2018 NRC Written Examination
Waterford 3
Reactor Operator and Senior Reactor Operator

1.		B			26.		C	
2.				D	27.	A		
3.		B			28.			D
4.			C		29.			D
5.	A				30.			D
6.		B			31.		C	
7.			C		32.		B	
8.	A				33.	A		
9.	A				34.		C	
10.				D	35.		B	
11.		B			36.			D
12.		B			37.		B	
13.	A				38.			D
14.			C		39.		B	
15.	A				40.		B	
16.			C		41.		B	
17.		B			42.		C	
18.	A				43.		B	
19.	A				44.	A		
20.		B			45.	A		
21.				D	46.		C	
22.				D	47.	A		
23.		B			48.			D
24.			C		49.		C	
25.			C		50.		C	

2018 NRC Written Examination
Waterford 3
Reactor Operator and Senior Reactor Operator

51.			D	76.			D
52.	A			77.			D
53.			D	78.	A		
54.	A			79.		B	
55.		C		80.		B	
56.	A			81.			D
57.		B		82.		C	
58.		B		83.		B	
59.		B		84.	A		
60.	A			85.		C	
61.			D	86.			D
62.	A			87.		B	
63.		B		88.		C	
64.		B		89.		B	
65.	A			90.			D
66.	A			91.		B	
67.		B		92.			D
68.		C		93.	A		
69.		C		94.			D
70.		C		95.		B	
71.	A			96.	A		
72.			D	97.			D
73.	A			98.		B	
74.			D	99.		C	
75.		B		100.		C	

2018 NRC Exam
RO Written Exam Worksheet

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #	1	
	Group #	1	
	K/A #	000007 EK1.2	
	Importance Rating	3.0	

K/A Statement

000007 Reactor Trip, Stabilization, Recovery EK1.2 Knowledge of the operational implications of the following concepts as they apply to the (Reactor Trip Recovery) **Normal, abnormal and emergency operating procedures associated with (Reactor Trip Recovery)**

Proposed Question: RO 1 Rev: 0

Given:

- Plant is at 100% power
- Steam Generator 1 Steam Flow transmitter failed low. Crew has entered OP-901-201, Steam Generator Level Control Malfunction
- BOP operator took manual control of FWCS Master Controller #1 and raised output to 45%, but reactor tripped on low Steam Generator Level

To reset Reactor Trip Override (RTO), the BOP will be required to ____(1)____.

A. raise output of FWCS Master Controller #1

B. lower output of FWCS Master Controller #1

C. raise steam generator level to a minimum of 27.4% NR

D. raise steam generator level to a minimum of 55% NR

Proposed Answer: B

Explanation: (Optional)

A. Incorrect. To reset RTO for FWCS #1, the BOP will be required to lower master controller output to 3.5%.
B. **CORRECT:** To reset RTO for FWCS #1, the BOP will be required to lower master controller output to 3.5%. Once master controller output lowers to 3.5%, RTO signal to the FWCS goes away and the FWCS once again can be operated in auto. The master controller output is lowered because it started at 45% as indicated in the stem.
C. Incorrect. The trip setpoint for low S/G level is 27.4%. This low level trip setpoint does not input into logic for resetting the RTO.
D. Incorrect. The normal operating band designated in W3 off normals and EOPs is 55 to 70% NR. The 55% NR level is procedure driven and does not input into the RTO logic.

Technical Reference(s): SD-FWC page 25 Rev. 13
(Attach if not previously provided)
(including version/revision number)

Proposed references to be provided
to applicants during examination: None

Learning Objective: WLP-OPS-FWC00 obj. 6 (As available)

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

Question History: Last NRC Exam None

Question Cognitive Level: Memory or Fundamental Knowledge
Comprehension or Analysis 2

10 CFR Part 55 Content: 55.41 7,10
55.43

Comments:

2018 NRC Exam
RO Written Exam Worksheet

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #	1	
	Group #	1	
	K/A #	000008 AK2.02	
	Importance Rating	2.7	

K/A Statement

000008 Pressurizer Vapor Space Accident AK2.02 Knowledge of the interrelations between the Pressurizer Vapor Space Accident and the following: **Sensors and detectors**

Proposed Question: RO 2 Rev: 0

Plant is at 100% power when a Pressurizer relief valve failed open.

Which of the following statements is correct?

A. Quench Tank temperature will equal Tsat for current Pressurizer pressure.
B. Quench Tank pressure will equal Psat for current Pressurizer vapor space temperature.
C. The downstream Safety Relief temperature detector will indicate Tsat for current Pressurizer pressure.
D. The downstream Safety Relief temperature detector will indicate Tsat for current Quench Tank pressure.

Proposed Answer: D

Explanation: (Optional)

A. Incorrect. Applicant must be aware that quench tank pressure will not be at pressurizer pressure and that throttling process across the open relief valve is isenthalpic.
B. Incorrect. Quench tank pressure will increase until the rupture disc on the quench tank ruptures at 124 psig, but will never be Psat for existing temperature in the pressurizer vapor space.
C. Incorrect. Downstream Safety Relief temperature will be at Tsat for current Quench tank pressure knowing that the throttling process across the open relief valve is isenthalpic.
D. **CORRECT:** Downstream Safety Relief temperature will be at Tsat for current Quench tank pressure knowing that the throttling process across the open relief valve is isenthalpic.

Technical Reference(s): WLP-OPS-THY04 pages 86-92
(Attach if not previously provided)
(including version/revision number)

Proposed references to be provided to applicants during examination: None

Learning Objective: WLP-OPS-RCS obj. 2 (As available)
WLP-OPS-THY04 obj. 21

Question Source: Bank # RO2
Modified Bank # (Note changes or attach parent)
New

Question History: Last NRC Exam 2014 RO EXAM

Question Cognitive Level: Memory or Fundamental Knowledge
Comprehension or Analysis 3

10 CFR Part 55 Content: 55.41 5
55.43

Comments:

2018 NRC Exam
RO Written Exam Worksheet

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #	1	
	Group #	1	
	K/A #	000009 EK3.11	
	Importance Rating	4.4	

K/A Statement

000009 Small Break LOCA EK3.11 Knowledge of the reasons for the following responses as they apply to the small break LOCA: **Dangers associated with inadequate core cooling**

Proposed Question: RO 3 Rev: 0

Venting non-condensable gases from Reactor Vessel Head may be required during a _____(1)_____ Break LOCA, to ensure continuous core cooling through the _____(2)_____.

	(1)	(2)
A.	Small	break
B.	Small	steam generators
C.	Large	break
D.	Large	steam generators

Proposed Answer: B

Explanation: (Optional)

A. Incorrect: For SB LOCAs, break flow is insufficient for core heat removal.
B. **CORRECT**: For SB LOCAs, break flow is insufficient for core heat removal. It is imperative that core heat is removed via the steam generator(s). Per TG-OP-902-002 (p5), reactor vessel head vent may be used to prevent non-condensable gases from reaching SG U-tubes and interfering with core heat removal.
C. Incorrect: For LB LOCAs, break flow is the primary method of core heat removal; however, venting gases (non-condensables is a small part of the mix) from reactor vessel head will have negligible effect on core heat removal.
D. Incorrect: Per TG-OP-902-002 (p5), break flow provides adequate heat removal without relying on SGs.

Technical Reference(s): WLP-OPS-PPE02 Rev 20, Slides 64 - 66
(Attach if not previously provided) TG-OP-902-002 Rev 19, Pages 4,5
(including version/revision number)

Proposed references to be provided
to applicants during examination: None

Learning Objective: WLP-OPS-PPE02, EO-13 (As available)

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

Question History: Last NRC Exam None

Question Cognitive Level: Memory or Fundamental Knowledge 2
Comprehension or Analysis

10 CFR Part 55 Content: 55.41 4
55.43

Comments:

2018 NRC Exam
RO Written Exam Worksheet

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #	1	
	Group #	1	
	K/A #	000011 EA1.09	
	Importance Rating	4.3	

K/A Statement

000011 Large Break LOCA EA1.09 Ability to operate and monitor the following as they apply to a Large Break LOCA: **Core flood tank initiation**

Proposed Question: RO 4 Rev: 0

Given:

- Plant is at 100% power when a Large Break LOCA occurred
- Crew has entered OP-902-002, Loss of Coolant Accident Recovery Procedure

As RCS pressure continues to lower, the maximum pressure at which BOP will expect Safety Injection Tanks (SIT's) to start discharging into the RCS is _____(1)_____ psig.

As RCS pressure becomes controlled, the CRS directs the BOP to close SIT outlet valves per OP-902-009, Appendix 14 SIT Isolation and Venting. To close the SIT outlet valves, the crew will be required to _____(2)_____ .

	(1)	(2)
A.	1000	place key switch at SIT outlet valve breaker cubicle to bypass
B.	670	place key switch at SIT outlet valve breaker cubicle to bypass
C.	670	reset SIAS
D.	1000	reset SIAS

Proposed Answer: C

Explanation: (Optional)

A. Incorrect. Pressure at which OP-902-002 will refer the crew to the Appendix to isolate SITs is 1000 psig. The SIT outlet valves have a key switch located on its breaker that will override SIT interlocks so that SIT outlet valve can be closed. This is not the method directed by OP-902-009, Appendix 14 SIT Isolation and Venting.
B. Incorrect. Part 1 is correct. SIT outlet valves have a key switch located on its breaker that will override SIT interlocks so that the SIT outlet valve can be closed. This is not the method directed by OP-902-009, Appendix 14 SIT Isolation and Venting.
C. **CORRECT:** Required range of SIT pressure per OP-903-001, TS Surveillance Log, is 600-670 psig. Therefore, the maximum pressure at which a SIT is expected to inject into RCS is 670 psig. OP-902-009, Appendix 14 SIT Isolation and Venting, states that the SIT outlet valve will not close unless SIAS is reset.
D. Incorrect. The pressure at which OP-902-002 will refer the crew to Appendix to isolate SITs is 1000 psig. Part 2 is correct.

Technical Reference(s): OP-902-002 page 45 Rev. 20
(Attach if not previously provided) OP-903-001 page 168, OP-902-009 pages 113
(including version/revision number) Rev. 317, SD-SI page 33 Rev. 16

Proposed references to be provided
to applicants during examination: None

Learning Objective: WLP-OPS-PPE01 obj. 6 (As available)

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

Question History: Last NRC Exam None

Question Cognitive Level: Memory or Fundamental Knowledge
Comprehension or Analysis 3

10 CFR Part 55 Content: 55.41 7
55.43

Comments:

2018 NRC Exam
RO Written Exam Worksheet

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #	1	
	Group #	1	
	K/A #	000022 AA2.01	
	Importance Rating	3.2	

K/A Statement

000022 Loss of Reactor Coolant Makeup AA2.01 Ability to determine and interpret the following as they apply to the Loss of Reactor Coolant Makeup: **Whether Charging line leak exists**

Proposed Question: RO 5 Rev: 0

Given:

- Plant is at 100% power
- Pressurizer level started to lower and then returned to normal level
- Letdown Flow lowered to 30 GPM and is steady
- Charging Header flow is 44 GPM with one charging pump running
- Regen HX Tube Outlet (Letdown) temperature rises from 220°F to 300°F
- Regen HX Shell Outlet (Charging) temperature rises from 430°F to 460°F

Determine location of the leak.

A. Charging header upstream of CVC-209, Charging Header Isolation

B. Charging header downstream of CVC-218A, Charging Line 1A Isolation Valve

C. Letdown header upstream of CVC-103, Letdown Inside Containment Isolation

D. Letdown header downstream of CVC-109, Letdown Outside Containment Isolation

Proposed Answer: A

Explanation: (Optional)

A. **CORRECT:** Regen HX outlet temperature rising on both tube and shell side indicates a charging line leak upstream of Regenerative HX. Tube (Letdown) side goes up due to less cooling from charging flow. The Shell (Charging) side also goes up because charging flow to HX has lowered. Some is going out the break. Charging flow will still indicates 44 gpm because the flow transmitter is upstream of the break. CVC-209 is upstream of the Regen HX.
B. Incorrect. If leak were located downstream of Regen HX on the Charging side temperature would not rise on either side of the HX since charging flow through HX would remain at 44 gpm due to the positive displacement charging pump. CVC-218A is downstream of the Regen HX.
C. Incorrect. A leak in this location would cause tube outlet temperature to lower even before letdown flow lowered due to lower letdown flow through HX. CVC-103 is upstream of the Regen HX.
D. Incorrect. A leak in this location would cause tube outlet temperature to be unaffected until letdown flow lowered and then tube outlet temperature would lower. CVC-109 is downstream of the Regen HX.

Technical Reference(s): SD-CVC Rev. 18 - Table 1 & Figures 2 and 3
(Attach if not previously provided)
(including version/revision number)

Proposed references to be provided
to applicants during examination: None

Learning Objective: WLP-OPS-PP010 Obj. 1 (As available)

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

Question History: Last NRC Exam None

Question Cognitive Level: Memory or Fundamental Knowledge
Comprehension or Analysis 4

10 CFR Part 55 Content: 55.41 14
55.43

Comments:

2018 NRC Exam
RO Written Exam Worksheet

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #	1	
	Group #	1	
	K/A #	000025 2.1.20	
	Importance Rating	4.6	

K/A Statement

000025 Loss of Residual Heat Removal System **2.1.20** Ability to interpret and execute procedure steps.

Proposed Question: RO 6 Rev: 0

Given:

- Plant is in MODE 5
- RCS is drained to 14.5 ft. MSL
- LPSI pumps have been secured due to RCS leakage
- HPSI Pump B has been started in accordance with OP-901-131, Shutdown Cooling Malfunction
- RCS level has been raised to and is being maintained at 16 ft. MSL

To restore a Shutdown Cooling train to service in accordance with OP-901-131, crew will vent and start LPSI Pump ____(1)____ because HPSI Pump B is injecting to _____(2)_____ .

	(1)	(2)
A.	A	Hot Leg 1
B.	A	Hot Leg 2
C.	B	Hot Leg 1
D.	B	Hot Leg 2

Proposed Answer: B

Explanation: (Optional)

A. Incorrect. Crew will start LPSI pump A because HPSI Pump B is injecting to suction of LPSI pump A. HPSI Pump B injects to Hot leg #2 (not hot leg #1). LPSI pump A takes a suction from hot leg 2.
B. **CORRECT:** Crew will start LPSI pump A because HPSI Pump B is injecting to suction of LPSI pump A. HPSI Pump B injects to Hot leg #2. LPSI pump A takes a suction from hot leg 2.
C. Incorrect. Crew will start LPSI pump A because HPSI Pump B is injecting to suction of LPSI pump A. HPSI Pump B injects to Hot leg #2 (not hot leg #1). LPSI pump A takes a suction from hot leg 2
D. Incorrect. Crew will start LPSI pump A because HPSI Pump B is injecting to suction of LPSI pump A. HPSI Pump A (not running) injects to Hot leg #1. LPSI pump A takes a suction from hot leg 2.

Technical Reference(s): OP-901-131 pages 10 & 12 Rev. 304
(Attach if not previously provided) SD-SI FIG 01 Rev 14
(including version/revision number)

Proposed references to be provided
to applicants during examination: None

Learning Objective: WLP-OPS-REQ21 EO-6 (As available)

Question Source: Bank # RO 31
Modified Bank # (Note changes or attach parent)
New

Question History: Last NRC Exam 2017 NRC Exam

Question Cognitive Level: Memory or Fundamental Knowledge
Comprehension or Analysis 3

10 CFR Part 55 Content: 55.41 10
55.43

Comments:

2018 NRC Exam
RO Written Exam Worksheet

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #	1	
	Group #	1	
	K/A #	000026 AA2.02	
	Importance Rating	2.9	

K/A Statement

000026 Loss of Component Cooling Water AA2.02 Ability to determine and interpret the following as they apply to the Loss of Component Cooling Water: **The cause of possible CCW loss**

Proposed Question: RO 7 Rev: 0

Given:

- Plant is at 100% power
- Following alarms have been received due to a CCW Surge Tank level switch failed low:
  - CCW A Surge Tank Level Lost (CP-18)
  - CCW Makeup Pump A Running/Power Lost (CP-18)
  - Dry Tower A isolated (CP-13)
- BOP reports that both CCW Surge tank levels are 82% and steady

With the above conditions coincident with an accident in containment, crew will be required to secure Reactor Coolant Pumps within ____(1)____ minutes of containment pressure reaching a minimum of _____(2)_____ psia.

	(1)	(2)
A.	ten	17.7
B.	ten	17.1
C.	three	17.1
D.	three	17.7

Proposed Answer: C

Explanation: (Optional)

A. Incorrect. CCW cannot be restored to a RCP once it has been lost for 10 minutes. CSAS will occur at 17.7 psia and in normal conditions (without a failed limit switch) would be the point in which RCPs must be secured.
B. Incorrect. CCW cannot be restored to a RCP once it has been lost for 10 minutes. Part 2 is correct.
C. **CORRECT**. The conditions given indicate CC-ILS-7013A has failed low. Enough conditions are given to determine that this is the level switch which closes CC-200A. With CC-200A already closed, a loss of CCW will occur on a SIAS vice a CSAS. A SIAS will occur at a containment pressure of 17.1 psia.
D. Incorrect. Part 1 is correct. CSAS will occur at 17.7 psia and in normal conditions (without a failed limit switch) would be the point in which RCPs must be secured

Technical Reference(s): OP-901-510 page 41 Rev. 303
(Attach if not previously provided) OP-902-009 pages 24 & 30 Rev. 317
(including version/revision number) OP-902-002 page 9 Rev. 20

Proposed references to be provided
to applicants during examination: None

Learning Objective: WLP-OPS-CC00 obj. 3 (As available)
WLP-OPS-PPE02 obj. 17

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

Question History: Last NRC Exam None

Question Cognitive Level: Memory or Fundamental Knowledge
Comprehension or Analysis 3

10 CFR Part 55 Content: 55.41 3,10
55.43

Comments:

2018 NRC Exam
RO Written Exam Worksheet

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #	1	
	Group #	1	
	K/A #	000027 AA1.03	
	Importance Rating	3.6	

K/A Statement

000027 Pressurizer Pressure Control System Malfunction AA1.03 Ability to operate and / or monitor the following as they apply to the Pressurizer Pressure Control Malfunctions: **Pressure control when on a steam bubble**

Proposed Question: RO 8 Rev: 0

Given:

- Plant is at 100% power
- Loss of all Pressurizer heaters occurred
- Crew entered OP-901-120, Pressurizer Pressure Control Malfunction
- Pressurizer Level Setpoint source input has been shifted at CP-31 and a plant shutdown has commenced in accordance with OP-010-005, Plant Shutdown

During the shutdown, crew is required to ____(1)____ . Pressurizer level setpoint will be controlled _____(2)_____ .

	(1)	(2)
A.	maintain pressurizer level constant	manually by the operator
B.	raise pressurizer level	automatically from the Reactor Regulating System
C.	maintain pressurizer level constant	automatically from the Reactor Regulating System
D.	raise pressurizer level	manually by the operator

Proposed Answer: A

Explanation: (Optional)

A. **CORRECT**: OP-901-120 requires crew to maintain pressurizer level constant during the cooldown to conserve Pressurizer inventory and enthalpy. Pressurizer level controller remains in auto as the setpoint is placed in manual. If level setpoint was not placed in manual, Reactor Regulating System would lower the setpoint and therefore lower pressurizer level during the cooldown. This would result in lowering RCS pressure with no means to restore it (loss of heaters).
B. Incorrect. Raising pressurizer level is plausible since the purpose of the actions in OP-901-120 is to conserve inventory. The pressurizer level controller remains in auto as the setpoint is placed in manual. The setpoint is normally adjusted by the Reactor Regulating System.
C. Incorrect. Part 1 is correct. Pressurizer level controller is maintained in auto as the setpoint is placed in manual. Setpoint is normally adjusted by the Reactor Regulating System
D. Incorrect. Raising pressurizer level is plausible since the purpose of the actions in OP-901-120 is to conserve inventory. Part 2 is correct.

Technical Reference(s): OP-901-120 pages 13 and 14 revision 302
(Attach if not previously provided)
(including version/revision number)

Proposed references to be provided
to applicants during examination: None

Learning Objective: WLP-OPS-PPO10 obj. 3 (As available)

Question Source: Bank # RO37
Modified Bank # (Note changes or attach parent)
New

Question History: Last NRC Exam 2014 NRC Exam

Question Cognitive Level: Memory or Fundamental Knowledge
Comprehension or Analysis 2

10 CFR Part 55 Content: 55.41 5,10
55.43

Comments:

2018 NRC Exam
RO Written Exam Worksheet

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #	1	
	Group #	1	
	K/A #	00029 EK3.11	
	Importance Rating	4.2	

K/A Statement

000029 Anticipated Transient Without Scram EK3.11 Knowledge of the reasons for the following responses as the apply to the ATWS: **Initiating emergency boration**

Proposed Question: RO 9 Rev: 0

Given:

- Plant was at 100% power when a FWCS malfunction occurred

CRS directed the ATC to manually trip reactor due to high Steam Generator Level Trip indicated on two PPS channels.

After the trip, CEAs 1 and 65 indicate NOT fully inserted into the core. Reactor power is 5 X 10^{-5}% power and dropping.

An Anticipated Transient Without a Scram ____(1)____ occurred. Emergency Boration _____(2)_____.

	(1)	(2)
A.	HAS	IS required to maintain shutdown margin
B.	HAS	IS NOT required because reactor power is < 10^{-4}% and dropping
C.	HAS NOT	IS required to maintain shutdown margin
D.	HAS NOT	IS NOT required because reactor power is < 10^{-4}% and dropping

Proposed Answer: A

Explanation: (Optional)

A. **CORRECT**: Even though the manual trip pushbuttons tripped the reactor, an ATWS has occurred due to failure of automatic trip function. Due to 2 CEAs not inserted, Emergency Boration is required to ensure reactor is shutdown and remains shutdown (TG-OP-902-000, page 8).
B. Incorrect. Part 1 is correct. Safety function status checklist for OP-902-001 Reactivity Control (Condition 2) requires that Reactor power be < 10^{-4}%, but it also requires emergency boration in service if < 2 CEAs are not fully inserted.
C. Incorrect. See answer A above. Part 2 is correct.
D. Incorrect. See answer A above. The safety function status checklist for OP-902-001 Reactivity Control (Condition 2) requires that Reactor power be < 10^{-4}%, but it also requires emergency boration in service if < 2 CEAs are not fully inserted.

Technical Reference(s): WLP-OPS-ATS00 Rev 11, slide 4
(Attach if not previously provided) TG-OP-902-000 Rev 304, page 8
(including version/revision number) OP-902-001 Rev 16, page 13

Proposed references to be provided
to applicants during examination: None

Learning Objective: WLP-OPS-PPE01 Rev 15 EO-4 (As available)

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

Question History: Last NRC Exam None

Question Cognitive Level: Memory or Fundamental Knowledge
Comprehension or Analysis 2

10 CFR Part 55 Content: 55.41 6
55.43

Comments:

2018 NRC Exam
RO Written Exam Worksheet

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #	1	
	Group #	1	
	K/A #	000038 EK1.01	
	Importance Rating	3.1	

K/A Statement

000038 Steam Generator Tube Rupture EK1.01 Knowledge of the operational implications of the following concepts as they apply to the SGTR: **Use of steam tables**

Proposed Question: RO 10 Rev: 0

Given:

- RCS depressurization is being performed IAW OP-902-007, Steam Generator Tube Rupture due to a rupture on SG 2
- All RCPs are secured
- CET Temp is 510 ºF
- T_{HOT} Loop 1 and 2 is 506 ºF
- T_{COLD} Loop 1 and 2 is 495 ºF
- The CRS has placed a lower limit of 30ºF on Subcool Margin

Determine the minimum value of RCS pressure that supports the requested RCS Subcool Margin.

A. 775 psia

B. 850 psia

C. 931 psia

D. 963 psia

Proposed Answer: D

Explanation: (Optional)

A. Incorrect: Value if the saturation pressure was chosen for 510 ºF and applicant were to add 30 psia to this pressure. (745 psia+30 psia).
B. Incorrect. Value associated with Cold leg temperatures. CET temperature should be used to determine subcool margin when on natural circulation.
C. Incorrect. Value associated with Hot Leg temperature. CET temperature should be used to determine subcool margin when on natural circulation.
D. **CORRECT:** Value associated with CET temperature. OI-038-000 has guidance to use CET temperatures on natural circulation.

Technical Reference(s): OI-038-000 Rev 16, step 5.2.5
(Attach if not previously provided) OP-902-009 Rev 317, page 20, Steam Tables
(including version/revision number)

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

Learning Objective: WLP-OPS-PPE01 obj. 4 (As available)

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

Question History: Last NRC Exam None

Question Cognitive Level: Memory or Fundamental Knowledge
Comprehension or Analysis 2

10 CFR Part 55 Content: 55.41 14
55.43

Comments:

2018 NRC Exam
RO Written Exam Worksheet

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #	1	
	Group #	1	
	K/A #	000040 EK2.1	
	Importance Rating	3.3	

K/A Statement

000040 Steam Line Rupture—Excessive Heat Transfer EK2.1 Knowledge of the interrelations between the (Excess Steam Demand) and the following: **Components, and functions of control and safety systems, including instrumentation, signals, interlocks, failure modes, and automatic and manual features.**

Proposed Question: RO 11 Rev: 0

Given:

- An Excess Steam Demand has occurred for Steam Generator #1
- Crew has entered OP-902-004, Excess Steam Demand Recovery Procedure
- Steam Generator # 1 level is 20% WR and lowering
- CRS has directed the BOP to perform actions to stabilize RCS temperature when conditions permit

BOP will take actions to stabilize RCS temperature once ____(1)_____ . Stabilization of RCS temperature is required to prevent _____(2)_____ .

	(1)	(2)
A.	CET temperature **and** pressurizer pressure rise	RCS pressure rising above HPSI shutoff head
B.	CET temperature **and** pressurizer pressure rise	Pressurized Thermal Shock (PTS)
C.	CET temperature **or** pressurizer pressure rise	Pressurized Thermal Shock (PTS)
D.	CET temperature **or** pressurizer pressure rise	RCS pressure rising above HPSI shutoff head

Proposed Answer: B

Explanation: (Optional)

A. Incorrect. Note prior to OP-902-004 step 18 states actions to stabilize RCS temperature should be initiated when both CET and pressurizer pressure rise. Actions are taken to prevent PTS. RCS pressure will be stabilized above HPSI shutoff head to prevent going solid in the pressurizer.
B. **CORRECT:** Note prior to OP-902-004 step 18 states actions to stabilize RCS temperature should be initiated when both CET and pressurizer pressure rise. Actions are taken to prevent PTS.
C. Incorrect: Note prior to OP-902-004 step 18 states actions to stabilize RCS temperature should be initiated when both CET and pressurizer pressure rise. Actions are taken to prevent PTS.
D. Incorrect: Note prior to OP-902-004 step 18 states actions to stabilize RCS temperature should be initiated when both CET and pressurizer pressure rise. Actions are taken to prevent PTS. RCS pressure will be stabilized above HPSI shutoff head to prevent going solid in the pressurizer.

Technical Reference(s): OP-902-004 Rev 16, page 20
(Attach if not previously provided) TG-OP-902-004 Rev 307, pages 41 & 42
(including version/revision number)

Proposed references to be provided
to applicants during examination: None

Learning Objective: WLP-OPS-PPE04 EO-4

Question Source: Bank # RO 11
Modified Bank # _____ (Note changes or attach parent)
New _____

Question History: Last NRC Exam 2014 NRC Exam

Question Cognitive Level: Memory or Fundamental Knowledge _____
Comprehension or Analysis 2

10 CFR Part 55 Content: 55.41 5
55.43 _____

Comments:

2018 NRC Exam
RO Written Exam Worksheet

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #	1	
	Group #	1	
	K/A #	000054 EK2.2	
	Importance Rating	3.5	

K/A Statement

000054 Loss of Main Feedwater EK2.2 Knowledge of the interrelations between the (Loss of Feedwater) and the following: **Facility's heat removal systems, including primary coolant, emergency coolant, the decay heat removal systems, and relations between the proper operation of these systems to the operation of the facility.**

Proposed Question: RO 12 Rev: 0

During a Loss of Feedwater event, BOTH Steam Generators (SGs) have boiled dry.

BOP Operator should slowly restore feed to ____(1)____ SG(s). A slow feed rate is desired to prevent damage to the SG _____(2)_____.

	(1)	(2)
A.	One	Feed Ring
B.	One	U-Tubes
C.	Both	Feed Ring
D.	Both	U-Tubes

Proposed Answer: B

Explanation: (Optional)

A. Incorrect. See Answer B. SG Feed Ring is plausible because the previous SGs at the plant had concerns of Feed Ring damage, and FW restoration was limited to < 150 gpm with SG level < 46% Wide Range.
B. **CORRECT**: OI-038-00, EOP Operator Expectations, Step 5.4.75 provides direction to slowly refill only one SG if both are dry. TG-OP-902-006, page 8, states that SGTR event is of great concern if both SGs boil dry.
C. Incorrect. See Answers A & B.
D. Incorrect. See Answer B.

