2023 NRC Exam
RO Written Exam Worksheet

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #	1	
	Group #	1	
	K/A #	(CE/E02) G2.4.16	
	Importance Rating	3.5	

K/A Statement

(CE/E02) **Reactor Trip, Stabilization, Recovery** (G2.4.16) Knowledge of emergency and abnormal operating procedures implementation hierarchy and coordination with other support procedures or guidelines, such as operating procedures, abnormal operating procedures, or severe accident management guidelines.

Proposed Question: RO 1 Rev: 0

Given:

- Circulating Water Pump (CWP) A is unavailable and danger tagged
- Circulating Water Pumps B, C and D are running
- Plant tripped due to feedwater heater perturbations
- Upon the trip, the auto transfer to the Startup Transformers was not successful for the 1B and 2B electrical busses

Following the plant trip, the plant is left with ____(1)____ Circulating Water Pump(s) running. The diagnostic flowchart directs the crew to _____(2)_____ Recovery Procedure.

	(1)	(2)
A.	one	OP-902-006, Loss of Feedwater
B.	one	OP-902-001, Reactor Trip
C.	zero	OP-902-001, Reactor Trip
D.	zero	OP-902-006, Loss of Feedwater

Proposed Answer: C

Explanation: (Optional)

A. Incorrect. With three CW pumps running and two trip, the remaining CW pump is designed to trip. The EOPs have been revised such that with AFW and /or 100% EFW flow equivalent available, the Reactor Trip Recovery Procedure is entered. Loss of MFW Recovery Procedure would have been correct prior to the EOP revision.
B. Incorrect. With three CW pumps running and two trip, the remaining CW pump is designed to trip. Part 2 is correct.
C. **CORRECT:** This question is from a W3 event (CR-WF3-2015-3565). With three CW pumps running and two trip, the remaining CW pump is designed to trip. Since CWP A is initially tagged out, the plant is left with zero CW pumps running. The plant is left without Main Feed Pumps due to an eventual loss of Condenser Vacuum (this info is in OP-003-003, Main Feedwater). In this event, the crew diagnosed into the Loss of Main Feedwater Recovery Procedure (OP-902-006). The EOPs have since been revised such that with AFW and /or 100% EFW flow equivalent available, the Reactor Trip Recovery Procedure (OP-902-001) is entered. The applicant must recognize that no optimal decision block has been circled in OP-902-009 Attachment 1 and entry into OP-902-001 Reactor Trip Recovery, is allowed. The guidance for this is located in OI-038-000, EOP Operations/Expectations Guidance Procedure.
D. Incorrect. Part 1 is correct. The EOPs have been revised such that with AFW and /or 100% EFW flow equivalent available, the Reactor Trip Recovery Procedure is entered. Loss of MFW Recovery Procedure would have been correct prior to the EOP revision

Technical Reference(s): SD-CW page 18, OI-038-000 step 5.5.1 Rev. 21
(Attach if not previously provided) OP-902-009 Appendix 1 Rev 323
(including version/revision number) OP-003-033 Rev 328 pages 55 and 56

Proposed references to be provided
to applicants during examination: None

Learning Objective: WLP-OPS-PPE01 objs. 4,6,12 (As available)

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

Question History: Last NRC Exam 2017 RO Exam

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

10 CFR Part 55 Content: 55.41 4,10
55.43 _____

Comments:

2023 NRC Exam
RO Written Exam Worksheet

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #	1	
	Group #	1	
	K/A #	008 AK2.07	
	Importance Rating	3.6	

K/A Statement

(008AK2.07) **Pressurizer Vapor Space Accident:** Knowledge of the relationship between (APE 8) PRESSURIZER VAPOR Space Accident and the following systems or components. PZR LCS.

Proposed Question: RO 2 Rev: 0

Given:

- Reactor is tripped
- Pressurizer Code Safety, RC-318B is stuck partially open
- Vessel level in the head indicates 90% and slowly lowering
- SIAS has not occurred

Pressurizer level is ____(1)____ and Pressurizer Level Controller output is ____(2)____.

	(1)	(2)
A.	lowering	lowering
B.	lowering	rising
C.	rising	lowering
D.	rising	rising

Proposed Answer: D

Explanation: (Optional)

A. Incorrect. Plausible for pressurizer level to lower due to a LOCA. Plausible due to PLC output rise or lower based on pressurizer level vs program setpoint.
B. Incorrect. Plausible for pressurizer level to lower due to a LOCA. Plausible due to PLC output rise or lower based on pressurizer level vs. program setpoint.
C. Incorrect. Plausible based on a steam space LOCA level will rise. Plausible due to PLC output rise or lower based on pressurizer level vs. program setpoint.
D. **CORRECT:** Based on conditions given, steam bubble has moved to the Reactor Head, therefore pressurizer level will rise. PLC output will rise to increase letdown flow to lower pressurizer level.

Technical Reference(s): TG-OP-902-002 page 144 Rev. 20
(Attach if not previously provided) SD-PLC pages 12,13 Ref. 12
(including version/revision number)

Proposed references to be provided
to applicants during examination: None

Learning Objective: WLP-OPS-PPE02 Obj. 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 10
55.43

Comments:

2023 NRC Exam
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Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #	1	
	Group #	1	
	K/A #	009 EA1.07	
	Importance Rating	3.5	

K/A Statement

(009EA1.07) **Small Break LOCA:** Ability to operate and/or monitor the following as they apply to (EPE 9) SMALL-Break LOCA. CCS

Proposed Question: RO 3 Rev: 0

Given:

- Reactor power 100%
- CFC A, B, D operating

Subsequently, the Reactor trips with the following indications:

- RCS Pressure is 1500 PSIA and stable
- RCS T_{COLD} is 541°F
- Containment Pressure is 16.9 PSIA and slowly rising
- SG 1 & 2 Pressures are 970 PSIA and stable

Which of the following is the correct alignment for Containment Fan Coolers (CFCs)?

A. CFCs A, B, C, D in SLOW speed.

B. CFCs A, B, D ONLY in SLOW speed.

C. CFCs A, B, C, D in FAST speed.

D. CFCs A, B, D ONLY in FAST speed.

Proposed Answer: A

Explanation: (Optional)

A. **CORRECT:** SIAS has occurred due to pressurizer pressure being less than 1684 psia. On a SIAS, all CFC fans will operate in slow speed.
B. Incorrect. The running CFC's will stop and restart in SLOW, and the standby fan will sequence on in SLOW. This answer is plausible if the applicant does not identify that a SIAS has occurred.
C. Incorrect. The running CFC's will stop and restart in SLOW, and the standby fan will sequence on in SLOW. All CFC's starting in FAST speed is plausible because all CFCs swap to FAST speed following a loss of offsite power event.
D. Incorrect. SIAS has occurred due to pressurizer pressure being less than 1684 psia. On a SIAS, all CFC fans will operate in slow speed. This answer is plausible if the applicant does not identify that CFCs swap to SLOW speed following a SIAS.

Technical Reference(s): SD-CCS page 10 Revision 9
(Attach if not previously provided)
(including version/revision number)

Proposed references to be provided
to applicants during examination: None

Learning Objective: WLP-OPS-CCS00 Obj. 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 2

10 CFR Part 55 Content: 55.41 7
55.43

Comments:

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Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #	1	
	Group #	1	
	K/A #	000011 EK2.03	
	Importance Rating	4.3	

K/A Statement

(011EK2.03) **Large Break LOCA:** Knowledge of the relationship between (EPE 11) LARGE Break LOCA and the following systems or components. RCS.

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 the BOP should 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 per this procedure, the crew will be required to _____(2)_____.

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

Proposed Answer: B

Explanation: (Optional)

A. 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. The key switch method is used during a control room evacuation.
B. **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.
C. Incorrect. Part 1 is plausible because the pressure at which OP-902-002 will refer the crew to the Appendix to isolate SITs is 1000 psig but the SITs will not start injecting to the RCS until RCS pressure lowers to 670 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. This key switch method is used during a control room evacuation.
D. Incorrect. Part 1 is plausible because the pressure at which OP-902-002 will refer the crew to Appendix to isolate SITs is 1000 psig. 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. Part 2 is correct.

Technical Reference(s): OP-902-002 page 46 Rev. 21
(Attach if not previously provided) OP-903-001 page 186 Rev. 102
(including version/revision number) OP-902-009 pages 121 Rev. 323

Proposed references to be provided
to applicants during examination: None

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

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

Question History: Last NRC Exam 2018 NRC Exam RO-4

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

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

Comments:

2023 NRC Exam
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Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #	1	
	Group #	1	
	K/A #	015 AK1.02	
	Importance Rating	3.9	

K/A Statement

(015AK1.02) **Reactor Coolant Pump Malfunctions:** Knowledge of the operational implications and/or cause and effect relationships of the following concepts as they apply to (APE 15) REACTOR COOLANT Pump Malfunctions. Consequences of an RCP failure

Proposed Question: RO 5 Rev: 0

Given:

- Plant is at 100% power
- RCP 1B shaft shears

Which of the following are the operational implications due to the sheared shaft on RCP 1B?

A. Automatic reactor trip due to a Low DNBR trip.

B. No automatic trip but a manual reactor trip is required.

C. Automatic reactor trip due to a Steam Generator low flow trip.

D. No reactor trip required with three Reactor Coolant Pumps running.

Proposed Answer: C

Explanation: (Optional)

A. Incorrect. The CPCs (low DNBR) would not trip the Reactor because CPCs detects flow from the RCP speed sensors, which is not affected by a sheared shaft. Plausible because RCP speed is an input to the Low DNBR trip.
B. Incorrect. Plausible if the applicant determines that the reactor will not trip due to speed sensors not able to "see" a sheared shaft event and is not aware of the purpose of the SG Low Flow Trip.
C. **CORRECT**: The SG Low Flow Trip provides protection against an RCP sheared shaft event. It monitors RCS flow on the primary side of the SG to trip the reactor on a loss of RCP flow. This trip actuates at 19.0 PSID across the primary side of the SG. This trip is necessary because the CPC-generated DNBR protection uses RCP speed sensors for RCS flow indication and can't "see" a loss of flow due to a sheared shaft event.
D. Incorrect. Plausible if the applicant determines that 3 RCPs running does not require the reactor to be tripped.

Technical Reference(s): SD-PPS page 26 and Figure 9 Rev. 23
(Attach if not previously provided)
(including version/revision number)

Proposed references to be provided
to applicants during examination: None

Learning Objective: WLP-OPS-PPS00 obj. 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 6,7
55.43

Comments:

2023 NRC Exam
RO Written Exam Worksheet

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #	1	
	Group #	1	
	K/A #	026 AK3.08	
	Importance Rating	3.4	

K/A Statement

(026 AK3.08) **Loss of Component Cooling Water:** Knowledge of the reasons for the following responses and/or actions as they apply to (APE 26) LOSS OF Component Cooling Water. Verifying CCW adequate surge tank level.

Proposed Question: RO 6 Rev: 0

Given:

- Component Cooling Water (CCW) Surge Tank level is lowering due to a CCW leak

The Reactor Coolant Pumps will lose CCW flow when the CCW surge tanks lower to ___(1)___ %.

If CCW flow cannot be restored to the CCW AB header within 10 minutes, CCW should not be restored to prevent damage to the _____(2)_____ .

	(1)	(2)
A.	24	RCP seals
B.	24	RCP bearings
C.	16	RCP seals
D.	16	RCP bearings

Proposed Answer: C

Explanation: (Optional)

A. Incorrect. Part 1 is plausible since 24% is the level that CCW makeup pumps are interlocked to start and stop. This value is also located in OP-901-510, CCW System Malfunction. Part 2 is correct.
B. Incorrect: Part 1 is plausible since 24% is the level that CCW makeup pumps are interlocked to start and stop. This value is also located in OP-901-510, CCW System Malfunction. Part 2 is plausible because RCP upper and lower bearings are supplied with CCW.
C. **CORRECT:** The CCW AB header isolates at 16% level. The Reactor Coolant Pumps are on the CCW AB header. OP-901-510 caution on page 15 states that "If component cooling water is lost to reactor coolant pump seals for > 10 minutes, then restoring component cooling water to reactor coolant pumps may result in seal failure". This question is comprehensive since the applicant must determine that the RCPs lose CCW when the CCW AB header isolates.
D. Incorrect. Part 1 is correct. Part 2 is plausible because RCP upper and lower bearings are supplied with CCW.

Technical Reference(s): OP-901-510 page 5, 6, and 11 Revision 305
(Attach if not previously provided)
(including version/revision number)

Proposed references to be provided to applicants during examination: None

Learning Objective: WLP-OPS-PPO51 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 2

10 CFR Part 55 Content: 55.41 3,10
55.43

Comments:

2023 NRC Exam
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Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #	1	
	Group #	1	
	K/A #	000027 AA1.01	
	Importance Rating	3.8	

K/A Statement

(027 AA1.01) **Pressurizer Pressure Control Malfunction:** Ability to operate and/or monitor the following as they apply to (APE 27) PRESSURIZER PRESSURE Control System Malfunction. PZR heaters, sprays, and PORVs.

Proposed Question: RO 7 Rev: 0

Given:

- Plant is at 100% power
- The in-service Pressurizer Pressure Control Channel has failed high

OP-901-120, Pressurizer Pressure Control Malfunction, directs the crew to place the pressurizer _____.

A. spray controller to MAN and adjust output to 0%

B. spray controller to MAN and adjust output to 100%

C. pressure controller to MAN and adjust output to 0%

D. pressure controller to MAN and adjust output to 100%

Proposed Answer: A

Explanation: (Optional)

A. **CORRECT**: The in-service Pressurizer Pressure Control Channel failing high will cause the output of the Pressurizer Pressure controller to rise. This controller feeds the Pressurizer Spray controller causing its output to raise therefore opening spray valves. OP-901-120 will direct the crew to take manual control of the spray valve controller and lower output to 0% close the spray valves.
B. Incorrect. Plausible to think that raising the output of the spray controller would cause pressurizer pressure to rise.
C. Incorrect. Plausible because adjusting the output of the pressurizer pressure controller would adjust the spray controller but this action is not fast enough to prevent a reactor trip. Adjusting output lower on the pressure controller works to raise Pressurizer pressure.
D. Incorrect. Plausible because adjusting the output of the pressurizer pressure controller would adjust the spray controller but this action is not fast enough to prevent the plant from tripping on low RCS pressure. Plausible to think that raising the output of the spray controller would cause pressurizer pressure to rise.

Technical Reference(s): OP-901-120 page 6 Rev. 303
(Attach if not previously provided)
(including version/revision number)

Proposed references to be provided
to applicants during examination: None

Learning Objective: WLP-OPS-PPO 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 2

10 CFR Part 55 Content: 55.41 7,10
55.43

Comments:

2023 NRC Exam
RO Written Exam Worksheet

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #	1	
	Group #	1	
	K/A #	029 EK1.03	
	Importance Rating	4.2	

K/A Statement

(029EK1.03) **Anticipated Transient Without Scram:** Knowledge of the operational implications and/or cause and effect relationships of the following concepts as they apply to (EPE 29) ANTICIPATED TRANSIENT WITHOUT SCRAM (ATWS). Addition of negative reactivity.

Proposed Question: RO 8 Rev: 0

Given:

- Reactor power is 1%
- A large steam leak upstream of MSIV B prompts the crew to trip the reactor
- A manual reactor trip using CP-2 pushbuttons was unsuccessful
- The crew tripped the reactor using the Diverse Reactor Trip System (DRTS)
- All CEAs have inserted into the core

The DRTS de-energized CEDM cabinets by opening the MG set ____(1)____.
Emergency boration _____(2)_____ to maintain shutdown margin.

	(1)	(2)
A.	supply breakers	IS required
B.	supply breakers	IS NOT required
C.	load contactors	IS required
D.	load contactors	IS NOT required

Proposed Answer: C

Explanation: (Optional)

A. Incorrect: DRTS opens the Motor-Generator Output contactors to de-energize CEDMCS. Second part is correct.
B. Incorrect: DRTS opens the Motor-Generator Output contactors to de-energize CEDMCS. OP-902-000, Standard Post Trip Action does not direct the operator to emergency borate when all CEAs insert into the core however, OP-901-103, Emergency Boration directs the operators to initiate emergency boration in response to an uncontrolled cooldown.
C. **CORRECT**: DRTS opens the Motor-Generator Output contactors to de-energize CEDMCS. The applicant must recognize that an uncontrolled cooldown is in progress and therefore emergency boration is required. OP-901-103, Emergency Boration directs the operators to initiate emergency boration in response to an uncontrolled cooldown.
D. Incorrect: First part is correct. OP-902-000, Standard Post Trip Action does not direct the operator to emergency borate when all CEAs insert into the core however, OP-901-103, Emergency Boration directs the operators to initiate emergency boration in response to an uncontrolled cooldown.

Technical Reference(s): OP-901-103 pages 2,3 Rev. 5
(Attach if not previously provided) SD-ATS page 9 Rev. 5
(including version/revision number) OP-902-000 page 5 Rev. 17

Proposed references to be provided
to applicants during examination: None

Learning Objective: WLP-OPS-PPO10 obj. 1,1 (As available)

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

Question History: Last NRC Exam 2015 RO NRC Exam

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

10 CFR Part 55 Content: 55.41 10
55.43 _____

Comments:

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #	1	
	Group #	1	
	K/A #	038 EA2.15	
	Importance Rating	4.0	

K/A Statement

(038EA2.15) **Steam Generator Tube Rupture:** Ability to determine and/or interpret the following as they apply to (EPE 38) STEAM GENERATOR Tube Rupture. RCS pressure

Proposed Question: RO 9 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 page 15 Rev. 21
(Attach if not previously provided) Steam Tables
(including version/revision number)

Proposed references to be provided
to applicants during examination: None

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

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

Question History: Last NRC Exam 2018 NRC RO Exam

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

10 CFR Part 55 Content: 55.41 14
55.43

Comments:

2023 NRC Exam
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Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #	1	
	Group #	1	
	K/A #	CE E05EK3.07	
	Importance Rating	3.7	

K/A Statement

(CE EO5EK3.07) **Steam Line Rupture:** Knowledge of the reasons for the following responses and/or actions as they apply to (CE E05) EXCESS STEAM DEMAND. Operating RCPs within operating limits

Proposed Question: RO 10 Rev: 0

OP-902-004, Excess Steam Demand Recovery Procedure, requires verifying no more than two Reactor Coolant Pumps running if Tcold is less than ___(1)___ °F to _____(2)_____.

	(1)	(2)
A.	380	prevent generating excessive core uplift forces
B.	380	aid in stabilizing Reactor Coolant System temperature after Steam Generator dryout
C.	230	prevent generating excessive core uplift forces
D.	230	aid in stabilizing Reactor Coolant System temperature after Steam Generator dryout

Proposed Answer: A

Explanation: (Optional)

A. **CORRECT**: Per OP-902-004, Tc < 380 requires 1 RCP in each loop to be secured. TG-OP-902-004 states that the PT limit curve specifies that one RCP should be tripped although OP-902-004 directs the crew to secure one RCP in each loop for even flow between the loops. The reason for this step identified in the Tech Guide is to prevent a core uplift problem.
B. Incorrect. The temperature is correct. The basis is incorrect per TG-OP-902-004; however, it is plausible that elimination of heat addition to the RCS would aid in stabilizing RCS temperature since Waterford's ADVs are not sufficient size to prevent needing to have a minimum EFW flow to aid in RCS temperature stabilization.
C. Incorrect. The temperature is incorrect. The temperature of 230°F is the minimum temperature for three pump configuration per OP-001-002. The basis is correct per TG-OP-902-004.
D. Incorrect. The temperature is incorrect. The temperature of 230°F is the minimum temperature for three pump configuration per OP-001-002. The basis is incorrect per OP-902-004; however, it is plausible that elimination of heat addition to the RCS would aid in stabilizing RCS temperature since Waterford's ADVs are not sufficient size to prevent needing to have a minimum EFW flow to aid in RCS temperature stabilization

Technical Reference(s): TGOP-902-004 page 28 Rev. 308
(Attach if not previously provided) OP-902-004 page 9 Revision 17
(including version/revision number) OP-001-002 page 4 Rev. 28

Proposed references to be provided
to applicants during examination: None

Learning Objective: WLP-OPS-PPE04 obj. 7 (As available)

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

Question History: Last NRC Exam 2017 NRC RO Exam

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

10 CFR Part 55 Content: 55.41 10
55.43 _____

Comments:

2023 NRC Exam
RO Written Exam Worksheet

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #	1	
	Group #	1	
	K/A #	054 G2.1.20	
	Importance Rating	4.6	

K/A Statement

(054) **Loss of Main Feedwater**: (G2.1.20) CONDUCT OF OPERATIONS: Ability to interpret and execute procedure steps.

Proposed Question: RO 11 Rev: 0

Given:

- The reactor is tripped due to an Inadvertent Main Steam Isolation Signal (MSIS)
- Emergency Feedwater (EFW) Pump A is danger tagged out
- An EFAS-1 and EFAS-2 have occurred

A subsequent loss of ____(1)____ would require entry into OP-902-006, Loss of Feedwater Recovery Procedure. Upon entry into OP-902-006, the crew will be required to secure ____(2)____.

	(1)	(2)
A.	EFW Pump B	all Reactor Coolant Pumps
B.	EFW Pump AB	all Reactor Coolant Pumps
C.	EFW Pump AB	one Reactor Coolant Pump in each loop
D.	EFW Pump B	one Reactor Coolant Pump in each loop

Proposed Answer: B

Explanation: (Optional)

A. Incorrect. EFW Pump AB supplies 100% capacity to the Steam Generators, therefore, the crew will not be required to enter OP-902-006 if EFW Pump AB is the only EFW Pump running. The applicant must interpret and execute the step in the Reactor Trip Recovery procedure that requires 100% feedwater flow. Part 2 is correct.

B. CORRECT: The inadvertent MSIS in the stem eliminated FW sources from MFW pumps and the AFW pump. The EFW motor driven pumps (EFW Pumps A and B) are 50% capacity. EFW Pump AB is 100% capacity. With the loss of EFW Pump AB, the Steam Generators no longer have 100% capacity feedwater flow and no longer meet the criteria in the Reactor Trip Recovery procedure. The diagnostic flow chart will direct the crew to enter OP-902-006, Loss of Feedwater Recovery Procedure. Upon entry into OP-902-006, the crew will be directed to secure all RCPs.

C. Incorrect. Part 1 is correct. Part 2 is plausible because the old revision of OP-902-006 had a step to secure one RCP in each loop if 100% emergency feedwater flow was available to the Steam Generators.

D. Incorrect. EFW Pump AB supplies 100% capacity to the Steam Generators, therefore, the crew will not be required to enter OP-902-006 if EFW Pump AB is the only EFW Pump running. The applicant must determine that OP-902-006 entry is required. Part 2 is plausible because the old revision of OP-902-006 had a step to secure one RCP in each loop if 100% emergency feedwater flow was available to the Steam Generators.

Technical Reference(s): OP-902-001 pages 7, 16 Rev. 16
(Attach if not previously provided) OP-902-009 Appendix 1 Note 2
(including version/revision number) OP-902-006 page 6 Rev. 19

Proposed references to be provided
to applicants during examination: None

Learning Objective: WLP-OPS-PPE01 obj 12, 16 (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 10
55.43

Comments:

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #	1	
	Group #	1	
	K/A #	000055 EA2.01	
	Importance Rating	3.5	

K/A Statement

(055EA2.01) **Station Blackout:** Ability to determine and/or interpret the following as they apply to (EPE55) Station Blackout: Existing valve positioning.

Proposed Question: RO 12 Rev: 0

Given:

- Station Blackout has occurred
- The crew has entered OP-902-005, Station Blackout
- Loss of DC power has occurred to EFW Pump AB Turbine Governor Valve
- The control Room has dispatched the RCA watch to determine the status of EFW Pump AB

Given these conditions, MS-416, EFW Pump AB Turbine Stop Valve is in the (1) position and MS-417, EFW Pump AB Turbine Governor is in the (2) position.

	(1)	(2)
A.	open	closed
B.	open	open
C.	closed	closed
D.	closed	open

Proposed Answer: D

Explanation: (Optional)

A. Incorrect. Part 1 is plausible because MS-416, EFW Pump AB Turbine Stop Valve, will close on the mechanical overspeed but the valve operator for this motor operated valve is still required to be taken to the closed position to reset the overspeed condition. This is necessary because MS-416 MOV has no power on the Station Blackout. Part 2 is plausible if the applicant determines that EFW Pump AB governor valve fails in the closed position and would not fail in an overspeed condition.
B. Incorrect. Part 1 is plausible because MS-416, EFW Pump AB Turbine Stop Valve, will close on the mechanical overspeed but the valve operator for this motor operated valve is still required to be taken to the closed position to reset the overspeed condition. This is necessary because MS-416 MOV has no power on the Station Blackout. Part 2 is correct.
C. Incorrect. Part 1 is correct. Part 2 is plausible if the applicant determines that EFW Pump AB governor valve fails in the closed position and would not fail in an overspeed condition.
D. **CORRECT**: On a loss of the AB-DC bus, EFW Pump AB governor valve will fail to the full open position causing EFW Pump AB to trip on a mechanical overspeed. This overspeed condition would close MS-416, EFW Pump AB Turbine Stop Valve through a mechanical leakage.

