsite communications capabilities** **SU7.1** (1, 2, 3, 4) Loss of **all** Table S-4 onsite communication methods **OR** Loss of **all** Table S-4 Offsite Response Organization (ORO) communication methods **OR** Loss of **all** Table S-4 NRC communication methods
8 CTMT Failure				**Failure to isolate containment or loss of containment pressure control** **SU8.1** (1, 2, 3, 4) **EITHER:** • **Any** penetration is not closed when required within 15 min. of a VALID isolation signal. (Note 1) • Containment pressure > 8.5 psig with < 4350 gpm Containment Spray flow for ≥ 15 min. (Note 1)
9 Hazardous Event Affecting Safety Systems			**Hazardous event affecting a SAFETY SYSTEM needed for the current operating mode** **SA9.1** (1, 2, 3, 4) The occurrence of **any** Table S-5 hazardous event **AND EITHER:** • Event damage has caused indications of degraded performance in at least one train of a SAFETY SYSTEM needed for the current operating mode • The event has caused VISIBLE DAMAGE to a SAFETY SYSTEM component or structure needed for the current operating mode	None

Table S-1 AC Power Supplies

Offsite:
- SUT (normal)
- SUT (alternate)
- SBOG #1 **AND** SBOG #2 (if already aligned)

Onsite:
- DG A
- DG B

Table S-2 Safety System Parameters

- Reactor power
- RCS level
- RCS pressure
- CET temperature
- Level in at least one S/G
- Auxiliary feed flow to at least one S/G (Note 11)

Table S-3 Significant Transients

- Reactor trip
- Runback > 25% thermal power
- Electrical load rejection > 25% electrical load
- Reactor power cutback
- ECCS actuation

Table S-4 Communications Methods

System	Onsite	ORO	NRC
PBX	X	X	X
Plant Page	X		
Two-Way Radio	X		
FTS (ENS)			X
Telephone Ringdown Circuits (NAN)		X	
Cellular Phones		X	X

Table S-5 Hazardous Events

- Seismic event (earthquake)
- Internal or external FLOODING event
- High winds or tornado strike
- FIRE
- EXPLOSION
- Other events with similar hazard characteristics as determined by the Shift Manager

Notes

Note 1: The Emergency Coordinator should declare the event promptly upon determining that time limit has been exceeded, or will likely be exceeded

Note 8: A manual trip action is **any** operator action, or set of actions, which causes the control rods to be rapidly inserted into the core, and does **not** include manually driving in control rods or implementation of boron injection strategies

Note 9: A pressurized thermal shock transient is defined as an UNPLANNED overcooling transient which causes RCS temperature to go below 500°F

Note 11: Downcomer flow instruments are also credited for auxiliary feed flow indication

Modes: 1 Power Operation | 2 Startup | 3 Hot Standby | 4 Hot Shutdown | Cold Shutdown | Refueling | Defueled

EP-0801 H
EAL Classification Matrix

HOT CONDITIONS (RCS > 210°F)