Technical Reference(s): OI-038-00 Rev 16, step 5.4.75
(Attach if not previously provided) TG-OP-902-006 Rev 18, page 8
(including version/revision number)

Proposed references to be provided
to applicants during examination: None

Learning Objective: WLP-OPS-PPE06, EO-4 (As available)

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

Question History: Last NRC Exam None

Question Cognitive Level: Memory or Fundamental Knowledge
Comprehension or Analysis 2

10 CFR Part 55 Content: 55.41 7
55.43

Comments:

2018 NRC Exam
RO Written Exam Worksheet

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #	1	
	Group #	1	
	K/A #	000055 EK3.02	
	Importance Rating	4.3	

K/A Statement

000055 Station Blackout EK3.02 Knowledge of the reasons for the following responses as the apply to the Station Blackout: **Actions contained in EOP for loss of offsite and onsite power**

Proposed Question: RO 13 Rev: 0

Given:

- Station Blackout has occurred
- Crew is performing actions in OP-902-005, Station Blackout Recovery
- All CEAs are inserted

CRS has directed BOP to commence a cooldown using Atmospheric Dump Valves. The cooldown must be stopped prior to lowering T_{cold} to less than ____(1)____ to ensure _____(2)_____.

	(1)	(2)
A.	400°F	shutdown margin requirements are met
B.	520°F	shutdown margin requirements are met
C.	400°F	RCS subcooled margin requirements are not exceeded
D.	520°F	RCS subcooled margin requirements are not exceeded

Proposed Answer: A

Explanation: (Optional)

A. **CORRECT**: Shutdown Margin is maintained while above 400°F as long as all CEAs are inserted. Step 22 of OP-902-005 directs stopping the cooldown prior to Tc lowering to less than 400°F.
B. Incorrect. Shutdown Margin is maintained while above 400°F (not 520°F) as long as all CEAs are inserted. 520°F is a trigger temperature in the EOPs for a rapid cooldown.
C. Incorrect. The temperature limit of 400°F is to ensure shutdown margin requirements are met. The limit is not to ensure proper subcooling.
D. Incorrect. Shutdown Margin is maintained while above 400°F (not 520°F) as long as all CEAs are inserted.

Technical Reference(s): OI-038-00 Rev 16, step 5.4.77
(Attach if not previously provided) OP-902-005 Rev 21, step 22
(including version/revision number) TG-OP-902-005 Rev 310, page 61
OP-902-007 Rev 17, step 11

Proposed references to be provided to applicants during examination: None

Learning Objective: WLP-OPS-PPE05 obj. 7 (As available)

Question Source: Bank # RO13
Modified Bank # _____ (Note changes or attach parent)
New _____

Question History: Last NRC Exam 2012 NRC Exam

Question Cognitive Level: Memory or Fundamental Knowledge 2
Comprehension or Analysis _____

10 CFR Part 55 Content: 55.41 10
55.43 _____

Comments:

2018 NRC Exam
RO Written Exam Worksheet

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #	1	
	Group #	1	
	K/A #	000056 AA1.37	
	Importance Rating	3.4	

K/A Statement

000056 Loss of Offsite Power AA1.37 Ability to operate and / or monitor the following as they apply to the Loss of Offsite Power: **Instrument Air**

Proposed Question: RO 14 Rev: 0

Given:

- Plant is at 100% power
- Reactor trip and Loss of Offsite Power occurs

Which of the following are the minimum actions (if any) required to restart IA Compressor A?

A. IA Compressor A will restart on EDG A sequencer.

B. IA Compressor A will auto start at IA receiver pressure of 105 psig.

C. Alternate cooling is aligned to IA Compressor A, and compressor is started manually.

D. Alternate cooling is aligned to IA compressor A, and compressor will auto start at IA receiver pressure of 105 psig.

Proposed Answer: C

Explanation: (Optional)

A. Incorrect. The auto start of an IA compressor is disabled by the undervoltage condition. Manual local start is required.
B. Incorrect. The auto start of an IA compressor is disabled by the undervoltage condition. Manual local start is required.
C. **CORRECT:** IA compressor A must be manually started due to auto start feature of IA compressor is disabled by the undervoltage condition. Alternate cooling must be aligned due to loss of normal cooling (TCW, CW). OP-902-003 contains steps to align potable water to IA compressors.
D. Incorrect. Alternate cooling must be aligned due to loss of normal cooling (TCW, CW). OP-902-003 contains steps to align potable water to IA compressors. Auto start of an IA compressor is disabled by undervoltage condition. Manual local start is required.

Technical Reference(s): SD-AIR page Rev 12, page 15
(Attach if not previously provided) OP-902-003 Rev 10, step 12
(including version/revision number) TG-OP-902-003 Rev 306, step 12
OP-003-016 Rev 21, step 9.1

Proposed references to be provided
to applicants during examination: None

Learning Objective: WLP-OPS-AIR EO-2, EO-4 (As available)

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

Question History: Last NRC Exam None

Question Cognitive Level: Memory or Fundamental Knowledge
Comprehension or Analysis 3

10 CFR Part 55 Content: 55.41 4
55.43

Comments:

2018 NRC Exam
RO Written Exam Worksheet

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #	1	
	Group #	1	
	K/A #	000057 AA2.19	
	Importance Rating	4.0	

K/A Statement

000057 Loss of Vital AC Instrument Bus AA2.19 Ability to determine and interpret the following as they apply to the Loss of Vital AC Instrument Bus: **The plant automatic actions that will occur on the loss of a vital ac electrical instrument bus.**

Proposed Question: RO 15 Rev: 0

Auxiliary Component Cooling Water Train A is operating. Following a loss of SUPS MA, which ONE of the following plant responses will occur?

A. ACCW Train A flow will rise.

B. Wet Cooling Tower Basin A level will rise.

C. ALL Train A Wet Cooling Tower Fans will start.

D. Essential Chiller A will transfer to ACCW.

Proposed Answer: A

Explanation: (Optional)

A. **CORRECT:** CCW HX A TCV (ACC-126A) fails open, which will cause ACCW Train A flow to rise.
B. Incorrect. WCT A Makeup valve (CMU-407A) fails closed and will not provide makeup to the WCT A Basin.
C. Incorrect. Automatic sequencing of WCT A fans are inoperable and will not Auto-sequence the fans on.
D. Incorrect. Automatic transfer for Essential Chiller A from CCW to ACCW is inoperable and will not Auto-transfer to ACCW.

Technical Reference(s): OP-901-312 Rev 315, page 8
(Attach if not previously provided) SD-CC Rev 23, Fig 24
(including version/revision number)

Proposed references to be provided
to applicants during examination: None

Learning Objective: WLP-OPS-PPO30 EO-3 (As available)

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

Question History: Last NRC Exam None

Question Cognitive Level: Memory or Fundamental Knowledge
Comprehension or Analysis 2

10 CFR Part 55 Content: 55.41 7
55.43

Comments:

2018 NRC Exam
RO Written Exam Worksheet

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #	1	
	Group #	1	
	K/A #	000058 2.4.4	
	Importance Rating	4.5	

K/A Statement

000058 Loss of DC Power **2.4.4** Ability to recognize abnormal indications for system operating parameters that are entry-level conditions for emergency and abnormal operating procedures.

Proposed Question: RO 16 Rev: 0

Loss of the _____ Bus will require entry into OP-901-313, Loss of a 125 Volt DC Bus, but is **NOT** expected to require entry into OP-902-000, Standard Post Trip Actions.

A. A-DC

B. B-DC

C. AB-DC

D. TGB-DC

Proposed Answer: C

Explanation: (Optional)

A. Incorrect. Loss of the A-DC Bus will cause Reactor Trip Breakers 1, 3, 5, and 7 to open, resulting in a reactor trip.
B. Incorrect. Loss of the B-DC Bus will cause Reactor Trip Breakers 2, 4, 6, and 8 to open, resulting in a reactor trip.
C. **CORRECT**: There are no automatic or manual reactor trips associated with a loss of AB-DC Bus. If not restored within 2 hours, a Tech Spec-related shutdown is required (TS 3.8.2.1).
D. Incorrect. Loss of the TGB-DC Bus will cause the Instrument and Station Air compressors to fail to load, which will require a manual reactor trip when IA Header pressure reaches 65 psig. Section E_4, steps 12 & 13 provide instructions to enter OP-903-000.

Technical Reference(s): OP-901-313 Rev 305, pages 13-16, 32, & 36
(Attach if not previously provided) Tech Spec 3.8.2.1, Tech Spec 3.7.1.2
(including version/revision number)

Proposed references to be provided
to applicants during examination: None

Learning Objective: WLP-OPS-PPO30 EO-3 (As available)

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

Question History: Last NRC Exam None

Question Cognitive Level: Memory or Fundamental Knowledge
Comprehension or Analysis 3

10 CFR Part 55 Content: 55.41 10
55.43

Comments:

2018 NRC Exam
RO Written Exam Worksheet

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #	1	
	Group #	1	
	K/A #	000062 AA2.04	
	Importance Rating	2.5	

K/A Statement

000062 Loss of Nuclear Service Water AA2.04 Ability to determine and interpret the following as they apply to the Loss of Nuclear Service Water: **The normal values and the upper limits for the temperatures of the components cooled by SWS.**

Proposed Question: RO 17 Rev: 0

Given:

- A controlled plant shutdown is in progress due to two seals failed on RCP 1A
- ACCW Pump A is tagged out and ACCW Pump B has tripped on overcurrent.

OP-901-130, Reactor Coolant Pump Malfunction, will direct the crew trip the reactor if controlled bleedoff (CBO) temperature reaches ____(1)____ °F, or any RCP bearing temperature exceeds _____(2)_____ °F.

	(1)	(2)
A.	200	212
B.	200	225
C.	180	212
D.	180	225

Proposed Answer: B

Explanation: (Optional)

A. Incorrect. Part 1 is correct. OP-901-130 directs the crew to perform a rapid plant down power if any RCP bearing exceeds a temperature of 212°F.
B. **CORRECT:** OP-901-130 directs the crew to trip the reactor if a CBO temperature of 200°F occurs during the controlled shutdown. OP-901-130 directs the crew to trip the reactor if any RCP bearing exceeds a temperature of 225°F.
C. Incorrect. OP-901-130 provides the normal operating range of 135°F to 190°F. CBO temperature of 180°F is still within the upper portion of the operating band. OP-901-130 directs the crew to perform a rapid plant down power if any RCP bearing exceeds a temperature of 212°F.
D. Incorrect. OP-901-130 provides the normal operating range of 135°F to 190°F. CBO temperature of 180°F is still within the upper portion of the normal operating band. Part 2 is correct.

Technical Reference(s): OP-901-130 pages 9-11, 15-16 Rev.11
(Attach if not previously provided)
(including version/revision number)

Proposed references to be provided to applicants during examination: None

Learning Objective: WLP-OPS-PPO10 EO-3 (As available)

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

Question History: Last NRC Exam None

Question Cognitive Level: Memory or Fundamental Knowledge 2
Comprehension or Analysis

10 CFR Part 55 Content: 55.41 10
55.43

Comments:

2018 NRC Exam
RO Written Exam Worksheet

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #	1	
	Group #	1	
	K/A #	000065 AA1.05	
	Importance Rating	3.3	

K/A Statement

000065 Loss of Instrument Air AA1.05 Ability to operate and / or monitor the following as they apply to the Loss of Instrument Air: **RPS**

Proposed Question: RO 18 Rev: 0

Given:

- Plant is at 100% power
- An instrument air leak has occurred

OP-901-511, Instrument Air Malfunction, states that the crew will trip the reactor when instrument air pressure lowers to ____(1)____ psig. As instrument air pressure continues to lower, Main Feed Isolation valves will fail _____(2)_____ .

	(1)	(2)
A.	65	as is
B.	65	closed
C.	80	as is
D.	80	closed

Proposed Answer: A

Explanation: (Optional)

A. **CORRECT**: OP-901-511, Instrument Air Malfunction, requires crew to trip the reactor when instrument air pressure lowers to 65 psig (E_0 step 1). Main Feed Isolation Valves fail as is on a loss of air (E_0 step 13 Caution). OP-901-511 will direct crew to close them when their respective accumulator or reservoir low pressure alarms annunciate.
B. Incorrect. Part 1 is correct. MFIV failing closed is plausible because closed is the position it will go to during a MSIS.
C. Incorrect. At 80 psig, a normal plant shutdown is required. Part 2 is correct.
D. Incorrect. At 80 psig, a normal plant shutdown is required. The MFIV failing closed is plausible because closed is the position it will go to during a MSIS.

Technical Reference(s): OP-901-511 Rev 15, pages 6 - 9
(Attach if not previously provided)
(including version/revision number)

Proposed references to be provided
to applicants during examination: None

Learning Objective: WLP-OPS-PPO EO- 3 (As available)

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

Question History: Last NRC Exam None

Question Cognitive Level: Memory or Fundamental Knowledge 2
Comprehension or Analysis

10 CFR Part 55 Content: 55.41 10
55.43

Comments:

2018 NRC Exam
RO Written Exam Worksheet

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #	1	
	Group #	2	
	K/A #	000037 2.4.11	
	Importance Rating	4.0	

K/A Statement

000037 Steam Generator Tube Leak **2.4.11** Knowledge of abnormal condition procedures.

Proposed Question: RO 19 Rev: 0

Given:

- A small tube leak is occurring in #1 Steam Generator

Per OP-901-202, Steam Generator Tube Leakage or High Activity, which one of the following is considered the primary Radiation Monitor with the designed sensitivity to measure small primary to secondary leakage?

A. AE Discharge PRM-IRE-0004

B. Main Steam Line 1 PRM-IRE-5500A

C. Circ Water Discharge PRM-IRE-1900

D. Steam Generator 1 and 2 Blowdown PRM-IRE-0100X

Proposed Answer: A

Explanation: (Optional)

A. **CORRECT**: OP-901-202, Steam Generator Tube Leakage or High Activity Off-normal states that the AE Discharge Radiation Monitor is considered to be the primary radiation monitor with the designed sensitivity to measure small Primary to Secondary Leakage.
B. Incorrect. The Main Steam Line 1 Radiation Monitor is referenced in OP-901-202 and will indicate rising activity but is not considered to be the primary radiation monitor.
C. Incorrect. The Circ Water Discharge Radiation Monitor is referenced in OP-901-202 and would indicate rising activity only if the blowdown was being discharged to Circ Water.
D. Incorrect. The Steam Generator 1 and 2 Radiation Monitor is one rad monitor that can be swapped between Steam Generators. This Radiation Monitor is referenced in OP-901-202 and will indicate rising activity but is not considered to be the primary radiation monitor.

Technical Reference(s): OP-901-202 Rev 15, pp 4 & 5
(Attach if not previously provided)
(including version/revision number)

Proposed references to be provided to applicants during examination: None

Learning Objective: WLP-OPS-PPO2 EO-3 (As available)

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

Question History: Last NRC Exam None

Question Cognitive Level: Memory or Fundamental Knowledge 2
Comprehension or Analysis

10 CFR Part 55 Content: 55.41 10
55.43

Comments:

2018 NRC Exam
RO Written Exam Worksheet

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #	1	
	Group #	2	
	K/A #	000003 AA2.03	
	Importance Rating	3.6	

K/A Statement

000003 Dropped Control Rod AA2.03 Ability to determine and interpret the following as they apply to the Dropped Control Rod: **Dropped rod, using in-core/ex-core instrumentation, in-core or loop temperature measurements**

Proposed Question: RO 20 Rev: 0

Given:

- Plant power ascension to 100% is in progress
- The following conditions are observed:
  - T_{ave} has lowered 1.5°F
  - Core Exit thermocouple indication has lowered by 10-13°F near Loop 2
  - CPC B power indication is 63%
  - CPC A, C and D power indication is 74%

Which of the following describes the cause of these indications?

A. Xenon oscillation

B. Dropped CEA

C. Inadvertent boration

D. Open Atmospheric Dump Valve

Proposed Answer: B

Explanation: (Optional)

A. Incorrect. A xenon oscillation would affect all 4 quadrants of power and temperature.
B. **CORRECT:** Temp will lower to compensate for – reactivity added by dropped CEA, adding + reactivity. The – reactivity will show up in one core quadrant, and the other 3 will rise to compensate as well.
C. Incorrect. An inadvertent boron injection would affect all 4 quadrants of power and temperature.
D. Incorrect. Would result in lower temperature and higher power in all quadrants, not just 3 of 4.

Technical Reference(s): WLP-OPS-TYR10 Rev 12, slides 181 & 182
(Attach if not previously provided) WLP-OPS-TYR05 Rev 5, slides 121 & 123
(including version/revision number) OP-901-102 Rev 304, page 5
OP-002-005 Rev 61, page 23
WLP-OPS-MS00 Rev 30, slide 266

Proposed references to be provided to applicants during examination: None

Learning Objective: WLP-OPS-TYR05 Rev 5, EO-10 (As available)

Question Source: Bank # RO57
Modified Bank # _____ (Note changes or attach parent)
New _____

Question History: Last NRC Exam 2008 NRC Exam

Question Cognitive Level: Memory or Fundamental Knowledge _____
Comprehension or Analysis 2

10 CFR Part 55 Content: 55.41 2
55.43 _____

Comments:

2018 NRC Exam
RO Written Exam Worksheet

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #	1	
	Group #	2	
	K/A #	000033 AA1.02	
	Importance Rating	3.0	

K/A Statement

000033 Loss of Intermediate Range Nuclear Instrumentation AA1.02 Ability to operate and / or monitor the following as they apply to the Loss of Intermediate Range Nuclear Instrumentation: **Level trip bypass**

Proposed Question: RO 21 Rev: 0

Given:

- Plant in Mode 4
- Following Operating Bypasses are bypassed on all four channels:
  - DNBR/LPD Trip
  - Low SG Flow Trip
  - High SG Level Trip
- Channel C Excore middle detector fails high

Which one of the following Channel C Operating bypasses will remain in bypass?

A. Hi Log Power Trip

B. DNBR/LPD Trip

C. Low SG Flow Trip

D. High SG Level Trip

Proposed Answer: D

Explanation: (Optional)

A. Incorrect: Hi Log Power Trip bypass is automatically removed when power is < 10^{-4}%. It must be manually initiated when power goes above 10^{-4}%.
B. Incorrect: DNBR/LPD Trips are automatically removed when power goes above 10^{-4}%.
C. Incorrect. Low SG Flow Trip is automatically removed when power goes above 8.5 X10^{-5}%.
D. **CORRECT**: High SG Level Trip has not auto feature and is manually initiated and removed from service. This trip bypass is administratively controlled.

Technical Reference(s): WLP-OPS-PPS00 Rev 15, slide 135
(Attach if not previously provided)
(including version/revision number)

Proposed references to be provided to applicants during examination: None

Learning Objective: WLP-OPS-PPS00 EO-4 (As available)

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

Question History: Last NRC Exam None

Question Cognitive Level: Memory or Fundamental Knowledge
Comprehension or Analysis 2

10 CFR Part 55 Content: 55.41 2
55.43

Comments:

2018 NRC Exam
RO Written Exam Worksheet

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #	1	
	Group #	2	
	K/A #	000059 AK3.04	
	Importance Rating	3.8	

K/A Statement

000059 Accidental Liquid Release AK3.04 Knowledge of the reasons for the following responses as they apply to the Accidental Liquid Radwaste Release: **Actions contained in EOP for accidental liquid radioactive-waste release**

Proposed Question: RO 22 Rev: 0

A discharge of Boric Acid Condensate Tank (BACT) D is in progress when BAC CONDENSATE DISCH ACTIVITY HI alarm actuates.

Crew takes the following actions:

- Notes highest activity received on BM rad monitor was 5.5 E^{-5} µci/ml
- Enters OP-901-412, Liquid Waste Discharge High Radiation, and secures release
- Contacts Chemistry to evaluate release

Shift Chemist informs Control Room that BM rad monitor alarm setpoint should have been set at 4.5 E^{-3} µci/ml, as per Release Permit instead of the current 4.3 E^{-5} µci/ml.

Which ONE of the following procedural actions is required prior to resuming discharge?

A. Take another sample isotopic analysis of tank discharged.

B. Verify valve alignment was correct for tank being discharged.

C. Evaluate release relative to Offside Dose Calculation Manual.

D. Adjust Rad Monitor setpoint to 4.5 E^{-3} µci/ml.

Proposed Answer: D

Explanation (Optional):

A. Incorrect: Radiation Monitor setting is lower than required for discharge and required permit limits were NOT exceeded. Step 9 of OP-901-412 does not apply to this condition.

B. Incorrect: Radiation Monitor setting is lower than required for discharge and required permit limits were NOT exceeded. Step 6 of OP-901-412 does not apply to this condition.

C. Incorrect: Radiation Monitor setting is lower than required for discharge and required permit limits were NOT exceeded. Step 8 of OP-901-412 does not apply to this condition.

D. **CORRECT**: Radiation Monitor setting is lower than required for discharge and required permit limits were NOT exceeded. Step 10 of OP-901-412 states that release may be re-initiated once the cause is determined and corrected. The steps for actions to take on an accidental radioactive liquid waste release is located in W3 AOP's instead of EOP's (as indicated in the K/A)

Technical Reference(s): OP-901-412, Liquid Waste Discharge

(Attach if not previously provided) High Radiation Rev 2, E_0

(including version/revision number)

Proposed references to be provided to applicants during examination: None

Learning Objective: WLP-OPS-PPO40 EO- 4 (As available)

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

Question History: Last NRC Exam None

Question Cognitive Level: Memory or Fundamental Knowledge 2
Comprehension or Analysis _____

10 CFR Part 55 Content: 55.41 13
55.43 _____

Comments:

2018 NRC Exam
RO Written Exam Worksheet

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #	1	
	Group #	2	
	K/A #	000067 AK1.02	
	Importance Rating	3.1	

K/A Statement

000067 Plant Fire On Site AK1.02 Knowledge of the operational implications of the following concepts as they apply to Plant Fire on Site: **Fire fighting**

Proposed Question: RO 23 Rev: 0

Upon lowering of fire protection system header pressure due to initiation of hose spray during fire-fighting activities, the crew will expect the _____(1)_____ driven fire pump(s) to start first.

Upon restoration of system pressure, the Motor Driven Fire Pump _____(2)_____.

	(1)	(2)
A.	Motor	will secure automatically
B.	Motor	must be secured locally
C.	Diesel	must be secured locally
D.	Diesel	will secure automatically

Proposed Answer: B

Explanation: (Optional)

A. Incorrect. Part 1 is correct. The motor driven fire pump must be secured locally using the STOP pushbutton. Securing automatically is plausible because the Jockey Fire Pump secures automatically.
B. **CORRECT**: Upon lowering fire protection header pressure, the motor driven fire pump starts at 125 psig. The first diesel driven fire pump will start at 115 psig. The motor driven fire pump must be secured locally using the STOP pushbutton.
C. Incorrect. Upon lowering fire protection header pressure, the motor driven fire pump starts at 125 psig. The first diesel driven fire pump will start at 115 psig. Part 2 is correct.
D. Incorrect. Upon lowering fire protection header pressure, the motor driven fire pump starts at 125 psig. The first diesel driven fire pump will start at 115 psig. The motor driven fire pump must be secured locally using the STOP pushbutton. Securing automatically is plausible because the Jockey Fire Pump secures automatically

Technical Reference(s): OP-009-004 page 16,39 Rev. 321
(Attach if not previously provided)

(including version/revision number)

Proposed references to be provided
to applicants during examination: None

Learning Objective: WLP-OPS-FP00 EO-1 (As available)

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

Question History: Last NRC Exam None

Question Cognitive Level: Memory or Fundamental Knowledge 2
Comprehension or Analysis

10 CFR Part 55 Content: 55.41 7
55.43

Comments:

2018 NRC Exam
RO Written Exam Worksheet

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #	1	
	Group #	2	
	K/A #	000069 AK2.03	
	Importance Rating	2.8	

K/A Statement

000069 Loss of Containment Integrity AK2.03 Knowledge of the interrelations between the Loss of Containment Integrity and the following: **Personnel access hatch and emergency access hatch**

Proposed Question: RO 24 Rev: 0

Concerning Tech Spec Containment Integrity in Mode 1, which of the following conditions would require a shutdown if not resolved within 24 hours?

A. Personnel Air Lock outer door is found closed and unlocked.

B. Escape Air Lock outer door seal is failed with the operable inner door verified locked closed.

C. Personnel Air Lock door interlocks are inoperable, allowing both doors to be open at the same time.

D. Escape Air Lock door position indications are inoperable on CP-8 and on the Plant Monitoring Computer.

Proposed Answer: C

Explanation: (Optional)

A. Incorrect. Personnel air lock outer door is normally locked during MODE 1 for security and radiological control. Being unlocked does not create a problem with containment integrity.
B. Incorrect. Locking the operable door closed is part of the action for a failed door seal. TS 3.6.1.3 allows operation under this condition until the next surveillance is due for the overall leakage test for the air lock.
C. **CORRECT**: The door interlock is tested every six months under TS 4.6.1.3.c. If the interlocks are not operable the air lock would be inoperable and TS action 3.6.1.3.b would apply. TS 4.6.1.1.b requires that the airlock be operable per TS 3.6.1.3. With the air lock inoperable for 24 hours, Containment Integrity requirements are not met.
D. Incorrect. Control Room indication is not required to be operable for airlock operability per TS 3/4.6.1.3.

Technical Reference(s): TS 1.7 Containment Integrity definition
(Attach if not previously provided) TS 3.6.1.3, Containment Air Lock
(including version/revision number) TS Surv. 4.6.1.3.c

Proposed references to be provided
to applicants during examination: None

Learning Objective: WLP-OPS-CB00 EO-6, EO-7 (As available)

Question Source: Bank # RO 24
Modified Bank # _____ (Note changes or attach parent)
New _____

Question History: Last NRC Exam 2011 NRC Exam

Question Cognitive Level: Memory or Fundamental Knowledge _____
Comprehension or Analysis 2

10 CFR Part 55 Content: 55.41 10
55.43 _____

Comments:

2018 NRC Exam
RO Written Exam Worksheet

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #	1	
	Group #	2	
	K/A #	000076 AK2.01	
	Importance Rating	2.6	

K/A Statement

000076 High Reactor Coolant Activity AK2.01 Knowledge of the interrelations between the High Reactor Coolant Activity and the following: **Process radiation monitors**

Proposed Question: RO 25 Rev: 0

Given:

- High Activity exists in RCS
- HVAC Duct PIG C (PRM-IRE-6710C) indication is rising due to higher than normal airborne activity in the Letdown Heat Exchanger Room
- Activity in all other areas are normal

ATC will ALSO expect to see rising activity indicated on:

A. HVAC Duct PIG A only

B. HVAC Duct PIG B only

C. HVAC Duct PIG D only

D. NO additional HVAC Duct PIG

Proposed Answer: C

Explanation: (Optional)

A. Incorrect. PRM-IRE-6710D, HVAC Duct PIG D, is located at the inlet of RAB Normal Exhaust Fans, HVAC Duct PIG A is not. Therefore, activity on this rad monitor will not be rising.
B. Incorrect. PRM-IRE-6710D, HVAC Duct PIG D, is located at the inlet of RAB Normal Exhaust Fans, HVAC Duct PIG B is not. Therefore, activity on this rad monitor will not be rising.
C. **CORRECT:** OP-901-402 note states that PRM-IRE-6710D, HVAC Duct PIG D, is located at the inlet of RAB Normal Exhaust Fans and therefore will see airborne activity originating from areas monitored by PRM-IRE-6710A, PRM-IRE-6710B, and PRM-IRE-6710C.
D. Incorrect. PRM-IRE-6710D, HVAC Duct PIG D, is located at the inlet of RAB Normal Exhaust Fans, the other HVAC Duct PIGs are not.

Technical Reference(s): OP-901-402 Rev 5, pages 3, 11-13
(Attach if not previously provided)
(including version/revision number)

Proposed references to be provided to applicants during examination: None

Learning Objective: WLP-OPS-RMS00 EO-3 (As available)

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

Question History: Last NRC Exam None

Question Cognitive Level: Memory or Fundamental Knowledge 2
Comprehension or Analysis

10 CFR Part 55 Content: 55.41 11
55.43

Comments:

2018 NRC Exam
RO Written Exam Worksheet

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #	1	
	Group #	2	
	K/A #	CE A13 AK3.3	
	Importance Rating	3.4	

K/A Statement

CE A13 Natural Circulation AK3.3 Knowledge of the reasons for the following responses as they apply to the (Natural Circulation Operations) **Manipulation of controls required to obtain desired operating results during abnormal, and emergency situations.**

Proposed Question: RO 26 Rev: 0

Severe weather conditions, including heavy rain, have resulted in Loss of Offsite Power.

To ensure power is maintained to the Ultimate Heat Sink, crew will restore power to Non-Safety related sides of MCCs _____.

A. 312A and 312B

B. 313A and 313B

C. 314A and 314B

D. 315A and 315B

Proposed Answer: C

Explanation: (Optional)

A. Incorrect. MCC-312A and MCC-312B are safety related MCCs with non-safety ties, but they do not supply DCT Sump Pumps.
B. Incorrect. MCC-313A and MCC-313B are safety related MCCs with non-safety ties, but they do not supply DCT Sump Pumps.
C. **CORRECT:** OP-902-009, Appendix 20, Operation of DCT Sump Pumps, provides directions to restore power to non-safety sides of MCC-314A and MCC-314B. The NOTE proves that this is to protect MCC-315A and MCC-315B from flooding. MCC-315A and 315B is required for availability of the UHS. CCW is required for cooling of the EDGs and the motor driven EFW pumps.
D. Incorrect. See Answer C above.