Technical Reference(s): OP-902-005 page 12 Rev. 23
(Attach if not previously provided) SD-EFW page 16 Rev. 18
(including version/revision number) OP-901-313 page 15 Rev. 308

Proposed references to be provided
to applicants during examination: None

Learning Objective: WLP-OPS-EFW00 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, 10
55.43

Comments:

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #	1	
	Group #	1	
	K/A #	056 AK1.07	
	Importance Rating	4.0	

K/A Statement

(056AK1.07) **Loss of Offsite Power:** Knowledge of the operational implications and/or cause and effect relationships of the following concepts as they apply to (APE 56) Loss of Offsite Power (CFR: 41.5 / 41.7 / 45.7 / 45.8): Long term core cooling

Proposed Question: RO 13 Rev: 0

Given:

- OP-902-003, Loss of Offsite Power/Loss of Forced Circulation Recovery has been implemented

After 30 minutes, which ONE of the following would indicate adequate single phase natural circulation flow?

A. Thot is 538°F and rising; Tcold is 529°F and constant.

B. RCS Subcooling based on representative CET temperature is 26°F and constant.

C. Thot is 480°F with Representative CET temperature 492°F.

D. Steam Generator pressures are 450 PSIA with RCS Tcold 450°F.

Proposed Answer: D

Explanation: (Optional)

A. Incorrect. Hot Leg temperature is not meeting natural circulation (NC) criteria. Natural Circulation criteria requires both Hot Leg and Cold Leg temperature constant or lowering.
B. Incorrect. Subcooling is <28°F, which does not meet Natural Circulation criteria of greater than or equal to 28°F.
C. Incorrect. Th and CET temperature are greater than 10°F, which does not meet Natural Circulation criteria of less than 10°F.
D. **CORRECT**: Steam Generator pressure is approximately equal to saturation pressure for the existing Tcold. This requirement is a contingency action for verifying Natural Circulation.

Technical Reference(s): OP-902-003 page 15 Revision 11
(Attach if not previously provided)
(including version/revision number)

Proposed references to be provided
to applicants during examination: None

Learning Objective: WLP-OPS-PPE05 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 10
55.43

Comments:

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #	1	
	Group #	1	
	K/A #	057 AA1.06	
	Importance Rating	3.8	

K/A Statement

(057AA1.06) **LOSS OF VITAL AC ELECTRICALINSTRUMENT BUS**: Ability to operate and/or monitor the following as they apply to (APE 57) LOSS OF VITAL AC ELECTRICALINSTRUMENT BUS: Manual control of components for which automatic control is lost

Proposed Question: RO 14 Rev: 0

Given:

- Reactor Coolant System cooldown is in progress using the Atmospheric Dump Valves (ADVs)
- The Main Condenser is unavailable
- Static Uninterruptible Power Supply (SUPS) SMC inverter fails

Due to the failure of SUPS SMC, Atmospheric Dump Valve 1 must be operated manually using the (1), because Atmospheric Dump Valve 1 failed (2).

	(1)	(2)
A.	handwheel only	closed
B.	handwheel only	open
C.	local air station or handwheel	closed
D.	local air station or handwheel	open

Proposed Answer: C

Explanation: (Optional)

A. Incorrect. The first part of this selection is incorrect. The handwheel is the not the only method for local operation of the ADV. OP-901-312 and OP-005-004 also have instructions for using the local air station and this would be the preferred method. The second part of this selection is correct. The ADV fails closed on loss of power or air.
B. Incorrect. The first part of this selection is incorrect. The handwheel is the not the only method for local operation of the ADV. OP-901-312 and OP-005-004 also have instructions for using the local air station and this would be the preferred method. The second part of this selection is incorrect. The ADV fails closed as a result of this failure. Other failures could cause the ADV to open as the result of the failure such as an air transducer failure or controller setpoint failure.
C. **CORRECT:** OP-901-312 and OP-005-004 have instructions for using the local air station and this would be the preferred method. OP-005-004 also has instructions for local handwheel operation which could be used if needed. The ADV fails closed on loss of power or air.
D. Incorrect. Correct operation methods. The second part of this selection is incorrect. The ADV fails closed as a result of this failure. Other failures could cause the ADV to open as the result of the failure such as an air transducer failure or controller setpoint failure.

Technical Reference(s): OP-901-312 pages 55, 75 Revision 324
(Attach if not previously provided) OP-005-004 pages 25-27 Rev. 37
(including version/revision number)

Proposed references to be provided
to applicants during examination: None

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

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

Question History: Last NRC Exam 2011 NRC RO Exam

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

10 CFR Part 55 Content: 55.41 7,10
55.43

Comments:

2023 NRC Exam
RO Written Exam Worksheet

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #	1	
	Group #	1	
	K/A #	058 G2.1.19	
	Importance Rating	3.9	

K/A Statement

(058) **Loss of DC Power:** (G2.1.19) CONDUCT OF OPERATIONS: Ability to use available indications to evaluate system or component status.

Proposed Question: RO 15 Rev: 0

Given:

- Loss of 125 Volt TGB-DC Bus has occurred
- Crew has entered OP-901-313, Loss of a 125 Volt DC Bus

The remote operation of the feeder breakers for the ____(1)____ feeder breakers is(are) lost.
All remote manual control and automatic protection of the switchgear and associated connected components are disabled for the ____(2)____.

	(1)	(2)
A.	2 bus only	1 and 2 busses
B.	2 bus only	2 bus only
C.	1 and 2 busses	1 and 2 busses
D.	1 and 2 busses	2 bus only

Proposed Answer: A

Explanation: (Optional)

A. **CORRECT:** The remote operation of the 2 bus feeder breakers are lost upon a loss of 125V TGB-DC. The 1A and 1B busses control power are fed from A and B DC Safety busses, so they are still available (designed this way to ensure RCP overcurrent protection is from a safety bus). The control power for both the 1 busses and the 2 busses are from TGB-DC. These busses will lose all indication in the control room and locally and remote/manual remote control are lost.
B. Incorrect. Part 1 is correct. The control power for both the 1 busses and the 2 busses are from TGB-DC. These busses will lose all indication in the control room and locally and remote/manual remote control are lost.
C. Incorrect. The remote operation of the 2 bus feeder breakers are lost upon a loss of 125V TGB-DC. The 1A and 1B busses control power are fed from A and B DC Safety busses, so they are still available (designed this way to ensure RCP overcurrent protection is from a safety bus). Part 2 is correct.
D. Incorrect. The remote operation of the 2 bus feeder breakers are lost upon a loss of 125V TGB-DC. The 1A and 1B busses control power are fed from A and B DC Safety busses, so they are still available (designed this way to ensure RCP overcurrent protection is from a safety bus). The control power for both the 1 busses and the 2 busses are from TGB-DC. These busses will lose all indication in the control room and locally and remote/manual remote control are lost.

Technical Reference(s): OP-901-313 pages 13 and 16 Rev 308
(Attach if not previously provided)
(including version/revision number)

Proposed references to be provided
to applicants during examination: None

Learning Objective: WLP-OPS-PP03 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 2

10 CFR Part 55 Content: 55.41 7
55.43

Comments:

2023 NRC Exam
RO Written Exam Worksheet

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #	1	
	Group #	1	
	K/A #	062 AK2.09	
	Importance Rating	3.3	

K/A Statement

(062AK2.09) **LOSS OF SERVICE WATER:** Knowledge of the relationship between (APE62) LOSS OF SERVICE WATER and the following systems or components: AFW System

Proposed Question: RO 16 Rev: 0

Per OP-902-009 Appendix 10, Transferring EFW Pump Suction, the transfer of EFW pump suction to Auxiliary Component Cooling Water (ACCW) should be completed by a CSP level of _____ to prevent EFW Pump cavitation.

A. 5%

B. 10%

C. 11%

D. 25%

Proposed Answer: C

Explanation: (Optional)

A. Incorrect. Plausible because 5% is from an older revision to EOPs that did not take instrument uncertainties into account.
B. Incorrect. Plausible because 10% is when action is required for an RWSP low level.
C. **CORRECT**: Appendix 10 of OP-902-009 states Transfer of EFW Pump suction should be completed by a CSP level of 11% to prevent cavitation of EFW pumps.
D. Incorrect. The optimal recovery procedures and OI-038-000, EOP Expectations/Guidance procedures states that ACCW flow to EFW should not be established until the CSP contents have depleted. The lineup should commence at 25% CSP level, however, ACCW flow to the suction of EFW should be completed before a CSP level of 11% is reached to prevent cavitation of the EFW Pumps.

Technical Reference(s): OP-902-009 Appendix 10 Rev. 323
(Attach if not previously provided)
(including version/revision number)

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 2
Comprehension or Analysis

10 CFR Part 55 Content: 55.41 8,10
55.43

Comments:

2023 NRC Exam
RO Written Exam Worksheet

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #	1	
	Group #	1	
	K/A #	065 AK3.03	
	Importance Rating	3.6	

K/A Statement

(065AK3.03) **Loss of Instrument Air:** Knowledge of the reasons for the following responses and/or actions as they apply to (APE 65) LOSS OF Instrument Air: Knowing effects on plant operation of isolating certain equipment from instrument air

Proposed Question: RO 17 Rev: 0

Given:

- Plant is in a refueling outage
- Shutdown Cooling Train A is in service and Train B is in standby
- SI-129A, LPSI Pump A Flow Control, is 20% open
- SI-415A, Shutdown Cooling HX A Temperature Control, is 50% open
- CC-963A, SDC HX A TCV is full open
- Shutdown Cooling Train A flow is 3000 gpm

An instrument Air tubing rupture occurs at SI-129A, LPSI Pump A Flow Control. The crew entered OP-901-511, Loss of Instrument Air Malfunction.

The crew should manually throttle SI-129A in the ____(1)____ direction because RCS temperature is ____(2)____.

	(1)	(2)
A.	closed	lowering
B.	closed	rising
C.	open	lowering
D.	open	rising

Proposed Answer: B

Explanation: (Optional)

A. Incorrect. Part 1 is correct. SI-415 does not respond automatically to SDC outlet temperature and will stay at 50% open. This failure will cause total SDC flow to rise and cause flow to bypass the SDC heat exchanger which will make RCS temperature rise.
B. **CORRECT**: SI-129A fails OPEN on a loss of air and will fail to the full open position. OP-901-511 directs the crew to manually throttle closed SI-129A. SI-415 does not respond automatically to SDC outlet temperature and will stay at 50% open. This failure will cause total SDC flow to rise and cause flow to bypass the SDC heat exchanger which will make RCS temperature rise.
C. Incorrect. SI-129A fails OPEN on a loss of air and will fail to the full open position. SI-415 does not respond automatically to SDC outlet temperature and will stay at 50% open. This failure will cause total SDC flow to rise and cause flow to bypass the SDC heat exchanger which will make RCS temperature rise. OP-901-511 directs the crew to manually throttle closed SI-129A.
D. Incorrect. SI-129A fails OPEN on a loss of air and will fail to the full open position. OP-901-511 directs the crew to manually throttle closed SI-129A. Part 2 is correct.

Technical Reference(s): OP-901-511 page 6 Rev. 19
(Attach if not previously provided) SD-SDC Pages 6,7,14,39 Rev. 9
(including version/revision number) OP-009-008 page 58 Revision 48

Proposed references to be provided
to applicants during examination: None

Learning Objective: WLP-OPS-PPO50 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 7
55.43

Comments:

2023 NRC Exam
RO Written Exam Worksheet

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #	1	
	Group #	1	
	K/A #	077 AA2.04	
	Importance Rating	3.6	

K/A Statement

(077AA2.04) **GENERATOR VOLTAGE AND ELECTRIC Grid Disturbances:** Ability to determine and/or interpret the following as they apply to (APE 77) GENERATOR VOLTAGE AND ELECTRIC Grid Disturbances: VAR

Proposed Question: RO 18 Rev: 0

Given:

- Reactor power is 100%
- A large load connected to the grid is lost causing a grid disturbance
- MVAR load changed from 20 MVAR out to 70 MVAR in

The administrative limit for MVAR IN as defined in OP-010-004, Power Operations __(1)__ being exceeded.

To restore MVAR load to 20 MVAR out, the crew should adjust the Main Generator voltage adjust regulator control switch to ____(2)____.

	(1)	(2)
A.	is	raise
B.	is	lower
C.	is not	raise
D.	is not	lower

Proposed Answer: C

Explanation: (Optional)

A. Incorrect. Part 1 is plausible because the applicant must know what the administrative limit for MVAR IN is to get this correct. Part 2 is correct.
B. Incorrect. Part 1 is plausible because the applicant must know what the administrative limit for MVAR IN is to get this correct. Part 2 is plausible because the applicant could determine taking the Voltage Adjust Regulator Switch to Lower would make the absolute number of MVAR go from 70 to 20.
C. **CORRECT**: In accordance with limitation 3.2.16 and step 9.8.1.9.1 in OP-010-004, Power Operations, the administrative limit for MVAR in is 75 MVAR. To raise MVARS (Less MVAR IN or More MVAR OUT), take the Voltage Adjust Regulator Switch to Raise.
D. Incorrect. Part 1 is correct. Part 2 is plausible because the applicant could determine taking the Voltage Adjust Regulator Switch to Lower would make the absolute number of MVAR go from 70 to 20.

Technical Reference(s): OP-010-004 pages 7, 65 Rev. 341
(Attach if not previously provided)
(including version/revision number)

Proposed references to be provided
to applicants during examination: None

Learning Objective: WLP-OPS-PPN01 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 5,10
55.43

Comments:

2023 NRC Exam
RO Written Exam Worksheet

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #	1	
	Group #	2	
	K/A #	001 G2.4.12	
	Importance Rating	4.0	

K/A Statement

(001) (APE 1) **Continuous Rod Withdrawal:** (G2.4.12) Knowledge of operating crew responsibilities during emergency and abnormal operations

Proposed Question: RO 19 Rev: 0

Given:

- Plant is at 5% power
- Group P CEAs are 85 inches withdrawn
- All other CEAs are at the Upper Electrical Limit
- ATC withdraws Group P CEAs 3 steps and releases the CEA Manual Shim switch
- CEA Group P CEAs continued stepping out

Which of the following is performed FIRST per OP-901-102, CEA or CEDMCS Malfunction?

A. Adjust Turbine load to match Tave and Tref.

B. Place the CEDMCS Mode Select switch to OFF.

C. Trip the Reactor and GO TO OP-902-000, Standard Post Trip Actions.

D. Momentarily place the Manual Shim Switch to insert and then release.

Proposed Answer: B

Explanation: (Optional)

A. Incorrect. Matching Tave and Tref by adjusting turbine load is plausible and is the third step of this procedure section. Matching Tave and Tref is the first step in many events such as a dropped rod.
B. **CORRECT**: Placing the CEMCS mode select switch to OFF is the first step directed in the "continuous movement of CEA group" section of OP-901-102, CEA or CEDMCS Malfunction. This step is performed in an attempt to stop the CEA group movement. This is a "quick" event and this step is important for the RO to know and may be performed before the off-normal is officially entered. The Mode Select switch to OFF is the method used to attempt to stop rod motion. Matching Tave and Tref by adjusting turbine load is plausible and is the third step of this procedure section. Matching Tave and Tref is the first step in many events such as a dropped rod.
C. Incorrect. Tripping the Reactor is performed when placing the CEDMCS mode select switch in OFF does not stop rod movement but is not the first step performed and not the preferred sequence.
D. Incorrect. Placing the CEA manual shim switch to insert and releasing it is not a step in the off-normal for continuous motion of a group of CEAs: however, it does hold the possibility of correcting the situation by exercising the switch contacts.

Technical Reference(s): OP-901-102 page 17 Rev. 308
(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 #
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:

2023 NRC Exam
RO Written Exam Worksheet

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #	1	
	Group #	2	
	K/A #	003 AA2.09	
	Importance Rating	3.8	

K/A Statement

(003AA2.09) **DROPPED Control Rod:** Ability to determine and/or interpret the following as they apply to (APE 3) DROPPED Control Rod: Reactor Power

Proposed Question: RO 20 Rev: 0

Given:

- Plant was operating at 80% when CEA 40 dropped into the core
- Crew has entered OP-901-102, CEA or CEDMCS Malfunction
- Crew is lowering power to comply with TS 3.1.3.1

The crew must be at or below the minimum requirement of (1) percent power within 30 minutes of the dropped rod. The down power can be stopped when reactor power reaches (2) percent.

	(1)	(2)
A.	70	60
B.	75	60
C.	70	50
D.	75	50

Proposed Answer: A

Explanation: (Optional)

A. **CORRECT**: COLR Figure 3 requires a power reduction of 10% 30 minutes from the time of the dropped rod. COLR Figure 3 requires a power reduction of 30% after a single CEA deviation, unless power is reduced to 60%, then no further reduction is required. Initial reactor power is 80%, therefore, the power reduction can be stopped at 60%.
B. Incorrect. Part 1 is plausible because COLR figure 3 is written in 5% increments. Part 2 is correct.
C. Incorrect. Part 1 is correct. Part 2 is plausible because COLR Figure 3 requires a power reduction of 30% after a single CEA deviation, unless power is reduced to 60%, then no further reduction is required. Initial reactor power is 80%, therefore, power reduction to 50% would be correct if the floor of 60% is not known.
D. Incorrect. Part 1 is plausible because COLR figure 3 is written in 5% increments. Part 2 is plausible because COLR Figure 3 requires a power reduction of 30% after a single CEA deviation, unless power is reduced to 60%, then no further reduction is required. Initial reactor power is 80%, therefore, power reduction to 50% would be correct if the floor of 60% is not known.

Technical Reference(s): OP-901-102 page 12 Rev. 308
(Attach if not previously provided) TS 3.1.3.1 and COLR Figure 3
(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 #
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:

2023 NRC Exam
RO Written Exam Worksheet

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #	1	
	Group #	2	
	K/A #	032 AK3.02	
	Importance Rating	3.5	

K/A Statement

(032AK3.02) **LOSS OF SOURCE RANGE Nuclear Instrumentation:** Knowledge of the reasons for the following responses and/or actions as they apply to (APE 32) LOSS OF SOURCE RANGE Nuclear Instrumentation: Guidance contained in procedures for loss of source range NI

Proposed Question: RO 21 Rev: 0

Given:

- Reactor Power is 5.5 X 10^{-8}
- "Startup Channel 1 OFF NORMAL" annunciates at CP-2
- The HV Control switch in Startup Channel #1 drawer is selected to PRIMARY

The annunciator response procedure will direct the crew to select ALTERNATE in Startup #1 channel drawer because ENI LOG _____ has failed high.

A. Channel A

B. Channel B

C. Channel C

D. Channel D

Proposed Answer: C

Explanation: (Optional)

A. Incorrect. Log Channel A controls high voltage shutoff to Startup Channel 2 if the HV control Switch in Startup Channel 2 is selected to Primary
B. Incorrect. Log Channel B controls high voltage shutoff to Startup Channel 2 if the HV control Switch in Startup Channel 2 is selected to Alternate
C. **CORRECT:** The startup channels are de-energized by the $5X10^{-6}$% bistables of the selected log channel. Log Channel C controls high voltage shutoff to Startup Channel 1 if the HV control Switch in Startup Channel 1 is selected to Primary. The power source to startup channel 1 will be log channel D when the HV control switch is taken to alternate and High Voltage power will be restored
D. Incorrect. Log Channel D controls high voltage shutoff to Startup Channel 1 if the HV control Switch in Startup Channel 1 is selected to Alternate.

Technical Reference(s): OP-500-008 attachments 4.93 and 4.94. Rev. 26
(Attach if not previously provided)
(including version/revision number)

Proposed references to be provided to applicants during examination: None

Learning Objective: WLP-OPS-ENI00 obj. 2 and 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 6, 10
55.43

Comments:

2023 NRC Exam
RO Written Exam Worksheet

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #	1	
	Group #	2	
	K/A #	033 AA1.02	
	Importance Rating	3.3	

K/A Statement

(033AA1.02) **LOSS OF INTERMEDIATE RANGE Nuclear Instrumentation**: Ability to operate and/or monitor the following as they apply to (APE 33) LOSS OF INTERMEDIATE RANGE Nuclear Instrumentation: Level trip bypass

Proposed Question: RO 22 Rev: 0

Given:

- Plant is in Mode 4
- The 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 be in bypass following the middle detector failing high?

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}%. The Hi Log Power trip bypass must be manually restored 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 no auto feature and is manually initiated and removed from service. This trip bypass is administratively controlled.

Technical Reference(s): WLP-OPS-PPS00 pages 30-32 Rev. 18
(Attach if not previously provided)
(including version/revision number)

Proposed references to be provided
to applicants during examination: None

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

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

Question History: Last NRC Exam 2018 RO NRC Exam

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

10 CFR Part 55 Content: 55.41 2
55.43

Comments:

2023 NRC Exam
RO Written Exam Worksheet

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #	1	
	Group #	2	
	K/A #	037 G2.2.22	
	Importance Rating	4.0	

K/A Statement

(037) (APE 37) **Steam Generator Tube Leak**: (G2.2.22) EQUIPMENT CONTROL: Knowledge of limiting conditions for operation and safety limits

Proposed Question: RO 23 Rev: 0

Given:

- A Steam Generator Tube Leak is in progress and the crew has implemented OP-901-202, Steam Generator Tube Leakage or High Activity
- AE Discharge Radiation Monitor is in HIGH Alarm
- PSLR indicates 0.04 GPM into Steam Generator #1
- PSLR indicates 0.05 GPM into Steam Generator #2
- Secondary Coolant Specific Activity is 0.11 µci/gram DEI-131

Which ONE of the following conditions will require a plant shutdown in accordance with OP-010-005, Plant Shutdown?

A. Secondary Coolant Specific Activity
B. AE Discharge Radiation Monitor is in HIGH Alarm
C. Primary to Secondary Leak in Steam Generator #2
D. Combined Primary to Secondary Leakage in Steam Generator #1 and Steam Generator #2

Proposed Answer: A

Explanation: (Optional)

A. **CORRECT**: OP-901-202 step 4 requires a plant shutdown in accordance with OP-010-005 if the Specific activity of the Secondary Coolant System is >.1 microci/gram Dose Equivalent I-131. This step complies with the actions required in TS 3.7.1.4. This action is in effect if leakage is < 75 gpd, because if and steam generator leakage is > 75 gpd, a rapid plant power reduction is required.
B. Incorrect. AE Discharge Radiation Monitor is in HIGH Alarm is plausible because it is listed in OP-901-202 as the primary Rad Monitor which has the sensitivity to measure small Primary to Secondary Leakage. There is no required shutdown for this Rad Monitor being in high alarm.
C. Incorrect. Leakage in SG#2 is 72 gpd (.05 gpmx60x24). The limit in TS 3.4.5.2 and the requirement in step 3 of OP-901-202 is 75 gpd. No shutdown is required.
D. Incorrect. Plausible if the applicant determines that the combined leakage of the two steam generators meet the threshold of TS 3.4.5.2. TS 3.4.5.2 limits is for leakage in one steam generator.

Technical Reference(s): OP-901-202 pages 9, 10 Rev. 16
(Attach if not previously provided) TS 3.4.5.2
(including version/revision number) TS 3.7.1.4

Proposed references to be provided
to applicants during examination: None

Learning Objective: WLP-OPS-PPO2 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 10
55.43

Comments:

2023 NRC Exam
RO Written Exam Worksheet

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #	1	
	Group #	2	
	K/A #	074 EK2.07	
	Importance Rating	3.4	

K/A Statement

(000074EK2.03) Knowledge of the relationship between (EPE 74) Inadequate Core Cooling and the following systems or components (CFR: 41.8 / 41.10 / 45.3): Main steam system

Proposed Question: RO 24 Rev: 0

Per TS 3.7.1.7, Atmospheric Dump Valves, the Atmospheric Dump Valve controller setpoints are required to be operable prior to exceeding ____(1)____ percent power. The basis for this requirement is to mitigate the effects of a ____(2)____.

	(1)	(2)
A.	70	Small Break LOCA
B.	70	Station Blackout
C.	85	Small Break LOCA
D.	85	Station Blackout

Proposed Answer: A

Explanation: (Optional)

A. **CORRECT:** Per TS 3.7.1.7, the ADV automatic actuation channels shall be operable greater than 70% Rated Thermal Power. Per TS 3.7.1.7 basis, above 70% power, an ADV is required along with a HPSI Train to mitigate the effects of a SBLOCA to ensure adequate core cooling.
B. Incorrect: Per TS 3.7.1.7 basis, above 70% power, an ADV is required along with a HPSI Train to mitigate the effects of a SBLOCA. The station blackout is credible due to the importance of the ADVs during a loss of all power.
C. Incorrect: 85% power is the power level that the plant is required to reduce to in the event of one MSSV inoperable.
D. Incorrect. 85% power is the power level that the plant is required to reduce to in the event of one MSSV inoperable. Per TS 3.7.1.7 basis, above 70% power, an ADV is required along with a HPSI Train to mitigate the effects of a SBLOCA to ensure adequate core cooling.