Technical Reference(s): OP-902-009 Rev 317, Appendix 20
(Attach if not previously provided) WLP-OPS-PPE05 Rev 30, slide 28
(including version/revision number)

Proposed references to be provided
to applicants during examination: None

Learning Objective: WLP-OPS-PPE05 EO-7 (As available)

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

Question History: Last NRC Exam None

Question Cognitive Level: Memory or Fundamental Knowledge 2
Comprehension or Analysis

10 CFR Part 55 Content: 55.41 10
55.43

Comments:

2018 NRC Exam
RO Written Exam Worksheet

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #	1	
	Group #	2	
	K/A #	CE E09 EA1.3	
	Importance Rating	3.6	

K/A Statement

CE E09 Functional Recovery EA1.3 Ability to operate and / or monitor the following as they apply to the (Functional Recovery) **Desired operating results during abnormal and emergency situations**

Proposed Question: RO 27 Rev: 0

Given:

- Crew has entered OP-902-008, Functional Recovery Procedure, and is performing required actions of RCS and Core Heat Removal
- CRS directs BOP to coordinate aligning EFW Pump suction to ACCW Train A

ACCW Pump A is _____(1)_____ to be running for successful transfer.

To prevent cavitation of EFW Pumps, transfer of EFW Pump suction to ACCW must be completed before CSP level lowers to _____(2)_____.

	(1)	(2)
A.	required	11%
B.	required	25%
C.	NOT required	11%
D.	NOT required	25%

Proposed Answer: A

Explanation: (Optional)

A. **CORRECT:** OP-902-009 Appendix 10 states 11% CSP level is the level at which EFW pump suction transfer should be completed to prevent cavitating the EFW pump. ACCW Pump A must be running to successfully complete this transfer.
B. Incorrect. Part 1 is correct. At 25% CSP level, OP-902-008 directs crew to Appendix 10 to ensure transfer is complete by 11%.
C. Incorrect. Step for transferring EFW Pump suction directs crew to verify the train being aligned has an ACCW Pump running. Part 2 is correct.
D. Incorrect. Step for transferring EFW Pump suction directs crew to verify the train being aligned has an ACCW Pump running. At 25% CSP level, OP-902-008 directs crew to Appendix 10 to ensure transfer is complete by 11%

Technical Reference(s): OP-902-008 page 233 Rev. 27
(Attach if not previously provided) OP-902-009 Appendix 10 Rev. 317
(including version/revision number)

Proposed references to be provided
to applicants during examination: None

Learning Objective: WLP-OPS-PPE01 EO- 6 (As available)

Question Source: Bank #
Modified Bank # RO 51 (Note changes or attach parent)
New

Question History: Last NRC Exam 2014 NRC Exam

Question Cognitive Level: Memory or Fundamental Knowledge 2
Comprehension or Analysis

10 CFR Part 55 Content: 55.41 10
55.43

Comments:

2018 NRC Exam
RO Written Exam Worksheet

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #	2	
	Group #	1	
	K/A #	003 K1.12	
	Importance Rating	3.0	

K/A Statement

003 Reactor Coolant Pump K1.12 Knowledge of the physical connections and/or cause-effect relationships between the RCPS and the following systems: **CCWS**

Proposed Question: RO 28 Rev: 0

Which ONE of the following parameters is a valid Reactor Coolant Pump (RCP) **INTERLOCK** that **meets** a required start permissive?

A. RCP Control Bleed-off pressure is 45 PSIG.

B. RCP Seal Cooler Outlet CCW temperature is 150 ºF.

C. RCP Lift Oil pressure is 120 PSIG.

D. RCP Total CCW flow is 380 GPM.

Proposed Answer: D

Explanation: (Optional)

A. Incorrect. Controlled Bleed-off pressure is not a RCP start interlock.
B. Incorrect. Component Cooling Water temperature is not a RCP start interlock.
C. Incorrect. RCP Lift Oil pressure must be greater than 400 PSIG to meet RCP start interlocks. RCP lift oil pressure of 120 PSIG does not meet the start interlock.
D. **CORRECT:** Total CCW flow must be > 372 gpm to meet the start interlock for starting a RCP.

Technical Reference(s): WLP-OPS-RCP00 Rev 25, slides 102, 105
(Attach if not previously provided) OP-001-002 Rev 22, steps 3.1.9, 3.2.16
(including version/revision number)

Proposed references to be provided
to applicants during examination: None

Learning Objective: WLP-OPS-RCP00 EO-6 (As available)

Question Source: Bank # RO 28
Modified Bank # (Note changes or attach parent)
New

Question History: Last NRC Exam 2009 NRC Exam

Question Cognitive Level: Memory or Fundamental Knowledge 2
Comprehension or Analysis

10 CFR Part 55 Content: 55.41 7
55.43

Comments:

2018 NRC Exam
RO Written Exam Worksheet

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #	2	
	Group #	1	
	K/A #	004 K2.01	
	Importance Rating	2.9	

K/A Statement

004 Chemical and Volume Control K2.01 Knowledge of bus power supplies to the following:
Boric acid makeup pumps

Proposed Question: RO 29 Rev: 0

Power supplies to the Boric Acid Makeup (BAM) Pumps are:

A. BAM Pump A = MCC-311A, BAM Pump B = MCC-312B
B. BAM Pump A = MCC-312A, BAM Pump B = MCC-313B
C. BAM Pump A = MCC-311B, BAM Pump B = MCC-312B
D. BAM Pump A = MCC-312A, BAM Pump B = MCC-313A

Proposed Answer: D

Explanation: (Optional)

A. Incorrect. Plausible to assume that BAM Pump A is powered from the A train and BAM Pump B is powered from the B train.

B. Incorrect. Plausible to assume that BAM Pump A is powered from the A train and BAM Pump B is powered from the B train.

C. Incorrect. The BAM Pumps are powered from the A Safety Train, BAM Gravity Feed Valves are powered from the B Safety Train.

D. **CORRECT**: The BAM Pumps are powered from the A Safety Train, BAM Gravity Feed Valves are powered from the B Safety Train.

Technical Reference(s): OP-002-005 Rev 62, Att. 11.3 BAM System
(Attach if not previously provided) Standby Breaker Lineup
(including version/revision number)

Proposed references to be provided
to applicants during examination: None

Learning Objective: WLP-OPS-CVC00 EO-5 (As available)

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

Question History: Last NRC Exam None

Question Cognitive Level: Memory or Fundamental Knowledge 2
Comprehension or Analysis

10 CFR Part 55 Content: 55.41 6,10
55.43

Comments:

2018 NRC Exam
RO Written Exam Worksheet

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #	2	
	Group #	1	
	K/A #	004 K6.09	
	Importance Rating	2.8	

K/A Statement

004 Chemical and Volume Control K6.09 Knowledge of the effect of a loss or malfunction on the following CVCS components: **Purpose of VCT divert valve**

Proposed Question: RO 30 Rev: 0

Given:

- Crew is performing OP-002-005, section 6.5, Purification Ion Exchanger Venting and Sampling
- VCT Inlet/Bypass to Holdup Tanks, CVC-169, has been placed to the BMS position and ATC is directed to maintain VCT level 37-76%

ATC reports that CVC-169 is mechanically bound in the BMS position. Which annunciator will come in first to alert the ATC that VCT level is at the lower band provided?

A. CVCS BORIC ACID MAKEUP FLOW HI/LO

B. CVCS RX MAKEUP WTR FLOW HI/LO

C. CHARGING PUMPS HEADER PRESSURE LO

D. BORIC ACID PUMPS DISCH HEADER PRESS LO

Proposed Answer: D

Explanation: (Optional)

A. Incorrect. Using the same logic as Answer D below: VCT Makeup Mode Selector Switch is normally maintained in MANUAL, which will not auto-start the selected BAM Pump when level reaches the lower normal level band. During Auto Makeup to the VCT, Boric Acid flow (at preset flow rate) to the VCT should also commence at the same time the BAM Pump starts. This does not occur with Mode Selector Switch in Manual; however, this alarm does not annunciate because the Boric Acid flow controller is in Manual rather than Auto.

B. Incorrect. Using the same logic as Answer D below: VCT Makeup Mode Selector Switch is normally maintained in MANUAL, which will not auto-start the selected BAM Pump when level reaches the lower normal level band. During Auto Makeup to the VCT, PMU flow (at preset flow rate) to the VCT should also commence at the same time the BAM Pump starts. This does not occur with Mode Selector Switch in Manual; however, this alarm does not annunciate because the PMU controller is in Manual rather than Auto.

C. Incorrect. This alarm is not associated with VCT level setpoints, but it is worded very similar to answer D, which is correct. If VCT level were lost, this alarm would come in due to gas intrusion into the Charging System.

D. **CORRECT:** VCT Makeup Mode Selector Switch is normally maintained in MANUAL, which will not auto-start the selected BAM Pump when level reaches the lower normal level band. Since the BAM Pump does not start, this alarm will annunciate prior to the Lo Level Alarm.

Technical Reference(s): OP-500-007 Rev 20 Att 4.114, 4.104, 4.65, 4.89
(Attach if not previously provided) SD-CVC Figure 21, Rev 18
(including version/revision number)

Proposed references to be provided
to applicants during examination: None

Learning Objective: WLP-OPS-CVC00 EO-1 (As available)

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

Question History: Last NRC Exam None

Question Cognitive Level: Memory or Fundamental Knowledge
Comprehension or Analysis 2

10 CFR Part 55 Content: 55.41 6
55.43

Comments:

2018 NRC Exam
RO Written Exam Worksheet

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #	2	
	Group #	1	
	K/A #	005 K3.05	
	Importance Rating	3.7	

K/A Statement

005 Residual Heat Removal K3.05 Knowledge of the effect that a loss or malfunction of the RHRS will have on the following: **ECCS**

Proposed Question: RO 31 Rev: 0

Given:

- RCS temperature is 180°F and steady
- RCS pressure is 320 PSIA and steady
- SDC Train B is in service
- SDC Train A is secured
- The SDC watch reports that SDCS LOOP 1 SUCTION ISOL DOWNSTREAM OUTSIDE (SI-407B) has gone closed.

The crew will FIRST ____(1)____. The crew will enter OP-901-131, Shutdown Cooling Malfunction section ____(2)____

	(1)	(2)
A.	place SDC Train A in service	E3 Loss of Shutdown Cooling Heat Removal Capability
B.	place SDC Train A in service	E2 Loss of Shutdown Cooling Flow
C.	secure LPSI Pump B	E2 Loss of Shutdown Cooling Flow
D.	secure LPSI Pump B	E3 Loss of Shutdown Cooling Heat Removal Capability

Proposed Answer: C

Explanation: (Optional)

A. Incorrect. Placing SDC Train A in service is plausible if the applicant does not realize that SI-407B (this valve is the only one of the three outside of containment) is part of the immediate action. The next step in section E2 is to place the standby SDC train to service. The applicant must know the proper section to go to if the only train of SDC is lost, E3 sounds as if it is applicable but it contains the guidance for a loss of CCW to the SDC HX.
B. Incorrect. Placing SDC Train A in service is plausible if the applicant does not realize that SI-407B (this valve is the only one of the three outside of containment) is part of the immediate action. The next step in section E2 is to place the standby SDC train to service. Part 2 is correct.
C. **CORRECT**: The immediate operator action contained in OP-901-131 will direct the crew to secure LPSI Pump B if SI-401B, SI-405B, or SI-407B go closed. After immediate operator actions are completed the crew will enter section E2 Loss of Shutdown Cooling Flow. The LPSI Pumps are a part of the ECCS system.
D. Incorrect. Part 1 is correct. The applicant must know the proper section to go to if the only train of SDC is lost, E3 sounds as if it is applicable but it contains the guidance for a loss of CCW to the SDC HX.

Technical Reference(s): OP-901-131 Rev 304, pages 6,8, 9. &26
(Attach if not previously provided)
(including version/revision number)

Proposed references to be provided to applicants during examination: None

Learning Objective: WLP-OPS-PPO50 EO-3 (As available)

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

Question History: Last NRC Exam None

Question Cognitive Level: Memory or Fundamental Knowledge
Comprehension or Analysis 2

10 CFR Part 55 Content: 55.41 10
55.43

Comments:

2018 NRC Exam
RO Written Exam Worksheet

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #	2	
	Group #	1	
	K/A #	005 2.1.28	
	Importance Rating	4.1	

K/A Statement

005 (SF4P RHR) Residual Heat Removal **2.1.28** - Knowledge of the purpose and function of major system components and controls.

Proposed Question: RO 32 Rev: 0

Crew is aligning Train A Shutdown Cooling Suction Header Relief Valve (SI-406A) for Service in accordance with OP-009-005, Shutdown Cooling.

SI-4052A, RC Loop 2 SDC Suct Hdr Press Equalizing and Insd Cntmnt Isol, is taken to open for a minimum of ten minutes with SI-401A _____(1)_____ to _____(2)_____.

	(1)	(2)
A.	closed	minimize a hydraulic transient that could lift SI-406A
B.	open	minimize a hydraulic transient that could lift SI-406A
C.	open	satisfy open permissive interlock for SI-405A, SDCS Loop 2 Inside Containment Downstream Isol
D.	closed	satisfy open permissive interlock for SI-405A, SDCS Loop 2 Inside Containment Downstream Isol

.

Proposed Answer: B

Explanation: (Optional)

A. Incorrect. SI-401A is opened prior to opening SI-4052A. "Closed" position is plausible because the opening of SI-4052A with SI-401A closed would eliminate any hydraulic locks between the two valves. Part 2 is correct.
B. **CORRECT:** The caution on page 15 of OP-009-005 states "To minimize a hydraulic transient that could challenge the integrity of SI-406A during the opening of SI-405A, the piping between SI-407A and SI-405A is pressurized through SI-4052A with SI-401A open.
C. Incorrect. Part 1 is correct. SI-405A is installed with an minimum pressure to open interlock of 386 psia. But, the purpose of opening SI-4052A is to prevent an inadvertent opening of an LTOP relief, not to meet this open interlock.
D. Incorrect. SI-401A is opened prior to opening SI-4052A. Closed position is plausible because the opening of SI-4052A with SI-401A closed would eliminate any hydraulic locks between the two valves. SI-405A is installed with an minimum pressure to open interlock of 386 psia. But, the purpose of opening SI-4052A is to prevent an inadvertent opening of an LTOP relief, not to meet this open interlock.

Technical Reference(s): SD-SDC Fig. 1 R 3, LP-OPS-SI00 Rev 26 slide 51
(Attach if not previously provided) OP-009-005 Rev. 40 pages 13-15 and 95
(including version/revision number)

Proposed references to be provided
to applicants during examination: None

Learning Objective: WLP-OPS-SDC00 EO-5 (As available)

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

Question History: Last NRC Exam None

Question Cognitive Level: Memory or Fundamental Knowledge
Comprehension or Analysis 3

10 CFR Part 55 Content: 55.41 8
55.43

Comments:

2018 NRC Exam
RO Written Exam Worksheet

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #	2	
	Group #	1	
	K/A #	006 K4.11	
	Importance Rating	3.9	

K/A Statement

006 Emergency Core Cooling K4.11 Knowledge of ECCS design feature(s) and/or interlock(s) which provide for the following: **Reset of SIS**

Proposed Question: RO 33 Rev: 0

Given:

- Plant has experienced an Excess Steam Demand event
- CRS has directed the ATC to reset Safety Injection and Containment Isolation in accordance with OP-902-009, Standard Appendices, Attachment 5-A: SIAS/CIAS Pressurizer Pressure Reset Procedure
- Channels A and B LO PZR PRESS trip bistables have been reset

To reset SIAS and CIAS logic, BOP will:

A. Bypass ONLY Channel C LO PZR PRESS trip, reset Initiation relays and then reset Actuation relays for SIAS and CIAS.

B. Bypass ONLY Channel C LO PZR PRESS trip, reset Actuation relays and then reset Initiation relays for SIAS and CIAS.

C. Bypass BOTH Channels C and D LO PZR PRESS trips, reset Initiation relays and then reset Actuation relays for SIAS and CIAS.

D. Bypass BOTH Channels C and D LO PZR PRESS trips, reset Actuation relays and then reset Initiation relays for SIAS and CIAS.

Proposed Answer: A

Explanation: (Optional)

A. **CORRECT**: OP-902-009 Attachment 5-A: SIAS and CIAS Pressurizer Pressure Reset Procedure, directs the crew to reset PPS Channel A and B, then bypass Channel C. At this time, the initiation relays are reset and then the actuation relays. are reset
B. Incorrect. The initiation relays must be reset before the actuation relays can be reset.
C. Incorrect. Only Channel C is bypassed before the initiation and actuation relays are reset.
D. Incorrect. Only Channel C is bypassed before the initiation and actuation relays are reset. Also, the initiation relays must be reset before the actuation relays can be reset.

Technical Reference(s): OP-902-009, Standard Appendices, Rev. 317
(Attach if not previously provided) Attachment 5-A
(including version/revision number)

Proposed references to be provided
to applicants during examination: None

Learning Objective: WLP-OPS-PPE01 EO-6 (As available)

Question Source: Bank # RO 31
Modified Bank # (Note changes or attach parent)
New

Question History: Last NRC Exam 2012 NRC Exam

Question Cognitive Level: Memory or Fundamental Knowledge
Comprehension or Analysis 2

10 CFR Part 55 Content: 55.41 7,10
55.43

Comments:

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

K/A Statement

007 Pressurizer Relief Tank/Quench Tank K5.02 Knowledge of the operational implications of the following concepts as the apply to PRTS: **Method of forming a steam bubble in the PZR**

Proposed Question: RO 34 Rev: 0

Given:

- Crew has entered OP-902-008, Safety Functional Recovery Procedure
- Pressurizer Level is 100%
- QSPDS Reactor Vessel Level 4 is voided

In order to restore a Pressurizer bubble, crew should vent the ____(1)____ to the ____(2)____ Tank.

	(1)	(2)
A.	Pressurizer	Quench
B.	Pressurizer	Reactor Drain
C.	Reactor Vessel Head	Quench
D.	Reactor Vessel Head	Reactor Drain

Proposed Answer: C

Explanation: (Optional)

A. Incorrect. Stem provides indication that the bubble has shifted from the Pressurizer to the Head. In some cases, the Pressurizer may need venting, but not when it is showing100% full.
B. Incorrect. See A above. Reactor Drain Tank is plausible for Part 2 since it receives several inputs from the RCS. But the Head is not vented to the RDT.
C. **CORRECT**: Stem provides indication that the bubble has shifted from the Pressurizer to the Head. Applicant must understand that Reactor Vessel Head level is below that which is required. App. 11, Void Elimination, of OP-902-009, Standard Appendices, provides direction to vent Reactor Vessel Head to the Quench Tank.
D. Incorrect. Reactor Drain Tank is plausible for Part 2 since it receives several inputs from the RCS. But the Head is not vented to the RDT.

Technical Reference(s): OP-902-008 Rev 27, pp 102 and 93
(Attach if not previously provided) OP-902-009 Rev 317, p 90
(including version/revision number) SD-RCS Rev 23, Fig. 31, pp 27-29
SD-BMS Rev 8, Fig. 06

Proposed references to be provided to applicants during examination: None

Learning Objective: WLP-OPS-PPE08, EO-4 (As available)

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

Question History: Last NRC Exam None

Question Cognitive Level: Memory or Fundamental Knowledge _____
Comprehension or Analysis 3

10 CFR Part 55 Content: 55.41 10
55.43 _____

Comments:

2018 NRC Exam
RO Written Exam Worksheet

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #	2	
	Group #	1	
	K/A #	008 A1.01	
	Importance Rating	2.8	

K/A Statement

008 Component Cooling Water A1.01 Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating the CCWS controls including: **CCW flow rate**

Proposed Question: RO 35 Rev: 0

Given:

- Plant is at 100% power
- Letdown Heat Exchanger Tube Outlet Temperature transmitter fails low

As a result of this condition, the ATC will be required to take manual control of Letdown HX Temperature controller (for CC-636) and ____(1)____ its output to ____(2)____ CCW flow to Letdown HX.

	(1)	(2)
A.	lower	lower
B.	raise	raise
C.	lower	raise
D.	raise	lower

Proposed Answer: B

Explanation: (Optional)

A. Incorrect. If applicant believes that this condition will cause output to raise, lowering output would be correct. In this case, output will go to minimum.
B. **CORRECT**: With process temp failing low, controller will lower output to minimum to lower CCW flow so that Letdown Temp will rise. ATC must respond to rising Letdown Temp by manually raising output to raise CCW flow to Letdown HX.
C. Incorrect. Some controllers at W3 are reverse-acting (i.e. PLC), lowering output causes flow to rise.
D. Incorrect. Some controllers at W3 are reverse-acting (i.e. PLC), raising output causes flow to lower.

Technical Reference(s): SD-CC Rev 23, page 36
(Attach if not previously provided) SD-CVC Rev 18, pp 10, 13, & 14
(including version/revision number) OP-500-007 Rev 11, Att 4.11 & 4.33

Proposed references to be provided
to applicants during examination: None

Learning Objective: WLP-OPS-CVC00 EO-2 (As available)

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

Question History: Last NRC Exam None

Question Cognitive Level: Memory or Fundamental Knowledge
Comprehension or Analysis 3

10 CFR Part 55 Content: 55.41 7
55.43

Comments:

2018 NRC Exam
RO Written Exam Worksheet

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #	2	
	Group #	1	
	K/A #	008 A4.08	
	Importance Rating	3.1	

K/A Statement

008 Component Cooling Water A4.08 Ability to manually operate and/or monitor in the control room: **CCW pump control switch**

Proposed Question: RO 36 Rev: 0

Given:

- CCW Pumps A and B are currently running
- AB Bus is aligned to Train B
- CCW AB Assignment Switch is in B position
- CCW Pump AB has NOT yet been started

If a Loss of Offsite Power occurs, which ONE of the following describes the operation of the CCW pumps for this event?
(Assume Both Sequencers have timed out)

A. ALL CCW Pumps are running.

B. ONLY CCW Pump A is running.

C. ONLY CCW Pumps A and B are running.

D. ONLY CCW Pumps A and AB are running.

Proposed Answer: D

Explanation: (Optional)

A. Incorrect. The AB electrical bus is aligned to the B bus and CCW Pump AB assignment switch is aligned to B. CCW Pump AB will start on the sequencer replacing CCW Pump B. One could believe that all 3 pumps receive a start signal from restoration of LOOP.
B. Incorrect. The AB electrical bus is aligned to the B bus and CCW Pump AB assignment switch is aligned to B. Therefore, CCW Pump AB will start on the sequencer replacing CCW Pump B. This answer would be true if AB electrical bus was aligned to A side.
C. Incorrect. The AB electrical bus is aligned to the B bus and CCW Pump AB assignment switch is aligned to B. Therefore, CCW Pump AB will start on the sequencer replacing CCW Pump B. One could believe that the B pump will start with the Assignment Switch in the B position.
D. **CORRECT:** The AB electrical bus is aligned to the B bus and CCW Pump AB assignment switch is aligned to B. Therefore, CCW Pump AB will start on the sequencer replacing CCW Pump B.

Technical Reference(s): SD-CC Rev. 23 page 15
(Attach if not previously provided)
(including version/revision number)

Proposed references to be provided
to applicants during examination: None

Learning Objective: WLP-OPS-CC00 EO-3 (As available)

Question Source: Bank # RO 7
Modified Bank # (Note changes or attach parent)
New

Question History: Last NRC Exam 2008 NRC Exam

Question Cognitive Level: Memory or Fundamental Knowledge
Comprehension or Analysis 2

10 CFR Part 55 Content: 55.41 7
55.43

Comments:

2018 NRC Exam
RO Written Exam Worksheet

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #	2	
	Group #	1	
	K/A #	010 K6.01	
	Importance Rating	2.7	

K/A Statement

010 Pressurizer Pressure Control K6.01 Knowledge of the effect of a loss or malfunction of the following will have on the PZR PCS: **Pressure detection Systems**

Proposed Question: RO 37 Rev: 0

Given:

- The plant was operating at 2250 PSIA when the selected Pressurizer Pressure Control Channel, RC-IPT-0100X failed high.
- Operator action was taken to stabilize RCS pressure
- Backup Heater Bank 3 control switch is in ON
- The remaining heaters control switches are in AUTO
- The lowest pressurizer pressure reached was 2235 PSIA

Pressurizer backup heater capability will be restored when the Pressurizer Pressure Channel selector switch___(1)___ the Lo Level Heater Cutout selector switch is(are) transferred to the non-faulted channel and _____(2)_____ will energize.

	1	2
A.	or	Backup Heater Bank 3
B.	and	Backup Heater Bank 3
C.	or	all Backup Heater Banks
D.	and	all Backup Heater Banks

Proposed Answer: B

Explanation: (Optional)

A. Incorrect. To restore the heaters both switches must be operated to cutout the faulted channel and restore heater capability. The Pressurizer backup heaters condition is correct.
B. **CORRECT**: To restore the heaters both switches must be operated to cutout the faulted channel and restore heater capability. Only back up heater bank 3 will reenergize. The remaining Backup heaters remain off because the RCS pressure given is > the setpoint to energize the heaters.
C. Incorrect. To restore the heaters both switches must be operated to cutout the faulted channel and restore heater capability. The heater status is incorrect.
D. Incorrect. To restore the heaters both switches must be operated to cutout the faulted channel and restore heater capability. Only back up heater bank 3 will reenergize. The remaining Backup heaters remain off because the RCS pressure given is > the setpoint to energize the heaters.

Technical Reference(s): OP-901-120 Rev 302, page 8
(Attach if not previously provided) SD-PLC Rev. 11, page 27, Figures 8 & 6
(including version/revision number)

Proposed references to be provided
to applicants during examination: None

Learning Objective: WLP-OPS-PPO10 EO-3 (As available)

Question Source: Bank # RO 8
Modified Bank # (Note changes or attach parent)
New

Question History: Last NRC Exam 2011 NRC Exam

Question Cognitive Level: Memory or Fundamental Knowledge
Comprehension or Analysis 3

10 CFR Part 55 Content: 55.41 7,10
55.43

Comments:

2018 NRC Exam
RO Written Exam Worksheet

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #	2	
	Group #	1	
	K/A #	012 K5.01	
	Importance Rating	3.3	

K/A Statement

012 Reactor Protection K5.01 Knowledge of the operational implications of the following concepts as the apply to the RPS: **DNB**

Proposed Question: RO 38 Rev: 0

DNBR-Low Reactor Protection Trip setpoint is…

A. 1.24 and is automatically bypassed below the $10^{-4\%}$ bistable setpoint.

B. 1.24 and may be manually bypassed below the $10^{-4\%}$ bistable setpoint.

C. 1.26 and is automatically bypassed below the $10^{-4\%}$ bistable setpoint.

D. 1.26 and may be manually bypassed below the $10^{-4\%}$ bistable setpoint.

Proposed Answer: D

Explanation: (Optional)

A. Incorrect: The safety limit for DNBR is 1.24 but the RPS trip setpoint is 1.26. DNBR-low trip can be bypassed by enabling the operating bypass below the 10 E-4 bistable setpoint. Operating bypass will automatically be removed above the 10 E-4 bistable setpoint.
B. Incorrect: The safety limit for DNBR is 1.24 but the RPS trip setpoint is 1.26. DNBR-low trip can be bypassed by enabling the operating bypass below the 10 E-4 bistable setpoint. Operating bypass will automatically be removed above the 10 E-4 bistable setpoint.
C. Incorrect: The safety limit for DNBR is 1.24 but the RPS trip setpoint is 1.26. DNBR-low trip can be bypassed by enabling the operating bypass below the 10 E-4 bistable setpoint. Operating bypass will automatically be removed above the 10 E-4 bistable setpoint.
D. **CORRECT:** The safety limit for DNBR is 1.24 but the RPS trip setpoint is 1.26. DNBR-low trip can be bypassed by enabling the operating bypass below the 10 E-4 bistable setpoint. Operating bypass will automatically be removed above the 10 E-4 bistable setpoint.

Technical Reference(s): TS Table 2.2.1 and Note 5
(Attach if not previously provided) TS Basis for DNBR Low Trip Setting
(including version/revision number)

Proposed references to be provided
to applicants during examination: None

Learning Objective: WLP-OPS-PPS00 EO-1, EO-4 (As available)

Question Source: Bank # RO 38
Modified Bank #
New

(Note changes or attach parent)

Question History: Last NRC Exam 2014 NRC Exam

Question Cognitive Level: Memory or Fundamental Knowledge 2
Comprehension or Analysis

10 CFR Part 55 Content: 55.41 2,6
55.43

Comments:

2018 NRC Exam
RO Written Exam Worksheet

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #	2	
	Group #	1	
	K/A #	012 A2.01	
	Importance Rating	3.1	

K/A Statement

012 Reactor Protection A2.01 Ability to (a) predict the impacts of the following malfunctions or operations on the RPS; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: **Faulty bistable operation**

Proposed Question: RO 39 Rev: 0

Given:

- Plant is at 100% power
- RCP Speed Sensor input to CPC Channel A fails causing LPD and DNBR trips on CPC Channel A
- Crew attempted to bypass bistables 3 and 4 on CPC Channel A but the bypass pushbuttons on CP-10 failed to go to bypass

In accordance with OP-009-007, Plant Protection System, crew will utilize the power trip test interlock by _____.

A. placing the Linear Calibrate Switch to zero to bypass bistables 3 and 4

B. placing the Linear Calibrate Switch to zero to trip bistables 3 and 4

C. pulling the associated bistable comparator cards to bypass bistables 3 and 4

D. pulling the associated bistable comparator cards to trip bistables 3 and 4

Proposed Answer: B

Explanation: (Optional)

A. Incorrect. This action places the bistables in the **tripped** condition, not **bypassed**.
B. **CORRECT:** OP-009-007 section 8.8 provides the guidance for placing bistables 1-4 in the tripped condition. This is done by placing the Linear Calibrate Switch to Zero.
C. Incorrect. OP-009-007 section 8.10 contains the steps for placing bistables 5-20 in the tripped condition. This is done by having I&C pull the associated bistable card. This is not the method used to place bistables 3 and 4 in the bypass position.
D. Incorrect. OP-009-007 section 8.10 contains the steps for placing bistables 5-20 in the tripped condition. This is done by having I&C pull the associated bistable card. This is not the method used to place bistables 3 and 4 in the tripped condition.

Technical Reference(s): OP-009-007 Rev. 19, sections 8.8 and 8.10
(Attach if not previously provided) TS Table 3.3-1 Action 2
(including version/revision number)

Proposed references to be provided
to applicants during examination: None

Learning Objective: WLP-OPS-PPS00 EO-17 (As available)

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

Question History: Last NRC Exam None

Question Cognitive Level: Memory or Fundamental Knowledge
Comprehension or Analysis 2

10 CFR Part 55 Content: 55.41 7
55.43

Comments:

2018 NRC Exam
RO Written Exam Worksheet

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #	2	
	Group #	1	
	K/A #	013 A3.02	
	Importance Rating	4.1	

K/A Statement

013 Engineered Safety Features Actuation A3.02 Ability to monitor automatic operation of the ESFAS including: **Operation of actuated equipment**

Proposed Question: RO 40 Rev: 0

Given:

- Plant has experienced an Excess Steam Demand event
- Steam Generator 1 pressure is 530 PSIA
- Steam Generator 2 pressure is 655 PSIA
- Steam Generator 1 level is 40% WR and lowering
- Steam Generator 2 is 65% WR and slowly lowering

Which ONE of the following valves should the BOP find open?

A. EFW-224B, Emergency Feedwater Flow SG 2 Primary FCV
B. EFW-228B, Emergency Feedwater Isolation SG 2 Primary
C. FW-166B, SG 2 Startup Feedwater Regulating Valve
D. FW-173B, SG 2 Main Feedwater Regulating Valve

Proposed Answer: B

Explanation: (Optional)

A. Incorrect. An EFAS 2 is present, but Critical Level (55% WR) has not been reached, which will open EFW-224B (FCV).
B. **CORRECT:** Since SG 2 meets the EFAS logic, EFAS-2 has actuated, which opens EFW-228B (IV).
C. Incorrect. FW-166B will be closed due to MSIS. MSIS comes in because SG pressure is less than 666 psia.
D. Incorrect. FW-173B will be closed due to MSIS. . MSIS comes in because SG pressure is less than 666 psia.

Technical Reference(s): SD-PPS Rev. 18, pages 36-37 and Table 3
(Attach if not previously provided) SD-EFW Rev. 15, page 26
(including version/revision number) OP-902-009 Rev. 317, pages 22, 39-40

Proposed references to be provided
to applicants during examination: None

Learning Objective: WLP-OPS-PPS00 EO-1, EO-5 (As available)

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

Question History: Last NRC Exam None

Question Cognitive Level: Memory or Fundamental Knowledge
Comprehension or Analysis 3

10 CFR Part 55 Content: 55.41 7
55.43

Comments:

2018 NRC Exam
RO Written Exam Worksheet

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #	2	
	Group #	1	
	K/A #	022 A4.03	
	Importance Rating	3.2	

K/A Statement

022 Containment Cooling A4.03 Ability to manually operate and/or monitor in the control room: **Dampers in the CCS**

Proposed Question: RO 41 Rev: 0

Given:

- Plant is operating at 100% power
- A LOCA occurs
- Containment pressure is 17.3 PSIA and rising
- Pressurizer pressure is 1700 PSIA and lowering

The containment fan coolers will be operating in _____(1)_____ speed. Containment Fan Cooler discharge will be to the containment cooling _____(2)_____.

	(1)	(2)
A.	slow	system ring header
B.	slow	safety discharge dampers
C.	fast	safety discharge dampers
D.	fast	system ring header

Proposed Answer: B

Explanation: (Optional)

A. Incorrect. Part 1 is correct. Discharge of the containment fan coolers will swap from CCS ring header to CCS-102A and CCS-102B. These dampers fail open on a SIAS.
B. **CORRECT**: SIAS is present. PZR pressure does not meet the setpoint for a SIAS but containment pressure does. On a SIAS, all containment fan coolers will swap to slow speed. Discharge of the containment fan coolers will swap from the CCS ring header to CCS-102A and CCS-102B. These dampers fail open on a SIAS.
C. Incorrect. On a SIAS, all containment fan coolers will swap to slow speed. Part 2 is correct.
D. Incorrect. SIAS is present. PZR pressure does not meet the setpoint for a SIAS but containment pressure does. On a SIAS, all containment fan coolers will swap to slow speed. Discharge of the containment fan coolers will swap from the CCS ring header to CCS-102A and CCS-102B. These dampers fail open on a SIAS.

Technical Reference(s): SD-PPS Rev. 18, Table 3
(Attach if not previously provided) OP-008-003 Rev. 302, page 10
(including version/revision number)

Proposed references to be provided
to applicants during examination: None

Learning Objective: WLP-OPS-CCS00 EO-5 (As available)

Question Source: Bank # RO 41
Modified Bank # (Note changes or attach parent)
New

Question History: Last NRC Exam 2015 NRC Exam

Question Cognitive Level: Memory or Fundamental Knowledge
Comprehension or Analysis 2

10 CFR Part 55 Content: 55.41 7,8
55.43

Comments:

2018 NRC Exam
RO Written Exam Worksheet

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #	2	
	Group #	1	
	K/A #	026 A3.02	
	Importance Rating	3.9	

K/A Statement

026 Containment Spray A3.02 Ability to monitor automatic operation of the CSS, including:
Verification that cooling water is supplied to the containment spray heat exchanger

Proposed Question: RO 42 Rev: 0

Given:

- Plant is at 100% power
- A LOCA occurs
- SIAS, CIAS, MSIS, and CSAS have actuated

Which ONE of the following describes operation of Shutdown Cooling Heat Exchanger CCW Flow Control Valves (CC-963A and CC-963B) for this event?

A. Both CC-963A and 963B received a full open signal from SIAS.

B. Both CC-963A and 963B received a full open signal from CSAS.

C. CC-963B received a full open signal from SIAS, and CC-963A received a full open signal from CSAS.

D. CC-963A received a full open signal from SIAS, and CC-963B received a full open signal from CSAS.

Proposed Answer: C

Explanation: (Optional)

A. Incorrect. CC-963B fully opens upon a SIAS. CC-963A fully opens upon CSAS.
B. Incorrect. See answer A.
C. **CORRECT:** See answer A.
D. Incorrect. See answer A.

Technical Reference(s): SD-CC Rev. 23, Page 31
(Attach if not previously provided) OP-902-009 Rev. 317, Pages 30,41
(including version/revision number)

Proposed references to be provided
to applicants during examination: None

Learning Objective: WLP-OPS-CC00 EO-5 (As available)

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

Question History: Last NRC Exam None

Question Cognitive Level: Memory or Fundamental Knowledge 2
Comprehension or Analysis

10 CFR Part 55 Content: 55.41 8
55.43

Comments:

2018 NRC Exam
RO Written Exam Worksheet

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #	2	
	Group #	1	
	K/A #	026 2.1.23	
	Importance Rating	4.3	

K/A Statement

026 Containment Spray **2.1.23** - Ability to perform specific system and integrated plant procedures during all modes of operation.

Proposed Question: RO 43 Rev: 0

Given:

- Plant is at 100% power
- Containment Spray Pump A is inoperable and is unable to discharge water into containment

OP-100-014, Technical Specification and Technical Requirements Compliance, states that the crew will satisfy the requirements of TS 3.6.3, Containment Isolation, by gagging closed CS-125A or by ensuring _____ closed.

Note valve names:

- CS-111A, Containment Spray Pump A Discharge Stop Check
- CS-117A, Shutdown Cooling HX A Outlet Stop Check
- CS-118A, Shutdown Cooling HX A Outlet Isolation to RWSP

A. CS-111A and CS-117A

B. CS-117A and CS-118A

C. CS-111A or CS-118A

D. CS-117A or CS-118A

Proposed Answer: B

Explanation: (Optional)

A. Incorrect. CS-111A is a major valve similar to CS-117A. CS-111A and CS-117A are ganged on a common alarm if either valve is not fully open.
B. **CORRECT:** Attachment 6.6 of OP-100-014 states, if Containment Spray Pump A(B) is unavailable to discharge water into containment, then Enter TS 3.6.3, Containment Isolation, and perform either of the following: Close CS-117A and CS-118A or gag closed CS-125A.
C. Incorrect. CS-111A is a major valve in the CS system and is similar to CS-118A (reach rod and a large isolation valve).
D. Incorrect. Per OP-100-014, both CS-117A and CS-118A or required to be closed to meet requirements of TS 3.6.3.

Technical Reference(s): OP-100-014 Rev. 344, page 64
(Attach if not previously provided) OP-009-001 pages 13, 37-38
(including version/revision number) SD-CS Fig. 1 Rev. 12

Proposed references to be provided
to applicants during examination: None

Learning Objective: WLP-OPS-CS00 EO-5 (As available)

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

Question History: Last NRC Exam None

Question Cognitive Level: Memory or Fundamental Knowledge 2
Comprehension or Analysis

10 CFR Part 55 Content: 55.41 10
55.43

Comments:

2018 NRC Exam
RO Written Exam Worksheet

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #	2	
	Group #	1	
	K/A #	039 K1.02	
	Importance Rating	3.3	

K/A Statement

039 Main and Reheat Steam K1.02 Knowledge of the physical connections and/or cause-effect relationships between the MRSS and the following systems: **Atmospheric relief dump valves**

Proposed Question: RO 44 Rev: 0

Given:

- Plant is at 100% power
- An inadvertent MSIS occurs

The crew will verify Steam Generator pressures being maintained at approximately _____.

A. 990 psig by the Atmospheric Dump Valves

B. 990 psig by the Steam Bypass Valves

C. 1070 psig by the Atmospheric Dump Valves

D. 1070 psig by the Steam Bypass Valves

Proposed Answer: A

Explanation: (Optional)

A. **CORRECT**: The first step in OP-901-504 directs the crew to verify that SG pressures are being controlled by ADVs. The ADVs setpoints are verified to be 990-992 psig prior to exceeding 70% power as directed by step 9.1.70 of OP-010-004.
B. Incorrect. The ADVs setpoints are verified to be 990-992 psig prior to exceeding 70% power as directed by step 9.1.70 of OP-010-004. The steam bypass valves would open before the ADVs but are isolated due to the MSIVs closing on the MSIS.
C. Incorrect. The setpoint of the first main steam relief valve to lift is required to be set at 1070 psig per TS 3.7.1.1. The first step in OP-901-504 directs the crew to verify that SG pressures are being controlled by ADVs
D. Incorrect. The steam bypass valves would open before the ADVs but are isolated due to the MSIVs closing on the MSIS. The setpoint of the first main steam relief valve to lift is required to be set at 1070 psig per TS 3.7.1.1

Technical Reference(s): OP-901-504 Rev 10, page 24
(Attach if not previously provided) OP-010-004 Rev 331, page 38
(including version/revision number) WLP-OPS-MS00 Rev 30, slides 95, 100, & 226
TS 3.7.1.1, Table 3.7-1

Proposed references to be provided to applicants during examination: None

Learning Objective: WLP-OPS-MS00 EO-2 (As available)

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

Question History: Last NRC Exam None

Question Cognitive Level: Memory or Fundamental Knowledge _____
Comprehension or Analysis 2

10 CFR Part 55 Content: 55.41 7,10
55.43 _____

Comments:

2018 NRC Exam
RO Written Exam Worksheet

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

K/A Statement

059 Main Feedwater K3.04 Knowledge of the effect that a loss or malfunction of the MFW will have on the following: **RCS**

Proposed Question: RO 45 Rev: 0

Given:

- Plant is at 90% power
- A Hi-Hi level in #1 Main Feedwater Heaters has occurred causing ES-109, ES to HP Heaters #1 isolation, to start closing

To control RCS temperature, crew will be required to ____(1)____ turbine load. ES-109 will ____(2)____ if Hi-Hi level condition in # 1 Main Feedwater Heater clears during valve movement.

	(1)	(2)
A.	lower	stop valve movement
B.	lower	continue to go closed
C.	raise	stop valve movement
D.	raise	continue to go closed

Proposed Answer: A

Explanation: (Optional)

A. **CORRECT**: In accordance with OP-901-221, Secondary System Transient, the crew will be required to reduce turbine load by 100 MW at a rate of 40 MW/min. This is due to RCS temperature dropping as a result of less MFW preheating due to ES-109 going closed. The note in Section E1 of OP-901-221 states that ES-109 will stop valve movement if the Hi-Hi condition clears in the #1 Heaters.
B. Incorrect. Part 1 is correct. Plausible because it is not the norm at W3 that a component will stop motion if the condition that initiated the reposition clears.
C. Incorrect. Plausible because the applicant must rationalize that ES-109 going closed would reduce preheating of Main Feedwater, which will lower RCS temperature and require a reduction of turbine load to restore. Part 2 is correct.
D. Incorrect. Plausible because the applicant must rationalize that ES-109 going closed would reduce preheating of Main Feedwater, which will lower RCS temperature and require a reduction of turbine load to restore. Part 2 is plausible because it is not the norm at W3 that a component will stop motion if the condition that initiated the reposition clears.

Technical Reference(s): OP-901-221 Rev. 221, pp 8,10
(Attach if not previously provided)
(including version/revision number)

Proposed references to be provided
to applicants during examination: None

Learning Objective: WLP-OPS-PPO20 EO-3 (As available)

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

Question History: Last NRC Exam None

Question Cognitive Level: Memory or Fundamental Knowledge
Comprehension or Analysis 3

10 CFR Part 55 Content: 55.41 4,10
55.43

Comments:

2018 NRC Exam
RO Written Exam Worksheet

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #	2	
	Group #	1	
	K/A #	061 K2.02	
	Importance Rating	3.7	

K/A Statement

061 Auxiliary/Emergency Feedwater K2.02 Knowledge of bus power supplies to the following:
AFW electric drive pumps

Proposed Question: RO 46 Rev: 0

Emergency Feedwater (EFW) Pump B is powered from which bus?

A. 1B

B. 2B

C. 3B

D. 31B

Proposed Answer: C

Explanation: (Optional)

A. Incorrect. 1B bus supplies power to large 6.9Kv loads. This bus does provide power to the Auxiliary Feedwater Pump.
B. Incorrect. 2B bus supplies power to large 4.16 Kv loads but not EFW Pump B.
C. **CORRECT:** Emergency Feedwater Pump B is powered from 4.16 Kv safety bus 3B.
D. Incorrect. 31B bus supplies power to 480 V switchgear safety loads.

Technical Reference(s): OP-009-003 Rev. 309, page 35
(Attach if not previously provided)
(including version/revision number)

Proposed references to be provided to applicants during examination: None

Learning Objective: WLP-OPS-EFW00 EO-3 (As available)

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

Question History: Last NRC Exam None

Question Cognitive Level: Memory or Fundamental Knowledge 2
Comprehension or Analysis

10 CFR Part 55 Content: 55.41 8
55.43

Comments:

2018 NRC Exam
RO Written Exam Worksheet

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #	2	
	Group #	1	
	K/A #	061 A2.07	
	Importance Rating	3.4	

K/A Statement

061 Auxiliary/Emergency Feedwater A2.07 Ability to (a) predict the impacts of the following malfunctions or operations on the AFW; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: **Air or MOV failure**

Proposed Question: RO 47 Rev: 0

SG 1 WR level instrument associated with EFW-223A, EFW Header A to SG1 Backup Flow Cntrl, has failed low

Upon an EFAS-1 actuation, EFW-223A will be ____(1)____. EFW-223A can be controlled _____(2)_____.

	(1)	(2)
A.	open	locally or from the controller on CP-8
B.	open	locally only
C.	closed	locally only
D.	closed	locally or from the controller on CP-8

Proposed Answer: A

Explanation: (Optional)

A. **CORRECT**: WR level instrument that feeds EFW-223A failing low will cause the process on EFW-223A controller to go high. In this condition, EFW-223A is only awaiting an EFAS-1 signal to fail open (valve sees SG #1 as < 55% WR). EFW-223A can be closed using the controller on CP-8. OP-902-006 will direct manual control of the failed open EFW control valve to maintain level in S/G#1 less than 70% NR.
B. Incorrect. Part 1 is correct. Before EC-64081, the EFW FCVs could only be operated manually from the controller if there was an EFAS coincident with a SIAS. EC changed the controller circuit such that it can be operated manually from the controller at any time.
C. Incorrect. With no instrument failure, EFW-223A will be closed upon an EFAS-1. EFW-223A will not open until SG #1 level lowers to less than 55% WR. Part 1 is correct. Before EC-64081, the EFW FCVs could only be operated manually from the controller if there was an EFAS coincident with a SIAS. EC changed the controller circuit such that it can be operated manually at any time.
D. Incorrect. With no instrument failure, EFW-223A will be closed upon an EFAS-1. EFW-223A will not open until SG #1 level lowers to less than 55% WR. Part 2 is correct.

Technical Reference(s): SD-EFW Rev 15, Fig. 1, Fig. 17, pages 25 & 26
(Attach if not previously provided) EC-64801
(including version/revision number)

Proposed references to be provided
to applicants during examination: None

Learning Objective: WLP-OPS-EFW00 EO-4, EO-6 (As available)

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

Question History: Last NRC Exam None

Question Cognitive Level: Memory or Fundamental Knowledge
Comprehension or Analysis 2

10 CFR Part 55 Content: 55.41 7
55.43

Comments:

2018 NRC Exam
RO Written Exam Worksheet

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #	2	
	Group #	1	
	K/A #	062 K4.02	
	Importance Rating	2.5	

K/A Statement

062 AC Electrical Distribution K4.02 Knowledge of ac distribution system design feature(s) and/or interlock(s) which provide for the following: **Circuit breaker automatic trips**

Proposed Question: RO 48 Rev: 0

Given:

- Plant is at 100% power
- Loss of the 125 Volt TGB-DC-A bus has occurred

The backup over current protection for Reactor Coolant Pumps 1A and 2A is ____(1)____. All other remote manual control and automatic protection for Switchgear 1A including its associated connected components are _____(2)_____.

	(1)	(2)
A.	disabled	disabled
B.	disabled	available
C.	available	available
D.	available	disabled

Proposed Answer: D

Explanation: (Optional)

A. Incorrect. Backup overcurrent protection for RCPs is the feeder breaker to the 1A(B) opening if the RCP breaker does not open within 4 seconds. The feeder breaker control power is from the A and B DC bus, which is still available
B. Incorrect. Backup overcurrent protection for RCPs is the feeder breaker to the 1A(B) opening if the RCP breaker does not open within 4 seconds. The feeder breaker control power is from the A and B DC bus, which is still available. TGB-DC bus supplies the control power to the 1A(B) bus, which is not available
C. Incorrect. TGB-DC bus supplies the control power to the 1A(B) bus, which is not available.
D. **CORRECT:** Backup overcurrent protection for RCPs is the feeder breaker to the 1A bus tripping open if the RCP load breaker does not trip open within 4 seconds. The feeder breaker control power is from the A DC bus, which is still available with the conditions given in the stem. The TGB-DC bus supplies the control power to the 1A(B) bus load breakers, which is not available. This renders the remote control and protective functions for the load breakers themselves unavailable.

Technical Reference(s): SD-7KV Rev. 8, pp 14, 28, 37
(Attach if not previously provided) OP-901-313 Rev. 305, pp 47, 54
(including version/revision number)

Proposed references to be provided
to applicants during examination: None

Learning Objective: WLP-OPS-ED00 EO-2 (As available)

Question Source: Bank # RO 12
Modified Bank # (Note changes or attach parent)
New

Question History: Last NRC Exam 2012 NRC Exam

Question Cognitive Level: Memory or Fundamental Knowledge
Comprehension or Analysis 2

10 CFR Part 55 Content: 55.41 4, 6
55.43

Comments:

2018 NRC Exam
RO Written Exam Worksheet

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #	2	
	Group #	1	
	K/A #	062 A1.01	
	Importance Rating	3.4	

K/A Statement

062 AC Electrical Distribution A1.01 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**

Proposed Question: RO 49 Rev: 0

Given:

- Crew is performing a post-maintenance 24-hour EDG B run in accordance with OP-903-116, Train B Integrated Emergency Diesel Generator/Engineering Safety Features Test
- 15 minutes ago, crew loaded EDG B to 4840 kW

Which ONE of the following describes load restrictions (if any) defined in OP-009-002, Emergency Diesel Generator, such that EDG B will not exceed design load limits?

A. EDG B can remain at this load indefinitely.

B. EDG B load must be reduced to 4400 KW immediately.

C. EDG B can remain at this load for 1.75 hours, then load must be reduced to 4400 KW.

D. EDG B can remain at this load for 23.75 hours, then load must be reduced to 4400 kW.

Proposed Answer: C

Explanation: (Optional)

A. Incorrect. Plausible if the applicant assumes that 4840 KW is the limit that continuous loading is allowed.
B. Incorrect. Plausible if the applicant assumes that load of 4840 KW is not allowed at any time. If this were the case, then load would have to be reduced immediately.
C. **CORRECT:** Limitation 3.25 of OP-009-002 states that the Emergency Diesel Generator ratings of 4.4 MW for continuous loading and 4.84 MW for 2 hours out of any 24 hours should not be exceeded. OP-903-116 surveillance testing will load the EDG in a range of 4700 to 4840 KW.
D. Incorrect. Limitation 3.25 of OP-009-002 states that the Emergency Diesel Generator ratings of 4.4 MW for continuous loading and 4.84 MW for 2 hours out of any 24 hours should not be exceeded. Applicant may assume that the time limit to run at the 4840 KW limit is 24 hours.

Technical Reference(s): OP-903-116 Rev. 43, pp 22-24
(Attach if not previously provided) OP-009-002 Rev 346, Limitation 3.2.5
(including version/revision number)

Proposed references to be provided
to applicants during examination: None

Learning Objective: WLP-OPS-EDG00 EO-2 (As available)

Question Source: Bank # RO 19
Modified Bank # _____ (Note changes or attach parent)
New _____

Question History: Last NRC Exam 2008 NRC Exam

Question Cognitive Level: Memory or Fundamental Knowledge _____
Comprehension or Analysis 2

10 CFR Part 55 Content: 55.41 8
55.43 _____

Comments:

2018 NRC Exam
RO Written Exam Worksheet

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #	2	
	Group #	1	
	K/A #	063 K2.01	
	Importance Rating	2.9	

K/A Statement

063 DC Electrical Distribution K2.01 Knowledge of bus power supplies to the following: **Major DC loads**

Proposed Question: RO 50 Rev: 0

What is the power supply to MS-417, EFW Pump AB Turbine Governor Valve?

A. A-DC

B. B-DC

C. AB-DC

D. TGB-DC

Proposed Answer: C

Explanation: (Optional)

A. Incorrect. Plausible because A-DC is a vital DC bus and powers various safety related equipment.
B. Incorrect. Plausible because A-DC is a vital DC bus and powers various safety related equipment.
C. **CORRECT:** MS-417, EFW Pump AB Turbine Governor Valve, is powered from EFW-EBKR-AB-37 (DC). This valve is a major load because a loss of AB-DC will cause MS-417 to fail open and overspeed EFW Pump AB.
D. Incorrect. Plausible because DC power to the Main Feed Pumps are powered from TGB-DC.

Technical Reference(s): OP-009-003 Rev. 309, page 35
(Attach if not previously provided)
(including version/revision number)

Proposed references to be provided to applicants during examination: None

Learning Objective: WLP-OPS-EFW00 EO-3 (As available)

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

Question History: Last NRC Exam None

Question Cognitive Level: Memory or Fundamental Knowledge 2
Comprehension or Analysis

10 CFR Part 55 Content: 55.41 8
55.43

Comments:

2018 NRC Exam
RO Written Exam Worksheet

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #	2	
	Group #	1	
	K/A #	064 A1.08	
	Importance Rating	3.1	

K/A Statement

064 Emergency Diesel Generator A1.08 Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating the ED/G system controls including: **Maintaining minimum load on ED/G (to prevent reverse power)**

Proposed Question: RO 51 Rev: 0

Given:

- EDG A is being synchronized to the grid
- EDG A synchroscope is rotating slowly in the counter-clockwise direction
- EDG A voltage is 5 volts higher than bus voltage
- BOP closes EDG A output breaker

In order to prevent an automatic EDG trip, BOP will be required to manipulate the ____(1)____ Adjust switch in order to establish positive ____(2)____ load.

	(1)	(2)
A.	Volt	reactive
B.	Volt	real
C.	Speed	reactive
D.	Speed	real

Proposed Answer: D

Explanation: (Optional)

A. Incorrect. Negative real load, not reactive load, will result in a reverse power trip of the EDG. With EDG voltage higher than bus voltage, outgoing MVARs will already exist when the EDG output breaker is closed. The applicant is required to know that the synchroscope is rotating in the wrong direction which is indicative of EDG frequency less than bus frequency. The volt adjust switch will adjust MVARs if adjusted with the output breaker closed.
B. Incorrect. Real load (MW) is adjusted with the speed adjust control switch, the volt adjust switch will adjust MVARs if adjusted with the output breaker closed. Plausible because it could be determined that raising voltage would raise MW. Power=VI.
C. Incorrect. See answer A above.
D. **CORRECT:** CAUTION prior to step 6.4.7 of OP-009-002 states "When EDG is connected to the grid, always maintain outgoing reactive load (MVAR) and at least .1 MW real load to prevent a reverse power trip. EDG may trip if not loaded within 5 seconds after its output breaker is closed. With EDG voltage higher than bus voltage, outgoing MVARs will exist when the EDG output breaker is closed. With synchroscope rotating in the counter-clockwise direction (not clockwise as directed in the procedure), the generator will reverse power and trip if real load is not placed on the EDG. Real load (MW) is adjusted with the speed adjust control switch.

Technical Reference(s): OP-009-002 Rev. 344, page 28
(Attach if not previously provided) SD-EDG Rev. 27, pages 79, 82, FIG. 34
(including version/revision number)

Proposed references to be provided
to applicants during examination: None

Learning Objective: WLP-OPS-EDG00 EO-8 (As available)

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

Question History: Last NRC Exam None

Question Cognitive Level: Memory or Fundamental Knowledge
Comprehension or Analysis 3

10 CFR Part 55 Content: 55.41 8
55.43

Comments:

2018 NRC Exam
RO Written Exam Worksheet

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #	2	
	Group #	1	
	K/A #	073 K1.01	
	Importance Rating	3.6	

K/A Statement

073 Process Radiation Monitoring K1.01 Knowledge of the physical connections and/or cause-effect relationships between the PRM system and the following systems: **Those systems served by PRMs**

Proposed Question: RO 52 Rev: 0

Given:

- Plant is at 100% power
- DRY COOLING TOWER SUMP 1 ACTIVITY HI annunciator is received
- High Activity reading on DCT Sump 1 radiation monitor, PRM-IRE-6775, indicated on RM-11

Which of the following AUTOMATIC actions are expected for DCT 1 Sump?

A. Sump pumps trip.

B. Flow path to Circ Water isolates.

C. Flow path to the storm drains isolates.

D. Flow path aligns to the Waste Tanks.

Proposed Answer: A

Explanation: (Optional)

A. **CORRECT**: The automatic actions on a DCT Sump 1 rad monitor high alarm is that both DCT sump pumps for the respective rad monitor will trip.
B. Incorrect. The automatic actions on a DCT Sump 1 rad monitor high alarm is that both DCT sump pumps for the respective rad monitor will trip. DCT Sump Pumps are normally aligned to the Circ Water System. Alignment to the Waste Tanks is performed manually.
C. Incorrect. The automatic actions on a DCT Sump 1 rad monitor high alarm is that both DCT sump pumps for the respective rad monitor will trip. Storm drains is an alternate flow path for the DCT Sump Pumps.
D. Incorrect. The automatic actions on a DCT Sump 1 rad monitor high alarm is that both DCT sump pumps for the respective rad monitor will trip. DCT sumps are aligned to the waste tanks on high radiation. But, this action is performed manually.

Technical Reference(s): SD-SP Rev 16, page 16, Figure 7
(Attach if not previously provided) OP-901-414 Rev.301, pages 4 and 9
(including version/revision number)

Proposed references to be provided
to applicants during examination: None

Learning Objective: WLP-OPS-SP00 obj. 6 (As available)

Question Source: Bank # RO 52
Modified Bank # _____ (Note changes or attach parent)
New _____

Question History: Last NRC Exam 2012 NRC Exam

Question Cognitive Level: Memory or Fundamental Knowledge 2
Comprehension or Analysis _____

10 CFR Part 55 Content: 55.41 11
55.43 _____

Comments:

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #	2	
	Group #	1	
	K/A #	076 K4.06	
	Importance Rating	2.8	

K/A Statement

076 Service Water K4.06 Knowledge of SWS design feature(s) and/or interlock(s) which provide for the following: **Service water train separation**

Proposed Question: RO 53 Rev: 0

Surveillance testing of ACC-138A, ACC Wet Cooling Tower A Cross-Connect Isolation, is in progress IAW OP-903-118, Primary Auxiliaries Quarterly IST Valve Tests.