Technical Reference(s): TS 3.7.1.7
(Attach if not previously provided) TS 3.7.1.7 basis
(including version/revision number)

Proposed references to be provided
to applicants during examination: None

Learning Objective: WLP-OPS MS00 obj. 6 (As available)

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

Question History: Last NRC Exam 2014 RO NRC Exam

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

10 CFR Part 55 Content: 55.41 4
55.43

Comments:

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #	1	
	Group #	2	
	K/A #	CE A16 AK1.06	
	Importance Rating	3.8	

K/A Statement

(CE A16AK1.06) **EXCESS RCS Leakage:** Knowledge of the operational implications and/or cause and effect relationships of the following concepts as they apply to (CE A16) EXCESS RCS Leakage: Methods for quantifying an RCS leak

Proposed Question: RO 25 Rev: 0

Given:

- Plant is at 100% power
- The crew has entered OP-901-111, Reactor Coolant System Leak
- Charging Pump A is running
- Pressurizer level is 55% and slowly lowering
- The Standby Charging Pumps selector switch is selected to the B-AB position

To allow for a more accurate leak rate determination, OP-901-111, Reactor Coolant System Leak, provides the guidance to ____(1)____.

The ATC should determine an RCS leak rate by subtracting the total of ____(2)____.

	(1)	(2)
A.	place Charging Pump B control switch to the ON position	Charging flow and RCP CBO flow from Letdown flow
B.	place the Letdown Flow controller to manual	Charging flow and RCP CBO flow from Letdown flow
C.	place the Letdown Flow controller to manual	Letdown flow and RCP CBO flow from Charging flow
D.	place Charging Pump B control switch to the ON position	Letdown flow and RCP CBO flow from Charging flow

Proposed Answer: D

Explanation: (Optional)

A. Incorrect. Part 1 is correct. A leakrate will be determined by subtracting the total of letdown flow and RCP CBO flow from charging flow.
B. Incorrect. Plausible because placing the letdown flow controller to manual will maintain a steady letdown flow, but this is not what OP-901-111 directs. A leakrate will be determined by subtracting the total of letdown flow and RCP CBO flow from charging flow.
C. Incorrect. Plausible because placing the letdown flow controller to manual will maintain a steady letdown flow, but this is not what OP-901-111 directs. Part 2 is correct.
D. **CORRECT**: Note in OP-901-111 states if RCS leakage will result in a backup charging Pump cycling to maintain pressurizer level, starting and continuously running (place to on) an additional Charging Pump will allow for a more accurate leakrate determination. A leakrate will be determined by subtracting the total of letdown flow and RCP CBO flow from charging flow.

Technical Reference(s): OP-901-111 page 8 Rev. 307
(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 # X
Modified Bank # _____ (Note changes or attach parent)
New _____

Question History: Last NRC Exam 2015 NRC RO Exam

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

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

Comments:

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #	1	
	Group #	2	
	K/A #	CE E13 EA1.14	
	Importance Rating	2.7	

K/A Statement

(CE13EA1.14) **LOSS OF FORCED CIRCULATION AND/OR LOOP AND/OR A BLACKOUT:** Ability to operate and/or monitor the following as they apply to (CE E13) LOSS OF FORCED CIRCULATION AND/OR LOOP AND/OR A BLACKOUT: MFW system

Proposed Question: RO 26 Rev: 0

Given:

- Power is 100%
- SG-ILR-1111, Steam Generator 1 Narrow Range level indicator is reading 0% on the CP-1 recorder
- SG-ILR-1105, Steam Generator 1 Narrow Range level indicator is reading 68% on the CP-1 recorder
- All Narrow Range Steam Generator levels on CP-8 are indicating 68%
- A reactor trip occurs due to a loss of Component Cooling Water to the Reactor Coolant Pumps
- The crew has entered OP-902-003, Loss of Offsite Power/ Loss of Forced Circulation Recovery Procedure

The BOP operator should place the Steam Generator 1 Main Feedwater control system in its required position by manually _____.

A. adjusting the Main Feedwater Pump A speed controller to 3900 rpm only

B. closing the Main Feedwater Regulating Valve A and Startup Feedwater Regulating Valve A only

C. closing the Main Feedwater Regulating Valve A and adjusting the Startup Feedwater Regulating Valve A to 13-21% open only

D. adjusting the Main Feedwater Pump A speed controller to 3900 rpm, close Main Feedwater Regulating Valve A, adjust Startup Feedwater Regulating Valve A to 13-21% open

Proposed Answer: C

Explanation: (Optional)

A. Incorrect. Plausible if the applicant is not aware that the Main Feed Regulating Valve and Startup Feed Regulating valve have not swapped to the manual position due to the level deviation.
B. Incorrect. Plausible if the applicant is not aware the Startup Feed Regulating Valve is required to be throttled 13-21% open for a Reactor Trip override.
C. **CORRECT**: Level deviation exists in the FWCS #1. The level deviation shifts the Feed pump speed controller, Main feedwater regulating valve controller and the Startup Feedwater Regulating Valve controllers to manual. Upon the reactor trip, Feed pump speed controller swaps to auto and goes to 3900 RPM. The Main Feedwater Regulating Valve Controller and Startup Feedwater Regulating Valves are still in manual and do **NOT** go to Reactor Trip Override position. The crew will be directed to place FWCS in RTO during Standard Post Trip Actions.
D. Incorrect. Plausible if the applicant is not aware of the swap to auto feature of the Main Feed Pump speed controller on a RTO.

Technical Reference(s): OP-901-201 page 5, Att. 1 Rev. 7
(Attach if not previously provided) OP-902-000 page 11 Rev. 17
(including version/revision number) WLP-OPS-PPO20 slide 20

Proposed references to be provided
to applicants during examination: None

Learning Objective: WLP-OPS-PPO20 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 4,10
55.43

Comments:

2023 NRC Exam
RO Written Exam Worksheet

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #	1	
	Group #	2	
	K/A #	003 A1.05	
	Importance Rating	3.4	

K/A Statement

(003 A1.05) **REACTOR COOLANT PUMP SYSTEM:** Ability to predict and/ or monitor changes in parameters associated with operation of the REACTOR COOLANT PUMP SYSTEM including: RCS flow

Proposed Question: RO 27 Rev: 0

Given:

- The reactor was manually tripped due to 1A RCP ARRD High Temperature
- 1A RCP has been secured
- Five minutes later, the ATC reports that the RCP PMC Mimic indicates RCP 1A speed is 600 rpm

OP-901-130, Reactor Coolant Pump Malfunction, provides the guidance to trip the reactor if ARRD temperature exceeds ____(1)____ °F.

Based on the above conditions, the crew should _____(2)_____.

	(1)	(2)
A.	225	remove reactor coolant pump 1B from service only
B.	210	remove reactor coolant pump 1B from service only
C.	225	remove all reactor coolant pumps from service
D.	210	remove all reactor coolant pumps from service

Proposed Answer: C

Explanation: (Optional)

A. Incorrect. Part 1 is correct. With the given conditions, RCP 1A is reverse rotating even though speed on the RCP mimic is indicating a positive number. This guidance on RCP speed indication is given in a note in the Reverse rotation section of OP-901-130. If RCP is reverse rotating, all RCPs must be secured. Part 2 is plausible because RCP 1B is on the same loop as RCP 1A and forced flow would be maintained.
B. Incorrect. Per OP-901-130, the crew is required to trip the reactor and secure the affected RCP when ARRD temperature exceeds 225 °F. At 210°F, a plant shutdown must be commenced. With the given conditions, RCP 1A is reverse rotating. Part 2 is plausible because RCP 1B is on the same loop as RCP 1A and forced flow would be maintained
C. **CORRECT**: Per OP-901-130, the crew is required to trip the reactor and secure the affected RCP when ARRD temperature exceeds 225 °F. With the given conditions, RCP 1A is reverse rotating even though speed on the RCP mimic is indicating a positive number. This guidance on RCP speed indication is given in a note in the Reverse rotation section of OP-901-130. If a RCP is reverse rotating, all RCPs must be secured. The question meets the K/A because the operator is monitoring for reverse flow through the RCP.
D. Incorrect. Per OP-901-130, the crew is required to trip the reactor and secure the affected RCP when ARRD temperature exceeds 225 °F. At 210°F, a plant shutdown must be commenced. Part 2 is correct.

Technical Reference(s): OP-901-130 page 7, 19, 21 Revision 12
(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 # X
Modified Bank # (Note changes or attach parent)
New

Question History: Last NRC Exam 2015 NRC RO Exam

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

10 CFR Part 55 Content: 55.41 10
55.43

Comments:

2023 NRC Exam
RO Written Exam Worksheet

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #	2	
	Group #	1	
	K/A #	003 G2.1.28	
	Importance Rating	4.1	

K/A Statement

(003) (SF4P RCP) **REACTOR COOLANT PUMP SYSTEM:** (G2.1.28) CONDUCT OF OPERATIONS: Knowledge of the purpose and function of major system components and controls

Proposed Question: RO 28 Rev: 0

The ATC notes the following indications on RCP 1A:

- Vapor Seal is 45 PSIG
- Upper Seal is 910 PSIG
- Middle Seal is 2190 PSI
- RCS pressure is 2250 PSIA

Which ONE of the following RCP 1A seals has failed or is degraded?

A. Vapor

B. Upper

C. Middle

D. Lower

Proposed Answer: D

Explanation: (Optional)

A. Incorrect. Normal pressure range is 25 to 45 PSIG. Pressure is high in the band due to a failed lower seal.
B. Incorrect. Normal pressure range is 585 to 915 PSIG. Upper seal pressure is high in the band due to a failed lower seal. The upper seal is working properly.
C. Incorrect. Normal pressure range is 1237 to 1815 PSIG. The middle seal pressure is out of band high due a failed lower seal.
D. **CORRECT:** The D/P between RCS pressure and the lower seal is less than 100 psid. The D/P is outside of the range given in OP-901-130. A D/P of less than 100 psid is indicates of a failed seal. These parameters are indicative of a lower seal failure**.**

Technical Reference(s): OP-901-130 page 9 Rev. 12
(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 #
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:

2023 NRC Exam
RO Written Exam Worksheet

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #	2	
	Group #	1	
	K/A #	004 A2.22	
	Importance Rating	3.4	

K/A Statement

(004A2.22) **CHEMICAL AND VOLUME CONTROL SYSTEM:** Ability to (a) predict the impacts of the following on the (SF1; SF2 CVCS) CHEMICAL AND VOLUME CONTROL SYSTEM and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal operations: Mismatch of letdown and charging flows

Proposed Question: RO 29 Rev: 0

Given:

- Plant is operating at 100% power
- Charging Pumps A and B are running for RCS clean-up
- Pressurizer Level Control CHANNEL SELECT switch is selected to Channel X

Now:

- Pressurizer Level Control Channel RC-ILT-0110X fails low

Pressurizer level will initially __(1)__. OP-901-110, Pressurizer Level Control Malfunction, will direct the operator to first __(2)__.

	(1)	(2)
A.	lower	transfer Pressurizer Level Control CHANNEL SELECT switch to non-faulted channel
B.	rise	place the Pressurizer Level Controller in MAN and adjust output
C.	lower	place the Pressurizer Level Controller in MAN and adjust output
D.	rise	transfer Pressurizer Level Control CHANNEL SELECT switch to non-faulted channel

Proposed Answer: B

Explanation: (Optional)

A. Incorrect. With the in-service pressurizer level control channel failed low, the PLCS will see a low level and start all backup charging pumps which would cause pressurizer level to rise, not lower. Part 2 is plausible because it is the second step to perform when an in-service pressurizer level control channel fails. Pressurizer level is restored to setpoint first because selecting the non-faulted channel may cause automatic actions to occur if actual level is not at program level.
B. **CORRECT:** With the in-service pressurizer level control channel failed low, the PLCS will see a low level and start all backup charging pumps which would cause pressurizer level to rise. The first step for a failed pressurizer level control channel is to transfer place the Pressurizer Level Controller in MAN and adjust output. The second step is to select the operable channel.
C. Incorrect. With the in-service pressurizer level control channel failed low, the PLCS will see a low level and start all backup charging pumps which would cause pressurizer level to rise, not lower. Part 2 is correct.
D. Incorrect. Part 1 is correct. Part 2 is plausible because it is the second step to perform when an in-service pressurizer level control channel fails. Pressurizer level is restored to setpoint first because selecting the non-faulted channel may cause automatic actions to occur if actual level is not at program level.

Technical Reference(s): OP-901-110 page 7 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-PPO1 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 2

10 CFR Part 55 Content: 55.41 7,10
55.43

Comments:

2023 NRC Exam
RO Written Exam Worksheet

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #	2	
	Group #	1	
	K/A #	004 K6.07	
	Importance Rating	3.4	

K/A Statement

(004K6.07) **CHEMICAL AND VOLUME CONTROL SYSTEM:** Knowledge of the effect of the following plant conditions, system malfunctions, or component malfunctions on the (SF1; SF2 CVCS) CHEMICAL AND VOLUME CONTROL SYSTEM: Regenerative and nonregenerative heat exchangers.

Proposed Question: RO 30 Rev: 0

Given:

- Plant operating at 100% power
- Charging Pump B is running with Charging Pumps A and AB in standby

Upon a trip of Charging Pump B, the first backup charging pump is designed to start at a pressurizer level of __(1)__ %. If uncorrected, letdown should isolate on __(2)__ heat exchanger outlet temperature.

	(1)	(2)
A.	51.7	Regenerative
B.	51.7	Letdown
C.	53.1	Letdown
D.	53.1	Regenerative

Proposed Answer: D

Explanation: (Optional)

A. Incorrect: The PLCS is designed such that the first Backup Charging Pump will start at a Pressurizer level deviation of 2.5%. The second Charging Pump will start at a level deviation of 3.9% which would equate to a level of 51.7% at 100% power. Part 2 is correct.
B. Incorrect. The PLCS is designed such that the first Backup Charging Pump will start at a Pressurizer level deviation of 2.5%. The second Charging Pump will start at a level deviation of 3.9% which would equate to a level of 51.7% at 100% power. A loss of Charging flow will raise Regenerative HX outlet temperature. If temperature reaches 470ºF, letdown will isolate. The letdown HX is downstream of the Regenerative HX and is cooled by CCW
C. Incorrect. Part 1 is correct. A loss of Charging flow will raise Regenerative HX outlet temperature. If temperature reaches 470ºF, letdown will isolate. The letdown HX is downstream of the Regenerative HX and is cooled by CCW.
D. **CORRECT**: The PLCS is designed such that the first Backup Charging Pump will start at a Pressurizer level deviation of 2.5%. The applicant must know that Pressurizer level at 100% power is programmed at 55.6%. Charging flow is the cooling medium for the Regenerative HX. Therefore, a loss of Charging flow will raise Regenerative HX outlet temperature. If temperature reaches 470ºF, letdown will isolate.

Technical Reference(s): OP-901-112 page 5 and 8 Revision 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 obj. 3 (As available)

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

Question History: Last NRC Exam 2017 NRC RO 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 #	005 K6.16	
	Importance Rating	3.9	

K/A Statement

(005K6.16) **RESIDUAL HEAT REMOVAL SYSTEM:** Knowledge of the effect of the following plant conditions, system malfunctions, or component malfunctions on the (SF4P RHR) RESIDUAL HEAT REMOVAL SYSTEM: Injection and/or recirculation valves

Proposed Question: RO 31 Rev: 0

Given:

- An RCS drain down to less than 20 feet MSL is in progress in accordance with OP-001-003, RCS Drain Down
- Shutdown Cooling (SDC) Train A is in service
- LPSI Flow Control Valves (SI-138A and SI-139A) have been placed in their transient flow limiting positon

Throttling the in-service LPSI Flow control valves to their transient flow limiting positions will limit maximum SDC Train A flow to __(1)__ gpm. This is performed to prevent __(2)__

	(1)	(2)
A.	3,000	vortexing in the RCS
B.	3,000	diverting flow from the SDC Heat Exchanger
C.	4,000	vortexing in the RCS
D.	4,000	diverting flow from the SDC Heat Exchanger

Proposed Answer: A

Explanation: (Optional)

A. **CORRECT:** Throttling the in-service SDC train LPSI Flow control valves is performed to limit maximum Transient SDC flow to 3000 gpm while the RCS is at a lowered inventory condition (20 feet MSL).This high flow could occur if SI-129 (SDC Flow Control Valve) fails open. Flow is limited to 3000 gpm to prevent vortexing in the RCS.
B. Incorrect. Part 1 is correct. Part 2 is plausible because this is the reason flow must not be taken to greater than 3,000 gpm if the LPSI FCVs are throttled, but this not the reason the LPSI FCVs are throttled.
C. Incorrect. Part 1 is plausible because both 3000 gpm and 4000 gpm are Tech Spec required flow rates based on hours after shutdown and both numbers are referenced to in the RCS drain down procedure (OP-001-003). Part 2 is correct.
D. Incorrect. Part 1 is plausible because both 3000 gpm and 4000 gpm are Tech Spec required flow rates based on hours after shutdown and both numbers are referenced to in the RCS drain down procedure (OP-001-003). Part 2 is plausible because this is the reason flow must not be taken to greater than 3,000 gpm if the LPSI FCVs are throttled, but this not the reason the LPSI FCVs are throttled.

Technical Reference(s): OP-001-003 page 38 Revision 328
(Attach if not previously provided) WLP-OPS-REQ13 slide 118 notes Rev. 28
(including version/revision number)

Proposed references to be provided
to applicants during examination: None

Learning Objective: WLP-OPS-REQ13 obj. 1 (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 7,10
55.43

Comments:

2023 NRC Exam
RO Written Exam Worksheet

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #	2	
	Group #	1	
	K/A #	006 A2.02	
	Importance Rating	3.9	

K/A Statement

(006A2.02) **EMERGENCY CORE COOLING SYSTEM:** Ability to (a) predict the impacts of the following on the (SF2; SF3 ECCS) EMERGENCY CORE COOLING SYSTEM and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal operations: Loss of flowpath

Proposed Question: RO 32 Rev: 0

Given:

- A LOCA occurred 15 minutes ago
- The crew has entered OP-902-002, Loss of Coolant Accident Recovery
- RCS Pressure is 500 psia and stable
- All ESFAS actuations occurred as required
- HPSI flow to Cold Leg 1A is below the HPSI Flow Curve
- LPSI flow to both RCS loops is zero gpm

In accordance with the HPSI and LPSI flow curves located in OP-902-009, Standard Appendices, which of the following is true?

A. Both HPSI and LPSI flow curves are being met

B. Both HPSI and LPSI flow curves are <u>not</u> being met.

C. HPSI flow curves are met and the LPSI flow curves are <u>not</u> met.

D. LPSI flow curves are met and the HPSI flow curves are <u>not</u> met.

Proposed Answer: D

Explanation: (Optional)

A. Incorrect. The current RCS pressure is above 200 psia, which is above LPSI shutoff head. Therefore, LPSI flow is meeting the curve in Attachment 2F. HPSI flow curves are not being met, because one injection line is below the required curve. Plausible because only one LPSI train has to meet the curve to obtain required flow.
B. Incorrect. The applicant could assume LPSI flow is not within the curve if it is not determined that RCS pressure is above LPSI shutoff head. HPSI flow curves are not met.
C. Incorrect. The applicant could assume LPSI flow is not within the curve if it is not determined that RCS pressure is above LPSI shutoff head. Attachment 2E of OP-902-009 provides the required HPSI flow for the applicable RCS pressure. The required flow is for each injection line. With one injection line below the curve, HPSI flow is not being met.
D. **CORRECT**: Attachment 2E of OP-902-009 provides the required HPSI flow for the applicable RCS pressure. The required flow is for each injection line. With one injection line below the curve, HPSI flow is not being met. The current RCS pressure is above 200 psia, which is above LPSI shutoff head. Therefore, LPSI flow is meeting the curve in Attachment 2F.

Technical Reference(s): OP-902-009 Attachments 2E and 2F Rev. 323
(Attach if not previously provided)
(including version/revision number)

Proposed references to be provided to applicants during examination: None

Learning Objective: WLP-OPS-PPE01 (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:

2023 NRC Exam
RO Written Exam Worksheet

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #	2	
	Group #	1	
	K/A #	007 A2.02	
	Importance Rating	3.6	

K/A Statement

(007A2.02) **PRESSURIZER RELIEF/QUENCH TANK SYSTEM**: Ability to (a) predict the impacts of the following on the (SF5 PRTS) PRESSURIZER RELIEF/QUENCH TANK SYSTEM and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal operations: Abnormal pressure in the PRT/quench tank

Proposed Question: RO 33 Rev: 0

Given:

- Plant is at 100% power
- The following annunciators are received:

  QUENCH TANK PRESSURE HI

  QUENCH TANK LEVEL HI/LO

The crew should monitor pressure in the ____(1)____ tank while draining the Quench Tank. If pressure in the Quench Tank were allowed to rise, the Quench tank rupture disc would rupture at a pressure of ____(2)____.

	(1)	(2)
A.	holdup	124 psig
B.	holdup	150 psig
C.	reactor drain	124 psig
D.	reactor drain	150 psig

Proposed Answer: C

Explanation: (Optional)

A. Incorrect. Part 1 is plausible because the holdup tanks accept borated waste water but not from the Quench Tank. Part 2 is correct.
B. Incorrect. Part 1 is plausible because the holdup tanks accept borated waste water but not from the Quench Tank. Part 2 is plausible because CBO would divert to the quench tank at a pressure of 150 psig.
C. **CORRECT:** The annunciator response and Boron Management procedure direct the crew to monitor pressure in the Reactor Drain Tank while draining the quench tank. The annunciator response states that the Quench Tank rupture disc will rupture at 124 psig.
D. Incorrect. Part 1 is correct. Part 2 is plausible because CBO would divert to the quench tank at a pressure of 150 psig.

Technical Reference(s): OP-500-008 Attachment 4.2 and 4.12 Rev. 48
(Attach if not previously provided) OP-007-001 page 87 Revision 40
(including version/revision number)

Proposed references to be provided
to applicants during examination: None

Learning Objective: WLP-OPS-RCS00 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 7
55.43

Comments:

2023 NRC Exam
RO Written Exam Worksheet

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #	2	
	Group #	1	
	K/A #	007 A3.01	
	Importance Rating	3.4	

K/A Statement

(007A3.01) **PRESSURIZER RELIEF/QUENCH TANK SYSTEM:** Ability to monitor automatic features of the (SF5 PRTS) PRESSURIZER RELIEF/QUENCH TANK SYSTEM, including: Components that discharge to the PRT/quench tank

Proposed Question: RO 34 Rev: 0

A Steam Generator Tube Rupture has occurred resulting in an automatic Safety Injection Actuation Signal (SIAS) and Containment Isolation Actuation Signal (CIAS).

Realignment of ___(1)___ could result in a rise in Quench Tank pressure and temperature. This piping is normally aligned to the ___(2)___.

	(1)	(2)
A.	RCP Control Bleedoff	Volume Control Tank
B.	RCP Vapor Seal Leak Off	Volume Control Tank
C.	RCP Control Bleedoff	Containment Sump
D.	RCP Vapor Seal Leak Off	Containment Sump

Proposed Answer: A

Explanation: (Optional)

A. **CORRECT**: RC-606, RCP Control Bleedoff Inside Containment Isolation Valve closes on a CIAS, redirecting RCP control bleedoff to the quench tank through a relief valve (RC-603).Controlled bleedoff from the Reactor Coolant Pumps is normally aligned to the Volume Control Tank (VCT).
B. Incorrect. RCP Vapor seal leakage is directed to the containment sump at all times. Normally aligned to the VCT is plausible because RCP CBO is normally aligned to the VCT.
C. Incorrect. Part 1 is correct. Part 2 is plausible because RCP Vapor Seal Leakage is normally aligned to the containment sump.
D. Incorrect. RCP Vapor seal leakage is directed to the containment sump at all times. Part 2 is correct.

Technical Reference(s): SD-CVC pages 39, 40, Figure 9 Rev. 20
(Attach if not previously provided) SD-RCS page 20 Rev. 26
(including version/revision number)

Proposed references to be provided
to applicants during examination: None

Learning Objective: WLP-OPS-RCS00 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
Comprehension or Analysis 2

10 CFR Part 55 Content: 55.41 7
55.43

Comments:

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #	2	
	Group #	1	
	K/A #	008 A4.04	
	Importance Rating	2.8	

K/A Statement

(008A4.04) **COMPONENT COOLING WATER SYSTEM:** Ability to manually operate and/or monitor the (SF8 CCW) COMPONENT COOLING WATER SYSTEM in the control room: Startup of a CCW pump when the system is shut down

Proposed Question: RO 35 Rev: 0

Given:

- Component Cooling Water (CCW) pumps are being started for a system startup in accordance with OP-002-003, CCW System Startup

Lowering CCW temperature may cause containment pressure to lower. Lowering containment pressure will cause indicated containment spray riser level to __(1)__.

Lowering CCW temperature and Letdown temperature may __(2)__ boron from CVCS Ion Exchanger effluent.