With ACC-138A open, Auxiliary Component Cooling Water (ACCW) Train A will be inoperable due to cross-connecting _____(1)_____. ACC-138A can be operated _____(2)_____.

	(1)	(2)
A.	ACCW Train A and B basins	locally only
B.	ACCW Train A and B basins	locally or from the control room
C.	safety related piping with non-safety related piping	locally only
D.	safety related piping with non-safety related piping	locally or from the control room

Proposed Answer: D

Explanation: (Optional)

A. Incorrect. ACCW Train A and B basins are not cross-connected because ACC-138B is closed. ACC-138A and ACC-138B must both be opened to cross-connect basins. ACC-138A and ACC-138B are only operated during surveillance testing, important to know that power is available and the valve can be operated from the Control Room if the need to fill one basin from another is ever required.
B. Incorrect. ACCW Train A and B basins are not cross-connected because ACC-138B is closed. ACC-138A and ACC-138B must both be opened to cross-connect the basins. Part 2 is correct.
C. Incorrect. Part 1 is correct. ACC-138A and ACC-138B are only operated during surveillance testing, important to know that power is available and the valve can be operated from the Control Room if the need to fill one basin from another is ever required.
D. **CORRECT:** The piping between ACC-138A and ACC-138B is non-safety related as indicated in the caution prior to step 7.4.18. If ACC-138A is opened, ACC Train A is inoperable and TS 3.7.3 entry is required. ACC-138A can be operated from the Control Room (CP-33) or locally.

Technical Reference(s): SD-CC Rev. 23, Fig. 24
(Attach if not previously provided) OP-903-118 Rev. 43, page 56
(including version/revision number)

Proposed references to be provided
to applicants during examination: None

Learning Objective: WLP-OPS-CC00 EO-2, EO-9 (As available)

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

Question History: Last NRC Exam None

Question Cognitive Level: Memory or Fundamental Knowledge 2
Comprehension or Analysis

10 CFR Part 55 Content: 55.41 4
55.43

Comments:

2018 NRC Exam
RO Written Exam Worksheet

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #	2	
	Group #	1	
	K/A #	078 A3.01	
	Importance Rating	3.1	

K/A Statement

078 Instrument Air A3.01 Ability to monitor automatic operation of the IAS, including: **Air pressure**

Proposed Question: RO 54 Rev: 0

Given:

- Plant is at 100% power
- An instrument air leak has occurred
- Crew has entered OP-901-511, Instrument Air Malfunction

BOP will direct the NAO to ____(1)____ the set point for SA-125, SA Backup Supply for IA Press Cntl Valve, to force it open.

When instrument air pressure lowers to 95 psig, _____(2)_____ .

	(1)	(2)
A.	raise	IA-123, Instrument Air Dryers Bypass solenoid, opens
B.	raise	a plant shutdown in accordance with OP-010-005, Plant Shutdown, is required
C.	lower	IA-123, Instrument Air Dryers Bypass solenoid, opens
D.	lower	a plant shutdown in accordance with OP-010-005, Plant Shutdown, is required

Proposed Answer: A

Explanation: (Optional)

A. **CORRECT**: The set point on SA-125 must be raised to force the valve open. The set point is the pressure at which the valve will start to open, usually set at 105 psig. Raising the set point will make the valve open sooner. IA-123 is designed to open and bypass the IA dryers at 95 psig.
B. Incorrect. Part 1 is correct. The crew will commence a plant shutdown in accordance with OP-010-005, Plant Shutdown when Instrument Air pressure reaches 80 psig.
C. Incorrect. The set point on SA-125 must be raised to force the valve open. The set point is the pressure at which the valve will start to open, usually set at 105 psig. Raising the set point will make the valve open sooner. Part 2 is correct
D. Incorrect. The set point on SA-125 must be raised to force the valve open. The set point is the pressure at which the valve will start to open, usually set at 105 psig. Raising the set point will make the valve open sooner. The crew will commence a plant shutdown in accordance with OP-010-005, Plant Shutdown, when Instrument Air pressure reaches 80 psig.

Technical Reference(s): OP-901-511 Rev. 15, pages, 4, 6, and 7
(Attach if not previously provided)
(including version/revision number)

Proposed references to be provided
to applicants during examination: None

Learning Objective: WLP-OPS-PPO50 EO-3 (As available)

Question Source: Bank # RO 17
Modified Bank # (Note changes or attach parent)
New

Question History: Last NRC Exam 2017 NRC Exam

Question Cognitive Level: Memory or Fundamental Knowledge
Comprehension or Analysis 2

10 CFR Part 55 Content: 55.41 10
55.43

Comments:

2018 NRC Exam
RO Written Exam Worksheet

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #	2	
	Group #	1	
	K/A #	103 A4.09	
	Importance Rating	3.1	

K/A Statement

103 Containment System **A4.09** Ability to manually operate and/or monitor in the control room: **Containment vacuum system**

Proposed Question: RO 55 Rev: 0

At a negative ___(1)___ INWD Containment to Annulus differential pressure, CVR-101(201) open to ensure Containment internal pressure does not become more ____(2)____ than the Containment design limit.

	(1)	(2)
A.	5.5	negative
B.	5.5	positive
C.	8.5	negative
D.	8.5	positive

Proposed Answer: C

Explanation: (Optional)

A. Incorrect. Containment Vacuum Relief valve auto operation occurs at 8.5 INWD is to ensure the design Containment negative pressure is not exceeded. 5.5 INWD is the setpoint at which CVR-101 and CVR-102 reset. Part 2 is correct.
B. Incorrect. Containment Vacuum Relief valve auto operation occurs at 8.5 INWD to ensure the design Containment negative pressure is not exceeded
C. **CORRECT:** Containment Vacuum Relief valve auto operation occurs at 8.5 INWD to ensure the design Containment negative pressure is not exceeded.
D. Incorrect. Containment Vacuum Relief valve auto operation occurs at 8.5 INWD to ensure the design Containment negative pressure is not exceeded.

Technical Reference(s): SD-CB Rev. 11, pp 8 & 9, and Fig. 2
(Attach if not previously provided) OP-008-005 Rev. 306, page 11
(including version/revision number)

Proposed references to be provided
to applicants during examination: None

Learning Objective: WLP-OPS-CB00 EO-2 (As available)

Question Source: Bank # RO 28
Modified Bank # (Note changes or attach parent)
New

Question History: Last NRC Exam 2010 NRC Exam

Question Cognitive Level: Memory or Fundamental Knowledge 2
Comprehension or Analysis

10 CFR Part 55 Content: 55.41 7
55.43

Comments:

2018 NRC Exam
RO Written Exam Worksheet

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #	2	
	Group #	2	
	K/A #	014 K1.01	
	Importance Rating	3.2	

K/A Statement

014 Rod Position Indication K1.01 Knowledge of the physical connections and/or cause-effect relationships between the RPIS and the following systems: **CRDS**

Proposed Question: RO 56 Rev: 0

Given:

- Plant is performing a startup and Group P CEAs are being withdrawn for ASI control
- CEA 25 in Group P becomes mechanically bound

With the CEA Manual Shim switch in WITHDRAW, PMC pulse counter indication for CEA 25 will ____(1)____. CEAC position indication for CEA 25 will _____(2)____.

	(1)	(2)
A.	rise	remain constant
B.	remain constant	remain constant
C.	rise	rise
D.	remain constant	rise

Proposed Answer: A

Explanation: (Optional)

A. **CORRECT**: PMC pulse counters will be rising as long as the shim switch is taken to withdraw. CEA position used in the CEACs work on reed switch position indicators and will "see" actual CEA position. Therefore, CEACs will show a stationary position for CEAs.
B. Incorrect. PMC pulse counters will be rising as long as the shim switch is taken to withdraw.
C. Incorrect. CEA position used in CEACs work on reed switch position indicators and will "see" actual CEA position. Therefore, CEACs will show a stationary position for CEAs.
D. Incorrect. PMC pulse counters will be rising as long as the shim switch is taken to withdraw. CEA position used in CEACs work on reed switch position indicators and will "see" actual CEA position. Therefore, CEACs will show a stationary position for CEAs

Technical Reference(s): SD-CED Rev.12, pages 8 & 11
(Attach if not previously provided)
(including version/revision number)

Proposed references to be provided to applicants during examination: None

Learning Objective: WLP-OPS-CED00 EO-4, EO-17 (As available)

Question Source: Bank # RO 58
Modified Bank # (Note changes or attach parent)
New

Question History: Last NRC Exam 2012 NRC Exam

Question Cognitive Level: Memory or Fundamental Knowledge
Comprehension or Analysis 2

10 CFR Part 55 Content: 55.41 6
55.43

Comments:

2018 NRC Exam
RO Written Exam Worksheet

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #	2	
	Group #	2	
	K/A #	017 K5.01	
	Importance Rating	3.1	

K/A Statement

017 In-Core Temperature Monitor K5.01 Knowledge of the operational implications of the following concepts as they apply to the ITM system: **K5.01 Temperature at which cladding and fuel melt**

Proposed Question: RO 57 Rev: 0

The Peak Centerline Temperature safety limit for new fuel with no burnable poison is ____(1)_____°F. Per TS 2.2.1, Reactor Trip Setpoints, a steady state peak linear heat rate of ___(2)___ has been selected as the Limited Safety System Setting to prevent fuel centerline melt.

	(1)	(2)
A.	5080	12.9 KW/Ft
B.	5080	21.0 KW/Ft
C.	3350	12.9 KW/Ft
D.	3350	21.0 KW/Ft

Proposed Answer: B

Explanation: (Optional)

A. Incorrect. 5080°F is the fuel centerline melt temperature at 10,000 MWD/MTU for fuel with no burnable poison. The limiting Safety System setting is 21 KW/FT. 12.9 KW/Ft is the TS 3.2.1 LCO limit as stated in the COLR with COLSS in service with Containment average temperature > 95°F.
B. **CORRECT.** 5080°F is the fuel centerline melt temperature at 10,000 MWD/MTU for fuel with no burnable poison. The limiting Safety System setting is 21 KW/FT.
C. Incorrect. 3350°F is the temperature that the cladding melts. The basis in this selection is incorrect. 12.9 KW/Ft is the TS 3.2.1 LCO limit as stated in the COLR with COLSS in service with Containment average temperature > 95°F.
D. Incorrect. 3350°F is the temperature at which the cladding melts. Per Bases 2.1.1 the LSSS is based on normal steady state operation is 21KW/FT

Technical Reference(s): TS 2.1.1.2 (Amd 224), TS Bases 2.1.1 (Ch 64)
(Attach if not previously provided) TS 3.2.1 (Amd 102). COLR 3.2.1 (Cycle 22 Rev 0)
(including version/revision number) WLP-OPS-MCD03 (Rev 5), slide 10

Proposed references to be provided
to applicants during examination: None

Learning Objective: WLP-OPS-CPC00, EO-9 (As available)

Question Source: Bank # RO 70
Modified Bank # _____ (Note changes or attach parent)
New _____

Question History: Last NRC Exam 2011 NRC Exam

Question Cognitive Level: Memory or Fundamental Knowledge 2
Comprehension or Analysis _____

10 CFR Part 55 Content: 55.41 2
55.43 _____

Comments:

2018 NRC Exam
RO Written Exam Worksheet

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #	2	
	Group #	2	
	K/A #	011 K3.01	
	Importance Rating	3.2	

K/A Statement

011 Pressurizer Level Control K3.01 Knowledge of the effect that a loss or malfunction of the PZR LCS will have on the following: **CVCS**

Proposed Question: RO 58 Rev: 0

Given:

- Plant is at 100% power
- Pressurizer Level Controller (RC-ILIC-0110), located on CP-2, process (input) signal has failed low.

Which of the following is the expected letdown flow following the failure?

A. 0 gpm

B. 28 gpm

C. 40 gpm

D. 126 gpm

Proposed Answer: B

Explanation: (Optional)

A. Incorrect. Zero is plausible because flow would go to 0 if the minimum output signal of the pressurizer level controller was not limited to 16%.
B. **CORRECT:** The pressurizer level controller output is limited to 16% output with the controller in auto. Even though the process (control channel input) fails low the pressurizer level controller output will be limited to 16% which is equivalent to a minimum flow of approximately 28 gpm.
C. Incorrect. 40 gpm is plausible because this is normal letdown flow at 100% power. Letdown flow will drop to 28 gpm.
D. Incorrect. 126 gpm is plausible if it is determine that letdown flow will go to maximum if the pressurizer level controller input fails to minimum.

Technical Reference(s): SD-CVC Rev. 18, page 12
(Attach if not previously provided) OP-901-110 Rev. 10, page 11
(including version/revision number) SD-PLC Rev. 11, pages 10,13, 14

Proposed references to be provided
to applicants during examination: None

Learning Objective: WLP-OPS-CVC EO-3 (As available)

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

Question History: Last NRC Exam None

Question Cognitive Level: Memory or Fundamental Knowledge 2
Comprehension or Analysis

10 CFR Part 55 Content: 55.41 7
55.43

Comments:

2018 NRC Exam
RO Written Exam Worksheet

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #	2	
	Group #	2	
	K/A #	033 K4.03	
	Importance Rating	2.6	

K/A Statement

033 Spent Fuel Pool Cooling K4.03 Knowledge of design feature(s) and/or interlock(s) which provide for the following: **Anti-siphon devices**

Proposed Question: RO 59 Rev: 0

Fuel Pool Cooling Pumps _____(2)_____ piping has drilled holes that act as an anti-siphon device to prevent inadvertent draining of the Spent Fuel Pool.

Per TS 5.6.3, this design feature will prevent draining the spent fuel pool below the elevation of _____(1)_____ feet MSL.

	(1)	(2)
A.	suction	40
B.	return	40
C.	suction	23
D.	return	23

Proposed Answer: B

Explanation: (Optional)

A. Incorrect. Plausible because the suction side of the SFP purification pump has a siphon breaker because it is cut at 40 feet 6 inches. Part 2 is correct.
B. **CORRECT:** The return piping of the Fuel Pooling cooling pump has holes drilled at the 40'6" elevation to ensure that level does not drop below 40' as defined by TS 5.6.3.
C. Incorrect. Plausible because the suction side of the SFP purification pump has a siphon breaker because it is cut at 40 feet 6 inches. Plausible because TS 3.9.11 requires 23 feet of water above the irradiated fuel assemblies seated in the storage racks.
D. Incorrect. Part 1 is correct. Plausible because TS 3.9.11 requires 23 feet of water above the irradiated fuel assemblies seated in the storage racks

Technical Reference(s): TS 5.6.3
(Attach if not previously provided) SD-FS Rev. 11, page 14 and Fig. 1
(including version/revision number)

Proposed references to be provided
to applicants during examination: None

Learning Objective: WLP-OPS-FS00 EO-3 (As available)

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

Question History: Last NRC Exam None

Question Cognitive Level: Memory or Fundamental Knowledge 2
Comprehension or Analysis

10 CFR Part 55 Content: 55.41 10
55.43

Comments:

2018 NRC Exam
RO Written Exam Worksheet

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #	2	
	Group #	2	
	K/A #	016 A2.01	
	Importance Rating	3.0	

K/A Statement

016 Non-Nuclear Instrumentation A2.01 Ability to (a) predict the impacts of the following malfunctions or operations on the NNIS; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: **Detector failure**

Proposed Question: RO 60 Rev: 0

Given:

- Power is 100%
- Charging Pump A is running
- VCT Level Transmitter CVC-ILT-0227 fails to 0%

The crew will be required to declare both ____(1)____ inoperable.

OP-901-113, Volume Control Makeup Tank Malfunction, will direct the crew to secure Charging Pump A while simultaneously closing ___(2)___.

	(1)	(2)
A.	boric acid gravity feed valves	CVC-101, Letdown Stop Valve
B.	boric acid gravity feed valves	CVC-103, Letdown Inside Containment Isolation
C.	boric acid makeup tanks	CVC-101, Letdown Stop Valve
D.	boric acid makeup tanks	CVC-103, Letdown Inside Containment Isolation

Proposed Answer: A

Explanation: (Optional)

A. **CORRECT**: CR-2018-2016 recognized if CVC-507 is opened, BAM-113A(B) boric acid gravity feed valves will not be able to perform their design function. This is because the head of the RWSP would seat downstream check valve BAM-115. W3 procedures were changed. W3 procedures were changed to reflect this. OP-901-113 will direct the crew to close CVC-101 while simultaneously securing the running Charging Pump. CVC-101 is the CVC isolation that would auto close at 470F.
B. Incorrect. Part 1 is correct. OP-901-113 will direct the crew to close CVC-101 while simultaneously securing the running Charging Pump. CVC-103 is also an air operated valve with a control switch on CP-4 and is located just downstream of CVC-101.
C. Incorrect. See explanation A. The boric acid makeup pumps can overcome check valve BAM-115. Therefore the BAMTs are not inoperable when CVC-507 is opened. Part 2 is correct.
D. Incorrect. See explanation A. The boric acid makeup pumps can overcome check valve, BAM-115. Therefore the BAMTs are not inoperable when CVC-507 is opened. OP-901-113 will direct the crew to close CVC-101 while simultaneously securing the running Charging Pump. CVC-103 is also an air operated valve with a control switch on CP-4 and is located just downstream of CVC-101.

Technical Reference(s): OP-901-113 Rev. 304, page 6
(Attach if not previously provided) SD-CVC Rev. 18, page 19
(including version/revision number) CR-WF3-2018-2016

Proposed references to be provided
to applicants during examination: None

Learning Objective: WLP-OPS-PPO10 EO-3 (As available)

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

Question History: Last NRC Exam None

Question Cognitive Level: Memory or Fundamental Knowledge
Comprehension or Analysis 3

10 CFR Part 55 Content: 55.41 6
55.43

Comments:

2018 NRC Exam
RO Written Exam Worksheet

Tier #	2
Group #	2
K/A #	035 K6.01
Importance Rating	3.2

K/A Statement

035 Steam Generator K6.01 Knowledge of the effect of a loss or malfunction on the following will have on the S/GS: **MSIVs**

Proposed Question: RO 61 Rev: 0

An inadvertent closure of MSIV #2 will result in a CPC initiated auxiliary reactor trip due to _____.

A. SG #1 low pressure

B. SG #2 high pressure

C. SG #1 T_{cold} higher than SG #2 T_{cold}

D. SG #2 T_{cold} higher than SG #1 T_{cold}

Proposed Answer: D

Explanation: (Optional)

A. Incorrect. Plausible due to RPS Low SG Pressure Trip of 666 psia, but ASGT is designed to occur before that.
B. Incorrect. Plausible because SG #2 pressure rises, but there is not High SG Pressure Trip function.
C. Incorrect. Could be chosen if candidate misjudges the effect of MSIV closure.
D. **CORRECT:** When MSIV #2 closes, SG #2 pressure will rise and T_{cold} will approach T_{hot}. SG #1 pressure will drop as load increases, lowering T_{cold}.

Technical Reference(s): SD-CPC Rev 17, page 37, Figure 18
(Attach if not previously provided)
(including version/revision number)

Proposed references to be provided
to applicants during examination: None

Learning Objective: WLP-OPS-CPC00 EO-4 (As available)

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

Question History: Last NRC Exam None

Question Cognitive Level: Memory or Fundamental Knowledge
Comprehension or Analysis 2

10 CFR Part 55 Content: 55.41 5
55.43

Comments:

2018 NRC Exam
RO Written Exam Worksheet

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #	2	
	Group #	1	
	K/A #	041 A1.02	
	Importance Rating	3.1	

K/A Statement

041 Steam Dump/Turbine Bypass Control A1.02 Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating the SDS controls including: **Steam pressure**

Proposed Question: RO 62 Rev: 0

Given:

- Plant is at 15% power following a mid-cycle outage startup
- Main Turbine is on line with Speed Loop in service
- Spurious operation of Steam Bypass Control System causes MS-319 A, Main Steam Bypass 1A, and MS-320 A, Main Steam Bypass 2A, to OPEN

Which of the following parameters will LOWER as a result of this condition?

A. Steam Generator pressure
B. Reactor power
C. Main Turbine Speed
D. Main Steam flow

Proposed Answer: A

Explanation: (Optional)

A. **CORRECT**: With plant above the point of adding heat, inadvertent opening of the Steam Bypass valves will cause Main Steam flow to rise. With the Main Turbine in service and only the Speed feedback loop in service, Main Turbine load will not change.
B. Incorrect. Power rises due to higher steam demand, which lowers T_{avg} to add + reactivity.
C. Incorrect. With Speed Loop in, turbine speed will not change. Plausible due to possibility that lower SBC valves are robbing flow from the turbine.
D. Incorrect. Steam flow will rise because the SBCVs failed open.

Technical Reference(s): WLP-OPS-TYR08 Rev 3
(Attach if not previously provided) Plant Data Book 2 Figure 1
(including version/revision number)

Proposed references to be provided
to applicants during examination: None

Learning Objective: WLP-OPS-TYR08 EO-11 (As available)

Question Source: Bank # RO 63
Modified Bank # (Note changes or attach parent)
New

Question History: Last NRC Exam 2012 NRC Exam

Question Cognitive Level: Memory or Fundamental Knowledge
Comprehension or Analysis 3

10 CFR Part 55 Content: 55.41 1
55.43

Comments:

2018 NRC Exam
RO Written Exam Worksheet

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #	2	
	Group #	2	
	K/A #	045 A3.05	
	Importance Rating	2.6	

K/A Statement

045 Main Turbine Generator A3.05 Ability to monitor automatic operation of the MT/G system, including: **Electrohydraulic control**

Proposed Question: RO 63 Rev: 0

Main Turbine Overspeed Protection Circuit (OPC) will close Governor and Intercept valves at _____ rpm.

A. 1751
B. 1854
C. 1998
D. 2007

Proposed Answer: B

Explanation: (Optional)

A. Incorrect. Main Turbine rated speed is 1800 rpm. Plausible because the applicant may determine that rated speed is 1700 rpm (speed at which the main turbine goes from throttle valve control to governor valve control). The OPC occurs at 103% which equals 1751 rpm.
B. **CORRECT:** Applicant must know that Main Turbine rated speed is 1800 rpm. The Overspeed Protection Circuit (OPC) will close Governor and Intercept valves at 103% of rated speed which equals 1854 rpm.
C. Incorrect. Main Turbine rated speed is 1800 rpm. The Mechanical overspeed trip is 111% of rated speed which equals 1998 rpm.
D. Incorrect. Main Turbine rated speed is 1800 rpm. The Electrical overspeed trip is 111.5% of rated speed which equals 2007 rpm.

Technical Reference(s): OP-005-007 page 58 Rev. 306
(Attach if not previously provided) SD-DEH Rev. 10, page 27
(including version/revision number)

Proposed references to be provided
to applicants during examination: None

Learning Objective: WLP-OPS-TUR00 EO-6 (As available)

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

Question History: Last NRC Exam None

Question Cognitive Level: Memory or Fundamental Knowledge
Comprehension or Analysis 2

10 CFR Part 55 Content: 55.41 4
55.43

Comments:

2018 NRC Exam
RO Written Exam Worksheet

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #	2	
	Group #	2	
	K/A #	075 K2.03	
	Importance Rating	2.6	

K/A Statement

075 Circulating Water K2.03 Knowledge of bus power supplies to the following:
Emergency/essential SWS pumps

Proposed Question: RO 64 Rev: 0

Auxiliary Component Cooling Water (ACCW) Pump A is powered from which bus?

A. 31A

B. 3A

C. 1A

D. 2A

Proposed Answer: B

Explanation: (Optional)

A. Incorrect. ACCW Pump A is powered from the 3A bus. Bus 31A is a 480 V safety bus fed from the 3A bus.
B. **CORRECT:** ACCW Pump A is powered from the 3A bus.
C. Incorrect: ACCW Pump A is powered from the 3A bus. 1A bus is a 6.9 Kv which carries large loads.
D. Incorrect: ACCW Pump A is powered from the 3A bus. 2A bus is a 4.16 Kv non-safety bus.

Technical Reference(s): OP-002-001 Rev 312, page 41
(Attach if not previously provided)
(including version/revision number)

Proposed references to be provided to applicants during examination: None

Learning Objective: WLP-OPS-CC00 EO-4 (As available)

Question Source: Bank # RO 64
Modified Bank # (Note changes or attach parent)
New

Question History: Last NRC Exam 2014 RO Exam

Question Cognitive Level: Memory or Fundamental Knowledge 2
Comprehension or Analysis

10 CFR Part 55 Content: 55.41 4
55.43

Comments:

2018 NRC Exam
RO Written Exam Worksheet

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #	2	
	Group #	2	
	K/A #	072 A4.02	
	Importance Rating	2.5	

K/A Statement

072 Area Radiation Monitoring (ARM) System A4.02 Ability to manually operate and/or monitor in the control room: **Major Components**

Proposed Question: RO 65 Rev: 0

Given

- Control Room Ventilation is in normal alignment
- All four Control Outside Air Intake Area Radiation Monitors ARM-IRE-0200.1, 200.2, 200.5 and 200.6 have received a HI-Hi alarm

Which of the following actions will occur as a result of this condition?

A. Control Room Toilet Exhaust Fans stop. BOTH Control Room Emergency Filtration Units start.

B. Control Room Toilet Exhaust Fans start. ONLY ONE Control Room Emergency Filtration Unit starts.

C. Control Room Toilet Exhaust Fans start. BOTH Control Room Emergency Filtration Units start.

D. Control Room Toilet Exhaust Fans stop. ONLY ONE Control Room Emergency Filtration Unit starts.

Proposed Answer: A

Explanation: (Optional)

A. **CORRECT**: Upon Hi-Hi radiation indicated on the CROAI Rad Monitors, both Toilet Exhaust fans will secure and both Control Room Emergency Filtration Units will start.
B. Incorrect. Upon Hi-Hi radiation indicated on the CROAI Rad Monitors, both Toilet Exhaust fans will secure and both Control Room Emergency Filtration Units will start. One CR EFU running is plausible because If one Control Room EFU was already running, the other unit would not start.
C. Incorrect. Upon Hi-Hi radiation indicated on the CROAI Rad Monitors, both Toilet Exhaust fans will secure and both Control Room Emergency Filtration Units will start.
D. Incorrect. Upon Hi-Hi radiation indicated on the CROAI Rad Monitors, both Toilet Exhaust fans will secure and both Control Room Emergency Filtration Units will start. One CR EFU running is plausible because If one Control Room EFU was already running, the other unit would not start.

Technical Reference(s): OP-901-401 page 4 Rev. 304
(Attach if not previously provided)
(including version/revision number)

Proposed references to be provided
to applicants during examination: None

Learning Objective: WLP-OPS-HVC00 EO-2 (As available)

Question Source: Bank # RO 60
Modified Bank # (Note changes or attach parent)
New

Question History: Last NRC Exam 2008 NRC Exam

Question Cognitive Level: Memory or Fundamental Knowledge 2
Comprehension or Analysis

10 CFR Part 55 Content: 55.41 7
55.43

Comments:

2018 NRC Exam
RO Written Exam Worksheet

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #	3	
	Group #	1	
	K/A #	2.1.1	
	Importance Rating	3.8	

K/A Statement

2.1.1 Knowledge of conduct of operations requirements.

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Proposed Question: RO 66 Rev: 0

Per EN-OP-115-08, Annunciator Response, which of the following could require referring to the Annunciator Response Procedure?

A. A “reflash” alarm with multiple inputs.

B. Repeat alarm that occurs during the shift.

C. Any “expected” alarm.

D. Annunciator caused by a local panel annunciator test.

Proposed Answer: A

Explanation: (Optional)

A. **CORRECT**: EN-OP-115-08 states that a "reflash" alarm with an unknown cause will require ARP review. ARP review is not required (alarm can be deemed "expected" if the initiator informs the control room that he is bringing in the alarm and can verify that no other alarms exist on the local panel.
B. Incorrect. EN-OP-115-08 states that referring to the ARP is not required for a repeat alarm that occurs during the shift.
C. Incorrect. EN-OP-115-08 states that referring to the ARP is not required for an "expected" alarm.
D. Incorrect. EN-OP-115-08 states that referring to the ARP is not required for an annunciator caused by a local panel annunciator test.

Technical Reference(s): EN-OP-115-08 Rev. 4, pages 5 and 7
(Attach if not previously provided)
(including version/revision number)

Proposed references to be provided
to applicants during examination: None

Learning Objective: WLP-OPS-EXP00 EO-11 (As available)

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

Question History: Last NRC Exam None

Question Cognitive Level: Memory or Fundamental Knowledge 2
Comprehension or Analysis

10 CFR Part 55 Content: 55.41 10
55.43

Comments:

2018 NRC Exam
RO Written Exam Worksheet

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #	3	
	Group #	1	
	K/A #	2.1.37	
	Importance Rating	4.3	

K/A Statement

2.1.37 Knowledge of procedures, guidelines, or limitations associated with reactivity management.

Proposed Question: RO 67 Rev: 0

Given:

- The crew is performing actions in OP-010-003, Plant Startup
- The CRS has directed the ATC to perform a VCT Makeup using the Dilute Makeup Mode per OP-002-005, Chemical and Volume Control

Per OI-042-000, Watch Station Process, a ____(1)____ should be performed prior to and immediately following the PMU addition and the evolution should be cross-checked by _____(2)_____ .