	(1)	(2)
A.	rise	remove
B.	rise	release
C.	lower	remove
D.	lower	release

Proposed Answer: C

Explanation: (Optional)

A. Incorrect. Part 1 is plausible because the applicant must know how containment pressure will affect riser levels. Part 2 is correct.
B. Incorrect. Part 1 is plausible because the applicant must know how containment pressure will affect riser levels. Part 2 is plausible if the applicant is not aware of the correlation between CCW temperature and reactivity.
C. **CORRECT**: In accordance with the CCW system startup section of OP-002-003, changing CCW temperature will cause changes in containment pressure. Lowering containment pressure will cause indicated containment spray riser level to lower. Lowering letdown temperature may remove boron from ion exchanger effluent in the CVCS system. This would result in a corresponding increase in reactor power.
D. Incorrect. Part 1 is correct. Part 2 is plausible if the applicant is not aware of the correlation between CCW temperature and reactivity.

Technical Reference(s): OP-002-003 page 10 Revision 322
(Attach if not previously provided)
(including version/revision number)

Proposed references to be provided
to applicants during examination: None

Learning Objective: WLP-OPS-CC00 Rev. 44 obj. 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 2

10 CFR Part 55 Content: 55.41 10
55.43

Comments:

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #	2	
	Group #	1	
	K/A #	010 A3.03	
	Importance Rating	3.3	

K/A Statement

(010A3.03) **PRESSURIZER PRESSURE CONTROL SYSTEM:** Ability to monitor automatic features of the (SF3 PZR PCS) PRESSURIZER PRESSURE CONTROL SYSTEM, including: PZR heater operation

Proposed Question: RO 36 Rev: 0

Given:

- Plant is at 100% power
- Pressurizer Pressure Channel X/Y recorder (RC-IPR-0100) indicates that the in-service Pressurizer Pressure Control Channel instrument has failed low

The Pressurizer Pressure Controller output should ____(1)____. The failed control channel should energize ___(2)___ heaters.

	(1)	(2)
A.	rise	both proportional and backup
B.	lower	both proportional and backup
C.	lower	only proportional
D.	rise	only proportional

Proposed Answer: B

Explanation: (Optional)

A. Incorrect. The in-service pressurizer pressure control channel failing low will cause the PPC system to see actual pressure less than setpoint. The pressurizer pressure controller output will lower to raise pressure (energize heaters). Part 2 is correct.
B. **CORRECT**: The in-service pressurizer pressure control channel failing low will cause the PPC system to see actual pressure less than setpoint. The pressurizer pressure controller output will lower to raise pressure (energize heaters). The pressurizer pressure controller controls only the proportional heaters. The control channel that inputs to the pressure controller is the same instrument that energizes the backup heaters at 2200 psia. The pressure controller output does not input to the backup heaters.
C. Incorrect. Part 1 is correct. A high pressure heater cutout will de-energize all heaters at 2270 psia through the low level heater cutout switch. A pressure of 2300 psia is plausible since this is the pressure at which the Pressurizer spray valves are full open on rising pressure.
D. Incorrect. The in-service pressurizer pressure control channel failing low will cause the PPC system to see actual pressure less than setpoint. The pressurizer pressure controller output will lower to raise pressure (energize heaters). A pressure of 2300 psia is plausible since this is the pressure at which the Pressurizer spray valves are full open on rising pressure.

Technical Reference(s): SD-PLC pages 25-27 Rev. 12
(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 # X
Modified Bank # _____ (Note changes or attach parent)
New _____

Question History: Last NRC Exam 2017 NRC RO exam

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

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

Comments:

2023 NRC Exam
RO Written Exam Worksheet

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #	2	
	Group #	1	
	K/A #	012 K2.01	
	Importance Rating	4.0	

K/A Statement

(012K2.01) **REACTOR PROTECTION SYSTEM:** Knowledge of electrical power supplies to the following: (SF7 RPS) REACTOR PROTECTION SYSTEM RPS channels, components, and interconnections

Proposed Question: RO 37 Rev: 0

Given:

- The plant is at 100% power
- A loss of PDP MD occurs

Reactor Trip Switchgear breakers _____(1)_____ open and a reactor trip _____(2)_____.

	(1)	(2)
A.	3, 4, 7, and 8	occurs
B.	3, 4, 7, and 8	does not occur
C.	1, 2, 5, and 6	occurs
D.	1, 2, 5, and 6	does not occur

Proposed Answer: B

Explanation: (Optional)

A. Incorrect. Correct breakers but reactor trip does not occur, as power to CEDMCS is not interrupted with these reactor trip breakers open. Reactor trip is p
B. **CORRECT**: On a loss of SUPS MD, Reactor trip breakers 3, 4, 7, and 8 open but power is still available to CEDMCS.
C. Incorrect. Reactor trip breakers 1, 2, 5, and 6 are A train powered and are not affected. A reactor trip would still not occur.
D. Incorrect. Reactor trip breakers 1, 2, 5, and 6 are A train powered and are not affected. A reactor trip would still not occur

Technical Reference(s): OP-901-312 page 18 Rev. 325
(Attach if not previously provided)
(including version/revision number)

Proposed references to be provided to applicants during examination: None

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

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

Question History: Last NRC Exam 2015 NRC RO Exam

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

10 CFR Part 55 Content: 55.41 6
55.43

Comments:

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #	2	
	Group #	1	
	K/A #	013 A1.16	
	Importance Rating	2.9	

K/A Statement

(013A1.16) **ENGINEERED SAFETY FEATURES ACTUATION SYSTEM:** Ability to predict and/or monitor changes in parameters associated with operation of the (SF2 ESFAS) ENGINEERED SAFETY FEATURES ACTUATION SYSTEM, including: Auxiliary building HVAC system status

Proposed Question: RO 38 Rev: 0

Given:

- Controlled Ventilation Area System (CVAS) Filtration Unit A is running for OP-903-124, CVAS Pressure Boundary Testing when a Loss of Cooling Accident occurs
- RCS pressure is 1670 psia
- Containment pressure is 16.9 psia

What is the present status of the Controlled Ventilation Filtration Units?

A. Both CVAS Filtration Units are secured

B. Both CVAS Filtration Units are running

C. Only CVAS Filtration Unit A is running

D. Only CVAS Filtration Unit B is running

Proposed Answer: C

Explanation: (Optional)

A. Incorrect. Plausible if the applicant is not aware that CVAS filtration units get a start on a SIAS. It could be assumed the unit that is running for surveillance secures for EDG loading limitations.
B. Incorrect. Plausible because both units start on a SIAS if one unit was not already running.
C. **CORRECT:** The applicant must first determine that a SIAS has occurred by recognizing that pressure (<1684 psia) meets the criteria. Containment pressure does not meet the criteria (>17.1 psia). CVAS provides a safety function during a design basis accident after a Safety Injection Actuation signal. Both fans will start on the SIAS. If one CVAS Filtration unit is already operating, the standby unit will not start.
D. Incorrect. Plausible if the applicant determines that the unit not started by the SIAS secures and the other unit gets the start signal from the SIAS.

Technical Reference(s): SD-HVR page 40 Rev.15
(Attach if not previously provided) SD-PPS page 43 Rev. 23
(including version/revision number)

Proposed references to be provided
to applicants during examination: None

Learning Objective: WLP-OPS-HVR00 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 2

10 CFR Part 55 Content: 55.41 7
55.43

Comments:

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #	2	
	Group #	1	
	K/A #	013 K4.06	
	Importance Rating	4.1	

K/A Statement

(013K4.06) **ENGINEERED SAFETY FEATURES ACTUATION SYSTEM:** Knowledge of (SF2 ESFAS) ENGINEERED SAFETY FEATURES ACTUATION SYSTEM design features and/or interlocks that provide for the following: Recirculation actuation/reset
.

Proposed Question: RO 39 Rev: 0

Recirculation Actuation Signal (RAS) occurs at an RWSP level of ____(1)____ percent.

Recirculation Actuation Signal can be initiated manually from the ____(2)____.

	(1)	(2)
A.	10	auxiliary relay cabinets in the RAB switchgear only
B.	10	control room and auxiliary relay cabinets in the RAB switchgear
C.	20	control room and auxiliary relay cabinets in the RAB switchgear
D.	20	auxiliary relay cabinets in the RAB switchgear only

Proposed Answer: A

Explanation: (Optional)

A. **CORRECT:** Recirculation Actuation Signal (RAS) occurs at an RWSP level of 10%. An RAS signal is the only ESFAS signal that cannot be initiated from the Control Room. It can only be initiated from auxiliary relay cabinets in the RAB switchgear.
B. Incorrect. Part 1 is correct. Part 2 is plausible because an RAS signal is the only ESFAS signal that cannot be initiated from the Control Room. It can only be initiated from auxiliary relay cabinets in the RAB switchgear.
C. Incorrect. Part 1 is plausible because other ESFAS actions occur at 20% such as bypassing High SG water level trip and actions that occur with the CSP. Part 2 is plausible because an RAS signal is the only ESFAS signal that cannot be initiated from the Control Room. It can only be initiated from auxiliary relay cabinets in the RAB switchgear.
D. Incorrect. Part 1 is plausible because other ESFAS actions occur at 20% such as bypassing High SG water level trip and actions that occur with the CSP. Part 2 is correct.

Technical Reference(s): SD-PPS page 50 and 52 Revision 23
(Attach if not previously provided)
(including version/revision number)

Proposed references to be provided
to applicants during examination: None

Learning Objective: WLP-OPS-PPS00 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 2
Comprehension or Analysis

10 CFR Part 55 Content: 55.41 7
55.43

Comments:

2023 NRC Exam
RO Written Exam Worksheet

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #	2	
	Group #	1	
	K/A #	022 A1.01	
	Importance Rating	3.8	

K/A Statement

(022A1.01) **CONTAINMENT COOLING SYSTEM:** Ability to predict and/or monitor changes in parameters associated with operation of the (SF5 CCS) CONTAINMENT COOLING SYSTEM, including: Containment temperature

Proposed Question: RO 40 Rev: 0

Given:

- Plant is in Mode 1
- The BOP operator is taking Tech Spec Logs in accordance with OP-903-001, Technical Specification Surveillance Logs

When taking readings for containment temperature, which of the following is true?

A. Containment average air temperature shall be the average of temperatures taken at <u>any three</u> Containment Fan Cooler (CFC) air <u>intake</u> locations.

B. Containment average air temperature shall be the average of temperatures taken at <u>any three</u> Containment Fan Cooler (CFC) air <u>discharge</u> locations.

C. Containment average air temperature shall be the average of temperatures taken at <u>all four</u> Containment Fan Cooler (CFC) air <u>intake</u> locations

D. Containment average air temperature shall be the average of temperatures taken at <u>all four</u> Containment Fan Cooler (CFC) air <u>discharge</u> locations.

Proposed Answer: A

Explanation: (Optional)

A. **CORRECT**: Note 2 of the Mode 1-4 Technical Specification Surveillance Logs states that Containment average air temperature shall be the average of temperatures taken at any three Containment Fan Cooler (CFC) air intake locations.
B. Incorrect. Note 2 of the Mode 1-4 Technical Specification Surveillance Logs states that Containment average air temperature shall be the average of temperatures taken at any three Containment Fan Cooler (CFC) air intake locations.
C. Incorrect. Note 2 of the Mode 1-4 Technical Specification Surveillance Logs states that Containment average air temperature shall be the average of temperatures taken at any three Containment Fan Cooler (CFC) air intake locations. Plausible because there are four CFCs at W3.
D. Incorrect. Note 2 of the Mode 1-4 Technical Specification Surveillance Logs states that Containment average air temperature shall be the average of temperatures taken at any three Containment Fan Cooler (CFC) air intake locations. Plausible because there are four CFCs at W3.

Technical Reference(s): OP-903-001 page 48, 227 Rev. 102
(Attach if not previously provided)
(including version/revision number)

Proposed references to be provided
to applicants during examination: None

Learning Objective: WLP-OPS-CB00 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 2
Comprehension or Analysis

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 #	026 K2.01	
	Importance Rating	3.9	

K/A Statement

(026K2.01) **CONTAINMENT SPRAY SYSTEM:** Knowledge of electrical power supplies to the following: (SF5 CSS) CONTAINMENT SPRAY SYSTEM: Containment spray pumps

Proposed Question: RO 41 Rev: 0

Containment Spray Pump A is powered from which bus?

A. 1A

B. 2A

C. 3A

D. 31A

Proposed Answer: C

Explanation: (Optional)

A. Incorrect. Plausible because the 1A bus is a 6.9 KV bus that powers major pumps at W3.
B. Incorrect. Plausible because the 2A bus is a 4.16 KV bus that powers major pumps at W3.
C. **CORRECT:** Containment Spray Pump A is powered from the 3A safety bus.
D. Incorrect. Plausible because the 31A bus is a 480V safety bus that is powered from the 3A safety bus.

Technical Reference(s): OP-009-001 page 40 Rev. 308
(Attach if not previously provided)
(including version/revision number)

Proposed references to be provided
to applicants during examination: None

Learning Objective: WLP-OPS-CS00 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 2
Comprehension or Analysis

10 CFR Part 55 Content: 55.41 7
55.43

Comments:

2023 NRC Exam
RO Written Exam Worksheet

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #	2	
	Group #	1	
	K/A #	039 2.1.23	
	Importance Rating	4.3	

K/A Statement

(039) (SF4S MSS) **MAIN AND REHEAT STEAM** (2.1.23) CONDUCT OF OPERATIONS: Ability to perform general and/or normal operating procedures during any plant condition.

Proposed Question: RO 42 Rev: 0

Given:

- The crew is placing Moisture Separator Reheaters (MSRs) in service following a turbine trip in accordance with OP-005-005 Reheat Steam System

The Moisture Separator Reheaters will be started in the _____(1)_____ start mode. Once the _____(2)_____ pushbutton is depressed on the Reheater Control Panel, the MSR temperature control valves will open over a five hour span.

	(1)	(2)
A.	hot	Reset
B.	hot	Ramp
C.	cold	Reset
D.	cold	Ramp

Proposed Answer: D

Explanation: (Optional)

A. Incorrect. (OP-005-005 precaution 3.1.3) The MSR Cold Start Mode should always be used. The MSR Hot Start Mode is no longer used because the MSR Warm-up valves are maintained closed. Part 2 is plausible because there is a Reset pushbutton on the Reheater Control Panel. This reset pushbutton closes the reheater TCVs following a turbine trip.
B. Incorrect. (OP-005-005 precaution 3.1.3) The MSR Cold Start Mode should always be used. The MSR Hot Start Mode is no longer used because the MSR Warm-up valves are maintained closed. Part 2 is correct.
C. Incorrect. Part 1 is correct. Part 2 is plausible because there is a Reset pushbutton on the Reheater Control Panel. This reset pushbutton closes the reheater TCVs following a turbine trip.
D. **CORRECT**: (OP-005-005 precaution 3.1.3) The MSR Cold Start Mode should always be used. The MSR Hot Start Mode is no longer used because the MSR Warm-up valves are maintained closed. A necessary condition for performing an MSR Hot Start is that the MSRs have remain pressurized. With the MSR Warmup valves closed, the MSRs will not remain pressurized.

Technical Reference(s): OP-005-005 pages 5, 8, 12 Rev. 307
(Attach if not previously provided)
(including version/revision number)

Proposed references to be provided
to applicants during examination: None

Learning Objective: WLP-OPS-MS00 obj. 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 4, 10
55.43

Comments:

2023 NRC Exam
RO Written Exam Worksheet

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #	2	
	Group #	1	
	K/A #	059 K1.14	
	Importance Rating	3.8	

K/A Statement

(059K1.14) **MAIN FEEDWATER SYSTEM:** Knowledge of the physical connections and/or cause and effect relationships between the (SF4S MFW) MAIN FEEDWATER SYSTEM and the following systems: ESFAS

Proposed Question: RO 43 Rev: 0

Given:

- An Excess Steam Demand event has occurred
- The reactor was manually tripped and the ATC reports the following parameters:
  Pressurizer pressure is 1720 psia and lowering
  Containment pressure is 17.2 psia and rising

The proper alignment for Main Feedwater is _____.

A. Main Feed Regulating Valves closed and Startup Feed Regulating Valves 13-21% open, Main Feed Isolation Valves closed.

B. Main Feed Regulating Valves closed and Startup Feed Regulating Valves 13-21% open. Main Feed Isolation Valves open.

C. Main Feed Regulating, Startup Feed Regulating, and Main Feed Isolation Valves are closed.

D. Main Feed Regulating Valves closed and Startup Feed Regulating Valves closed, Main Feed Isolation Valves open.

Proposed Answer: C

Explanation: (Optional)

A. Incorrect. Plausible because the Main Feed Isolation Valves close on a MSIS and would isolate all feedwater. The Main Feed Regulating and Startup Feed Regulating Valves also get a closed signal on a MSIS.
B. Incorrect. Plausible because the Main Feed Regulating valve going closed and Startup Feed Regulating valve going to 13 to 21% open (RTO) would be the proper position for these valves after a reactor trip but not if a MSIS has occurred.
C. **CORRECT**: The applicant must first determine that a Main Steam Isolation (MSIS) has occurred. The logic for a MSIS is met because containment pressure is > 17.1 psia. On a MSIS, the Main Feed Regulating, Startup Feed Regulating, and Main Feed Isolation Valves get a closed signal.
D. Incorrect. Plausible if the applicant is not aware that the Main Feed Isolation Valves also get a closed signal on a MSIS. Main Feedwater would be effectively isolated to the Steam Generators if the Main Feed Regulating and Startup Feed Regulating Valves are closed.

Technical Reference(s): SD-FW page 4 Revision 18
(Attach if not previously provided) OP-902-000 page 11 Revision 17
(including version/revision number)

Proposed references to be provided
to applicants during examination: None

Learning Objective: WLP-OPS-FW00 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 2

10 CFR Part 55 Content: 55.41 4,10
55.43

Comments:

2023 NRC Exam
RO Written Exam Worksheet

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #	2	
	Group #	1	
	K/A #	059 K3.05	
	Importance Rating	2.7	

K/A Statement

(059K3.05) **MAIN FEEDWATER SYSTEM:** Knowledge of the effect that a loss or malfunction of the (SF4S MFW) MAIN FEEDWATER SYSTEM will have on the following systems or system parameters: Extraction steam

Proposed Question: RO 44 Rev: 0

Given:

- Plant is at 100% power
- Level in Feedwater Heater 2B level reached the Hi-Hi level alarm set point
- The crew has entered OP-901-221, Secondary System Transient

Level in Feedwater Heater 2B should directly cause ____(1)____. This event should cause RCS cold leg temperature to ____(2)____.

	(1)	(2)
A.	Heater Drain Pump B to trip	rise
B.	Heater Drain Pump B to trip	lower
C.	ES-205, ES to #2 Heaters Isolation to close	rise
D.	ES-205, ES to #2 Heaters Isolation to close	lower

Proposed Answer: D

Explanation: (Optional)

A. Incorrect. Part 1 is plausible because Heater Drain Pump B takes a suction from Feedwater Heater 2B, but it does not get an automatic trip signal on high level. Part 2 is plausible if the applicant is not aware of the dynamics of feedwater pre-heating.
B. Incorrect. Part 1 is plausible because Heater Drain Pump B takes a suction from Feedwater Heater 2B, but it does not get an automatic trip signal on high level. Part 2 is correct.
C. Incorrect. Part 1 is correct. Part 2 is plausible if the applicant is not aware of the dynamics of feedwater pre-heating.
D. **CORRECT**: ES to #2 Heaters Isolation, ES-205, will automatically close if any #2 heater level continues to rise above the Hi-Hi level alarm setpoint. As a result of ES-205 going closed, RCS Tcold temperature will lower.

Technical Reference(s): OP-003-034 page 14 Revision 29
(Attach if not previously provided) OP-901-221 page 10 Revision 11
(including version/revision number)

Proposed references to be provided
to applicants during examination: None

Learning Objective: WLP-OPS-PPO2 obj. 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
Comprehension or Analysis 3

10 CFR Part 55 Content: 55.41 4,5
55.43

Comments:

2023 NRC Exam
RO Written Exam Worksheet

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #	2	
	Group #	1	
	K/A #	061 K4.11	
	Importance Rating	3.6	

K/A Statement

(061K4.11) **AUXILIARY/EMERGENCY FEEDWATER SYSTEM:** Knowledge of (SF4S AFW) AUXILIARY/EMERGENCY FEEDWATER SYSTEM design features and/or interlocks that provide for the following: Automatic level control*

Proposed Question: RO 45 Rev: 0

Upon an EFAS-1 event, the Primary Flow Control Valve for Steam Generator 1 will _____.

A. open at 55% WR level in Steam Generator 1 and control level at 82% WR

B. open at 55% WR level in Steam Generator 1 and control level at 85% WR

C. open at 27.4% NR level in Steam Generator 1 and control level at 82% WR

D. open at 27.4% NR level in Steam Generator 1 and control level at 85% WR

Proposed Answer: B

Explanation: (Optional)

A. Incorrect: At 55% WR following an EFAS-1, the Primary FCV will fully open then maintain level at 85% WR. 82% WR level is where the Alternate FCV is designed to maintain
B. **CORRECT:** At 55% WR following an EFAS-1, the Primary FCV will fully open then maintain level at 85% WR.
C. Incorrect. At 55% WR following an EFAS-1, the Primary FCV will fully open then maintain level at 85% WR. Steam Generator level of 27.4% is the level at which EFAS-1 actuates. 82% WR level is where the Alternate FCV is designed to maintain.
D. Incorrect. At 55% WR following an EFAS-1, the Primary FCV will fully open then maintain level at 85% WR. Steam Generator level of 27.4% is the level at which EFAS-1 actuates.

Technical Reference(s): WLP-OPS-EFW00 page 119 Rev. 49
(Attach if not previously provided)
(including version/revision number)

Proposed references to be provided
to applicants during examination: None

Learning Objective: WLP-OPS-EFW00 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 2
Comprehension or Analysis

10 CFR Part 55 Content: 55.41 7
55.43

Comments:

2023 NRC Exam
RO Written Exam Worksheet

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #	2	
	Group #	1	
	K/A #	062 K3.02	
	Importance Rating	4.4	

K/A Statement

(062K3.02) **AC ELECTRICAL DISTRIBUTION SYSTEM:** Knowledge of the effect that a loss or malfunction of the (SF6 ED AC) AC ELECTRICAL DISTRIBUTION SYSTEM will have on the following systems or system parameters: EDG

Proposed Question: RO 46 Rev: 0

Given:

- Plant was at 100% power when a loss of offsite power occurred

The BOP is performing verification of the Maintenance of Vital Auxiliaries and observes the following for EDG B:

- EDG B frequency is 59.8 Hertz
- EDG B output breaker is open
- EDG B voltage is 3900 AC volts

In accordance with OP-902-000, Standard Post Trip Actions, which of the following should the BOP perform?

A. Manually close EDG B output breaker.

B. Direct the NAO to close EDG B output breaker locally.

C. Raise EDG B voltage and verify EDG B output breaker closes.

D. Raise EDG B frequency and verify EDG B output breaker closes.

Proposed Answer: C

Explanation: (Optional)

A. Incorrect. If EDG B output breaker did not close in auto, then the operator should verify voltage in band prior to manually closing the EDG output breaker.
B. Incorrect. Closing the EDG output breaker locally is an immediate action step but is performed only after EDG voltage is verified to be within band.
C. **CORRECT**: Per OP-902-000, the contingency action for an EDG output breaker not closing is to verify EDG voltage 3920-4350 VAC. If the voltage is not in the band, the operator is expected to manually adjust voltage to within the band and the EDG output breaker should then close. (This step is an immediate action)
D. Incorrect. EDG frequency can not be adjusted when the EDG is running in Emergency mode.

Technical Reference(s): OP-902-000 page 7 Revision 17
(Attach if not previously provided)
(including version/revision number)

Proposed references to be provided
to applicants during examination: None

Learning Objective: WLP-OPS-PPE01 obj. 10 (As available)

Question Source: Bank # X
Modified Bank #
New

Question History: Last NRC Exam 2012 RO 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:

2023 NRC Exam
RO Written Exam Worksheet

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #	2	
	Group #	1	
	K/A #	063 A4.03	
	Importance Rating	3.5	

K/A Statement

(063A4.03) **DC ELECTRICAL DISTRIBUTION SYSTEM:** Ability to manually operate and/or monitor the (SF6 ED DC) DC ELECTRICAL DISTRIBUTION SYSTEM in the control room: Battery discharge rate

Proposed Question: RO 47 Rev: 0

Given:

- A reactor trip occurred due to a Station Blackout
- The crew entered OP-902-005, Station Blackout Recovery

To ensure stripping of 125 VDC loads are performed within the requirement of 30 minutes, OI-038-000 Emergency Operating Procedure Expectations/Guidance Procedure, states that the Balance of Plant operator should perform which of the following upon the onset of the Station Blackout.

A. Dispatch one NAO to the A switchgear room and one NAO to the B switchgear room to ensure Station Safety Related batteries survive the designed four hours with acceptable DC voltage.