	(1)	(2)
A.	shift update	verifying the pre-power dependent insertion limit annunciator is clear
B.	shift update	comparing what was placed in the batch counter to the totalizer reading
C.	notification to the RAB watch	comparing what was placed in the batch counter to the totalizer reading
D.	notification to the RAB watch	verifying the pre-power dependent insertion limit annunciator is clear

Proposed Answer: B

Explanation: (Optional)

A. Incorrect. Part 1 is correct. A cross-check of the reactivity manipulation is performed by comparing what was placed in the batch counter to the totalizer reading. The pre-power dependent insertion limit annunciator coming in will be a reason to stop diluting as indicated as a Caution in OP-002-005 section 6.9 (VCT makeup using the Dilute Makeup Mode). But it is not a method used for crosschecking as identified in OI-042-000.
B. **CORRECT:** Per OI-042-000, section 5.3.2, a shift update should be performed prior to and immediately following any reactivity manipulation and a cross-check of the reactivity manipulation is performed by comparing what was placed in the batch counter to the totalizer reading.
C. Incorrect. Notification to the RAB watch is not required. Plausible because for large loads, the affected watchstander would be notified prior to and after the equipment is operated. Part 2 is correct.
D. Incorrect. Notification to the RAB watch is not required. Plausible because for large loads, the affected watchstander would be notified prior to and after the equipment is operated. The pre-power dependent insertion limit annunciator coming in will be a reason to stop diluting as indicated as a Caution in OP-002-005 section 6.9 (VCT makeup using the Dilute Makeup Mode). But it is not a method used for crosschecking as identified in OI-042-000

Technical Reference(s): OI-042-000 page 61 Rev. 58
(Attach if not previously provided) OP-002-005 Rev 62, page 42
(including version/revision number)

Proposed references to be provided
to applicants during examination: None

Learning Objective: WLP-OPS-PPA00 obj. 3 (As available)

Question Source: Bank # RO 69
Modified Bank # (Note changes or attach parent)
New

Question History: Last NRC Exam 2014 NRC Exam

Question Cognitive Level: Memory or Fundamental Knowledge 2
Comprehension or Analysis

10 CFR Part 55 Content: 55.41 10
55.43

Comments:

2018 NRC Exam
RO Written Exam Worksheet

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #	3	
	Group #	1	
	K/A #	2.1.4	
	Importance Rating	3.3	

K/A Statement

2.1.4 Knowledge of individual licensed operator responsibilities related to shift staffing, such as medical requirements, “no-solo” operation, maintenance of active license status, 10CFR55, etc.

Proposed Question: RO 68 Rev: 0

A licensee has NOT stood the required number of proficiency watches prior to the end of the calendar quarter. In addition to conducting a plant tour, which one of the following correctly describes the 10CFR55 provision for the licensee to perform licensed duties during the next quarter?

A. Active status may be continued provided the remaining proficiency watches are stood during the first month of the following calendar quarter.

B. Active status may be continued provided 12 hours of under instruction watches are completed within the first month of the following calendar quarter.

C. The license must become inactive. As a minimum, 40 hours of under instruction watches shall be stood to return the license to active status.

D. The license must become inactive. As a minimum, five 12-hour under instruction watches shall be stood to return the license to active status.

Proposed Answer: C

Explanation: (Optional)

A. Incorrect. The license becomes inactive if proficiency watches are not stood. OI-024-000 states that the 40 hours under instruction should be started and completed within a 30 day period.
B. Incorrect. Twelve hours of under instruction is the required number of hours need for an SRO to upgrade to active fuel handling supervisor status.
C. **CORRECT:** Failure to complete the required number of proficiency watches will result in inactivation of the license, which will require 40 hours under instruction to reactivate.
D. Incorrect. 40 hours of under instruction must be performed to return an inactive license to active status.

Technical Reference(s): OI-024-000 Rev 314 pages 8, 9, 14
(Attach if not previously provided)
(including version/revision number)

Proposed references to be provided
to applicants during examination: None

Learning Objective: WLP-OPS-PPA00 EO-2 (As available)

Question Source: Bank # RO 66
Modified Bank #
New

Question History: Last NRC Exam 2014 NRC Exam

Question Cognitive Level: Memory or Fundamental Knowledge 2
Comprehension or Analysis

10 CFR Part 55 Content: 55.41 10
55.43

Comments:

2018 NRC Exam
RO Written Exam Worksheet

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #	3	
	Group #	2	
	K/A #	2.2.14	
	Importance Rating	3.9	

K/A Statement

2.2.14 Knowledge of the process for controlling equipment configuration or status.

Proposed Question: RO 69 Rev: 0

A standby valve line-up is being performed following a refueling outage. Per EN-OP-115-05, Operation of Components, which of the following is the minimum requirement for checking the position of a locked throttle valve?

A. Unlock and open the valve counting the number of turns. Re-close to the required number of turns. Re-install the locking device.

B. Unlock and close the valve counting the number of turns. Re-open to the required number of turns. Re-install the locking device.

C. Check the locking device is installed properly and perform a visual inspection that the valve is throttled.

D. Check the locking device is installed properly and then verify no valve movement by attempting to rotate the valve hand wheel to the open and closed direction.

Proposed Answer: C

Explanation: (Optional)

A. Incorrect. To check the position of a locked throttle valve that has not been manipulated (in this case, it is a standby valve lineup), the operator shall check that the locking device is properly installed. In addition, a determination that the valve is indeed throttled and not closed shall be made by visual inspection. (step 5.2.5.6.2)
B. Incorrect. To check the position of a locked throttle valve that has not been manipulated (in this case, it is a standby valve lineup), the operator shall check that the locking device is properly installed. In addition, a determination that the valve is indeed throttled and not closed shall be made by visual inspection. (step 5.2.5.6.2)
C. **CORRECT:** Step 5.2.5.6.1 states that unlocking a valve requires verification and documentation of the valve operation. To check the position of a locked throttle valve that has not been manipulated (in this case, it is a standby valve lineup), the operator shall check that the locking device is properly installed. In addition, a determination that the valve is indeed throttled and not closed shall be made by visual inspection. (step 5.2.5.6.2).
D. Incorrect. A visual inspection must also be performed when checking a locked throttled valve in accordance with EN-OP-115. This answer could be correct it the applicant believes that verification of no valve movement is required.

Technical Reference(s): EN-OP-115-05 Rev. 0, page 10
(Attach if not previously provided)
(including version/revision number)

Proposed references to be provided
to applicants during examination: None

Learning Objective: WLP-OPS-EXP00 EO-6 (As available)

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

Question History: Last NRC Exam None

Question Cognitive Level: Memory or Fundamental Knowledge 2
Comprehension or Analysis

10 CFR Part 55 Content: 55.41 10
55.43

Comments:

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #	3	
	Group #	2	
	K/A #	2.2.38	
	Importance Rating	3.6	

K/A Statement

2.2.38 Knowledge of conditions and limitations in the facility license.

Proposed Question: RO 70 Rev: 0

Per the Waterford 3 Operating License, Entergy Operations Inc. is authorized to operate the Waterford 3 reactor core at power levels not to exceed:

A. 3441 MW_t

B. 3461 MW_t

C. 3716 MW_t

D. 3739 MW_t

Proposed Answer: C

Explanation: (Optional)

A. Incorrect. This value is equal to the intermediate power uprate value
B. Incorrect. This value is equal to the intermediate power uprate value + the old estimated RCP heat contribution.
C. **CORRECT:** This is the value listed in the current Operating License post power uprate.
D. Incorrect. This is the value listed in the current Operating License post power uprate + the most recent evaluation of RCP heat contribution

Technical Reference(s): W3 Operating License, Page 4, Amdmnt 251
(Attach if not previously provided) TS Definition 1.24, Amdmnt 199
(including version/revision number)

Proposed references to be provided
to applicants during examination: None

Learning Objective: WLP-OPS-TS00 EO-2 (As available)

Question Source: Bank # RO 69
Modified Bank # (Note changes or attach parent)
New

Question History: Last NRC Exam 2010 NRC Exam

Question Cognitive Level: Memory or Fundamental Knowledge 2
Comprehension or Analysis

10 CFR Part 55 Content: 55.41 2
55.43

Comments:

2018 NRC Exam
RO Written Exam Worksheet

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #	3	
	Group #	3	
	K/A #	2.3.4	
	Importance Rating	3.2	

K/A Statement

2.3.4 Knowledge of radiation exposure limits under normal or emergency conditions.

Proposed Question: RO 71 Rev: 0

Emergency Team members chosen to perform Corrective Actions for accident-mitigating activities shall not exceed maximum exposure limit of _____(1)_____ rem TEDE.

Emergency Exposure Limits for _____(2)_____ may be exceeded by volunteers fully aware of risks involved.

	(1)	(2)
A.	10	lifesaving activities ONLY
B.	10	life saving AND accident mitigating activities
C.	25	lifesaving activities ONLY
D.	25	life saving AND accident mitigating activities

Proposed Answer: A

Explanation: (Optional)

A. **CORRECT**: Per EP-002-030 step 5.2.1, Emergency Team members chosen to perform Corrective Actions for accident-mitigating activities shall not exceed maximum exposure limit of 10 rem TEDE. Step 5.2.3 states that limits may be exceeded for Life Saving activities only.
B. Incorrect. Part 1 is correct. Step 5.2.3 states that limits may be exceeded for Life Saving activities only.
C. Incorrect. Per EP-002-030 step 5.2.1, Emergency Team members chosen to perform Corrective Actions for accident-mitigating activities shall not exceed maximum exposure limit of 10 rem TEDE. The limit for life saving activities is 25 rem. Part 2 is correct.
D. Incorrect. Per EP-002-030 step 5.2.1, Emergency Team members chosen to perform Corrective Actions for accident-mitigating activities shall not exceed maximum exposure limit of 10 rem TEDE. The limit for life saving activities is 25 rem. Step 5.2.3 states that limits may be exceeded for Life Saving activities only.

Technical Reference(s): EP-002-030 Rev.10, page 3
(Attach if not previously provided)
(including version/revision number)

Proposed references to be provided to applicants during examination: None

Learning Objective: WLP-OPS-EP02 EO-8 (As available)

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

Question History: Last NRC Exam None

Question Cognitive Level: Memory or Fundamental Knowledge 2
Comprehension or Analysis

10 CFR Part 55 Content: 55.41 12
55.43

Comments:

2018 NRC Exam
RO Written Exam Worksheet

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #	3	
	Group #	3	
	K/A #	2.3.12	
	Importance Rating	3.2	

K/A Statement

2.3.12 Knowledge of radiological safety principles pertaining to licensed operator duties, such as containment entry requirements, fuel handling responsibilities, access to locked high-radiation areas, aligning filters, etc.

Proposed Question: RO 72 Rev: 0

Given:

- The plant is at 10% Power
- A containment entry is desired

Which of the following areas inside containment are forbidden from being entered?

A. Pressurizer Cubicle below +21' elevation

B. +46' elevation at the Quench Tank

C. Main Steam Line Crossovers on the +46' elevation

D. RCS Cold Leg 1A penetration through the 'D' Ring Wall

Proposed Answer: D

Explanation: (Optional)

A. Incorrect. This is an area known to have high radiation levels, but is not listed in HP-001-213 as being forbidden in MODE 1 (step 5.2.2). Also, not an area listed as needing RP Manager approval to enter (step 5.2.1).
B. Incorrect. This area is in close proximity to the Reactor Cavity but is a sufficient distance away that it is not forbidden (step 5.2.2), or need RP Manager approval to enter (step 5.2.1).
C. Incorrect. This is an exception to the requirement for obtaining RP Manager approval for going above the actual +46' elevation in Containment (step 5.2.1). It is not listed as forbidden (step 5.2.2).
D. **CORRECT:** Per HP-001-213, Step 5.2.2 and Attachment 7.1, this is a forbidden area in MODE 1. (> 5% RTP).

Technical Reference(s): HP-001-213 Rev. 305, page 7
(Attach if not previously provided)
(including version/revision number)

Proposed references to be provided
to applicants during examination: None

Learning Objective: WLP-OPS-PPA00 EO-3 (As available)

Question Source: Bank # RO 72
Modified Bank # (Note changes or attach parent)
New

Question History: Last NRC Exam 2017 NRC Exam

Question Cognitive Level: Memory or Fundamental Knowledge 2
Comprehension or Analysis

10 CFR Part 55 Content: 55.41 9,12
55.43

Comments:

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #	3	
	Group #	4	
	K/A #	2.4.9	
	Importance Rating	3.8	

K/A Statement

2.4.9 Knowledge of low power/shutdown implications in accident (e.g., loss of coolant accident or loss of residual heat removal) mitigation strategies.

Proposed Question: RO 73 Rev: 0

Given:

- Crew is performing the actions of OP-902-002, LOCA Recovery Procedure
- Pressurizer level indicates 10% and rising
- Steam Generator #1 level is 51% NR and rising
- Steam Generator #2 level is 50% NR and rising
- Both Steam Generator levels are being controlled with EFW in Auto
- CET temperature is 430°F
- RCS pressure is 524 psia
- QSPDS Reactor Vessel plenum level indicates 100%
- Harsh environment exists in containment

Which ONE of the following HPSI Throttle Criteria is NOT met?

A. Pressurizer level

B. Reactor Vessel level

C. Steam Generator availability

D. RCS Subcooling

Proposed Answer: A

Explanation: (Optional)

A. **CORRECT:** Question is TIER 3 because HPSI Throttle Criteria is the same for LOCA (902-002), ESD (902-004) and the FRP (902-008). Pressurizer level must be greater than 7% to meet HPSI throttle criteria. However, Harsh Environment conditions exist in containment if containment temperature >200°F. Therefore, minimum pressurizer level is 23% and not meeting HPSI throttle criteria. The guidance for harsh conditions in containment is located in the administrative procedure OI-038-000, EOP Operations Expectations/Guidance, procedure and must be applied to this question
B. Incorrect: Vessel level is satisfied when level 5 indicates not voided or plenum level is greater than 80%.
C. Incorrect. Steam Generators are considered available—even though they are not at the required levels—because they are rising. This meets the part of the criteria stating, "or restored to".
D. Incorrect. The RCS is 42°F subcooled based on CET temperature and pressurizer pressure, which meets the 28°F subcooled requirement.

Technical Reference(s): OI-038-000 Rev. 16, page 6
(Attach if not previously provided) OP-902-002 Rev. 20, step 23
(including version/revision number) OP-902-004 Rev. 16, step 20
OP-902-008 Rev. 27, page 47

Proposed references to be provided to applicants during examination: None

Learning Objective: WLP-OPS-PPE01 EO-4 (As available)
WLP-OPS-PPE02 EO-19

Question Source: Bank # RO 74
Modified Bank # _____ (Note changes or attach parent)
New _____

Question History: Last NRC Exam 2014 NRC Exam

Question Cognitive Level: Memory or Fundamental Knowledge _____
Comprehension or Analysis 2

10 CFR Part 55 Content: 55.41 10
55.43 _____

Comments:

2018 NRC Exam
RO Written Exam Worksheet

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #	3	
	Group #	4	
	K/A #	2.4.14	
	Importance Rating	3.8	

K/A Statement

2.4.14 Knowledge of general guidelines for EOP usage.

Proposed Question: RO 74 Rev: 0

Per OI-038-000, Emergency Operating Procedures Operations Expectations/Guidance, all available charging pumps running is defined as ____(1)____ running if NO SIAS is initiated and _____(2)_____ running if SIAS is initiated.

	(1)	(2)
A.	two	two
B.	two	three
C.	three	three
D.	three	two

Proposed Answer: D

Explanation: (Optional)

A. Incorrect. Per OI-038-000, step 5.4.72, if NO SIAS is initiated all available charging pumps running is defined as three charging pumps running and with a SIAS initiated all available charging pumps running is defined as two charging pumps running.
B. Incorrect. Per OI-038-000, step 5.4.72, if NO SIAS is initiated all available charging pumps running is defined as three charging pumps running and with a SIAS initiated all available charging pumps running is defined as two charging pumps running.
C. Incorrect. Per OI-038-000, step 5.4.72, if NO SIAS is initiated all available charging pumps running is defined as three charging pumps running and with a SIAS initiated all available charging pumps running is defined as two charging pumps running.
D. **CORRECT**: Per OI-038-000, step 5.4.72, if NO SIAS is initiated all available charging pumps running is defined as three charging pumps running and with a SIAS initiated all available charging pumps running is defined as two charging pumps running.

Technical Reference(s): OI-038-000 Rev. 16, step 5.4.72
(Attach if not previously provided)
(including version/revision number)

Proposed references to be provided to applicants during examination: None

Learning Objective: WLP-OPS-PPE01 EO-4 (As available)

Question Source: Bank # RO 75
Modified Bank # (Note changes or attach parent)
New

Question History: Last NRC Exam 2012 RO Exam

Question Cognitive Level: Memory or Fundamental Knowledge 2
Comprehension or Analysis

10 CFR Part 55 Content: 55.41 10
55.43

Comments:

2018 NRC Exam
RO Written Exam Worksheet

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #	3	
	Group #	4	
	K/A #	2.4.32	
	Importance Rating	3.6	

K/A Statement

2.4.32 Knowledge of operator response to loss of all annunciators.

Proposed Question: RO 75 Rev: 0

Given:

- The following annunciators are received:
  - Annunciator A-F Power Trouble
  - Annunciator G-N Power Trouble
- BOP identifies that Annunciator Panels A-N are lost

A list of the annunciators that are required by Technical Specifications are found in _____(1)_____ procedure(s).

To verify Cabinet SA and Cabinet SB annunciator Panels, the RO will test annunciators at ___(2)____ .

	(1)	(2)
A.	the Annunciator Response	CP-18
B.	OP-100-014, Technical Specification and Technical Requirements	CP-18
C.	the Annunciator Response	CP-8
D.	OP-100-014, Technical Specification and Technical Requirements	CP-8

Proposed Answer: B

Explanation: (Optional)

A. Incorrect. The ARP for Cabinets A-F and G-N refer the user to the Off Normal. The Off Normal will refer the user to OP-100-014 for a list of what annunciators are TS required. Part 2 is correct.
B. **CORRECT:** A list of the annunciators that are required by Technical Specifications are found in OP-100-014, Technical Specification and Technical Requirements, Att. 6.11. Cabinet SA and Cabinet SB annunciator Panels are found on CP-18 as shown in OP-901-505 page 6.
C. Incorrect. The ARP for Cabinets A-F and G-N refer the user to the Off Normal. The Off Normal will refer the user to OP-100-014 for a list of what annunciators are TS required. CP-8 (Annunciator panels M and N) has ESFAS equipment annunciators on it but are not safety related.
D. Incorrect. Part 1 is correct. CP-8 (Annunciator panels M and N) has ESFAS equipment annunciators on it but are not safety related.

Technical Reference(s): OP-500-012 M-20 Rev. 25 and N-20 Rev. 26
(Attach if not previously provided) OP-100-014 page 86 Rev.345
(including version/revision number) OP-901-505 pp 6 & 7 Rev. 4

Proposed references to be provided
to applicants during examination: None

Learning Objective: WLP-OPS-PPO50 EO-3 (As available)

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

Question History: Last NRC Exam None

Question Cognitive Level: Memory or Fundamental Knowledge 2
Comprehension or Analysis

10 CFR Part 55 Content: 55.41 10
55.43

Comments:

2018 NRC Exam
SRO Written Exam Worksheet

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #		1
	Group #		1
	K/A #	015/017	AA2.01
	Importance Rating		3.0

K/A Statement

015/017 Reactor Coolant Pump Malfunction **AA2.01** - Ability to determine and interpret the following as they apply to the Reactor Pump Malfunction (Loss of RC Flow) :
Cause of RCP failure

Proposed Question: SRO 76 Rev: 0

Given:

- Plant is at 100% power when multiple annunciators alarm for RCP 1B
- Plant experiences an automatic reactor trip
- ATC reports that the red start light is lit on RCP1B control switch but abnormally low amps for RCP 1B are indicated on CP-2

CRS will determine that RCP 1B has experienced a ___(1)___ shaft event. The RPS feature designed to protect the core from this event is the _____(2)_____ trip.

	(1)	(2)
A.	seized	CPC LPD and DNBR
B.	seized	PPS Reactor Coolant Flow- Low
C.	sheared	CPC LPD and DNBR
D.	sheared	PPS Reactor Coolant Flow- Low

Proposed Answer: D

Explanation: (Optional)

A. Incorrect. Torque on RCPs rise during a seized shaft event, therefore amps would be higher. Torque on RCPs drop during a sheared shaft event, therefore amps will be low. Reactor Coolant flow is an input to CPC trips LPD and DNBR via RCP speed sensors. The speed sensors are not affected during a sheared shaft which is the reason for the PPS RCS Low flow trip.
B. Incorrect. Torque on RCPs rise during a seized shaft event, therefore amps would be higher. Part 2 is correct.
C. Incorrect. Part 1 is correct. Torque on RCPs drop during a sheared shaft event, therefore amps will be low. Reactor Coolant flow is an input to CPC trips LPD and DNBR via RCP speed sensors. Speed sensors are not affected during a sheared shaft which is the reason for PPS RCS Low flow trip.
D. **CORRECT**: Torque on RCPs drop during a sheared shaft event, therefore amps will be low. TS basis for Reactor Coolant Flow-Low states that this trip provides protection against a reactor coolant pump sheared shaft event. Trip is required because RCP speed sensors provide input to CPCs. Speed sensors are not affected during a sheared shaft. This question is SRO because the information for protection of the core on a sheared shaft event can only be found in TS basis.

Technical Reference(s): WLP-OPS-RCP00 Rev 25, slide 126
(Attach if not previously provided) TS 2.0 basis pages B 2.4-2.7
(including version/revision number)

Proposed references to be provided
to applicants during examination: None

Learning Objective: WLP-OPS-RCP00 EO-7 (As available)

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

Question History: Last NRC Exam None

Question Cognitive Level: Memory or Fundamental Knowledge
Comprehension or Analysis 2

10 CFR Part 55 Content: 55.41
55.43 2

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #		1
	Group #		1
	K/A #	000027 2.2.44	
	Importance Rating		4.4

K/A Statement

000027 Pressurizer Pressure Control System Malfunction **2.2.44** - Ability to interpret control room indications to verify the status and operation of a system, and understand how operator actions and directives affect plant and system conditions.

Proposed Question: SRO 77 Rev: 1

Given:

- Plant at 100% power
- ATC reports PZR spray valves have opened
- PZR pressure is 2200 psia and lowering
- PZR pressure controller output at 100%
- PZR spray valve controller output at 100%
- When PZR spray valve controller was placed in manual control and output was lowered to minimum, <u>one</u> PZR spray valve remained open.
- The reactor was manually tripped

In accordance with OP-901-120, Pressurizer Pressure Control Malfunction, subsection ____(1)____ , the crew will stabilize RCS pressure by ___(2)___.

	(1)	(2)
A.	E2, Pressurizer Pressure Controller Malfunction	securing necessary RCPs
B.	E2, Pressurizer Pressure Controller Malfunction	taking manual control of pressurizer pressure controller
C.	E3, Pressurizer Spray Valve Malfunction	taking manual control of pressurizer pressure controller
D.	E3, Pressurizer Spray Valve Malfunction	securing necessary RCPs

Proposed Answer: D

Explanation: (Optional)

A. Incorrect. Subsection E2, Pressurizer Pressure Controller Malfunction, is plausible because the Pressurizer Pressure Controller failed high. But, this section will not give CRS guidance to trip the Reactor and secure RCPs to control pressure. Part 2 is correct.
B. Incorrect. Subsection E2, Pressurizer Pressure Controller Malfunction, is plausible because the Pressurizer Pressure Controller is failed high Pressurizer pressure controller has failed high, but manually adjusting it will have no affect because it provides the input to the spray controller which had no effect on one of the spray valves.
C. Incorrect. Part 1 is correct. Pressurizer pressure controller has failed high, but manually adjusting it will have no affect because it provides the input to spray controller which had no effect on one of the spray valves.
D. **CORRECT:** In given conditions, Pressurizer pressure controller failed high causing both Pressurizer spray valves to open. Attempt made to close spray valves by lowering output of spray valve controller IAW OP-901-120 section E0, only one spray valve closed. CRS will recognize that one spray valve is stuck open and will trip the Reactor (actions above are time critical and done before OP-901-120 is referred to) and secure RCPs to stop pressure drop. This guidance for securing RCPs can only be found in subsection E3, Pressurizer Spray Valve Malfunction.

Technical Reference(s): OP-901-120 Rev. 302, pages 6, 7, 9, and 10
(Attach if not previously provided) SD-PLC Rev. 11, pages 27-32
(including version/revision number) EN-OP-115 Rev. 24, pages 25- 26

Proposed references to be provided
to applicants during examination: None

Learning Objective: WLP-OPS-PPO10 obj. 3 (As available)

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

Question History: Last NRC Exam None

Question Cognitive Level: Memory or Fundamental Knowledge
Comprehension or Analysis 3

10 CFR Part 55 Content: 55.41
55.43 5

Comments: “Free review” question w/ comments resolved.

2018 NRC Exam
SRO Written Exam Worksheet

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #		1
	Group #		1
	K/A #	00054 (CE E06) EA2.2	
	Importance Rating		4.2

K/A Statement

000054 (CE E06) Loss of Main Feedwater **EA2.2** - Ability to determine and interpret the following as they apply to the (Loss of Feedwater): **Adherence to appropriate procedures and operation within the limitations in the facility's license and amendments.**

Proposed Question: SRO 78 Rev: 1

Given:

- Crew has entered OP-902-006, Loss of Feedwater Recovery
- Subsequently, CRS determined the only available source of feedwater to Steam Generators is Condensate Pump A

Crew ___(1)____ Recovery and implement Attachment 32-B, Aligning Condensate to Feed the Steam Generators.

During depressurization of selected Steam Generator, crew is required to control pressurizer pressure to stay within the ____(2)____ .

	(1)	(2)
A.	will remain in OP-902-006, Loss of Feedwater	design limits for maximum steam generator differential pressure.
B.	will remain in OP-902-006, Loss of Feedwater	Reactor Coolant Pump operating curves
C.	must go to OP-902-008, Functional	design limits for maximum steam generator differential pressure
D.	must go to OP-902-008, Functional	Reactor Coolant Pump operating curves

Proposed Answer: A

Explanation: (Optional)

A. **CORRECT:** Part 1**.** A contingency action exists in OP-902-006 (step 9-B) that will refer the user to Attachment 32-B, Aligning Condensate to feed the Steam Generators if a MFW pump or AFW pump is unavailable. Attachment contains guidance for lowering SG and RCS pressure therefore entry into OP-902-008 is not required as it was in the previous revision of the EOPs. Part 2. Step 8g of this attachment provides the limit of 1600 psid between RCS and SG pressure.
B. Incorrect. Part 1 is correct. Maintaining RCPs within their operating curves is always required if RCPs are running but OP-902-006 requires securing the RCPs (step 6) soon after entry.
C. Incorrect. Plausible because prior to the latest major revision to the EOPs, guidance for lowering S/G pressure to feed with condensate was located in OP-902-008. Therefore, crew would exit the optimal and enter 902-008 to access attachment for feeding with Condensate. This is no longer required. Part 2 is correct.
D. Incorrect. Plausible because prior to the latest major revision to EOPs, guidance for lowering S/G pressure to feed with condensate was located in OP-902-008. Therefore, crew would exit the optimal and enter 902-008 to access the attachment for feeding with Condensate. This is no longer required. Maintaining RCPs within their operating curves is always required if RCPs are running but OP-902-006 requires securing RCPs (step 6) soon after entry.

Technical Reference(s): OP-902-006 Rev. 18, pages 6, 12
(Attach if not previously provided) OP-902-009 Rev. 317, Att 32-B page s 175-177
(including version/revision number) EC-S98-001 pp 184 & 185 Rev. 6, TS 3.4.4 basis

Proposed references to be provided
to applicants during examination: None

Learning Objective: WLP-OPS-PPE06 EO-9 (As available)

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

Question History: Last NRC Exam None

Question Cognitive Level: Memory or Fundamental Knowledge
Comprehension or Analysis 3

10 CFR Part 55 Content: 55.41
55.43 5

Comments: “Free review” question w/ comments resolved.

2018 NRC Exam
SRO Written Exam Worksheet

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #		1
	Group #		1
	K/A #	00056 2.4.18	
	Importance Rating		4.0

K/A Statement

000056 Loss of Offsite Power **2.4.18** - Knowledge of the specific bases for EOPs.

Proposed Question: SRO 79 Rev: 1

Given:

- Loss of offsite power has occurred
- Both Emergency Diesel Generators (EDGs) are supplying their respective busses
- AB bus is being supplied from the A side
- Component Cooling Water Pump B tripped on overcurrent after EDG B sequencer had timed out
- Crew is Verifying Proper CCW Operation in accordance with OP-902-003, Loss of Offsite Power/Loss of Forced Circulation Recovery Procedure

CRS will direct the BOP to ____(1)____. To restart Essential Chiller B, crew will be required to ____(2)____.