B. Dispatch one NAO to the A switchgear room and one NAO to the B switchgear room ensure Station Safety Related batteries survive the designed two hours with acceptable DC voltage.

C. Dispatch an NAO and his peer checker to the A switchgear room to ensure Station Safety Related batteries survive the designed four hours with acceptable DC voltage.

D. Dispatch an NAO and his peer checker to the A switchgear room to ensure Station Safety Related batteries survive the designed two hours with acceptable DC voltage.

Proposed Answer: A

Explanation: (Optional)

A. **CORRECT:** OI-038-000 Emergency Operating Procedure Expectations/Guidance Procedure step 5.5.7 directs the crew to dispatch one NAO to the A switchgear room and one NAO to the B switchgear room to ensure Station Safety Related batteries will survive the designed four hours with acceptable DC voltage.
B. Incorrect. Part 1 is correct. Two hours is plausible because some of the DC bus Tech Specs have two hour requirements such as the loss of the AB DC bus.
C. Incorrect. Plausible because all operations manipulations require a peer checker. Peer checking requirements are waived for this evolution by the guidance in OI-038-000. Part 2 is correct.
D. Incorrect. Plausible because all operations manipulations require a peer checker. Peer checking requirements are waived for this evolution by the guidance in OI-038-000. Two hours is plausible because some of the DC bus Tech Specs have two hour requirements such as the loss of the AB DC bus.

Technical Reference(s): OI-038-000 page 49 Revision 21
(Attach if not previously provided)
(including version/revision number)

Proposed references to be provided
to applicants during examination: None

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 2
Comprehension or Analysis

10 CFR Part 55 Content: 55.41 8,10
55.43

Comments:

2023 NRC Exam
RO Written Exam Worksheet

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #	2	
	Group #	1	
	K/A #	064 K5.07	
	Importance Rating	3.7	

K/A Statement

(064K5.07) **EMERGENCY DIESELGENERATOR SYSTEM:** Knowledge of the operational implications or cause and effect relationships of the following concepts as they apply to the (SF6 EDG) EMERGENCY DIESEL GENERATOR SYSTEM: Loading the EDG*

Proposed Question: RO 48 Rev: 0

Given:

- The crew is restoring Emergency Diesel Generator (EDG) B following a Station Blackout
- Emergency Diesel Generator B has started and the output breaker is closed
- The Input Transformer to MCC 315B develops a direct short to ground upon being re-energized by the 1 second Sequencer Load Block (S1 relay)
- An undervoltage condition exists on 4160 Volt Bus 3B

Which of the following conditions describes the Sequencer response?

A. Immediately stops the automatic loading process due to Under Voltage Override (UVO) condition.

B. Immediately stops the automatic loading process due to Sequencer Lockout (SLO) condition.

C. Stops the automatic loading process when the 7 second Load Block (S3 relay) is reached.

D. Stops the automatic loading process when the 17 second Load Block (S4 relay) is reached.

Proposed Answer: D

Explanation: (Optional)

A. Incorrect. The Undervoltage Override (UVO) of the Sequencer occurs at 0.5 seconds. UVO is the interlock that allows the sequencer to remain running between 0.5 and 17 seconds while large transformer loads are sequenced on.
B. Incorrect. Sequencer Lockout is blocked between the 0.5 second Sequencer Load block and the 17 Second load block (due to the UVO feature). The short occurs on the 1 Second load block so the sequencer will not stop immediately.
C. Incorrect. A SLO condition occurs at 17 seconds not 7 seconds as stated in the distractor. Sequencer Lockout is active at the 7 second load block but is blocked by the UVO feature.
D. **CORRECT**: A SLO condition will occur at Load Block S4 due to the undervoltage condition on Bus 3A.

Technical Reference(s): SD-EDG page 49 Revision 32
(Attach if not previously provided)
(including version/revision number)

Proposed references to be provided
to applicants during examination: None

Learning Objective: WLP-OPS-EDG00 obj. 3 (As available)

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

Question History: Last NRC Exam 2017 NRC RO Exam

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

10 CFR Part 55 Content: 55.41 7
55.43 _____

Comments:

2023 NRC Exam
RO Written Exam Worksheet

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #	2	
	Group #	1	
	K/A #	073 K1.05	
	Importance Rating	3.1	

K/A Statement

(073K1.05) **PROCESS RADIATION MONITORING SYSTEM:** Knowledge of the physical connections and/or cause and effect relationships between the (SF7 PRM) PROCESS RADIATION MONITORING SYSTEM and the following systems: CCWS

Proposed Question: RO 49 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 the 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 aligns to the Waste Tanks.

D. Flow path to the storm drains isolates.

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. The 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. The DCT sumps are aligned to the waste tanks on high radiation. Aligning the waste tanks is performed manually.
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. The storm drains is an alternate flow path for the DCT Sump Pumps.

Technical Reference(s): OP-901-414, Effluent Discharge High Radiation
(Attach if not previously provided)
(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 # X
Modified Bank # (Note changes or attach parent)
New

Question History: Last NRC Exam 2012 RO 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 K5.05	
	Importance Rating	3.1	

K/A Statement

(076K5.05) **SERVICE WATER SYSTEM:** Knowledge of the operational implications or cause and effect relationships of the following concepts as they apply to the (SF4S SW) SERVICE WATER SYSTEM: Radiation alarms on SWS

Proposed Question: RO 50 Rev: 0

Given:

- Blowdown discharge to Circ Water is in progress
- Circ Water Disch Activity Hi annunciates on CP-1

Which ONE of the following has occurred?

A. High radiation on the Blowdown Radiation Monitor

B. BD-303, Blowdown to Circ Water or Waste Ponds Header Isolation closes

C. Trip of the running Blowdown Pump

D. Blow down discharge is aligned to the waste tanks

Proposed Answer: B

Explanation: (Optional)

A. Incorrect. The blowdown radiation monitor does not send signals for any components to actuate. Alarm only. Plausible to determine that the Blowdown Radiation Monitor would be the Monitor that would annunciate when discharging blowdown to circ water.
B. **CORRECT**: High Radiation on the Circ Water Radiation Monitor will cause Circ Water Disch Activity Hi to annunciate and automatically close BD-303, isolating blowdown flow to the circ water system.
C. Incorrect. Plausible because Blowdown pumps is the motive force for pumping blowdown to circ water.
D. Incorrect. Plausible because discharge from the Dry Cooling Tower sumps (normally aligned to Circ Water) and the Industrial Waste Sump align to the waste tanks on a high radiation.

Technical Reference(s): OP-500-005 Attachment 4.69 Rev. 14
(Attach if not previously provided)
(including version/revision number)

Proposed references to be provided to applicants during examination: None

Learning Objective: WLP-OPS-BD00 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 2
Comprehension or Analysis

10 CFR Part 55 Content: 55.41 7,11
55.43

Comments:

2023 NRC Exam
RO Written Exam Worksheet

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #	2	
	Group #	1	
	K/A #	078 A3.03	
	Importance Rating	3.3	

K/A Statement

(078A3.03) **INSTRUMENT AIR SYSTEM:** Ability to monitor automatic features of the (SF8 IAS) INSTRUMENT AIR SYSTEM, including: Isolation of instrument air to containment

Proposed Question: RO 51 Rev: 0

IA-909, Instrument Air to Containment, will get an automatic close signal on a ____(1)____. The Containment Isolation Actuation Signal to IA-909 ____(2)____ be overridden.

	(1)	(2)
A.	Containment Isolation Actuation Signal (CIAS) only	can
B.	Containment Isolation Actuation Signal (CIAS) only	can NOT
C.	Containment Isolation Actuation Signal (CIAS) and lowering Instrument Air pressure	can
D.	Containment Isolation Actuation Signal (CIAS) and lowering Instrument Air pressure	can NOT

Proposed Answer: A

Explanation: (Optional)

A. **CORRECT**: IA-909, Instrument Air to Containment, will automatically close on a Containment Isolation Actuation Signal (CIAS). The CIAS to IA-909 can be overridden using its C/S on CP-8.
B. Incorrect. Part 1 is correct. Part 2 is plausible because not all containment isolation valves at W3 can be overridden on a CIAS.
C. Incorrect. Part 1 is plausible because it would make sense for the containment isolation to close on a lowering instrument air pressure to isolate the leak.
D. Incorrect. Part 1 is plausible because it would make sense for the containment isolation to close on a lowering instrument air pressure to isolate the leak. Part 2 is plausible because not all containment isolation valves at W3 can be overridden on a CIAS.

Technical Reference(s): SD-AIR page 12, 49 Rev. 15
(Attach if not previously provided)
(including version/revision number)

Proposed references to be provided
to applicants during examination: None

Learning Objective: WLP-OPS-AIR00 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 2
Comprehension or Analysis

10 CFR Part 55 Content: 55.41 4
55.43

Comments:

2023 NRC Exam
RO Written Exam Worksheet

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #	2	
	Group #	1	
	K/A #	078 K6.06	
	Importance Rating	3.0	

K/A Statement

(078K6.06) INSTRUMENT AIR SYSTEM: Knowledge of the effect of the following plant conditions, system malfunctions, or component malfunctions on the (SF8 IAS) INSTRUMENT AIR SYSTEM: Cross-tie valve

Proposed Question: RO 52 Rev: 0

Given:

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

The BOP should 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 105 psig, _____(2)_____ .

	(1)	(2)
A.	raise	IA-123, Instrument Air Dryers Bypass solenoid, opens
B.	raise	the standby Instrument Air Compressor starts
C.	lower	IA-123, Instrument Air Dryers Bypass solenoid, opens
D.	lower	the standby Instrument Air Compressor starts

Proposed Answer: B

Explanation: (Optional)

A. Incorrect. Part 1 is correct. Part 2 is plausible because IA-123 opens automatically at 95 psig on instrument air receiver pressure.
B. **CORRECT**: OP-901-511, Instrument Air Malfunction states that SA-125 will open and the standby Instrument Air Compressor will start at an instrument air receiver pressure of 105 psig. The setpoint will be raised on SA-125 to force it open early or if it is not operating properly. If it is malfunctioning, IA pressure will drop to 105 psig, and auto start the standby air compressor.
C. Incorrect. Part 1 is plausible because the applicant may assume that lowering the setpoint of SA-125 will open the valve sooner. Part 2 is plausible because IA-123 is opens automatically at 95 psig on instrument air receiver pressure.
D. Incorrect. Part 1 is plausible because the applicant may assume that lowering the setpoint of SA-125 will open the valve sooner. Part 2 is correct.

Technical Reference(s): OP-901-511 page 4 and 6 Revision 19
(Attach if not previously provided)
(including version/revision number)

Proposed references to be provided
to applicants during examination: None

Learning Objective: WLP-OPS-PPO50 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 2

10 CFR Part 55 Content: 55.41 7,10
55.43

Comments:

2023 NRC Exam
RO Written Exam Worksheet

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #	2	
	Group #	1	
	K/A #	103 G2.4.49	
	Importance Rating	4.4	

K/A Statement

(103) (SF5 CNT) **CONTAINMENT SYSTEM** (G2.4.49) EMERGENCY PROCEDURES/PLAN: Ability to perform without reference to procedures those actions that require immediate operation of system components and controls

Proposed Question: RO 53 Rev: 0

Given:

- Containment Pressure is 16.9 PSIA
- RCS Pressure is 1600 PSIA
- SSL-8004A, Sampling Isolation SG1 is OPEN
- BAM-126A, Boric Acid Makeup Pump A Recirc Valve is CLOSED
- HVR 313A, CVAS Train A Outlet Valve OPEN
- FP-601A, Fire Water A to Containment is CLOSED

Which ONE of the following valves requires operator action for the current plant conditions?

A. SSL-8004A

B. BAM-126A

C. HVR-313A

D. FP-601A

Proposed Answer: A

Explanation: (Optional)

A. **CORRECT**: With the given conditions, Safety Injection Actuation Signal (SIAS) and a Containment Isolation Actuation Signal (CIAS) are present due to RCS pressure <1684 psia. SSL-8004A is a Containment Isolation Valve that closes on a CIAS.
B. Incorrect. BAM-126A closes on a SIAS.
C. Incorrect. HVR-313A opens on a SIAS.
D. Incorrect. FP-601A closes on a CIAS.

Technical Reference(s): OP-902-009 Attachments 4C and 4D Rev. 323
(Attach if not previously provided)
(including version/revision number)

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 2

10 CFR Part 55 Content: 55.41 7,8
55.43

Comments:

2023 NRC Exam
RO Written Exam Worksheet

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #	2	
	Group #	1	
	K/A #	103 K3.04	
	Importance Rating	3.0	

K/A Statement

(103 K3.04) **CONTAINMENT SYSTEM:** Knowledge of the effect that a loss or malfunction of the (SF5 CNT) CONTAINMENT SYSTEM will have on the following systems or system parameters (CFR 41.7/45.4) Shield Building Vent system

Proposed Question: RO 54 Rev: 0

A plant trip and SIAS have occurred due to low Pressurizer pressure.

What is the designed range of Containment Annulus to ambient differential pressure in inches of water?

A. -3.0 to -8.0

B. +2.0 to -8.0

C. -3.0 to -10.0

D. +2.0 to -10.0

Proposed Answer: A

Explanation: (Optional)

A. **CORRECT**: SBV will cycle after starting on a SIAS at -3.0 to -8.0 of Containment Annulus to ambient differential pressure measured in inches of water.
B. Incorrect. The -8" is correct, but +2.0 inches is the maximum containment pressure that would ensure supply air to containment from the CAR System.
C. Incorrect. The -3.0" is correct but the10.0 inches is the maximum value for Containment pressure before containment purge can be initiated.
D. Incorrect. The +2.0 inches is the maximum containment pressure that would ensure supply air to containment from the CAR System and the 10.0 inches is the maximum value for Containment pressure before containment purge can be initiated.

Technical Reference(s): OP-008-008 page 11 Revision 11
(Attach if not previously provided)
(including version/revision number)

Proposed references to be provided
to applicants during examination: None

Learning Objective: WLP-OPS-SBV obj. 2 (As available)

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

Question History: Last NRC Exam 2015 RO NRC Exam

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

10 CFR Part 55 Content: 55.41 8
55.43

Comments:

2023 NRC Exam
RO Written Exam Worksheet

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #	2	
	Group #	1	
	K/A #	001 A4.01	
	Importance Rating	2.9	

K/A Statement

(001A4.01) **CONTROL ROD DRIVE SYSTEM:** Ability to manually operate and/or monitor the (SF1 CRDS) CONTROL ROD DRIVE SYSTEM in the control room: CRDM Cooling.

Proposed Question: RO 55 Rev: 0

In accordance with OP-008-004, Control Element Drive Mechanism Cooling System, which of the following would be the correct sequence to swap Control Element Drive Mechanism (CEDM) Cooling Fans?

Assume CEDM Cooling Fans A and B are running.

A. Start CEDM Cooling Fan D then secure CEDM Cooling Fan B.

B. Secure CEDM Cooling Fan B then start CEDM Cooling Fan C.

C. Start CEDM Cooling Fan C then secure CEDM Cooling Fan A.

D. Secure CEDM Cooling Fan A then start CEDM Cooling Fan C.

Proposed Answer: D

Explanation: (Optional)

A. Incorrect. Plausible if the applicant determines that running only one CEDM at a time is not allowed.
B. Incorrect. Plausible if the applicant is not aware of the train requirements or not aware of which electrical bus the CEDM is designated to.
C. Incorrect. Plausible if the applicant determines that running only one CEDM at a time is not allowed.
D. **CORRECT:** The guidance for swapping CEDM fans in OP-008-004, Control Element Drive Mechanism Cooling System, has two requirements. 1) One train from each safety bus should normally be running. 2) Do not operate more than two CEDM Cooling fans at a time. CEDM Fans A and C (A train) CEDM fans B and D (B train). This answer is the only one that meets these requirements.

Technical Reference(s): OP-008-004 page 8 revision 9
(Attach if not previously provided)
(including version/revision number)

Proposed references to be provided
to applicants during examination: None

Learning Objective: WLP-OPS-CCS00 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 4,10
55.43

Comments:

2023 NRC Exam
RO Written Exam Worksheet

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #	2	
	Group #	2	
	K/A #	033 K5.06	
	Importance Rating	3.7	

K/A Statement

(033K5.06) **SPENT FUEL POOL COOLING SYSTEM:** Knowledge of the operational implications or cause and effect relationships of the following concepts as they apply to the (SF8) SPENT FUEL POOL COOLING SYSTEM: Shielding (water level)

Proposed Question: RO 56 Rev: 0

The required water level in the Spent Fuel Pool is ___(1)___ feet.

The makeup source to Spent Fuel Pool can be from the ___(2)___.

	(1)	(2)
A.	43	Condensate Storage Pool only
B.	43	Refuel Water Storage Pool or Condensate Storage Pool
C.	23	Condensate Storage Pool only
D.	23	Refuel Water Storage Pool or Condensate Storage Pool

Proposed Answer: B

Explanation: (Optional)

A. Incorrect. Part 1 is correct. Part 2 is plausible because makeup to the SFP is done frequently on shift. The makeup is always from the non-borated CSP to make-up for evaporated losses. However, the off-normal procedure allows makeup from either source
B. **CORRECT:** Tech Spec 3.9.11 states "At least 23 feet of water shall be maintained over the top of the fuel seated in the storage racks. The top of the fuel seated in the storage racks is at the 20 foot level. Therefore, required level is 43 feet. Makeup can be aligned to either the CSP or the RWSP.
C. Incorrect. Part 1 is plausible because TS 3.9.11 requires that At least 23 feet of water shall be maintained over the top of the fuel seated in the storage racks, the top of the fuel is assembly is at 20 feet, therefore required level is 43 feet. Part 2 is plausible because makeup to the SFP is done frequently on shift. The makeup is always from the non-borated CSP to make-up for evaporated losses. However, the off-normal procedure allows makeup from either source.
D. Incorrect. Part 1 is plausible because TS 3.9.11 requires that At least 23 feet of water shall be maintained over the top of the fuel seated in the storage racks. The top of the fuel is assembly is at 20 feet, therefore, required level is 43 feet. Part 2 is correct.

Technical Reference(s): TS 3.9.11
(Attach if not previously provided) OP-901-513 page 6 Rev. 28
(including version/revision number) OP-002-006 page 9 Rev. 330

Proposed references to be provided
to applicants during examination: None

Learning Objective: WLP-OPS-FS00 objs. 3 and 6 (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 8
55.43

Comments:

2023 NRC Exam
RO Written Exam Worksheet

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #	2	
	Group #	2	
	K/A #	016 A3.01	
	Importance Rating	3.3	

K/A Statement

(016A3.01) **NONNUCLEAR INSTRUMENTATION SYSTEM:** Ability to monitor automatic features of the (SF7 NNI) NONNUCLEAR INSTRUMENTATION SYSTEM, including: Automatic selection of NNI system inputs to control systems

Proposed Question: RO 57 Rev: 0

Given:

- A plant power reduction is in progress
- Reactor power is 50% and slowly lowering
- Feedwater Control System #1 and #2 are providing Feedwater in AUTO mode
- The BOP reports Feedwater Master Controller #2 output has failed LOW
- The BOP reports NO response while attempting to operate the Master Controller #2 in MANUAL

Which of the following should be operated in MANUAL mode to restore and maintain Steam Generator level within band?

A. Main Feedwater Pump Speed #2 M/A station only.

B. Main Feedwater Regulating valve #2 M/A station only.

C. Startup Feedwater Regulating valve #2 M/A station only.

D. Both the SUFRV #1 M/A station and Main Feedwater Pump Speed #2 M/A station.

Proposed Answer: B

Explanation: (Optional)

A. Incorrect. MFW Pump Speed will take the high select from FWC Master #1 or #2. Pump speed will be adequate. In this case, from FWC Master #1. This is where the automatic selection of an NNI input to a control system occurs to meet the K/A.
B. **CORRECT:** MFW regulating valve controller adjustment is the proper action at this power level. The function of the SUFRV is to maintain level at low power levels. The SUFRV has the capacity to provide feedwater up to 22% flow demand. At 40% power, the SUFRV capacity is inadequate to restore level. The Main FWRV must be opened.
C. Incorrect. MFW regulating valve controller adjustment is the proper action at this power level. The function of the SUFRV is to maintain level at low power levels. The SUFRV has the capacity to provide feedwater up to 22% flow demand.
D. Incorrect. The SUFRV capacity is inadequate to restore SG level at this power Feedwater flow at this power level. MFW Pump Speed will take the high select from FWC Master #1 or #2. In this case, from FWC Master #1. Pump speed will be adequate.

Technical Reference(s): SD-FWC page 11 Rev. 14
(Attach if not previously provided) OP-901-201 Attachment 1 Rev. 7
(including version/revision number)

Proposed references to be provided to applicants during examination: None

Learning Objective: WLP-OPS-PPO2 obj. 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
Comprehension or Analysis 3

10 CFR Part 55 Content: 55.41 4
55.43

Comments:

2023 NRC Exam
RO Written Exam Worksheet

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #	2	
	Group #	2	
	K/A #	028 K3.01	
	Importance Rating	3.1	

K/A Statement

(028K3.01) **HYDROGEN RECOMBINER AND PURGE CONTROL SYSTEM:** Knowledge of the effect that a loss or malfunction of the (SF5 HRPS) HYDROGEN RECOMBINER AND PURGE CONTROL SYSTEM will have on the following systems or system parameters: Hydrogen concentration in containment

Proposed Question: RO 58 Rev: 0

Given:

- A LOCA has occurred
- Containment Hydrogen concentration is rising slowly
- The crew is placing Hydrogen Recombiners in service
- Hydrogen Recombiner B trips and CANNOT be restarted

Which of the following describes the MAXIMUM designed containment hydrogen concentration with ONLY ONE Hydrogen Recombiner in service and the direction for placing Hydrogen Recombiners in service?

A. Remain below 4% and should be manually started as directed by the TSC.

B. Remain below 4% and should be manually started as directed by OP-902-002, LOCA Recovery Procedure.

C. Remain below 8% and should be manually started as directed by the TSC.

D. Remain below 8% and should be manually started as directed by OP-902-002, LOCA Recovery Procedure.

Proposed Answer: A

Explanation: (Optional)

A. **CORRECT**: The design function of the hydrogen recombiners is to limit hydrogen concentration to less than 4 percent. Each hydrogen recombiner is 100% capacity. The direction for starting a Hydrogen Recombiner is from the TSC.
B. Incorrect. Part 1 is correct. Part 2 is plausible because OP-902-002 is the implementing procedure for a LOCA and direction to start the hydrogen analyzers is located in OP-902-002. Guidance was once provided int OP-902-002 to start the recombiners but has since been removed.
C. Incorrect. Part 1 is plausible because the explosive limit is 13%. 8% is approximately half that number. Part 2 is correct.
D. Incorrect. Part 1 is plausible because the explosive limit is 13%. 8% is approximately half that number. Part 2 is plausible because OP-902-002 is the implementing procedure for a LOCA and direction to start the hydrogen analyzers is located in OP-902-002. Guidance was once provided int OP-902-002 to start the recombiners but has since been removed.

Technical Reference(s): SD-HRA pages 4, 5, 8, 9 Rev. 6
(Attach if not previously provided)
(including version/revision number)

Proposed references to be provided
to applicants during examination: None

Learning Objective: WLP-OPS-HRA00 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 2
Comprehension or Analysis

10 CFR Part 55 Content: 55.41 8
55.43

Comments:

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #	2	
	Group #	2	
	K/A #	034 A2.07	
	Importance Rating	3.7	

K/A Statement

(034A2.07) **FUEL HANDLING EQUIPMENT SYSTEM:** Ability to (a) predict the impacts of the following on the (SF8 FHS) FUEL HANDLING EQUIPMENT SYSTEM and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal operations: Loss of Refueling Cavity or Spent Fuel Pool level

Proposed Question: RO 59 Rev: 0

Given:

- Core offload is in progress
- A failure of Reactor Cavity Pool Seal 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, the crew should expect a final level of (1) ft. MSL in the core.

If the leak occurs with a fuel assembly on the refueling machine grapple, the preferred location to place the fuel assembly as recommended by OP-010-006 is in the (2).

	(1)	(2)
A.	13.5	Reactor Vessel
B.	20	Reactor Vessel
C.	13.5	Fuel assembly storage rack in the Refueling Cavity
D.	20	Fuel assembly storage rack in the Refueling Cavity

Proposed Answer: B

Explanation: (Optional)

A. Incorrect. Part 1 is plausible because this is the level the Refuel Cavity will go to if the nozzle dams were leaking. This leak location is also listed in OP-010-006. Part 2 is correct.
B. **CORRECT**: OP-010-006 step 9.23.1.1 states a loss of the pool seal will result in a final water level of 20 ft. MSL in the core. This level is equal to the level of the reactor vessel flange. OP-010-006, step 9.23.2.4 provides a recommendation for placing the assembly upon a leak. The locations are listed in a decreasing order of preference. The Reactor Vessel is the first preferred location.
C. Incorrect. Part 1 is plausible because this is the level the Refuel Cavity will go to if the nozzle dams were leaking. This leak location is also listed in OP-010-006. Part 2 is plausible because the Fuel assembly storage racks in the Refuel Cavity are listed in the locations to place a fuel assembly and will still be underwater upon a refuel cavity leak to 20 ft. MSL. But, OP-010-006 list the reactor vessel as a more preferred location than the storage racks.
D. Incorrect. Part 1 is correct. Part 2 is plausible because the Fuel assembly storage racks in the Refuel Cavity are listed in the locations to place a fuel assembly and will still be underwater upon a refuel cavity leak to 20 ft. MSL. But, OP-010-006 list the reactor vessel as a more preferred location than the storage racks.