	(1)	(2)
A.	align CCW Pump AB to replace CCW Pump B	reset the chiller locally and then verify chiller starts from CP-18
B.	align CCW Pump AB to replace CCW Pump B	verify chiller starts from CP-18 only
C.	split CCW headers using Appendix 35, Single CCW Pump operation	reset the chiller locally and then verify chiller starts from CP-18
D.	split CCW headers using Appendix 35, Single CCW Pump operation	verify chiller starts from CP-18 only

Proposed Answer: B

Explanation: (Optional)

A. Incorrect. Part 1 is correct. Part 2. The basis for this step in OP-902-003 states that the location of the chillers may be inaccessible and could be a drain on NAO manpower if local chiller operation is required. In this case, chiller trips on low CCW flow. Therefore, the local reset pushbutton is not required to be depressed like other trips associated with the chiller.
B. **CORRECT:** OP-902-003 step 7.a.2 provides guidance if only one train of CCW is faulted and the AB bus is not aligned to the side with the faulted CCW pump. Crew will align CCW Pump AB to faulted side after EDGB sequencer has timed out. This step is prioritized before the step for splitting CCW headers. Thus step 7b would be N/A once step 7.a.2 is completed. Part 2. Essential Chiller B trips on low CCW flow, this trip does not require a local reset like other chiller trips. Reasons for not wanting local operation of chiller is provided in basis.
C. Incorrect. Splitting CCW headers is located in this step and would be the correct thing to do if starting CCW pump AB was not started in a previous step. The basis for this step in OP-902-003 states that aligning Essential Chiller AB can be an option but will require NAO support and access to the +46 RAB HVAC room. Essential Chiller B will require a restart but it will trip on low CCW flow. Resetting this trip locally is not required.
D. Incorrect. Splitting CCW headers is located in this step and would be the correct thing to do if starting CCW pump AB was not listed first. Part 2 is correct.

Technical Reference(s): OP-902-003 Rev. 10, step 7
(Attach if not previously provided) TG-OP-902-003 Rev. 306, step 7
(including version/revision number) SD-CHW Rev. 10, pages 17 and 18

Proposed references to be provided
to applicants during examination: None

Learning Objective: WLP-OPS-PPE05 EO-6 (As available)

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

Question History: Last NRC Exam None

Question Cognitive Level: Memory or Fundamental Knowledge
Comprehension or Analysis 2

10 CFR Part 55 Content: 55.41
55.43 5

Comments: “Free review” question w/ comments resolved.

2018 NRC Exam
SRO Written Exam Worksheet

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #		1
	Group #		1
	K/A #	000011 EA2.01	
	Importance Rating		4.7

K/A Statement

000011 Large Break LOCA **EA2.01** - Ability to determine and interpret the following as they apply to the Large Break LOCA: **Actions to be taken based on RCS temperature and pressure-saturated and superheated**

Proposed Question: SRO 80 Rev: 0

Given:

- A large break LOCA has occurred and crew has diagnosed into OP-902-002, Loss of Coolant Accident Recovery
- SIAS, CIAS, MSIS and CSAS have actuated
- Within the first hour of the event, STA informs CRS that superheat conditions and core uncovery has been indicated for the previous five minutes; therefore, safety function for RCS Inventory Control is not being met

Based on these conditions, CRS _____.

A. can remain in OP-902-002 if HPSI flow is within HPSI flow curves only

B. can remain in OP-902-002 if both HPSI and LPSI are within their respective flow curves

C. must exit to OP-902-008, Functional Recovery Procedure, due to CET subcool margin indicating superheat conditions

D. must exit to OP-902-008, Functional Recovery Procedure, due to RVLMS Plenum level less than 20%

Proposed Answer: B

Explanation: (Optional)

A. Incorrect. Procedure decision is correct. Only the HPSI flow curves would have to be met if an RAS had occurred as indicated in the RCS inventory control safety function. An RAS has not yet occurred in the given conditions.
B. **CORRECT:** The note preceding RCS Inventory Control Safety Function states that "Core Uncovery and Superheated conditions may be expected for up to 45 minutes within the first 75 minutes of some LOCA events. If the SI flow is in accordance with the SI flow curves exiting this procedure to the OP-902-008, Functional Recovery Procedure, will not provide any additional guidance to restore inventory control".
C. Incorrect. It is the practice to exit to OP-902-008 if the safety function status checklist is not being met in an Optimal Recovery Procedure. The RCS Inventory Safety Function for LOCA procedure provides a note to crew that OP-902-008 will not provide and additional guidance. Subcool Margin would be required if there was no SIAS (RCS Inventory Control, condition 1).
D. Incorrect. It is the practice to exit to OP-902-008 if the safety function status checklist is not being met in an Optimal Recovery Procedure. The RCS Inventory Safety Function for LOCA procedure provides a note to crew that OP-902-008 will not provide and additional guidance. RVLMS level is part of the RCS inventory control safety function and is not being met, but in this instance, exiting to OP-902-008 is not required.

Technical Reference(s): OP-902-002 Rev. 20, pages 71 and 72
(Attach if not previously provided)
(including version/revision number)

Proposed references to be provided
to applicants during examination: None

Learning Objective: WLP-OPS-PPE02 EO-16 (As available)

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

Question History: Last NRC Exam None

Question Cognitive Level: Memory or Fundamental Knowledge
Comprehension or Analysis 2

10 CFR Part 55 Content: 55.41
55.43 5

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #		1
	Group #		1
	K/A #	000077 2.4.30	
	Importance Rating		4.1

K/A Statement

000077 Generator Voltage and Electric Grid Disturbances **2.4.30** - Knowledge of events related to system operation / status that must be reported to internal organizations or external agencies, such as the State, the NRC, or the transmission system operator.

Proposed Question: SRO 81 Rev: 1

Given:

- Generator load is currently 1230 MWe and 50 MVARs Out
- 230KV BUS voltage is 231 KV
- Frequency is 60 Hz

Pine Bluff Systems Operation Center (SOC) requests that MVARs be raised to 350 MVARs and Real Load lowered to 1200 MW in order to maintain grid stability. The crew will implement OP-901-314, Degraded Grid Conditions, section _____(1)_____.

The Shift Manager is required to inform the Duty Plant Manager to notify the NRC resident of the _____(2)_____.

	(1)	(2)
A.	E1, Response to Degraded Grid	power reduction
B.	E2, Response to Transmission Loading Relief Request	MVAR rise
C.	E1, Response to Degraded Grid	MVAR rise
D.	E2, Response to Transmission Loading Relief Request	power reduction

Proposed Answer: D

Explanation: (Optional)

A. Incorrect. Section E1, Response to Degraded grid, provides guidance if any of the critical parameter levels for W3 offsite power supply is outside of prescribes ranges. No entry required with the given information. Part 2 is correct.
B. Incorrect. Part 1 is correct. No notification required for MVAR adjustment, 350 MVAR is still within the administrative upper limit (400 MVAR).
C. Incorrect. Section E1, Response to Degraded grid, provides guidance if any of the critical parameter levels for W3 offsite power supply is outside of prescribes ranges. No entry required with the given information. No notification required for MVAR adjustment, 350 MVAR is still within the administrative upper limit (400 MVAR).
D. **CORRECT:** OP-901-314 Section E2 covers the actions if a request is made from Pine Bluff SOC to reduce MW or adjust MVARs via a Transmission Loading Relief Request. If a power reduction of > 25 MWe is requested, step 1.4 directs the SM to notify the DPM to inform the NRC resident. The given adjustment would be 30 MW, therefore a notification is required.

Technical Reference(s): OP-901-314 Rev. 3, pp 6, 8, & 11
(Attach if not previously provided) OI-035-000 Rev. 307, Att. 7.1
(including version/revision number)

Proposed references to be provided
to applicants during examination: None

Learning Objective: WLP-OPS-PPO30 EO-3 (As available)

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

Question History: Last NRC Exam None

Question Cognitive Level: Memory or Fundamental Knowledge 2
Comprehension or Analysis

10 CFR Part 55 Content: 55.41
55.43 5

Comments: “Free review” question w/comments resolved.

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #		1
	Group #		2
	K/A #	000037 2.2.25	
	Importance Rating		4.2

K/A Statement

000037 Steam Generator Tube Leak **2.2.25** - Knowledge of the bases in Technical Specifications for limiting conditions for operations and safety limits.

Proposed Question: SRO 82 Rev: 0

Given:

- Plant at 100% power and steady state
- PSLR reads 85 GPD
- Chemistry reports primary to secondary leakage in Steam Generator 2 is consistent with PSLR

The LCO for Technical Specification 3.4.5.2, Operational Leakage, is _____(1)_____.

The Nuclear Energy Institute recommended a limit of 150 GPD for primary to secondary leakage; however, the limit in Technical Specification 3.4.5.2 is more restrictive ____(2)____.

	(1)	(2)
A.	not met	to ensure the magnitude of leakage does not interfere with the detection of UNIDENTIFIED LEAKAGE by the leakage detection systems
B.	met	to ensure the magnitude of leakage does not interfere with the detection of UNIDENTIFIED LEAKAGE by the leakage detection systems
C.	not met	because the proximity of the east ADV to the east control room air intake could result in unacceptable radiological consequences
D.	met	because the proximity of the east ADV to the east control room air intake could result in unacceptable radiological consequences

Proposed Answer: C

Explanation: (Optional)

A. Incorrect. Part 1 is correct. The description in Part 2 is the bases for IDENTIFIED LEAKAGE limits, not primary to secondary leakage.
B. Incorrect. LCO for T.S. 3.4.5.2 is not met because given leakage is greater than 75 gallons per day primary to secondary leakage through SG #2. The description in Part 2 is the bases for IDENTIFIED LEAKAGE limits, not primary to secondary leakage.
C. **CORRECT:** LCO for T.S. 3.4.5.2 is not met because given leakage is greater than 75 gallons per day primary to secondary leakage through SG #2. TS 3.4.5.2 basis states "due to the proximity of the east atmospheric dump valve to the east control room intake, the primary to secondary leakage limit required to achieve acceptable radiological consequences is limiting. Therefore, 75 gpd per steam generator is imposed as the limit".
D. Incorrect. LCO for T.S. 3.4.5.2 is not met because given leakage is greater than 75 gallons per day primary to secondary leakage through SG #2. Part 2 is correct.

Technical Reference(s): TS 3.4.5.2 Amd. 249
(Attach if not previously provided) TS 3.4.5.2 basis Ch. 53
(including version/revision number)

Proposed references to be provided
to applicants during examination: None

Learning Objective: WLP-OPS-RCS00 EO-9 (As available)

Question Source: Bank # SRO 8
Modified Bank # (Note changes or attach parent)
New

Question History: Last NRC Exam 2012 NRC Exam

Question Cognitive Level: Memory or Fundamental Knowledge 2
Comprehension or Analysis

10 CFR Part 55 Content: 55.41
55.43 2

Comments:

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #		1
	Group #		2
	K/A #	000028 AA2.11	
	Importance Rating		3.6

K/A Statement

000028 Pressurizer (PZR) Level Control Malfunction **AA2.11** – Ability to determine and interpret the following as they apply to the Pressurizer Level Control Malfunctions: **Leak in PZR**

Proposed Question: SRO 83 Rev: 1

Given:

- Plant at 100% power
- PZR Level Channel X is selected for service
- PZR level indicator RC-ILI-110X indicates 55.6% and steady
- PZR level indicator RC-ILI-110Y indicates 54% and slowly lowering
- Letdown flow is slowly rising

These conditions are caused by a reference leg leak in ____(1)____ .
The crew will enter _____(2)_____ .

	(1)	(2)
A.	RC-ILI-110X	OP-901-112, Charging or Letdown Malfunction, section E_2 Letdown Malfunction
B.	RC-ILI-110X	OP-901-110, Pressurizer Level Control Malfunction, section E_1 Pressurizer Level Control Channel Malfunction
C.	RC-ILI-110Y	OP-901-110, Pressurizer Level Control Malfunction, section E_1 Pressurizer Control Channel Malfunction
D.	RC-ILI-110Y	enter OP-901-112, Charging or Letdown Malfunction, section E_2 Letdown Malfunction

Proposed Answer: B

Explanation: (Optional)

A. Incorrect. Part 1 is correct. OP-901-112, Charging or Letdown Malfunction is plausible because Channel X (controlling channel) is at set point and letdown flow is rising, which could appear to be a letdown malfunction. But, crew needs to select operable level control channel (Y), and that guidance is found in OP-901-110 section E1.
B. **CORRECT: CR-WF3-2012-3047.** Actual OE at W3 from June 24, 2012. A reference leg leak in Channel X will cause indicated level on Channel X to fail high (wet reference leg). Since channel X is the controlling channel it will raise letdown flow to keep pressurizer level at 55.6%. This failure affects a level control channel and OP-901-110 section E1 would provide the guidance to swap to the Y channel.
C. Incorrect. Channel Y could be determined to be the failed channel because it is deviating from setpoint. This instrument is lowering because actual pressurizer level is lowering. Plausible because it was confusing to the shift and took an FMA team to figure it out. The crew could determine that it is a setpoint malfunction if they do not know that the setpoint supposed to be 55.6% at 100% power.
D. Incorrect. Channel Y looks like the failed channel because it is deviating from setpoint. This instrument is lowering because actual pressurizer level is lowering. Plausible because it was confusing to the shift and took an FMA team to figure it out. OP-901-112, Charging or Letdown Malfunction section E1 is plausible because charging pumps start and stop on these same instruments and it could be determined that there is charging flow oscillations.

Technical Reference(s): WLP-OPS-PLC00 Rev. 20, slides 61, 62, 68, 69
(Attach if not previously provided) OP-901-110 Rev. 10, pp 6 & 7
(including version/revision number) OP-901-112 Rev. 7, page 7

Proposed references to be provided
to applicants during examination: None

Learning Objective: WLP-OPS-PLC00 EO-5, EO-9 (As available)

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

Question History: Last NRC Exam None

Question Cognitive Level: Memory or Fundamental Knowledge
Comprehension or Analysis 4

10 CFR Part 55 Content: 55.41
55.43 5

Comments: "Free Review' question w/ comments resolved.

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #		1
	Group #		2
	K/A #	CE A16	2.2.40
	Importance Rating		4.7

K/A Statement

(**CE A16**) Excess RCS Leakage **2.2.40** - Ability to apply Technical Specifications for a system.

Proposed Question: SRO 84 Rev: 1

Given:

- Plant at 100% power
- An RCS leak has been confirmed

As stated in TS surveillance requirement 4.4.5.2.1, crew will perform OP-903-024, Reactor Coolant System Water Inventory Balance. This surveillance procedure is used to quantify identified leakage and _____(1)_____ .

The crew determined an unisolable leakage rate of 0.4 gpm leaking from a crack in the valve body of Safety Injection Header 2A Check Valve, SI-336A (located between SIT 2A and RCS Loop 2A). To comply with TS 3.4.5.2, Operational Leakage, crew will _____(2)_____.

	(1)	(2)
A.	unidentified leakage	conduct a plant shutdown
B.	unidentified leakage	reduce leakage rate to within limits
C.	primary to secondary leakage	conduct a plant shutdown
D.	primary to secondary leakage	reduce leakage rate to within limits

Proposed Answer: A

Explanation: (Optional)

A. **CORRECT**: OP-903-024 calculates identified and unidentified leakage. Primary to secondary leakage is calculated using CE-002-001, Maintaining Steam Generator Chemistry. SI-336A bonnet leakage is PRESSURE BOUNDARY LEAKAGE. TS 3.4.5.2 Action a directs being in HSB within 6 hours and CSD within the following 30 hours.
B. Incorrect. Part 1 is correct. . Part 2 is incorrect. SI-336A valve body leakage is PRESSURE BOUNDARY LEAKAGE. TS 3.4.5.2 Action a directs being in HSB within 6 hours and CSD within the following 30 hours. No time is allowed to reduce leakage rate.
C. Incorrect. OP-903-024 calculates identified and unidentified leakage. Primary to secondary leakage is calculated using CE-002-001, Maintaining Steam Generator Chemistry. Part 2 is correct.
D. Incorrect. OP-903-024 calculates identified and unidentified leakage. Primary to secondary leakage is calculated using CE-002-001, Maintaining Steam Generator Chemistry. The primary to secondary leakage is a manual input into the RCS inventory balance. SI-336A valve body leakage is PRESSURE BOUNDARY LEAKAGE. TS 3.4.5.2 Action a directs being in HSB within 6 hours and CSD within the following 30 hours. No time is allowed to reduce leakage rate.

Technical Reference(s): OP-901-111 Rev. 303, page 8
OP-901-202 Rev. 15, page 9
OP-903-024 Rev 23, pp 2, 31, 33
(Attach if not previously provided) TS 3.4.5.2 and Definitions 1.14, 1.21, 1.35
(including version/revision number) SD-SI Rev. 14, Fig. 1

Proposed references to be provided to applicants during examination: None

Learning Objective: WLP-OPS-RCS00 EO-9 (As available)

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

Question History: Last NRC Exam None

Question Cognitive Level: Memory or Fundamental Knowledge
Comprehension or Analysis 2

10 CFR Part 55 Content: 55.41
55.43 2

Comments: “Free Review” question w/comments resolved

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #		1
	Group #		2
	K/A #	CE E09 EA2.1	
	Importance Rating		4.4

K/A Statement

(**CE E09**) Functional Recovery **EA2.1** –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.**

Proposed Question: SRO 85 Rev: 0

Given:

- CRS is prioritizing safety functions in accordance with OP-902-008, Functional Recovery Procedure
- SIAS, CIAS, MSIS and CSAS are present
- Two CEAs have failed to insert and ATC has verified immediate actions are complete
- ATC reports that Reactor Power is 10^{-5} % and dropping
- CRS is evaluating the Reactivity Control Safety Function

____(1)____ safety function acceptance criteria are met. CRS will implement success path _____(2)_____ for Reactivity control.

	(1)	(2)
A.	Only RC-1	RC-1
B.	Only RC-1	RC-2
C.	RC-1 and RC-2	RC-2
D.	RC-1 and RC-2	RC-1

Proposed Answer: C

Explanation: (Optional)

A. Incorrect. RC-1(Condition 2) is met due to power $<10^{-4}$% and dropping. RC-2(Condition 1) is met because emergency boration is in progress due to SIAS. Even though RC-1 criteria is met, RC-2 is implemented because RC-1 has no guidance for emergency boration and termination.
B. Incorrect. RC-1(Condition 2) is met due to power $<10^{-4}$% and dropping. RC-2(Condition 1) is met because emergency boration is in progress due to SIAS. Part 2 is correct.
C. **CORRECT:** RC-1(Condition 2) is met due to power $<10^{-4}$% and dropping. RC-2(Condition 1) is met because emergency boration is in progress due to SIAS. Even though RC-1 criteria is met, RC-2 is implemented because RC-1 has no guidance for emergency boration and termination. This question is TIER 3 because the logic is from OI-038-000, EOP Operations/Expectations Guidance and this logic is the same when prioritizing safety functions with more than one CEA stuck for any type of event.
D. Incorrect. Part 1 is correct. Even though RC-1 criteria is met, RC-2 is implemented because RC-1 has no guidance for emergency boration and termination.

Technical Reference(s): OP-902-008 Rev. 27, pp14, 22, and 23
(Attach if not previously provided) OI-038-000 Rev. 16, step 5.4.55
(including version/revision number)

Proposed references to be provided
to applicants during examination: None

Learning Objective: WLP-OPS-PPE01 EO-4 (As available)

Question Source: Bank # SRO 24
Modified Bank # (Note changes or attach parent)
New

Question History: Last NRC Exam 2017 NRC Exam

Question Cognitive Level: Memory or Fundamental Knowledge
Comprehension or Analysis 3

10 CFR Part 55 Content: 55.41
55.43 5

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Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #		2
	Group #		1
	K/A #	006 A2.13	
	Importance Rating		4.2

K/A Statement

006 Emergency Core Cooling **A2.13** – Ability to (a) predict the impacts of the following malfunctions or operations on the ECCS; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: **Inadvertent SIS actuation**

Proposed Question: SRO 86 Rev: 0

Given:

- RCS temperature is 340°F
- RCS pressure is 380 PSIA
- SDC Train A is in service
- SDC Train B is in standby

Following annunciators are received:

- SIAS Train A Logic Initiated (Cabinet K, G-19)
- SIAS Train B Logic Initiated (Cabinet K, G-20)
- LOOP 1 SDC RELIEF VLV ACTIVE (Cabinet N, A-17)
- LOOP 2 SDC RELIEF VLV ACTIVE (Cabinet M, A-7)

CRS will direct BOP to FIRST ____(1)____ in accordance with the guidance in _____(2)_____.

	(1)	(2)
A.	secure HPSI Pumps	OP-901-131, Shutdown Cooling Malfunction
B.	secure LPSI Pump B	OP-901-131, Shutdown Cooling Malfunction
C.	secure LPSI Pump B	OP-901-504, Inadvertent ESFAS Actuation
D.	secure HPSI Pumps	OP-901-504, Inadvertent ESFAS Actuation

Proposed Answer: D

Explanation: (Optional)

A. Incorrect. HPSI pumps must be secured to prevent lifting LTOP reliefs. Pressure will rise to the shutoff head of HPSI pumps if they are not secured. Guidance is located in OP-901-504 and not in OP-901-131, Shutdown Cooling Malfunction, although the CRS may enter both off-normals.
B. Incorrect. OP-901-504 directs the crew to secure LPSI pump B but not until after HPSI pumps are secured because prevention of lifting LTOPs is a higher priority. Guidance is located in OP-901-504 and not in OP-901-131, Shutdown Cooling Malfunction, although the CRS may enter both off-normals.
C. Incorrect. OP-901-504 directs the crew to secure LPSI pump B but not till after HPSI pumps are secured because prevention of lifting LTOPs is a higher priority. Part 2 is correct.
D. **CORRECT:** HPSI pumps must be secured to prevent lifting LTOP reliefs. Pressure will rise to the shutoff head of HPSI pumps if they are not secured. Guidance is located in OP-901-504, Inadvertent ESFAS actuation. With the annunciators given, it can be determined that an inadvertent SIAS has occurred

Technical Reference(s): OP-500-009 Rev 6, Att 4.69
(Attach if not previously provided) OP-500-012 Rev 29, Att 4.7
(including version/revision number) OP-901-504 Rev 10, p 9

Proposed references to be provided
to applicants during examination: None

Learning Objective: WLP-OPS-PPO50 EO-3 (As available)

Question Source: Bank # SRO 12
Modified Bank # _____ (Note changes or attach parent)
New _____

Question History: Last NRC Exam 2014 NRC Exam

Question Cognitive Level: Memory or Fundamental Knowledge _____
Comprehension or Analysis 2

10 CFR Part 55 Content: 55.41 _____
55.43 5

Comments:

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #		2
	Group #		1
	K/A #	012 2.1.7	
	Importance Rating		4.7

K/A Statement

012 Reactor Protection **2.1.7** - Ability to evaluate plant performance and make operational judgments based on operating characteristics, reactor behavior, and instrument interpretation.

Proposed Question: SRO 87 Rev: 0

Given:

- Plant shutdown is in progress per OP-901-202, Steam Generator Tube Leakage or High Activity, because of rising steam plant activity due to a 150 gpd primary to secondary leak on SG 1
- ATC operator reports following:
  - Pressurizer level is 45% and lowering
  - Pressurizer pressure is 1750 PSIA and lowering
  - Containment pressure is 16.7 PSIA and rising
  - RCS Tcold is lowering rapidly
  - Steam Generator 1 and 2 pressure is 750 PSIA and lowering
  - All Charging Pumps are operating
  - Reactor power is 78% and lowering
- Per CRS direction the ATC performs a manual reactor trip, SIAS, and CIAS

An Anticipated Transient Without Scram (ATWS) ___(1)___ occurred. After verification of Standard Post Trip Actions, CRS will implement _____(2)_____.

	(1)	(2)
A.	has	OP-902-004, Excess Steam Demand Recovery
B.	has	OP-902-008, Functional Recovery
C.	has NOT	OP-902-004, Excess Steam Demand Recovery
D.	has NOT	OP-902-008, Functional Recovery

Proposed Answer: B

Explanation: (Optional)

A. Incorrect. Part 1 is correct. Parameters provided indicate an ESD in containment. Although the tube leak has not reached the level of a tube rupture, the crew must go to OP-902-008 due to the existence of secondary activity.
B. **CORRECT:** Prior to ATC tripping the reactor, RCS pressure went below the Aux Trip setpoint in the CPCs for RCS Pressure (1860 psia), which should have resulted in a CPC generated trip. This "Aux Trip" setpoint is located in the basis for TS section 2.0. The diagnostic flowchart will send the crew to OP-902-008 due indications of an ESD with rising activity in the steam plant. If the CRS misuses the Diagnostic Flowchart, OP-902-004 Safety Function Status Checklist will not support implementation of the procedure due to secondary activity.
C. Incorrect. RCS pressure has not reached low RPS trip setpoint of 1684 psia but it has reached the Aux trip setpoint of 1860 psia, which should have tripped the reactor. SG pressures and containment pressures are abnormal but have not reached a trip setpoint. Parameters provided indicate an ESD in containment. Although the tube leak has not reached the level of a tube rupture, the crew must go to OP-902-008 due to the existence of secondary activity.
D. Incorrect. RCS pressure has not reached low RPS trip setpoint of 1684 psiab but it has reached the Aux trip setpoint of 1860 psia, which should have tripped the reactor. SG pressures and containment pressures are abnormal but have not reached a trip setpoint. Part 2 is correct.

Technical Reference(s): TS Table 2.2-1 Amd 225
(Attach if not previously provided) TS Basis for DNBR trip Ch 75
(including version/revision number) OP-902-009 Rev. 317, Appendix 1

Proposed references to be provided
to applicants during examination: None

Learning Objective: WLP-OPS-PPS00 EO-1, EO-5 (As available)
WLP-OPS-PPE01 EO-12

Question Source: Bank # SRO 2
Modified Bank # _____ (Note changes or attach parent)
New _____

Question History: Last NRC Exam 2012 NRC Exam

Question Cognitive Level: Memory or Fundamental Knowledge _____
Comprehension or Analysis 3

10 CFR Part 55 Content: 55.41 _____
55.43 5

Comments:

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #		2
	Group #		1
	K/A #	062 A2.12	
	Importance Rating		3.6

K/A Statement

062 AC Electrical Distribution **A2.12** – Ability to (a) predict the impacts of the following malfunctions or operations on the ac distribution system; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: **Restoration of power to a system with a fault on it**

Proposed Question: SRO 88 Rev: 0

Given:

- Plant is at 100% power
- A loss of 3B Safety bus has occurred

The following abnormal conditions exist:

- ACCW Pump B tripped at the 17 second load block
- All EDG B Sequencer load block lights have extinguished
- EDG B Sequencer LOCKOUT light is LIT

_____(1)_____ on 3B safety bus are de-energized.

CRS will direct the crew to secure EDG B by _____(2)_____ IAW OP-901-311, Loss of Train B Safety Bus.

	(1)	(2)
A.	ONLY loads after block 17	depressing the Emergency Stop push button
B.	ONLY loads after block 17	pulling the overspeed trip plunger
C.	ALL loads	pulling the overspeed trip plunger
D.	ALL loads	depressing the Emergency Stop push button

Proposed Answer: C

Explanation: (Optional)

A. Incorrect. All loads on 3B Bus are de-energized on a Sequencer Lockout condition, not just loads after the lockout. Emergency Stop PB is effective for shutdown of EDG without going through cooldown cycle, but it does not work with EDG in Emergency Mode and is not an option for shutting down the EDG in OP-901-311.
B. Incorrect. All loads on 3B Bus are de-energized on a Sequencer Lockout condition, not just loads after the lockout. Part 2 is correct.
C. **CORRECT:** All loads on the 3B Bus are de-energized on a Sequencer Lockout condition, not just loads after the lockout. Step 4.1 of OP-901-311 provides directions to secure EDG B using the overspeed trip plunger. The overspeed trip plunger is required because EDG B is running in emergency mode.
D. Incorrect. Part 1 is correct. Emergency Stop PB is effective for shutdown of EDG without going through cooldown cycle, but it does not work with EDG in Emergency Mode and is not an option for shutting down the EDG in OP-901-311.

Technical Reference(s): WLP-OPS-SEQ00 Rev 5, slides 59 & 60
(Attach if not previously provided) OP-901-311 Rev. 310, pp 9 and 10
(including version/revision number) OP-009-002 Rev 345, pp 51 & 52

Proposed references to be provided
to applicants during examination: None

Learning Objective: WLP-OPS-SEQ00 EO-2 (As available)

Question Source: Bank # SRO 15
Modified Bank # _____ (Note changes or attach parent)
New _____

Question History: Last NRC Exam 2014 NRC Exam

Question Cognitive Level: Memory or Fundamental Knowledge _____
Comprehension or Analysis 3

10 CFR Part 55 Content: 55.41 _____
55.43 5

Comments:

2018 NRC Exam
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Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #		2
	Group #		1
	K/A #	078 2.4.46	
	Importance Rating		4.2

K/A Statement

078 Instrument Air **2.4.46** - Ability to verify that the alarms are consistent with the plant conditions.

Proposed Question: SRO 89 Rev: 0

Given:

- Plant is in mode 3
- Instrument Air pressure has been lost for 8 hours due to leak, and leak repair should be complete in 5 hours
- Reactor Coolant Pumps 1B and 2B are operating
- The following annunciators are illuminated on CP-2:
  - RCP 1A CCW FLOW LO
  - RCP 2A CCW FLOW LO
  - RCP 1B CCW FLOW LO
  - RCP 2B CCW FLOW LO
- The following annunciators are illuminated on CP-18:
  - RCP 1A CCW FLOW LOST
  - RCP 2A CCW FLOW LOST

Within ten hours of the loss of Instrument Air, the CRS will direct crew to ___(1)___ in accordance with guidance in _____(2)_____.

	(1)	(2)
A.	trip Reactor Coolant Pumps 1B and 2B	OP-901-511, Loss of Instrument Air
B.	gag open CC-200A and CC-727, CCW Suct & Discharge Header Tie Valves A to AB	OP-901-511, Loss of Instrument Air
C.	gag open CC-200A and CC-727, CCW Suct & Discharge Header Tie Valves A to AB	OP-901-510, Component Cooling Water Malfunction
D.	trip Reactor Coolant Pumps 1B and 2B	OP-901-510, Component Cooling Water Malfunction

Proposed Answer: B

Explanation: (Optional)

A. Incorrect. Plausible because this is the desired response if all CCW is lost to RCPs. Applicant could determine that CC-200A and 727 are closed and there is not enough time to gag open CC-200A and CC-727 within 3 minutes. If these valves were closed, then the Flow Lost alarms would be in alarm for all 4 RCPs. Part 2 is correct.
B. **CORRECT:** Per step 18 of OP-901-511, If loss of instrument air is expected to last longer than 10 hours, then actions must be taken within 10 hours. Applicant will determine that since the flow lost annunciator is clear to RCPs that are running, CCW flow must still exist. By procedure, CRS will direct gagging open CC-200A and CC-727 before they fail closed.
C. Incorrect. Part 1 is correct. OP-901-510 deals with CCW malfunctions but does not provide guidance for a loss of instrument air and manipulations of nitrogen accumulators to CCW valves.
D. Incorrect. Plausible because this is desired response if all CCW is lost to RCPs. Applicant could determine that CC-200A and CC-727 are closed and there is not enough time to gag them open within 3 minutes. If these valves were closed, then the Flow Lost alarms would be in alarm for all 4 RCPs. The guidance to trip Reactor Coolant Pumps on a loss of CCW is located in OP-901-510 but is the wrong response.

Technical Reference(s): OP-500-008 Rev 26, att. 4.75
(Attach if not previously provided) OP-500-013 Rev 18, att 4.1
(including version/revision number) OP-901-511 Rev 15, E_0 step 18
OP-901-510 Rev 303, step 2

Proposed references to be provided to applicants during examination: None

Learning Objective: WLP-OPS-PPO50 EO-3 (As available)

Question Source: Bank # SRO 6
Modified Bank # _____ (Note changes or attach parent)
New _____

Question History: Last NRC Exam 2015 NRC Exam

Question Cognitive Level: Memory or Fundamental Knowledge _____
Comprehension or Analysis 3

10 CFR Part 55 Content: 55.41 _____
55.43 5

Comments:

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #		2
	Group #		2
	K/A #	015 A2.04	
	Importance Rating		3.8

K/A Statement

015 Nuclear Instrumentation **A2.04** - Ability to (a) predict the impacts of the following malfunctions or operations on the NIS; and (b based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: **Effects on axial flux density of control rod alignment and sequencing, xenon production and decay, and boron vs. control rod reactivity changes**

Proposed Question: SRO 90 Rev: 0

Given:

- A plant disturbance has resulted in a significant ASI swing
- Plant power has recently been stabilized at 90% power
- ASI control is in progress
- Group P CEAs have been inserted to 120”
- Reg Group 6 CEAs have been inserted to 130”
- Reg Group 5 CEAs have been inserted to 145”
- ASI is moving in negative direction

Based on this condition, CRS should direct ATC _____ to control ASI in accordance with the ASI Control Guidelines of OP-010-004, Power Operations.

A. withdraw Reg Group 5 CEAs

B. insert Reg Group 5 CEAs

C. withdraw Reg Group 6 CEAs

D. insert Reg Group 6 CEAs

Proposed Answer: D

Explanation: (Optional)

A. Incorrect. Since ASI is moving in the negative direction (towards the top of the core), CEAs must be inserted to control ASI.
B. Incorrect. Since power is > 80%, Group 5 CEAs shall not be inserted below 145" (step 9.4.1.15 of Att. 9.4 of OP-010-004)
C. Incorrect. Since ASI is moving in the negative direction (towards the top of the core), CEAs must be inserted to control ASI.
D. **CORRECT:** Since ASI is moving in the negative direction (towards the top of the core), CEAs must be inserted to control ASI. Since power is > 80%, Group 5 CEAs shall not be inserted below 145" (step 9.4.1.15 of Att. 9.4 of OP-010-004), which leaves RG 6 and Group P as only CEAs to insert. Group P is not listed as a possible answer.

Technical Reference(s): OP-010-004 Rev 331, Steps 9.4.1.1, 9.4.1.5, &
(Attach if not previously provided) 9.4.1.15, & Caution prior to step 9.4.3.1
(including version/revision number)

Proposed references to be provided
to applicants during examination: None

Learning Objective: WLP-OPS-PPN01 EO-3 (As available)

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

Question History: Last NRC Exam None

Question Cognitive Level: Memory or Fundamental Knowledge
Comprehension or Analysis 3

10 CFR Part 55 Content: 55.41
55.43 5

Comments:

2018 NRC Exam
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Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #		2
	Group #		2
	K/A #	034 A1.02	
	Importance Rating		3.7

K/A Statement

034 Fuel-Handling Equipment **A1.02** - Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating the Fuel Handling System controls including: **Water level in the refueling canal**

Proposed Question: SRO 91 Rev: 0

Given:

- Core offload is in progress
- A failure of Steam Generator Nozzle Dams has occurred and crew is implementing OP-010-006 Attachment 9.23, Loss of Refuel Cavity Water Level Guidelines

With no means of isolating the leak, Refuel SRO will expect a final level of ____(1)____ ft. MSL in the core and _____(2)_____ ft. MSL in the Refueling Cavity.

	(1)	(2)
A.	13.5	13.5
B.	13.5	20
C.	20	13.5
D.	20	20

Proposed Answer: B

Explanation: (Optional)

A. Incorrect: OP-010-006 step 9.23.1.1 states a loss of a nozzle dam, if left uncorrected, will result in a final water level of 13.5 ft. MSL in core and a level of 20 ft. MSL water level in Spent Fuel Pool and north end of the Refueling Cavity. Plausible because applicant must be aware that the refuel cavity will stop draining at 20 ft. (level of the head flange)
B. **CORRECT:** OP-010-006 step 9.23.1.1 states, a loss of a nozzle dam, if left uncorrected, will result in a final water level of 13.5 ft. MSL in the core and a level of 20 ft. MSL water level in Spent Fuel Pool and north end of the Refueling Cavity. The upper cavity level is 20 ft, (even with the head flange). At this level the cavity will no longer drain and the core will drain to the level of the nozzle dams in the S/G (centerline of the RCS hot leg).
C. Incorrect. OP-010-006 step 9.23.1.1 states that a loss of a nozzle dam if left uncorrected, will result in a final water level of 13.5 ft. MSL in the core and a level of 20 ft. MSL water level in Spent Fuel Pool and north end of the Refueling Cavity. Applicant must be aware of the elevation arrangement between the refuel cavity and the core.
D. Incorrect. OP-010-006 step 9.23.1.1 states that a loss of a nozzle dam if left uncorrected, will result in a final water level of 13.5 ft. MSL in the core and a level of 20 ft. MSL water level in Spent Fuel Pool and north end of the Refueling Cavity. Plausible because the applicant must know that the core will continue to drain once the cavity stabilizes at 20 ft.

Technical Reference(s): OP-010-006 Rev. 330, Attachment 9.23
(Attach if not previously provided)
(including version/revision number)

Proposed references to be provided to applicants during examination: None

Learning Objective: WLP-OPS-REQ04 obj. 2 (As available)

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

Question History: Last NRC Exam None

Question Cognitive Level: Memory or Fundamental Knowledge 2
Comprehension or Analysis

10 CFR Part 55 Content: 55.41
55.43 7

Comments:

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #		2
	Group #		2
	K/A #	056 A2.04	
	Importance Rating		2.8

K/A Statement

056 Condensate **A2.04** - Ability to (a) predict the impacts of the following malfunctions or operations on the Condensate System; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: **Loss of condensate pumps**

Proposed Question: SRO 92 Rev: 1

Given:

- Plant at 100% power
- Relief valve for Moisture Separator Heater #1 has lifted
- Steam leak is beyond capacity of Hotwell makeup from CST
- The BOP reports that Condenser Hotwell level is 20 inches and lowering

In accordance with OP-901-221, Secondary System Transient, CRS directs a reactor trip and will diagnose to ____(1)____ Recovery Procedure. For this event, Main Feedwater is considered _____(2)_____.

	(1)	(2)
A.	OP-902-001, Reactor Trip	not available
B.	OP-902-006, Loss of Feedwater	not available
C.	OP-902-006, Loss of Feedwater	available
D.	OP-902-001, Reactor Trip	available

Proposed Answer: D

Explanation: (Optional)

A. Incorrect. Part 1 is correct. Condensate Pumps and MFW pumps are not available but AFW pump is, therefore, MFW is considered available. MFW is defined as feed to the S/Gs that flow through MFIVs.
B. Incorrect. When condenser hotwell level reaches 18 inches, all Condensate Pumps will trip causing both MFW Pumps to trip on low suction pressure. The AFW pump and 100% EFW flow is available so the crew will diagnose to OP-902-001. Before the latest revision to EOPs (and during this actual event) crew diagnosed to OP-902-006. MFW is available because AFW pump is available. OP-902-001 will direct the crew to start AFW Pump.
C. Incorrect. When condenser hotwell level reaches 18 inches, all Condensate Pumps will trip causing both MFW Pumps to trip on low suction pressure. The AFW pump and 100% EFW flow is available so the crew will diagnose to OP-902-001. Before the latest revision to the EOPs (and during this actual event) the crew diagnosed to OP-902-006. Part 2 is correct.
D. **CORRECT:** When condenser hotwell level reaches 18 inches, all Condensate Pumps will trip causing both MFW Pumps to trip on low suction pressure. AFW pump and 100% EFW flow is available so crew will diagnose to OP-902-001. Before the latest revision to EOPs (and during the actual event) crew diagnosed to OP-902-006. MFW is available because AFW pump is available. MFW is defined as feed to the S/Gs that flow through MFIVs. OP-902-001 will direct the crew to start AFW Pump**. Plant OE CR-W3-2009-5469.**

Technical Reference(s): OP-901-221 Revision 5, page 15
(Attach if not previously provided) OP-902-009 Revision 317, Appendix 1
(including version/revision number) OP-902-001 Revision 16, page 10
TG-OP-902-001 Rev. 306, page 28
CR-W3-2009-5469
SD-FW Fig. 1 Rev 17

Proposed references to be provided to applicants during examination: None

Learning Objective: WLP-OPS-PPE01 obj. 6,12,16 (As available)

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

Question History: Last NRC Exam None

Question Cognitive Level: Memory or Fundamental Knowledge _____
Comprehension or Analysis 3

10 CFR Part 55 Content: 55.41 _____
55.43 5

Comments: “Free review” question w/comments resolved.

2018 NRC Exam
SRO Written Exam Worksheet

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #		2
	Group #		2
	K/A #	045 2.1.9	
	Importance Rating		4.5

K/A Statement

045 Main Turbine Generator **2.1.9** –**Ability to direct personnel activities inside the control room.**

Proposed Question: SRO 93 Rev: 0

Given:

- Plant at 100% power
- Reactor Power Cutback is in service
- A Turbine Trip occurred due to a Loss of Main Lube Oil

CRS will direct the crew to _____.

A. trip the reactor and perform OP-902-000, Standard Post Trip Actions, and OP-901-210, Turbine Trip, concurrently

B. trip the reactor and perform OP-902-000, Standard Post Trip Actions, only

C. verify a reactor power cutback and perform OP-901-101, Reactor Power Cutback and OP-901-210, Turbine Trip, concurrently

D. verify a reactor power cutback and perform OP-901-101, Reactor Power Cutback, only

Proposed Answer: A

Explanation: (Optional)

A. **CORRECT:** The CRS could enter OP-901-101 and OP-901-210 and end up at the same conclusion to trip the reactor and perform OP-902-000 and OP-901-210 concurrently. Both ONPs provide the same direction.
B. Incorrect. Crew is required to go to OP-902-000 but OP-901-101 and OP-901-210 is also required crew to stay in OP-901-210, Turbine Trip. There are steps in OP-901-210 that will direct crew to break condenser vacuum.
C. Incorrect. Crew would perform OP-901-101 and OP-901-210 if the turbine trip was due to a reason other than a High Vibration or Loss of Main Lube Oil.
D. Incorrect. OP-901-101provides direction to trip the reactor and perform OP-902-000 and OP-901-210 concurrently if the turbine trip was due to High Vibration or Loss of Main Lube Oil

Technical Reference(s): OP-901-101 Rev 8, pp 8 & 10
(Attach if not previously provided) OP-901-210 Rev. 6, pp 7-9
(including version/revision number)

Proposed references to be provided
to applicants during examination: None

Learning Objective: WLP-OPS-PPO20 EO-3 (As available)

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

Question History: Last NRC Exam None

Question Cognitive Level: Memory or Fundamental Knowledge
Comprehension or Analysis 2

10 CFR Part 55 Content: 55.41
55.43 5

Comments:

2018 NRC Exam
SRO Written Exam Worksheet

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #		3
	Group #		1
	K/A #	G2.1.2	
	Importance Rating		4.4

K/A Statement

G2.1.2 Knowledge of operator responsibilities during all modes of plant operation.

Proposed Question: SRO 94 Rev: 0

Per EN-OP-115-09, Maintaining the Station Narrative Log, deletions or editing of Station Narrative Log entries after the log has been approved can _____.

A. only be made by person making the original entry

B. only be made by either off-going CRS or SM

C. only be made by off-going SM

D. not be made

Proposed Answer: D

Explanation: (Optional)

A. Incorrect. Prior to approval, log entries may be edited or deleted by the person making the entry or the SM as described in section 5.1 of EN-OP-115-09, Maintaining the Station Narrative Log.
B. Incorrect. See A above.
C. Incorrect. See A above.
D. **CORRECT**: Applicant must be aware that the SRO approval of Operations Logs signifies that all entries are comprehensive and accurate records for that shift's events and activities. No one may make changes to those entries once they are set to record by the SRO's approval.

Technical Reference(s): EN-OP-115-09 Rev 003, Section 5.1
(Attach if not previously provided)
(including version/revision number)

Proposed references to be provided to applicants during examination: None

Learning Objective: WLP-OPS-EXP EO-7 (As available)

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

Question History: Last NRC Exam None

Question Cognitive Level: Memory or Fundamental Knowledge 2
Comprehension or Analysis

10 CFR Part 55 Content: 55.41
55.43 5

Comments:

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #		3
	Group #		1
	K/A #	G2.1.36	
	Importance Rating		4.1

K/A Statement

G2.1.36 Knowledge of procedures and limitations involved in core alterations.

Proposed Question: SRO 95 Rev: 0

OP-010-006, Outage Operations, defines DEFUEL Mode of operation as all fuel being removed from the Reactor Vessel and the last fuel bundle is _____.

A. un-grappled in Containment Building Upender

B. removed from Fuel Handling Building Upender

C. un-grappled in a Spent Fuel Pool storage location

D. transferred to Fuel Handling Building Upender

Proposed Answer: B

Explanation: (Optional)

A. Incorrect OP-010-006 Limitation 3.2.11 states that plant is considered to be in DEFUEL mode of operation when all fuel has been removed from the containment building including the reactor vessel and the last fuel bundle has been removed from the Upender in the FHB.
B. **CORRECT:** OP-010-006 Limitation 3.2.11 states that plant is considered to be in DEFUEL mode of operation when all fuel has been removed from the containment building including the reactor vessel and the last fuel bundle has been removed from the Upender in the FHB. It is the responsibility and normal practice for Refuel SRO to inform the crew that the plant has entered Defuel Mode.
C. Incorrect. OP-010-006 Limitation 3.2.11 states that plant is considered to be in DEFUEL mode of operation when all fuel has been removed from the containment building including the reactor vessel and the last fuel bundle has been removed from the Upender in FHB.
D. Incorrect. OP-010-006 Limitation 3.2.11 states that plant is considered to be in DEFUEL mode of operation when all fuel has been removed from the containment building including the reactor vessel and the last fuel bundle has been removed from the Upender in FHB.

Technical Reference(s): OP-010-006 Rev. 330, pp 10 & 40
(Attach if not previously provided)
(including version/revision number)

Proposed references to be provided to applicants during examination: None

Learning Objective: WLP-OPS-REQ04 EO-4, EO-5 (As available)

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

Question History: Last NRC Exam None

Question Cognitive Level: Memory or Fundamental Knowledge 2
Comprehension or Analysis

10 CFR Part 55 Content: 55.41
55.43 6

Comments: “Free review” no changes based on NRC comments

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #		3
	Group #		2
	K/A #	G2.2.7	
	Importance Rating		3.6

K/A Statement

G2.2.7 Knowledge of the process for conducting special or infrequent tests.

Proposed Question: SRO 96 Rev: 0

In accordance with EN-OP-116, Infrequently Performed Tests or Evolutions, an IPTE briefing is required prior to performing ___(1)___.

The ___(2)___is responsible for ensuring proper performance of IPTE Pre-job Brief.

	(1)	(2)
A.	a Reactor Coolant System Drain Down to 17 feet	Senior Line Manager
B.	A Reactor Coolant System Drain Down to 17 feet	Shift Manager
C.	OP-903-007, Turbine Inlet Valve Cycling Test	Senior Line Manager
D.	OP-903-007, Turbine Inlet Valve Cycling Test	Shift Manager

Proposed Answer: A

Explanation: (Optional)

A. **CORRECT:** Lowered inventory to less than 20 feet is an IPTE. EN-OP-116 states that Senior Line Manager is responsible for ensuring proper performance of IPTE Pre-job Brief.
B. Incorrect. EN-OP-116, Attachment 9.1, Identified IPTEs, states that Reactor Coolant System Drain Down to Lowered Inventory is an IPTE. Lowered inventory is less than 20 feet, therefore, drain down to 17 feet is an IPTE. EN-OP-116 Responsibilities section 4.0 [8] states that Senior Line Manager is responsible for ensuring proper performance of IPTE Pre-job Brief, not Shift Manager.
C. Incorrect. OP-903-007 does not overspeed the Main Turbine, and therefore is <u>not</u> an IPTE. EN-OP-116 Responsibilities section states that Senior Line Manager is responsible for ensuring proper performance of IPTE Pre-job Brief.
D. Incorrect. EN-OP-116 states that any test that actually over-speeds a turbine or Emergency Diesel Generator is an IPTE. OP-903-007 tests the cycling of Turbine valves, not the overspeed protection system. EN-OP-116 Responsibilities section 4.0 [8] states that Senior Line Manager is responsible for ensuring proper performance of the IPTE Pre-job Brief, not Shift Manager.

Technical Reference(s): EN-OP-116 Rev 14, page 18
(Attach if not previously provided) OP-010-006 Rev 330, page 50
(including version/revision number) OP-903-007 Rev 17, page 4

Proposed references to be provided
to applicants during examination: None

Learning Objective: WLP-OPS-IPTE EO-1, EO-4 (As available)

Question Source: Bank # SRO 21
Modified Bank # _____ (Note changes or attach parent)
New _____

Question History: Last NRC Exam 2012 NRC Exam

Question Cognitive Level: Memory or Fundamental Knowledge 2
Comprehension or Analysis _____

10 CFR Part 55 Content: 55.41 _____
55.43 3

Comments:

2018 NRC Exam
SRO Written Exam Worksheet

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #		3
	Group #		2
	K/A #	G2.2.37	
	Importance Rating		4.6

K/A Statement

G2.2.37 Ability to determine operability and/or availability of safety related equipment.

Proposed Question: SRO 97 Rev: 0

Crew has determined that a required 7-day technical specification surveillance was due 35 days ago but was missed. A risk evaluation has been performed and the risk impact is being managed.

Technical Specification 4.0.3 requires the surveillance be performed no later than _____ from time of discovery.

A. 1 hour

B. 24 hours

C. 1.75 days

D. 7 days

Proposed Answer: D

Explanation: (Optional)

A. Incorrect. Plausible because TS 3.0.3 (not 4.0.3) is a one hour allowed outage time.
B. Incorrect. The answer would be 24 hours if the a risk evaluation has not been performed or the risk impact is not being managed.
C. Incorrect. Plausible because the applicant may apply the action of TS 4.0.2 and allow 25% of the time interval of 7 days. (.25 of 7 days = 42 hours). In this case, the action of TS 4.0.2 does not apply because the surveillance interval + .25% has expired.
D. **CORRECT:** TS 4.0.3 states "If it is discovered that a surveillance was not performed within its specified interval, then compliance with the requirement to delay the LCO not met may be delayed, from the time of discovery, up to 24 hours or up to the limit of the surveillance interval, whichever is greater. A risk evaluation shall be performed for any surveillance greater than 24 hours and the risk impact shall be managed".

Technical Reference(s): T.S. 4.0.3 Amendment 187
(Attach if not previously provided) T.S. 3.0.3 Amendment 219
(including version/revision number)

Proposed references to be provided
to applicants during examination: None

Learning Objective: WLP-OPS-TS02 EO-8, EO-9 (As available)

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

Question History: Last NRC Exam None

Question Cognitive Level: Memory or Fundamental Knowledge
Comprehension or Analysis 2

10 CFR Part 55 Content: 55.41
55.43 2

Comments:

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #		3
	Group #		3
	K/A #	G2.3.14	
	Importance Rating		3.8

K/A Statement

G2.3.14 Knowledge of radiation or contamination hazards that may arise during normal, abnormal, or emergency conditions or activities.

Proposed Question: SRO 98 Rev: 0

Per TS 3.9.10.1, Water Level – Reactor Vessel, at least 23 feet of water shall be maintained over top of the ___(1)___ during movement of irradiated fuel within reactor pressure vessel.

This restriction ensures that in the event of a rupture of an irradiated fuel assembly, sufficient water depth is available such that ___(2)___.

	(1)	(2)
A.	fuel seated in reactor pressure vessel	sufficient cooling capacity is maintained
B.	reactor pressure vessel flange	iodine released is within limits
C.	reactor pressure vessel flange	sufficient cooling capacity is maintained
D.	fuel seated in reactor pressure vessel	iodine released is within limits

Proposed Answer: B

Explanation: (Optional)

A. Incorrect. Twenty three feet of water above fuel is credible since this is the required level for determining the amount of shutdown cooling trains required per TS 3.9.8. Additionally, Tech Spec 3.9.10.2 states "At least 23 feet of water shall be maintained over the top of the fuel seated in the reactor pressure vessel". This is applicable for CEA movement, not fuel movement. The basis for TS 3.9.10.1 is to ensure sufficient depth such that the iodine released is by a factor of at least 200. Sufficient cooling capacity maintained is the basis for the 32 foot requirement in TS 3.9.8 (Shutdown Cooling).

B. **CORRECT:** Tech Spec 3.9.10.1 states "At least 23 feet of water shall be maintained over the top of the reactor pressure vessel flange". The basis for TS 3.9.10.1 is to ensure sufficient depth such that the iodine released is reduced by a factor of at least 200.

C. Incorrect. Part 1 is correct. The basis for TS 3.9.10.1 is to ensure sufficient depth such that the iodine released is reduced by a factor of at least 200. Sufficient cooling capacity maintained is the basis for the 32 foot requirement in TS 3.9.8 (Shutdown Cooling).

D. Incorrect. Twenty three feet of water above the fuel is credible since this is required levels for determining the amount of shutdown cooling trains required per TS 3.9.8. Additionally, Tech Spec 3.9.10.2 states "At least 23 feet of water shall be maintained over the top of the fuel seated in the reactor pressure vessel". This is applicable for CEA movement, not fuel movement. Part 2 is correct.

Technical Reference(s): TS 3.9.10.1 and 3.9.10.2, Amendment 249
(Attach if not previously provided) TS Bases 3.9.8 and 3.9.10, Change 86
(including version/revision number)

Proposed references to be provided
to applicants during examination: None

Learning Objective: WLP-OPS-REQ04 EO-2 (As available)

Question Source: Bank # SRO 23
Modified Bank # (Note changes or attach parent)
New

Question History: Last NRC Exam 2012 NRC Exam

Question Cognitive Level: Memory or Fundamental Knowledge 2
Comprehension or Analysis

10 CFR Part 55 Content: 55.41
55.43 4

Comments:

2018 NRC Exam
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Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #		3
	Group #		4
	K/A #	G2.4.16	
	Importance Rating		4.4

K/A Statement

G2.4.16 Knowledge of EOP implementation hierarchy and coordination with other support procedures or guidelines such as, operating procedures, abnormal operating procedures, and severe accident management guidelines.

Proposed Question: SRO 99 Rev: 2

Per OP-100-017, Emergency Operating Procedure Implementation Guide, which of the following criteria (if any) would allow the crew to remain in a selected Optimal Recovery Procedure (ORP) if a safety function is not being met?

A. Crew must exit to the functional recovery procedure any time a safety function is not met.

B. Two events are in progress and a shift brief is performed which must include the Shift Manager.

C. The reason for not meeting the safety function is known and operator action produces immediate response towards satisfying the failed safety function.

D. A single event is in progress and permission from the TSC is granted to remain in the selected ORP.

Proposed Answer: C

Explanation: (Optional)

A. Incorrect. OP-100-017 step 5.6.2 states that if a single event is in progress and transitioning to the functional recovery procedure will provide no additional guidance to correct the failed safety function, the decision may be made to stay in the ORP.
B. Incorrect. OP-100-017 step 5.6.2 states that if a single event is in progress and transitioning to the functional recovery procedure will provide no additional guidance to correct the failed safety function, the decision may be made to stay in the ORP. This step states that a brief should be performed which includes the SM
C. **CORRECT:** OP-100-017 step 5.6.2 states that if a single event is in progress and transitioning to the functional recovery procedure will provide no additional guidance to correct the failed safety function, the decision may be made to stay in the ORP.
D. Incorrect. OP-100-017 step 5.6.2 (first bullet) states that the reason for not meeting the safety function is known and operator action produces immediate response to toward satisfying the failed safety function. TSC concurrence is required in some steps in the EOPs but is not required in this situation.

Technical Reference(s): OP-902-008 Rev 27, page 3
(Attach if not previously provided) OP-100-017 Rev. 5, page 11
(including version/revision number)

Proposed references to be provided
to applicants during examination: None

Learning Objective: WLP-OPS-PPE01 EO-4 (As available)

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

Question History: Last NRC Exam None

Question Cognitive Level: Memory or Fundamental Knowledge 2
Comprehension or Analysis

10 CFR Part 55 Content: 55.41
55.43 5

Comments: Free review and comments incorporated.

2018 NRC Exam
SRO Written Exam Worksheet

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #		3
	Group #		4
	K/A #	G2.4.22	
	Importance Rating		4.4

K/A Statement

G2.4.22 Knowledge of the bases for prioritizing safety functions during abnormal/emergency operations

Proposed Question: SRO 100 Rev: 1

Given:

- CRS is prioritizing safety functions in accordance with OP-902-008, Functional Recovery Procedure
- Secondary Activity exists on Steam Generator #2

The earliest that success path CI-1 can be considered met is after the ____(1)____ .

The CRS will ensure that no release from Steam Generator #2 is occurring by directing the NAO to verify _____(2)_____ side Main Steam Safety Valves are closed.

	(1)	(2)
A.	MSIS actuation has been verified	East
B.	MSIS actuation has been verified	West
C.	EOP steps for isolating SG #2 have been completed	East
D.	EOP steps for isolating SG #2 have been completed	West

Proposed Answer: C

Explanation: (Optional)

A. Incorrect. OI-038-000 (EOP Operations Expectations Procedure) states that Success Path CI-1 should be considered not met if secondary activity exists and all EOP steps for isolating the affected SG have not been completed. MSIS is not adequate for meeting this step. Part 2 is correct.
B. Incorrect. OI-038-000 (EOP Operations Expectations Procedure) states that Success Path CI-1 should be considered not met if secondary activity exists and all EOP steps for isolating the affected SG have not been completed. MSIS is not adequate for meeting this step. SG #2 MSSVs are located on East side of the plant.
C. **CORRECT:** OI-038-000 (EOP Operations Expectations Procedure) states that Success Path CI-1 should be considered not met if secondary activity exists and all EOP steps for isolating the affected SG have not been completed. MSIS is not adequate for meeting this step. Making the correct decision on when the SG can be considered isolated (safety function met or not met) affects the prioritization of all remaining safety functions. SG #2 MSSVs are located on East side of the plant. The location is important for CRS whom may field a call stating there is steam being released from the east side of the plant. This question is generic because the guidance for when a SG is considered isolated is in OI-038-000 (EOP Operations Expectations Procedure). This guidance is valid in the optimal (902-007) or functional recovery (902-008). The location of the MSSV (East or West) is located in 902-004, 902-007 and 902-008.
D. Incorrect. Part 1 is correct. SG #2 MSSVs are located on the East side of the plant.

Technical Reference(s): OI-038-000 Rev 16, step 5.4.55 last bullet
(Attach if not previously provided) OP-902-008 Rev 27, pp 33, 34, 161, 162, 163
(including version/revision number)

Proposed references to be provided
to applicants during examination: None

Learning Objective: WLP-OPS-PPE01 EO-4 (As available)

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

Question History: Last NRC Exam None

Question Cognitive Level: Memory or Fundamental Knowledge 2
Comprehension or Analysis

10 CFR Part 55 Content: 55.41
55.43 5

Comments: “Free Review” question with comments resolved.