Technical Reference(s): OP-010-006 page 108, 109 Rev. 341
(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. 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 9,10
55.43

Comments:

2023 NRC Exam
RO Written Exam Worksheet

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #	2	
	Group #	2	
	K/A #	055 K1.02	
	Importance Rating	3.5	

K/A Statement

(055K1.02) **CONDENSER AIR REMOVAL SYSTEM:** Knowledge of the physical connections and/or cause and effect relationships between the (SF4S CARS) CONDENSER AIR REMOVAL SYSTEM and the following systems: Main condenser

Proposed Question: RO 60 Rev: 0

Given:

- Plant is at 100% power
- Condenser Vacuum Pump B has tripped

To maintain a suction path for Condenser Air Evacuation PIG Rad Monitor (PRM-IRE-0004), the BOP should verify Condenser Vacuum Pump ____(1)____ is running. Condenser Vacuum Pumps are designed to automatically start at a Main Condenser Vacuum of ____(2)____ inches Hg.

	(1)	(2)
A.	A	24.5
B.	A	26
C.	C	26
D.	C	24.5

Proposed Answer: C

Explanation: (Optional)

A. Incorrect. Condenser Vacuum Pump B or C must be operating to maintain a suction path for Condenser Air Evacuation PIG Rad Monitor (PRM-IRE-0004). Part 2 is plausible because the Loss of Condenser Vacuum off-normal procedure requires the crew to trip the reactor at 24.5 inches Hg.
B. Incorrect. Condenser Vacuum Pump B or C must be operating to maintain a suction path for Condenser Air Evacuation PIG Rad Monitor (PRM-IRE-0004). Part 2 is correct.
C. **CORRECT**: Condenser Vacuum Pump B or C must be operating to maintain a suction path for Condenser Air Evacuation PIG Rad Monitor (PRM-IRE-0004). Standby Condenser Vacuum Pumps will auto start at 26 inches Hg on lowering Main Condenser Vacuum.
D. Incorrect. Part 1 is correct. Part 2 is plausible because the Loss of Condenser Vacuum off-normal procedure requires the crew to trip the reactor at 24.5 inches Hg.

Technical Reference(s): OP-003-001 page 9 and 22 Rev. 25
(Attach if not previously provided) OP-901-220 page Rev. 306
(including version/revision number)

Proposed references to be provided
to applicants during examination: None

Learning Objective: WLP-OPS-AE00 (As available)

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

Question History: Last NRC Exam 2017 NRC RO Exam

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

10 CFR Part 55 Content: 55.41 4,10
55.43

Comments:

2023 NRC Exam
RO Written Exam Worksheet

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #	2	
	Group #	2	
	K/A #	056 K4.14	
	Importance Rating	3.6	

K/A Statement

(056K4.14) **CONDENSATE SYSTEM:** Knowledge of (SF4S CDS) CONDENSATE SYSTEM design features and/or interlocks that provide for the following: MFW Pump NPSH

Proposed Question: RO 61 Rev: 0

Given:

- The plant is at 100% power
- Heater Drain Pump A tripped
- The crew has entered OP-901-221, Secondary System Transient

CD-1532, Condensate Polisher Bypass, may need to be throttled ____(1)____ to maintain > 250 PSIG at Steam Generator Feed Pumps suction.

____(2)____ Main Feedwater Pump(s) will trip 10 seconds after reaching the suction pressure trip setpoint.

	(1)	(2)
A.	closed	both
B.	closed	one
C.	open	both
D.	open	one

Proposed Answer: D

Explanation: (Optional)

A. Incorrect. Condensate Polisher D/P will rise because more flow is being forced through the polisher on HDP trips. Only Main Feedwater Pump A will trip 10 seconds after reaching 250 psig for FWP suction pressure. Main Feedwater Pump B has a 30 second time delay to trip on low suction pressure. Suction pressure should restore after the MFP A trip. Opening CD-1532 will bypass the polishers and help to restore Main Feed Suction pressure.
B. Incorrect. Condensate Polisher D/P will rise because more flow is being forced through the polisher on HDP trips. The second part is correct.
C. Incorrect. The first part is correct. Only Main Feedwater Pump A will trip 10 seconds after reaching 250 psig for FWP suction pressure. Main Feedwater Pump B has a 30 second time delay to trip on low suction pressure. Suction pressure should restore after the MFP A trip. Opening CD-1532 will bypass the polishers and help to restore Main Feed Suction pressure.
D. **CORRECT**: Condensate Polisher D/P will rise because more flow is being forced through the polisher on HDP trips. Only Main Feedwater Pump A will trip 10 seconds after reaching 250 psig for FWP suction pressure. Main Feedwater Pump B has a 30 second time delay to trip on low suction pressure. Suction pressure should restore after the MFP A trip. Opening CD-1532 will bypass the polishers and help to restore Main Feed Suction pressure.

Technical Reference(s): OP-901-221 pages 4, 13 Rev. 11
(Attach if not previously provided) SD-CDP pages 25, 26 Rev. 8
(including version/revision number)

Proposed references to be provided
to applicants during examination: None

Learning Objective: WLP-OPS-PPO2 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 4,10
55.43

Comments:

2023 NRC Exam
RO Written Exam Worksheet

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #	2	
	Group #	1	
	K/A #	068 G2.3.11	
	Importance Rating	3.8	

K/A Statement

(068) **LIQUID RADWASTE SYSTEM** (G2.3.11) RADIATION CONTROL: Ability to Control Radiation Releases

Proposed Question: RO 62 Rev: 0

Prior to discharging a Waste Condensate Tank to the Circulating Water System, OP-007-001 Liquid Waste Management procedure, states that the crew should verify _____ is(are) in service.

A. either A1, A2, or B1 water box

B. all A1, A2, and B1 water boxes

C. either B2, C1 or C2 water box

D. all B2, C1 and C2 water boxes

Proposed Answer: C

Explanation: (Optional)

A. Incorrect. Both the Liquid Waste Management (LWM) and Boron Management (BM) systems effluent discharge to the Circulating Water System through the second discharge block of the condenser. This block contains circ water boxes B2, C1 and C2. The procedure requires one of these water boxes to be in service prior to discharging.
B. Incorrect. Both the Liquid Waste Management (LWM) and Boron Management (BM) systems effluent discharge to the Circulating Water System through the second discharge block of the condenser. This block contains circ water boxes B2, C1 and C2. The procedure requires one of these water boxes to be in service prior to discharging.
C. **CORRECT:** Both the Liquid Waste Management (LWM) and Boron Management (BM) systems effluent discharge to the Circulating Water System through the second discharge block of the condenser. This block contains circ water boxes B2, C1 and C2. The procedure requires one of these water boxes to be in service prior to discharging. Not a "substep" issue here because the stem is asking what does the procedure state to verify.
D. Incorrect. Both the Liquid Waste Management (LWM) and Boron Management (BM) systems effluent discharge to the Circulating Water System through the second discharge block of the condenser. This block contains circ water boxes B2, C1 and C2. The procedure requires one of these water boxes to be in service prior to discharging.

Technical Reference(s): OP-007-004 page 21 Rev. 322
(Attach if not previously provided)
(including version/revision number)

Proposed references to be provided to applicants during examination: None

Learning Objective: WLP-OPS-CW00 obj. 1 (As available)

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

Question History: Last NRC Exam 2020 NRC RO Exam

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

10 CFR Part 55 Content: 55.41 4,13
55.43

Comments:

2023 NRC Exam
RO Written Exam Worksheet

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #	2	
	Group #	2	
	K/A #	071 A1.09	
	Importance Rating	3.2	

K/A Statement

(071A1.09) **WASTE GAS DISPOSAL SYSTEM:** Ability to predict and/or monitor changes in parameters associated with operation of the (SF9 WGS) WASTE GAS DISPOSAL SYSTEM, including: Waste gas tank discharge radiation levels

Proposed Question: RO 63 Rev: 0

Given:

- Gas Decay Tank(s) discharge is in progress in accordance with OP-007-003, Gaseous Waste Management
- The RM-11 alarms and the associated annunciator is received

The validity of this annunciator is verified by checking Waste Gas Flow and Rad Recorder (GWMIFRR0648) located on __(1)__.

High radiation on __(2)__ Radiation Monitor will cause the Gas Decay Tank discharge to automatically isolate.

	(1)	(2)
A.	CP-42	either Plant Stack Vent
B.	CP-4	either Plant Stack Vent
C.	CP-42	the Gaseous Waste Management
D.	CP-4	the Gaseous Waste Management

Proposed Answer: D

Explanation: (Optional)

A. Incorrect. LCP-42 is the location for the Waste Gas Decay Tanks to Plant Vent Flow Indicator as mentioned in the ARP. This is not the indicator the off-normal directs use of to verify the validity of the annunciator. On high radiation during a GDT release, the Gaseous Waste Management Rad Monitor will automatically close GWM-309. The Plant Stack Vent Rad monitor is plausible because it is listed as one of the indications in OP-901-413.
B. Incorrect. Part 1 is correct. On high radiation during a GDT release, the Gaseous Waste Management Rad Monitor will automatically close GWM-309. The Plant Stack Vent Rad monitor is plausible because it is listed as one of the indications in OP-901-413.
C. Incorrect. LCP-42 is the location for the Waste Gas Decay Tanks to Plant Vent Flow Indicator as mentioned in the ARP. This is not the indicator the off-normal directs use of to verify the validity of the annunciator. Part 2 is correct.
D. **CORRECT:** From the annunciator response and off-normal procedure, the validity of this annunciator is verified by checking Waste Gas Flow and Rad Recorder (GWMIFRR0648). This recorder is located on CP-4. On high radiation during a GDT release, the Gaseous Waste Management Rad Monitor will automatically close GWM-309.

Technical Reference(s): OP-901-413 page 4 and 6 Rev. 2
(Attach if not previously provided) OP-500-007 Att. 4.50 Rev. 17
(including version/revision number) SD-GWM page 13 Rev. 8

Proposed references to be provided
to applicants during examination: None

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

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

Question History: Last NRC Exam 2017 NRC RO Exam

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

10 CFR Part 55 Content: 55.41 10,13
55.43 _____

Comments:

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RO Written Exam Worksheet

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #	2	
	Group #	2	
	K/A #	G2.1.8	
	Importance Rating	3.4	

K/A Statement

(G2.1.8) **CONDUCT OF OPERATIONS:** Ability to coordinate personnel activities outside the control room

Proposed Question: RO 64 Rev: 0

Given:

- The control room is being evacuated due to a fire

Procedures for supporting performance of OP-901-502, Evacuation of Control Room and Subsequent Plant Shutdown, can be found in the cabinets located at LCP-43 and the RAB +35 ____(1)____. The Emergency Communicator should assist the control room staff with activating the Fire Brigade, Plant Announcements, and notifying Hahnville Fire Department in accordance with the guidance in ____(2)____.

	(1)	(2)
A.	Cable vault room	OP-901-524, Fires in areas affecting Safe Shutdown
B.	Cable vault room	FP-001-020, Fire Emergency/Fire Report
C.	Relay room	OP-901-524, Fires in areas affecting Safe Shutdown
D.	Relay room	FP-001-020, Fire Emergency/Fire Report

Proposed Answer: D

Explanation: (Optional)

A. Incorrect. Part 1 is plausible because the Cable Spreading Room is located next to the Relay Room on the RAB +35. Actions in OP-901-502 are performed in both the Cable Vault and Relay rooms, but the cabinet where the procedures are stored are in the Relay Room. Part 2 is plausible because OP-901-524 provides the guidance for actions to be taken depending on which room the fire is located, but the guidance for plant announcements, activating the Fire Brigade, etc. are located in FP-001-020.

B. Incorrect. Part 1 is plausible because the Cable Spreading Room is located next to the Relay Room on the RAB +35. Actions in OP-901-502 are performed in both the Cable Vault and Relay rooms, but the cabinet where the procedures are stored are in the Relay Room. Part 2 is correct.

C. Incorrect. Part 1 is correct. Part 2 is plausible because OP-901-524 provides the guidance for actions to be taken depending on which room the fire is located, but the guidance for plant announcements, activating the Fire Brigade, etc. are located in FP-001-020.

D. **CORRECT:** Procedures to support the performance of OP-901-502, Evacuation of Control Room and Subsequent Plant Shutdown are in a cabinet located in the RAB +35 Relay Room. FP-001-020 provides the guidance for actions to be taken such as plant announcements, activating the Fire Brigade, etc. The question is generic because the Control Room can be evacuated for many reasons and this information is located on the Notes and Information section of OP-901-502.

Technical Reference(s): OP-901-502, page 50 Rev. 41
(Attach if not previously provided)
(including version/revision number)

Proposed references to be provided
to applicants during examination: None

Learning Objective: WLP-OPS-PPO51 obj. 6 (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:

2023 NRC Exam
RO Written Exam Worksheet

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #	2	
	Group #	2	
	K/A #	G2.1.47	
	Importance Rating	3.2	

K/A Statement

(G2.1.47) **CONDUCT OF OPERATIONS:** Ability to direct non-licensed personnel activities inside the control room

Proposed Question: RO 65 Rev: 0

Per OI-042-000, Watch Station Processes, the Switchgear Operator and the Emergency Communicator shall be staffed at all times. Which of the following is an additional minimal restriction for these positions as stated in OI-042-000?

A. The Switchgear Operator and the Emergency Communicator shall remain inside the protected area.

B. The Switchgear Operator and the Emergency Communicator shall remain inside RAB, RCA, FHB or Turbine Building (+15 or +40).

C. The Switchgear Operator shall remain in the protected area and the Emergency Communicator shall remain inside the RAB, RCA, FHB or Turbine Building (+15 or +40).

D. The Emergency Communicator shall remain in the protected area and the Switchgear operator shall remain inside the RAB, RCA, FHB or Turbine Building (+15 or +40).

Proposed Answer: C

Explanation: (Optional)

A. Incorrect. OI-042-000, Watch Station Process, states that the Switchgear operator shall remain in the protected area and the Emergency Communicator shall remain inside the RAB, RCA, FHB or Turbine Building (+15 or +40).
B. Incorrect. OI-042-000, Watch Station Process, states that the Switchgear operator shall remain in the protected area and the Emergency Communicator shall remain inside the RAB, RCA, FHB or Turbine Building (+15 or +40).
C. **CORRECT**: OI-042-000, Watch Station Process, states that the Switchgear operator shall remain in the protected area and the Emergency Communicator shall remain inside the RAB, RCA, FHB or Turbine Building (+15 or +40).
D. Incorrect. OI-042-000, Watch Station Process, states that the Switchgear operator shall remain in the protected area and the Emergency Communicator shall remain inside the RAB, RCA, FHB or Turbine Building (+15 or +40).

Technical Reference(s): OI-042-000 page 82 Rev. 67
(Attach if not previously provided)
(including version/revision number)

Proposed references to be provided
to applicants during examination: None

Learning Objective: WLP-OPS-PPA00 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 10
55.43

Comments:

2023 NRC Exam
RO Written Exam Worksheet

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #	3	
	Group #	1	
	K/A #	G2.2.12	
	Importance Rating	3.7	

K/A Statement

(G2.2.12) **EQUIPMENT CONTROL:** Knowledge of surveillance procedures

Proposed Question: RO 66 Rev: 0

In accordance with OP-100-014, Technical Specification and Technical Requirements Compliance, the crew is required to enter the appropriate cascading Technical Specifications upon declaring a(an) ___(1)___ inoperable.

The crew will be required to ___(2)___ within a MAXIMUM of one hour.

	(1)	(2)
A.	Emergency Diesel Generator	complete OP-903-066, Electrical Breaker Alignment Check
B.	Component Cooling Water Train	complete OP-903-066, Electrical Breaker Alignment Check
C.	Component Cooling Water Train	verify Emergency Feedwater Pump AB operable
D.	Emergency Diesel Generator	verify Emergency Feedwater Pump AB operable

Proposed Answer: B

Explanation: (Optional)

A. Incorrect. Even though the EDG supplies power to various loads during an emergency, W3 does not cascade due to an EDG being inoperable. Part 2 is correct.
B. **CORRECT**: OP-100-014, Technical Specification and Technical Requirements Compliance designates systems that required cascading Tech Specs, CCW is one of those systems. The Electrical Breaker Lineup Check is required to be completed w/i 1 hour in accordance with TS 3.8.1.1b. This question is generic because cascading TS applies to more than one system, cascading TS also applies to Essential Chillers and the UHS.
C. Incorrect. Part 1 is correct. TS 3.8.1.1d (verify EFW Pump AB operable) is required during cascading Tech Specs but must be performed within 2 hours
D. Incorrect. Even though the EDG supplies power to various loads during an emergency, W3 does not cascade due to an EDG being inoperable. TS 3.8.1.1d (verify EFW Pump AB operable) is required during cascading Tech Specs but must be performed within 2 hours.

Technical Reference(s): OP-100-014 page 43, 48 Rev. 365
(Attach if not previously provided) TS 3.8.1.1 actions b and d
(including version/revision number)

Proposed references to be provided
to applicants during examination: None

Learning Objective: WLP-OPS-CC00 obj. 9 (As available)

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

Question History: Last NRC Exam 2017 RO NRC Exam

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

10 CFR Part 55 Content: 55.41 10
55.43

Comments:

2023 NRC Exam
RO Written Exam Worksheet

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #	3	
	Group #	1	
	K/A #	G2.2.13	
	Importance Rating	4.1	

K/A Statement

(G2.2.13) **EQUIPMENT CONTROL:** Knowledge of tagging and clearance procedures

Proposed Question: RO 67 Rev: 0

Which of the following components qualifies as a NO TAG component on a Danger Tagout?

A. A drain valve that is going to be removed by maintenance.

B. A handwheel on a Motor Operated Valve being used as an isolation boundary.

C. A breaker that maintenance personnel will need to operate while signed on to the tagout.

D. A pump discharge valve that is used as the inside double valve isolation on a high energy system.

Proposed Answer: A

Explanation: (Optional)

A. **CORRECT**: EN-OP-102 identifies a purpose of a "no tag" is to identify components that cannot be tagged but require positioning when hanging a tagout. Removing a drain valve meets this purpose.
B. Incorrect. Not allowed as a "no tag" per EN-OP-102.
C. Incorrect. Not allowed as a "no tag" per EN-OP-102.
D. Incorrect. Not allowed as a "no tag" per EN-OP-102.

Technical Reference(s): EN-OP-102 page 78 Revision 28
(Attach if not previously provided)
(including version/revision number)

Proposed references to be provided
to applicants during examination: None

Learning Objective: ELP-OPS-CLR obj. 3 (As available)

Question Source: Bank # X
Modified Bank #
New

(Note changes or attach parent)

Question History: Last NRC Exam 2012 NRC RO Exam

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

10 CFR Part 55 Content: 55.41 10
55.43

Comments:

2023 NRC Exam
RO Written Exam Worksheet

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #	3	
	Group #	1	
	K/A #	G2.3.5	
	Importance Rating	2.9	

K/A Statement

(G2.3.5) **RADIATION CONTROL:** Ability to use RMSs, such as fixed radiation monitors and alarms or personnel monitoring equipment

Proposed Question: RO 68 Rev: 0

The ___(1)___ Rad Monitor is specified as the primary monitor with the designed sensitivity to measure small Primary to Secondary leakage and the ___(2)___ radiation monitor is specified as qualified for use if the primary monitor fails.

	(1)	(2)
A	MS Line N-16 PRM-RE5501-1 (2)	Steam Generator 1 and 2 Blowdown PRM-IRE-0100X
B	MS Line N-16 PRM-RE5501-1 (2)	AE Discharge PRM-IRE-0004
C	AE Discharge PRM-IRE-0004	Steam Generator 1 and 2 Blowdown PRM-IRE-0100X
D	AE Discharge PRM-IRE-0004	MS Line N-16 PRM-RE5501-1 (2)

Proposed Answer: D

Explanation: (Optional)

A. Incorrect: AE Discharge Radiation Monitor is considered the primary Radiation Monitor with the designed sensitivity to measure small Primary to Secondary Leakage. The Blowdown Rad Monitor is listed as available indication but is not the primary indication or backup.
B. Incorrect: AE Discharge is primary and MS Line N-16 is backup
C. Incorrect: Part 1 is correct. The Blowdown Rad Monitor is listed as available indication but is not the primary indication or backup.
D. **CORRECT:** AE Discharge Radiation Monitor is considered the primary Radiation Monitor with the designed sensitivity to measure small Primary to Secondary Leakage. The MS Line N16 Rad Monitors may be used as verification for the AE Discharge Radiation Monitor or as primary indication if the AE Discharge Radiation Monitor is out of service.

Technical Reference(s): OP-901-202 page 4 Revision 16
(Attach if not previously provided)
(including version/revision number)

Proposed references to be provided
to applicants during examination: None

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

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

Question History: Last NRC Exam 2014 NRC RO 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 #	3	
	Group #	2	
	K/A #	G2.4.21	
	Importance Rating	4	

K/A Statement

(G2.4.21) **EMERGENCY PROCEDURES/PLAN:** Knowledge of the parameters and logic used to assess the status of emergency operating procedures critical safety functions or shutdown critical safety functions (CFR: 41.7/43.5/45.12)

Proposed Question: RO 69 Rev: 0

Which of the following is the guidance stated in the RCS Inventory Control and Core Heat Removal Safety Functions criteria located in OP-902-002, Loss of Coolant Accident Recovery Procedure?

A. Entry into OP-902-008, Functional Recovery Procedure is required anytime core uncovery or superheated conditions exist.

B. Core uncovery and superheated conditions may be expected for up to a MAXIMUM of 30 minutes for some LOCA events.

C. Core uncovery and superheated conditions may be expected for up to a MAXIMUM of 45 minutes within the first 75 minutes of some LOCA events.

D. Core uncovery and superheated conditions may be expected for up to a MAXIMUM of 60 minutes within the first 90 minutes of some LOCA events.

Proposed Answer: C

Explanation: (Optional)

A. Incorrect. Plausible because the general rule for EOP usage is to go to OP-902-008, Functional Recovery procedure, any time critical safety functions are not met.
B. Incorrect. Plausible because 30 minutes is used in various situations in the EOPs.
C. **CORRECT**: The following note is located in both the RCS inventory control and Core heat removal safety function located in OP-902-002: "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."
D. Incorrect. Plausible because 1 hour is used in various situations in the EOPs.

Technical Reference(s): OP-902-002 page 73 Revision 21
(Attach if not previously provided)
(including version/revision number)

Proposed references to be provided
to applicants during examination: None

Learning Objective: WLP-OPS-PPE02 objective 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 2
Comprehension or Analysis

10 CFR Part 55 Content: 55.41 10
55.43

Comments:

2023 NRC Exam
RO Written Exam Worksheet

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #	4	
	Group #		
	K/A #	192006 K1.04	
	Importance Rating	2.8	

K/A Statement

(192006K1.04) **FISSION PRODUCT POISONS** Describe the removal of Xenon 135

Proposed Question: RO 70 Rev: 0

Reactor power is increased from 50 percent to 60 percent in one hour. What is the most significant contributor to the initial change in xenon-135 reactivity?

A. Production of xenon-135 directly from fission.

B. Production of xenon-135 from iodine-135 decay.

C. Loss of xenon-135 due to absorption of neutrons.

D. Loss of xenon-135 due to decay to cesium-135.

Proposed Answer: C

Explanation: (Optional)

A. Incorrect: An initial loss of Xenon-135 occurs during a reactor power increase. The greatest contributor to the loss of Xenon-135 is neutron absorption. This question is taken directly from the NRC Exam bank.
B. Incorrect. An initial loss of Xenon-135 occurs during a reactor power increase. The greatest contributor to the loss of Xenon-135 is neutron absorption. This question is taken directly from the NRC Exam bank.
C. **CORRECT**: An initial loss of Xenon-135 occurs during a reactor power increase. The greatest contributor to the loss of Xenon-135 is neutron absorption. This question is taken directly from the NRC Exam bank.
D. Incorrect. An initial loss of Xenon-135 occurs during a reactor power increase. The greatest contributor to the loss of Xenon-135 is neutron absorption. This question is taken directly from the NRC Exam bank.

Technical Reference(s): WLP-OPS-TYR06 slide 94 Revision 8
(Attach if not previously provided)
(including version/revision number)

Proposed references to be provided
to applicants during examination: None

Learning Objective: WLP-OPS-TYR06 obj. 4 (As available)

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

Question History: Last NRC Exam QID P460 in the NRC Exam Bank

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

10 CFR Part 55 Content: 55.41 1
55.43

Comments:

2023 NRC Exam
RO Written Exam Worksheet

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #	4	
	Group #		
	K/A #	192007 K1.04	
	Importance Rating	3.4	

K/A Statement

(192007K1.04) **FUEL DEPLETION AND BURNABLE POISONS**: Describe how and why boron concentration changes over core life

Proposed Question: RO 71 Rev: 0

During a 6 month period of continuous 100 percent power operation in the middle of a fuel cycle, the reactor coolant boron concentration must be decreased periodically to compensate for…

A. buildup of fission product poisons and decreasing control rod worth.

B. Fuel depletion and buildup of fission product poisons.

C. Decreasing control rod worth and burnable poison burnout.

D. Burnable poison burnout and fuel depletion.

Proposed Answer: B

Explanation: (Optional)

A. Incorrect. Fuel depletion adds negative reactivity over core life. Buildup of fission product poison adds negative reactivity over core life. Boron concentration must be decreased over core life to compensate for this negative reactivity.
B. **CORRECT**: Fuel depletion adds negative reactivity over core life. Buildup of fission product poison adds negative reactivity over core life. Boron concentration must be decreased over core life to compensate for this negative reactivity. This question was taken directly from the NRC Exam bank.
C. Incorrect. Fuel depletion adds negative reactivity over core life. Buildup of fission product poison adds negative reactivity over core life. Boron concentration must be decreased over core life to compensate for this negative reactivity.
D. Incorrect. Fuel depletion adds negative reactivity over core life. Buildup of fission product poison adds negative reactivity over core life. Boron concentration must be decreased over core life to compensate for this negative reactivity.

Technical Reference(s): WLP-OPS-TYR07 pages 41, 45 and 58 Rev. 6
(Attach if not previously provided)
(including version/revision number)

Proposed references to be provided
to applicants during examination: None

Learning Objective: WLP-OPS-TYR07 obj. 3 (As available)

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

Question History: Last NRC Exam QID P464 in the NRC Exam Bank

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

10 CFR Part 55 Content: 55.41 1
55.43

Comments:

2023 NRC Exam
RO Written Exam Worksheet

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #	4	
	Group #		
	K/A #	192008 K1.13	
	Importance Rating	3.6	

K/A Statement

(192008K1.13) **REACTOR OPERATIONAL PHYSICS:** (INTERMEDIATE RANGE OPERATION) Discuss the concept of the POAH and its impact on reactor power

Proposed Question: RO 72 Rev: 0

For a slightly supercritical reactor operating below the point of adding heat (POAH), what reactivity effects are associated with reaching the POAH?

A. There are no reactivity effects.

B. An increase in fuel temperature will begin to create a positive reactivity effect.

C. A decrease in fuel temperature will begin to create a negative reactivity effect.

D. An increase in fuel temperature will begin to create a negative reactivity effect.

Proposed Answer: D

Explanation: (Optional)

A. Incorrect. The reactor has a negative Fuel temperature Coefficient (FTC). As power rises, fuel temperature will start to rise at the POAH. The FTC will then add negative reactivity to the core.
B. Incorrect. The reactor has a negative Fuel temperature Coefficient (FTC). As power rises, fuel temperature will start to rise at the POAH. The FTC will then add negative reactivity to the core.
C. Incorrect. The reactor has a negative Fuel temperature Coefficient (FTC). As power rises, fuel temperature will start to rise at the POAH. The FTC will then add negative reactivity to the core.
D. **CORRECT**: The reactor has a negative Fuel temperature Coefficient (FTC). As power rises, fuel temperature will start to rise at the POAH. The FTC will then add negative reactivity to the core. This question was taken directly from the NRC Exam bank.

Technical Reference(s): WLP-OPS-TYR08 page 112 Rev. 9
(Attach if not previously provided)
(including version/revision number)

Proposed references to be provided
to applicants during examination: None

Learning Objective: WLP-OPS-TYR08 obj. 13 (As available)

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

Question History: Last NRC Exam QID P70 in the NRC Exam Bank

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

10 CFR Part 55 Content: 55.41 1
55.43

Comments:

2023 NRC Exam
RO Written Exam Worksheet

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #	3	
	Group #	4	
	K/A #	193003 K1.24	
	Importance Rating	3.1	

K/A Statement

(193003K1.24) **STEAM:** Explain the usefulness of steam tables to the control room operator

Proposed Question: RO 73 Rev: 0

The saturation pressure for water at 328°F is approximately….

A. 85 psig.

B. 100 psig.

C. 115 psig.

D. 130 psig.

Proposed Answer: A

Explanation: (Optional)

A. **CORRECT**: This question was taken directly from the NRC Exam bank. Using steam tables, saturation pressure for 328°F is 100.25 psia. Subtract 15 psia to convert to psig, results in 85 psia.
B. Incorrect. This question was taken directly from the NRC Exam bank. Using steam tables, saturation pressure for 328°F is 100.25 psia. Subtract 15 psia to convert to psig, results in 85 psia.
C. Incorrect. This question was taken directly from the NRC Exam bank. Using steam tables, saturation pressure for 328°F is 100.25 psia. Subtract 15 psia to convert to psig, results in 85 psia.
D. Incorrect. This question was taken directly from the NRC Exam bank. Using steam tables, saturation pressure for 328°F is 100.25 psia. Subtract 15 psia to convert to psig, results in 85 psia.

Technical Reference(s): Steam Tables
(Attach if not previously provided)
(including version/revision number)

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

Learning Objective: WLP-OPS-TYR03 obj. 7, 8 (As available)

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

Question History: Last NRC Exam QID P275

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

10 CFR Part 55 Content: 55.41 14
55.43

Comments:

2023 NRC Exam
RO Written Exam Worksheet

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #	4	
	Group #		
	K/A #	193004 K1.15	
	Importance Rating	2.8	

K/A Statement

(193004K1.15) **THERMODYNAMIC PROCESS**: (THROTTLING AND THE THROTTLING PROCESS) Determine the exit conditions for a throttling process based on the use of steam and/or water

Proposed Question: RO 74 Rev: 0

The plant is operating with the following main steam parameters at the main turbine steam inlet valves:

Pressure = 1,050 psia
Quality = 100 percent

The main turbine steam chest pressure is 400 psia. Assuming an ideal throttling process, which one of the following describes the steam in the steam chest?

A. Saturated, 96 percent quality

B. Saturated, 98 percent quality

C. Saturated, 100% quality

D. Superheated

Proposed Answer: B

Explanation: (Optional)

A. Incorrect. Calculated using Mollier diagram using moisture lines and pressure lines. The student must understand this is a constant enthalpy process.
B. **CORRECT**: Calculated using Mollier diagram using moisture lines and pressure lines. The student must understand this is a constant enthalpy process.
C. Incorrect. Calculated using Mollier diagram using moisture lines and pressure lines. The student must understand this is a constant enthalpy process.
D. Incorrect. Calculated using Mollier diagram using moisture lines and pressure lines. The student must understand this is a constant enthalpy process.

Technical Reference(s): WLP-OPS-THY03 pages 80 and 81
(Attach if not previously provided)
(including version/revision number)

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

Learning Objective: WLP-OPS-THY03 obj. 8 (As available)

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

Question History: Last NRC Exam QID P7140 in the NRC Exam Bank

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

10 CFR Part 55 Content: 55.41 14
55.43

Comments:

2023 NRC Exam
RO Written Exam Worksheet

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #	3	
	Group #	4	
	K/A #	193009 K1.01	
	Importance Rating	2.8	

K/A Statement

(193009 K1.01) **CORE THERMAL LIMITS:** Explain radial peaking factor.

Proposed Question: RO 75 Rev: 0

Radial peaking factor (FXY) is the ratio of the ____(1)____ heat flux at one core elevation to the average heat flux for ____(2)____ elevation.

	(1)	(2)
A.	minimum	the same
B.	minimum	a different
C.	maximum	the same
D.	maximum	a different

Proposed Answer: C

Explanation: (Optional)

A. Incorrect. Plausible since minimum heat flux is used in the calculation of average heat flux. The same plane is correct.
B. Incorrect. Plausible since minimum heat flux is used in the calculation of average heat flux. A different plane is plausible since it is used to calculate axial or linear heat flux.
C. **CORRECT.** explanation of radial peaking factor.
D. Incorrect. Plausible since maximum heat flux is correct and a different plane is used to calculate axial or linear heat flux.

Technical Reference(s): WLP-OPS-TYH09, Core Thermal Limits
(Attach if not previously provided)
(including version/revision number)

Proposed references to be provided to applicants during examination: None

Learning Objective: WLP-OPS-TYH09 Objective 2 (As available)

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

Question History: Last NRC Exam None

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

10 CFR Part 55 Content: 55.41 1
55.43 _____

Comments:

2023 NRC Exam
SRO Written Exam Worksheet

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #		1
	Group #		1
	K/A #	040 2.1.9	
	Importance Rating		4.5

K/A Statement

(040) **Excess Steam Demand** (G2.1.9) CONDUCT OF OPERATIONS: Ability to direct licensed personnel activities inside the control room.

Proposed Question 76: SRO 1 Rev: 0

Given:

- An Excess Steam Demand occurred
- SIAS, CIAS, MSIS and CSAS have been initiated
- After entering OP-902-004, Excess Steam Demand Recovery, the BOP reports that CFC A has tripped on overcurrent

The CRS should determine that the ____(1)____ safety function is <u>not</u> met. The crew should _____(2)_____.

	(1)	(2)
A.	containment isolation	go to OP-902-008, Functional Recovery procedure
B.	containment temperature and pressure control	go to OP-902-008, Functional Recovery procedure
C.	containment isolation	remain in OP-902-004, Excess Steam Demand Recovery procedure
D.	containment temperature and pressure control	remain in OP-902-004, Excess Steam Demand Recovery procedure

Proposed Answer: C

Explanation: (Optional)

A. Incorrect. Part 1 is correct. The guidance for closing the CFC CCW Isolation Valves is located in OP-902-004 as a contingency step. Therefore, the crew does not have to exit to OP-902-008 even though the Containment Isolation Safety Function is not being met.
B. Incorrect. The containment temperature and pressure control safety function is met due to > 1 CFC in operation and Containment Spray running. The guidance for closing the CFC CCW Isolation Valves is located in OP-902-004 as a contingency step. Therefore, the crew does not have to exit to OP-902-008 even though the Containment Isolation Safety Function is not being met.
C. **CORRECT**: If a SIAS/CIAS is initiated, the crew is to check all CFCs running. If any CFC is not operating, the crew is no longer meeting the Containment Isolation Safety Function until the CFC CCW isolation valves are overridden closed. The guidance for closing the CFC CCW Isolation Valves is located in OP-902-004 as a contingency step. Therefore, the crew does not have to exit to OP-902-008 even though the Containment Isolation Safety Function is not being met.
D. Incorrect. The containment temperature and pressure control safety function is met due to > 1 CFC in operation and Containment Spray running. Part 2 is correct.

Technical Reference(s): OP-902-004 page 26
(Attach if not previously provided) SFSC for CI and CTPC Rev. 17
(including version/revision number) TG-OP-902-004 page 56 Rev. 308

Proposed references to be provided
to applicants during examination: None

Learning Objective: WLP-OPS-PPE04 obj. 8 (As available)

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

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:

2023 NRC Exam
SRO Written Exam Worksheet

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #		1
	Group #		1
	K/A #	022 AA2.02	
	Importance Rating		3.7

(022AA2.02) **LOSS OF REACTOR Coolant Makeup:** Ability to determine and/or interpret the following as they apply to (APE 22) LOSS OF REACTOR Coolant Makeup**:** Charging Pump Problems.

Proposed Question 77: SRO 2 Rev: 0

Given:

- Plant is at 100% power
- Charging Pump A is running
- NAO notifies the control room of a failed pulsation dampener for Charging Pump A
- ATC operator identifies charging flow at 34 gpm and discharge pressure fluctuating

The crew should enter OP-901-112, Charging or Letdown Malfunction, subsection ____(1)____. The CRS should direct the crew to ____(2)____.

	(1)	(2)
A.	E1 Charging Malfunction	secure charging pump A, verify adequate VCT level, and start a standby charging pump
B.	E1 Charging Malfunction	place all charging pumps to OFF
C.	E3 Gas Bound Charging Pumps	secure charging pump A, verify adequate VCT level, and start a standby charging pump
D.	E3 Gas Bound Charging Pumps	place all charging pumps to OFF

Proposed Answer: D

Explanation: (Optional)

A. Incorrect. Entry into E1 Charging Malfunction is plausible because there is indications of a charging malfunction and it could be determined that the problem could be remedied by starting a different charging pump. This section will provide the steps to verify an available suction source and start a standby Charging Pump.
B. Incorrect. Entry into E1 Charging Malfunction is plausible because there are indications of a charging malfunction and it could be determined that the problem could be remedied by starting a different charging pump. Part 2 is correct.
C. Incorrect. Part 1 is correct. Part 2 is plausible if the applicant determines that the problem is voiding in Charging Pump A only and securing it along with starting a standby Charging pump will remedy the problem. The Caution in section E3, Gas Bound Charging Pumps, states that standby Charging Pumps should not be started until the suction source has been recovered.
D. **CORRECT:** There are indications of a gas bound charging pump. The Caution is section E3 Gas Bound Charging Pumps states that standby Charging Pumps should not be started until the suction source has been recovered. The crew will be directed to place all charging pumps to OFF and enter TS 3.0.3. This is done to preclude any standby charging pumps to start on pressurizer level deviation. This question is SRO knowledge because it requires an assessment of plant conditions, a course of action in the procedure, and then selection of a procedure section at which to proceed.

Technical Reference(s): OP-901-112 pages 4, 7 and 20 Rev. 8
(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. 3 (As available)

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

Question History: Last NRC Exam 2020 Question 76 (SRO 1)

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

10 CFR Part 55 Content: 55.41
55.43 5

Comments:

2023 NRC Exam
SRO Written Exam Worksheet

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #		1
	Group #		1
	K/A #	000025 G2.4.50	
	Importance Rating		4.0

K/A Statement

(025) **Loss of Residual Heat Removal System** (G2.4.50) EMERGENCY PROCEDURES/PLAN: Ability to verify system alarm setpoints and operate controls identified in the alarm response procedure.

Proposed Question 78: SRO 3 Rev: 0

Given:

- RCS T_{AVG} is 300°F and stable
- Pressurizer level is 43% and stable
- Shutdown Cooling Trains A and B are in service
- RCP's are secured

The following alarm is received in the Control Room:

- LPSI PUMP A FLOW LOST

The BOP reports LPSI Pump A shows steady LOW flow and amperage is less than expected for the existing configuration.

The CRS should enter OP-901-131, Shutdown Cooling Malfunction, subsection __(1)__ and direct the BOP to __(2)__.

	(1)	(2)
A.	E2 Loss of Shutdown Cooling Flow	stop LPSI Pump A
B.	E2 Loss of Shutdown Cooling Flow	raise LPSI Pump A Shutdown Cooling flow
C.	E4 System Malfunction in Mode 4	stop LPSI Pump A
D.	E4 System Malfunction in Mode 4	raise LPSI Pump A Shutdown Cooling flow

Proposed Answer: C

Explanation: (Optional)

A. Incorrect. Plausible since E2 would be entered if the plant was not in mode 4 and part 2 is correct. The same criteria for securing LPSI Pump A in E4 can be found in E2 of OP-901-131.
B. Incorrect. Plausible since E2 would be entered if the plant was not in mode 4 and part 2 would be correct if flow had lowered to below the low flow alarm setpoint without amperage and flow being less than expected for the present conditions.
C. **CORRECT:** E4 is entered due to the current plant temperature and because flow is oscillating, LPSI Pump A is stopped.
D. Incorrect. Plausible since E4 is correct but the second part is not correct since amperage and flow is less than expected for the present conditions.

Technical Reference(s): OP-901-131 pages 8, 32, 42 Rev 308
(Attach if not previously provided)
(including version/revision number)

Proposed references to be provided
to applicants during examination: None

Learning Objective: WLP-OPS-REQ21 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 3

10 CFR Part 55 Content: 55.41
55.43 5

Comments:(Sent for free review) Change “will” to “should” in stem. Changed “will” to “should” in the stem. What is the definition of “oscillating”? It appears the severity of the “oscillating” could be interpreted quite differently between applicants. Removed “flow is oscillating” and replaced it with LPSI Pump A shows steady low flow and amperage is less than expected for the existing configuration”. Needs LOD information. Added LOD information.

2023 NRC Exam
SRO Written Exam Worksheet

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #		1
	Group #		1
	K/A #	056 G2.1.6	
	Importance Rating		4.8

K/A Statement

(056) **Loss of Offsite Power** (G2.1.6) CONDUCT OF OPERATIONS: Ability to manage the control room crew during plant transients.

Proposed Question 79: SRO 4 Rev: 0

Given:

- Reactor tripped from 100% power due to a momentary grid disturbance
- EDG A and EDG B are running with their respective output breakers closed
- Both load sequencers have timed out
- OP-902-009, Appendix 1, Diagnostic Flow Chart, is in progress

The CRS should diagnose to ____(1)____ and the implementation of Appendix 20, Operation of DCT Sump Pumps, is ____(2)____.

	(1)	(2)
A.	OP-902-001, Reactor Trip Recovery	required
B.	OP-902-001, Reactor Trip Recovery	**NOT** required
C.	OP-902-003, Loss of Offsite Power	required
D.	OP-902-003, Loss of Offsite Power	**NOT** required

Proposed Answer: C

Explanation: (Optional)

A. Incorrect. Plausible since all safety buses are energized and nothing in the question stem implies that any safety functions are being challenged and the second part is correct.
B. Incorrect. Plausible since all safety buses are energized and nothing in the question stem implies that any safety functions are being challenged. Part 2 may not seem necessary since a Probable Maximum Precipitation (PMP) event is not occurring. Appendix 20 is required with any interruption of power to 3A or 3B safety busses. The applicant may also not be aware that the 314A and 314B safety to non-safety tie breakers open on a low voltage.
C. **CORRECT:** Both EDGs loading onto their respective buses is indicative of a LOOP. The load sequencer timing out provides another indication that Offsite has been lost. OP-902-003 requires the crew to align Dry Cooling Tower Portable Sump Pumps per OP-902-009, Appendix 20, Operation of DCT Sump Pumps if power has been interrupted to either 3A or 3B bus. This appendix is required because the safety to non-safety tie breakers on the 314A and 314B busses open upon the interruption of power. The Dry Cooling Tower sump pumps are on the non-safety portion meaning they have no power unless Appendix 20 is required to be performed.
D. Incorrect. Plausible since the first part is correct and the second part may not seem necessary since a Probable Maximum Precipitation (PMP) event is not occurring. Appendix 20 is required with any interruption of power to 3A or 3B safety busses. The applicant may also not be aware that the 314A and 314B safety to non-safety tie breakers open on a low voltage.

Technical Reference(s): OP-902-009, Appendix 20 Rev 323
(Attach if not previously provided) OP-902-003 page 6 Rev 011
(including version/revision number)

Proposed references to be provided
to applicants during examination: None

Learning Objective: WLP-OPS-PPE05 Obj 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 3

10 CFR Part 55 Content: 55.41
55.43 5

Comments: **Sent for "free review"**. Distractors B and D - why would one think that this pump start is optional and not required given a maximum precipitation event is in progress? Are there two pumps, and are you asking if one needs started? Removed "PMP event is occurring" and replaced "portable sump pump" with "dry cooling tower sump pumps". OP-902-003 requires the crew to align Dry Cooling Tower Portable Sump Pumps per OP-902-009, Appendix 20, Operation of DCT Sump Pumps if power has been interrupted to either 3A or 3B bus. This appendix is required because the safety to non-safety tie breakers on the 314A and 314B busses open upon the interruption of power. The Dry Cooling Tower sump pumps are on the non-safety portion meaning they have no power unless Appendix 20 is required to be performed. Should we mention that standard post trip actions have been completed in the stem? Standard Post Trip actions would have to be performed if 902-001 or 902-003 is entered. Don't see a reason to add it. Also, may be a little more discriminating to add that the disturbance was momentary and the grid is now stable Added "momentary" grid disturbance. Needs LOD information. Added LOD information.

2023 NRC Exam
SRO Written Exam Worksheet

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #		1
	Group #		1
	K/A #	000058 AA2.03	
	Importance Rating		4.0

K/A Statement:

(058 AA2.03) **LOSS OF DC Power:** Ability to determine and/or interpret the following as they apply to (APE 58) LOSS OF DC Power: Impact on ability to operate and monitor plant systems.

Proposed Question: 80 SRO 5 Rev: 0

Given:

- Plant is at 100% power when a loss of B-DC-S occurs

The CRS should implement __ (1) __. To prevent overflowing the Fuel Oil Day Tank, OP-901-313 Loss of a 125V DC Bus, will direct the crew to secure the EDG B Fuel Oil Transfer Pump by locally __ (2) __.

	(1)	(2)
A.	OP-901-313, Loss of a 125V DC Bus ONLY	operating the C/S at the EDG control panel
B.	OP-901-313, Loss of a 125V DC Bus ONLY	opening the breaker for the Fuel Oil Transfer Pump at MCC-312B
C.	OP-901-313, Loss of a 125V DC Bus, and OP-902-000, Standard Post Trip Actions concurrently	operating the C/S at the EDG control panel
D.	OP-901-313, Loss of a 125V DC Bus and OP-902-000, Standard Post Trip Actions concurrently	opening the breaker for the Fuel Oil Transfer Pump at MCC-312B

Proposed Answer: D

Explanation: (Optional)

A. Incorrect. Part 1 is plausible if the applicant does not determine that the reactor trips on a loss of the A or B DC busses. Part 2 is plausible because the EDG Fuel Oil Transfer Pumps are always controlled by the C/S at the local EDG control panel. With no DC power to the control panel, the procedure guidance is to open its breaker to stop the pump.
B. Incorrect. Part 1 is plausible if the applicant does not determine that the reactor trips on a loss of the A or B DC busses. Part 2 is correct.
C. Incorrect. Part 1 is correct. Part 2 is plausible because the EDG Fuel Oil Transfer Pumps are always controlled by the C/S at the local EDG control panel. With no DC power to the control panel, the procedure guidance is to open its breaker to stop the pump.
D. **CORRECT:** Loss of B-DC-S will open the required reactor trip switchgears to cause a reactor trip. The section for a loss of 125V-DC-B bus in OP-901-313 directs the crew to perform OP-902-000, Standard Post Trip Actions, concurrently. On a loss of control power to the Fuel Oil Transfer pumps, they will start and begin filling the appropriate day tank and will overflow them if action is not taken. There is no control power to the EDG B local control panel, therefore, the EDGB Fuel Oil Transfer Pump is required to be secure by locally opening its breaker, (MCC-EBKR-312B-3F).

Technical Reference(s): OP-901-313 page 25 Rev. 308
(Attach if not previously provided)
(including version/revision number)

Proposed references to be provided
to applicants during examination: None

Learning Objective: WLP-OPS-PPO30 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 3
Comprehension or Analysis

10 CFR Part 55 Content: 55.41
55.43 5

Comments:

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #		1
	Group #		1
	K/A #	077 A2.05	
	Importance Rating		3.6

(077 A2.05) **Generator Voltage and Electric Grid Disturbances:** Ability to determine and interpret the following as they apply to Generator Voltage and Electric Grid Disturbances: Status of grid.

Proposed Question 81: SRO 6 Rev: 0

Given:

- Plant is in MODE 1
- Shift Manager received a call from the grid operator informing them that maintenance activities are in progress that have resulted in grid voltage at the Waterford 3 switchyard lowering to 222 kV, with a predicted post-trip voltage of 220 kV
- All breakers from offsite to Class 1E distribution are closed
- Voltage on the B31 bus is below the acceptance criteria of OP-903-066, Electrical Breaker Alignment Check

Based on this information, the CRS should ____(1)____ because ____(2)____.

	(1)	(2)
A.	declare both AC off-site circuits inoperable and enter both Tech Spec 3.8.1.1 and TRM 3.8.1.1	sufficient power may not exist to supply safety related equipment needed for the mitigation of a design basis accident
B.	declare both AC off-site circuits inoperable and enter both Tech Spec 3.8.1.1 and TRM 3.8.1.1	post trip excessive current from this reduced voltage will actuate the SUT protective relays
C.	declare one AC off-site circuit inoperable and enter TRM 3.8.1.1 only	sufficient power may not exist to supply safety related equipment needed for the mitigation of a design basis accident
D.	declare one AC off-site circuit inoperable and enter TRM 3.8.1.1 only	post trip excessive current from this reduced voltage will actuate the SUT protective relays

Proposed Answer: A

Explanation: (Optional)

A. **CORRECT**: TS entry is required due to offsite circuit not meeting the requirements of OP-903-066. In this instance the offsite circuit is inoperable per Technical Specifications. The basis is correct.
B. Incorrect. TS entry is required due to offsite circuit not meeting the requirements of OP-903-066. In this instance the offsite circuit is inoperable per Technical Specifications. The basis is incorrect because this is not the reason for entering the spec but is plausible because lower voltage raises current.
C. Incorrect. TS entry is required due to offsite circuit not meeting the requirements of OP-903-066. In this instance, a TRM and Technical Specifications entry is required because the voltage does not meet the requirements of TRM 3.8.1.1 nor OP-903-066. One offsite circuit inoperable is plausible because only the B31 bus in the stem is identified as not meeting the breaker alignment check. Part 2 (the basis) is correct.
D. Incorrect. TS entry is required due to offsite circuit not meeting the requirements of OP-903-066. In this instance, a TRM and Technical Specifications entry is required because the voltage does not meet the requirements of TRM 3.8.1.1 nor OP-903-066. One offsite circuit inoperable is plausible because only the B31 bus in the stem is identified as not meeting the breaker alignment check. The basis is incorrect because this is not the reason for entering the spec but is plausible because lower voltage raises current.

Technical Reference(s): TRM/Technical Spec 3.8.1.1 & Bases
(Attach if not previously provided) OP-901-314 Rev 5
(including version/revision number) OP-903-066 Rev 306

Proposed references to be provided
to applicants during examination: None

Learning Objective: WLP-OPS-PPO30 Obj. 5 (As available)

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

Question History: Last NRC Exam N/A

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 #	028 AA.2.06	
	Importance Rating		3.6

K/A Statement

(028AA2.06) **PRESSURIZER (PZR) Level Control Malfunction:** Ability to determine and/or interpret the following as they apply to (APE 28) PRESSURIZER (PZR) Level Control Malfunction: Letdown flow.

Proposed Question 82: SRO 7 Rev: 0

Given:

- Plant is stable at 100% power
- RCS Temperature loop 1 Hot Leg (RC-ITI-0111X) has failed low
- The crew has entered OP-901-110, Pressurizer Level Control Malfunction

As a result of the failed temperature instrument, Letdown flow should ____(1)____. The CRS should implement subsection _____(2)_____ of OP-901-110.

	(1)	(2)
A.	rise	E1 Pressurizer Level Control Channel Malfunction
B.	rise	E2 Pressurizer Level Setpoint Malfunction
C.	lower	E1 Pressurizer Level Control Channel Malfunction
D.	lower	E2 Pressurizer Level Setpoint Malfunction

Proposed Answer: B

Explanation: (Optional)

A. Incorrect. The first part is correct. The hot leg indicator is in effect a pressurizer level control channel, but the E1 subsection of OP-901-110 provides guidance for failure of the pressurizer level instruments. E2 of OP-901-110 provides the guidance for PZR level setpoint malfunctions.
B. **CORRECT:** The hot leg indicator that has failed low is an input to Tave that is fed to the Reactor Regulating System. Pressurizer level setpoint is a function of Tave. Therefore, the Pzr level setpoint drops causing letdown flow to rise. The applicant must recognize that the Thot instrument will affect pressurizer level setpoint and enter subsection E2.
C. Incorrect. The hot leg indicator that has failed low is an input to Tave that is fed to the Reactor Regulating System. Pressurizer level setpoint is a function of Tave. Therefore, the Pzr level setpoint drops causing letdown flow to rise. The hot leg indicator is in effect a pressurizer level control channel, but the E1 subsection of OP-901-110 provides guidance for failure of the pressurizer level instruments. E2 of OP-901-110 provides the guidance for PZR level setpoint malfunctions.
D. Incorrect. The hot leg indicator that has failed low is an input to Tave that is fed to the Reactor Regulating System. Pressurizer level setpoint is a function of Tave. Therefore, the Pzr level setpoint drops causing letdown flow to rise. The second part is correct.

Technical Reference(s): OP-901-110 pages 6,8-10 Rev 11
(Attach if not previously provided) SD-RR Figure 02 Rev 7
(including version/revision number)

Proposed references to be provided
to applicants during examination: None

Learning Objective: WLP-OPS-PPO10 Obj 1 Rev (As available)
WLP-OPS-RR00 Obj 2

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

Question History: Last NRC Exam 2014 NRC SRO 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 #		1
	Group #		2
	K/A #	067 G2.1.8	
	Importance Rating		4.1

(067) **Plant Fire On Site** (G2.1.8) CONDUCT OF OPERATIONS: Ability to coordinate personnel activities outside the control room.

Proposed Question 83: SRO 8 Rev: 0

The crew has entered OP-901-502, Evacuation of Control Room and Subsequent Plant Shutdown, due to a fire in the Control Room.

The CRS should direct a Nuclear Auxiliary Operator to perform ____(1)____ as an immediate operator action.

If Nuclear Indication becomes suspect at LCP-43, the crew should consider performing Attachment 14, Connecting Excore Neutron Flux Channel D Indicator. This task is performed at the preamplifier located in the ____(2)____.

	(1)	(2)
A.	Attachment 1, Electrical Lockout of Reactor Coolant Pumps	RAB Relay Room
B.	Attachment 1, Electrical Lockout of Reactor Coolant Pumps	RAB Electrical Penetration Area
C.	Attachment 9, Local Operation of ADVs	RAB Relay Room
D.	Attachment 9, Local Operation of ADV	RAB Electrical Penetration Area

Proposed Answer: B

Explanation: (Optional)

A. Incorrect: First part is correct. The second part is plausible since the Relay Room is next to the Penetration Area and there are many tasks an NAO must perform in the EOPs that are located in the Relay Room.
B. **CORRECT:** The Control Room Supervisor is required to direct the Switchgear Operator to perform Attachment 1. Electrical Lockout of Reactor Coolant Pumps upon entry into OP-901-502. The cables will be swapped at the preamplifier located in the +35 RAB Electrical Penetration Area when placing NI channel D in service.
C. Incorrect. Plausible since Attachment 9 is performed during a Control Room Evacuation but it is not an immediate operator action. The second part is plausible since the Relay Room is next to the Penetration Area and there are many tasks an NAO must perform in the EOPs that are located in the Relay Room.
D. Incorrect. Plausible since Attachment 9 is performed during a Control Room Evacuation but it is not an immediate operator action. Part 2 is correct.

Technical Reference(s): OP-901-502 pages 5-7,30,51,83 Rev. 41
(Attach if not previously provided)
(including version/revision number)

Proposed references to be provided
to applicants during examination: None

Learning Objective: WLP-OPS-PPO51 obj. 2, 21 (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 #		1
	Group #		2
	K/A #	024 AA2.05	
	Importance Rating		3.9

K/A Statement

(024AA2.05) **Emergency Boration:** Ability to determine and/or interpret the following as they apply to Emergency Boration: Amount of boron to add to achieve required SDM.

Proposed Question 84: SRO 9 Rev: 0

Given:

- Reactor startup is in progress in accordance with OP-010-003, Plant Startup
- CEAs are in Manual Sequential
- CEA group positions are:
  - Shutdown Banks A & B are at their upper electrical limit
  - Reg Groups 1-3 are at their upper electrical limit
  - Reg Group 4 is at 100 inches
  - Reg Groups 5 and 6 are All Rods In

Nuclear instrumentation and Reactor Engineering reports indicate that criticality is expected in the next 50 inches of rod pull.

The CRS should direct ___(1)___ and direct the ATC to emergency borate until the required shutdown margin of ___(2)___ %Δk/k is reached.

	(1)	(2)
A.	a reactor trip	5.15
B.	a reactor trip	4.6
C.	full insertion of all Reg Group and Group P CEAs using the shim switch	4.6
D.	full insertion of all Reg Group and Group P CEAs using the shim switch	5.15

Proposed Answer: B

Explanation: (Optional)

A. Incorrect. Part 1 is correct. Part 2 is plausible because 5.15 %∆k/K would be the required SDM if any CEA is withdrawn.
B. **CORRECT:** Per OP-010-003 step 9.4.36, if NI shows evidence that criticality is expected to occur below Group 5 at 60 inches, then immediately trip the reactor and emergency borate. Step 6.1 of OP-901-103 states that if Emergency Boration was initiated due to inadequate SDM, then continue to emergency borate until Shutdown Margin is greater than or equal to that required by TS 3.1.1.2. (All CEAs fully inserted). The SDM required with Tc greater 400F is 4.6 %∆k/k.
C. Incorrect. From step 9.4.41 of OP-010-003. This would be the correct action to take if the CEAs were within TS 3.1.3.6 Transient Insertion limits but outside the calculations of the ECC. Part 2 is correct.
D. Incorrect. From step 9.4.41 of OP-010-003. This would be the correct action to take if the CEAs were within TS 3.1.3.6 Transient Insertion limits but outside the calculations of the ECC. Part 2 is plausible because 5.15 %∆k/K would be the required SDM if any CEA is withdrawn.

Technical Reference(s): OP-901-103 page 8 Rev. 5, TS COLR Fig. 1
(Attach if not previously provided) OP-010-003 page 78, 80 Rev. 364
(including version/revision number) TS 3.1.1.1 COLR

Proposed references to be provided
to applicants during examination: None

Learning Objective: WLP-OPS-PPN01 objs. 3 and 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
55.43 5

Comments:

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #		1
	Group #		2
	K/A #	CE 09 G2.4.22	
	Importance Rating		4.4

K/A Statement

(CE09) **Functional Recovery:** (G2.4.22) EMERGENCY PROCEDURES/PLAN: Knowledge of the basis for prioritizing safety functions during abnormal and emergency operations.

Proposed Question 85: SRO 10 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 are 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. In accordance with OI-038-000, Emergency Operating Procedures Operations Expectations/Guidance procedure, even though RC-1 criteria are met, RC-2 is implemented because RC-1 has no guidance for emergency boration initiation and termination.
D. Incorrect. Part 1 is correct. Even though RC-1 criteria are met, RC-2 is implemented because RC-1 has no guidance for emergency boration and termination.

Technical Reference(s): OI-038-000 page 30. Rev. 21
(Attach if not previously provided) OP-902-008 pages 13, 22 and 23 Rev. 31
(including version/revision number)

Proposed references to be provided
to applicants during examination: None

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

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

Question History: Last NRC Exam 2018 NRC SRO 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 #	005 A2.02	
	Importance Rating		3.9

K/A Statement

(005A2.02) **Residual Heat Removal System:** Ability to (a) predict the impacts of the following on the (SF4P RHR) Residual Heat Removal System; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal operations: Pressure transient protection during cold shutdown.

Proposed Question 86: SRO 11 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 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 M, A-7)

The addition of borated water ____(1)____ the capacity of SI-406B, RC Loop 1 SDC Suction LTOP relief to CNTMT Sump. The CRS should secure High Pressure Safety Injection Pumps in accordance with the guidance in ____(2)____.

	(1)	(2)
A.	is within	OP-901-504, Inadvertent ESFAS Actuation
B.	is within	OP-901-131, Shutdown Cooling Malfunction
C.	exceeds	OP-901-504, Inadvertent ESFAS Actuation
D.	exceeds	OP-901-131, Shutdown Cooling Malfunction

Proposed Answer: A

Explanation: (Optional)

A. **CORRECT:** The basis (TS 3.4.8.3) for the LTOP relief valves states that for conditions where the RCS cold legs are less than 200°F, the capacity of one LTOP has the adequate relieving capability to protect the RCS from an over-pressurization when the transient is an inadvertent SIAS injecting into a water solid RCS. The guidance to secure HPSI pumps is located in OP-901-504, Inadvertent ESFAS Actuation. RCS pressure and temperature are steady and there are no containment water leakage high alarms, the applicant will assume there is no RCS leak.
B. Incorrect. Part 1 is correct. OP-901-131, SDC malfunction may be entered but the guidance to secure HPSI pumps is located in OP-901-504. RCS pressure and temperature are steady and there are no containment water leakage high alarms, the applicant will assume there is no RCS leak.
C. Incorrect The basis (TS 3.4.8.3) for the LTOP relief valves states that for conditions where the RCS cold legs are less than 200°F, the capacity of one LTOP has the adequate relieving capability to protect the RCS from an over-pressurization when the transient is an inadvertent SIAS injecting into a water solid RCS.F. Part 2 is correct
D. The basis (TS 3.4.8.3) for the LTOP relief valves states that for conditions where the RCS cold legs are less than 200°F, the capacity of one LTOP has the adequate relieving capability to protect the RCS from an over-pressurization when the transient is an inadvertent SIAS injecting into a water solid RCS. The guidance to secure HPSI pumps is located in OP-901-504, Inadvertent ESFAS Actuation. RCS pressure and temperature are steady and there are no containment water leakage high alarms, the applicant will assume there is no RCS leak.

Technical Reference(s): OP-901-504 page 9 Rev. 11
(Attach if not previously provided) TS 3.4.8.3 basis
(including version/revision number)

Proposed references to be provided
to applicants during examination: None

Learning Objective: WLP-OPS-SDC00 obj. 1 (As available)

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

Question History: Last NRC Exam 2015 NRC SRO 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 #	010 G2.4.31	
	Importance Rating		4.1

K/A Statement

(010) **PRESSURIZER PRESSURE CONTROL SYSTEM** (G2.4.31) EMERGENCY PROCEDURES/PLAN: Knowledge of annunciator alarms, indications, or response procedures.

Proposed Question 87: SRO 12 Rev: 0

Given:

- Plant at 100% power
- ATC reports PZR spray valves have opened
- Pressurizer Pressure HI/LO annunciator alarms
- PZR pressure is 2150 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, one PZR spray valve remained open
- The reactor was manually tripped

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

	(1)	(2)
A.	E2, Pressurizer Pressure Controller Malfunction	taking manual control of pressurizer pressure controller
B.	E2, Pressurizer Pressure Controller Malfunction	securing necessary RCPs
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 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.
B. Incorrect. Subsection E2, Pressurizer Pressure Controller Malfunction, is plausible because the Pressurizer Pressure Controller failed high. Although, this section will not give CRS guidance to trip the Reactor and secure RCPs to control pressure. Part 2 is correct.
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 page 6,10 Rev. 303
(Attach if not previously provided) SD-PLC page 28 Rev. 12
(including version/revision number)

Proposed references to be provided
to applicants during examination: None

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

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

Question History: Last NRC Exam 2018 SRO NRC Exam

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

10 CFR Part 55 Content: 55.41
55.43 5

Comments:

2023 NRC Exam
SRO Written Exam Worksheet

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #		2
	Group #		1
	K/A #	012 A2.01	
	Importance Rating		3.6

K/A Statement

(012A2.01) **REACTOR PROTECTION SYSTEM** Ability to (a) predict the impacts on the (SF7 RPS) REACTOR PROTECTION SYSTEM; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal operations: Faulty bistable operation.

Proposed Question 88: SRO 13 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

The CRS should direct the BOP to utilize the power trip test interlock in accordance with OP-009-007, Plant Protection System _____.

A. section 8.8, and place the Linear Calibrate Switch to zero to bypass bistables 3 and 4

B. section 8.8, and place the Linear Calibrate Switch to zero to trip bistables 3 and 4

C. section 8.10, and pull the associated bistable comparator cards to bypass bistables 3 and 4

D. section 8.10, and pull 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 pages 25, 31 Rev. 23
(Attach if not previously provided)
(including version/revision number)

Proposed references to be provided
to applicants during examination: None

Learning Objective: WLP-OPS-PPS00 obj. 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
55.43 5

Comments:

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #		2
	Group #		1
	K/A #	063 G2.1.32	
	Importance Rating		4.0

K/A Statement

(063) **DC ELECTRICAL DISTRIBUTION SYSTEM** (G2.1.32) CONDUCT OF OPERATIONS: Ability to explain and apply system precautions, limitations, notes, or cautions.

Proposed Question 89: SRO 14 Rev: 0

Given:

- Plant is at 100% power when a loss of the 125 VOLT DC BUS TGB-DC occurs
- The crew has entered OP-901-313, Loss of a 125 Volt DC Bus
- Instrument Air pressure is 70 psig and lowering

If the 125 VOLT DC BUS TGB-DC cannot be restored, the crew will be required to perform the actions of OP-901-313 subsection E4, 125 VOLT DC BUS TGB-DC concurrently with ____(1)____. A loss of Instrument Air and Station Air has occurred due to _____(2)_____

	(1)	(2)
A.	OP-901-212, Rapid Plant Power Reduction	a loss of power to all station air and instrument air compressor unloader valves
B.	OP-901-212, Rapid Plant Power Reduction	the loss of control power to station air and instrument air compressors
C.	OP-902-000, Standard Post Trip Actions	the loss of control power to station air and instrument air compressors
D.	OP-902-000, Standard Post Trip Actions	a loss of power to all station air and instrument air compressor unloader valves

Proposed Answer: D

Explanation: (Optional)

A. Incorrect. Part 1 is plausible because OP-901-313 subsection E4, 125 VOLT DC BUS TGB-DC directs the crew to perform a Rapid Plant down power in accordance with OP-901-212 if TGB-DC cannot be restored and instrument air pressure remains above 65 psig. Part 2 is plausible because all of the compressors are located in the Turbine Generator Building (TGB). The station air compressor control power is TGB-DC but the instrument air compressor control power is from the safety bus DC.
B. Incorrect. Part 1 is plausible because OP-901-313 subsection E4, 125 VOLT DC BUS TGB-DC directs the crew to perform a Rapid Plant down power in accordance with OP-901-212 if TGB-DC cannot be restored and instrument air pressure remains above 65 psig. Part 2 is correct.
C. Incorrect. Part 1 is correct. Part 2 is plausible because all of the compressors are located in the Turbine Generator Building (TGB). The station air compressor control power is TGB-DC but the instrument air compressor control power is from the safety bus DC.
D. **CORRECT**: A reactor trip is required at an Instrument Air pressure of 65 psig. The crew will be required to perform OP-901-313 subsection E4, 125 VOLT DC BUS TGB-DC and OP-902-000, Standard Post Trip Actions concurrently. Due to the loss of TGB-DC, a loss of power to all station air and instrument air compressor unloader valves had occurred resulting in a loss of instrument and station air.

Technical Reference(s): OP-901-313 page 36 Rev. 308
(Attach if not previously provided)
(including version/revision number)

Proposed references to be provided
to applicants during examination: None

Learning Objective: WLP-OPS-PPO3 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 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 #	064 A2.24	
	Importance Rating		3.7

K/A Statement

(064A2.24) **EMERGENCY DIESEL GENERATOR SYSTEM:** Ability to (a) predict the impacts of the following on the (SF6 EDG) EMERGENCY DIESEL GENERATOR SYSTEM; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal operations: Fuel oil storage system failure.

Proposed Question 90: SRO 15 Rev: 0

Given:

The plant is at 100% power when the following annunciator is received:

- EDG A FUEL OIL STORAGE TANK LEVEL HI/LO

The minimum required levels for Diesel Fuel Oil Storage local indication and PMC indication to meet TS 3.8.1.3, Diesel Fuel Oil, are located in ____(1)____.

If Diesel Fuel Oil Storage Tank is below a six day supply, ____(2)____ entry is required.

	(1)	(2)
A.	OP-009-002, Emergency Diesel Generator	TS 3.8.1.3, Diesel Fuel Oil Storage only
B.	OP-009-002, Emergency Diesel Generator	TS 3.8.1.3, Diesel Fuel Oil Storage and TS 3.8.1.1, AC Electrical Power Sources
C.	OP-903-001 Technical Specification Surveillance Logs	TS 3.8.1.3, Diesel Fuel Oil Storage only
D.	OP-903-001 Technical Specification Surveillance Logs	TS 3.8.1.3, Diesel Fuel Oil Storage and TS 3.8.1.1, AC Electrical Power Sources

Proposed Answer: B

Explanation: (Optional)

A. Incorrect. Part 1 is correct. Part 2 is plausible if it is not known that the basis for TS 3.8.1.3 directs the crew to also declare the associated EDG inoperable.
B. **CORRECT**: The annunciator response procedure for EDG A FUEL OIL STORAGE TANK LEVEL HI/LO will direct the crew to OP-009-002, Emergency Diesel Generator, to acquire the minimum required levels for Diesel Fuel Oil Storage local indication and PMC indication to meet TS 3.8.1.3, Diesel Fuel Oil. With less than a 6 day supply of fuel oil available TS 3.8.1.3 and TS 3.8.1.1 are required. This question is SRO because TS 3.8.1.3 basis tells the operator that the EDG must also be declared inoperable if the Fuel Oil Storage Tank is inoperable.
C. Incorrect. Part 1 is plausible because Fuel Oil Storage Levels are Tech Spec related but this is not where the minimum levels are located. Part 2 is plausible if it is not known that the basis for TS 3.8.1.3 directs the crew to also declare the associated EDG inoperable.
D. Incorrect. Part 1 is plausible because Fuel Oil Storage Levels are Tech Spec related but this is not where the minimum levels are located. Part 2 is correct.

Technical Reference(s): OP-500-004 Attachment 4.22 Rev. 45
(Attach if not previously provided) OP-009-002 page 9 Rev. 360
(including version/revision number) TS 3.8.1.3 and basis

Proposed references to be provided
to applicants during examination: None

Learning Objective: WLP-OPS-EDG00 objs. 8 and 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
55.43 5

Comments:

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #		2
	Group #		2
	K/A #	011 A2.01	
	Importance Rating		3.5

K/A Statement

(011A2.01) **PRESSURIZER LEVEL CONTROL SYSTEM:** Ability to (a) predict the impacts of the following on the (SF2 PZR LCS) PRESSURIZER LEVEL CONTROL SYSTEM; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal operations: Excessive Letdown.

Proposed Question 91: SRO 16 Rev: 0

Given:

- Plant is at 100% power
- Letdown flow is 50 gpm and rising
- PZR level indicator RC-ILI-110X indicates 55% and lowering
- PZR level indicator RC-ILI-110Y indicates 54% and lowering
- The ATC reports that the pressurizer level setpoint on the Pressurizer Level Controller (RC-ILIC-0110) is 55.6%
- The output of the Pressurizer Level Controller (RC-ILIC-0110) is 90%

The CRS should enter ____(1)____ and direct the ATC to take manual control of the ____(2)____ to restore Pressurizer level.

	(1)	(2)
A.	OP-901-110, Pressurizer Level Control Malfunction	Pressurizer Level Controller (RC-ILIC-0110)
B.	OP-901-112, Charging and Letdown Malfunction	Pressurizer Level Controller (RC-ILIC-0110)
C.	OP-901-110, Pressurizer Level Control Malfunction	Letdown Flow Control Valves controller (RC-IHIC-0110)
D.	OP-901-112, Charging and Letdown Malfunction	Letdown Flow Control Valves controller (RC-IHIC-0110)

Proposed Answer: A

Explanation: (Optional)

A. **CORRECT**: The applicant will determine that a problem exists with the Pressurizer Level Controller (RC-ILIC-0110) because the control inputs to the PLCS are reading normal for the condition (PZR level setpoint and PZR level control channels). The PZR level controller should be reading minimum (less letdown). Section E3 of OP-901-110 provides the guidance for a pressurizer level controller malfunction.
B. Incorrect. Section E2 of OP-901-112 provides guidance for a letdown malfunction for everything downstream of the Pressurizer Level Controller (RC-ILIC-0110). The general actions of OP-901-112 will direct the crew to OP-901-110 if the malfunction is due to the Pressurizer level control system. Section E2 of OP-901-112 directs the crew to take manual control of Letdown Flow Control Valves controller (RC-IHIC-0110).
C. Incorrect. Section E2 of OP-901-112 provides guidance for a letdown malfunction for everything downstream of the Pressurizer Level Controller (RC-ILIC-0110). The general actions of OP-901-112 will direct the crew to OP-901-110 if the malfunction is due to the Pressurizer level control system. Section E2 of OP-901-112 directs the crew to take manual control of Letdown Flow Control Valves controller (RC-IHIC-0110). Also, OP-901-110 will direct the crew to take manual control of the letdown flow controller if the Pressure Level controller has failed low but in this instance that is not the case.
D. Incorrect. Section E2 of OP-901-112 provides guidance for a letdown malfunction for everything downstream of the Pressurizer Level Controller (RC-ILIC-0110). The general actions of OP-901-112 will direct the crew to OP-901-110 if the malfunction is due to the Pressurizer level control system. Section E2 of OP-901-112 directs the crew to take manual control of Letdown Flow Control Valves controller (RC-IHIC-0110). Also, OP-901-110 will direct the crew to take manual control of the letdown flow controller if the Pressure Level controller has failed low but in this instance that is not the case.

Technical Reference(s): OP-901-110 pages 6, 11 and 14 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 obj. 3 (As available)

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

Question History: Last NRC Exam 2015 SRO NRC Exam

2023 NRC Exam
SRO Written Exam Worksheet

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 #	014 G2.4.4	
	Importance Rating		4.7

K/A Statement

(014) **ROD POSITION INDICATION SYSTEM** (G2.4.4) EMERGENCY PROCEDURES/PLAN: Ability to recognize abnormal indications for system operating parameters that are entry-level conditions for emergency and abnormal operating procedures.

Proposed Question 92: SRO 17 Rev: 0

Given:

- Power is 100%
- All CEAs fully withdrawn

Five minutes later, the ATC reports the following:

- CEA 38 indicates 135 inches on the CP-2 CEAPDS
- CEA 38 indicates 150 inches on the PMC
- Both the Upper and Lower Electrical Limit lights for CEA 38 are extinguished
- All Rod Bottom lights are extinguished
- Tcold is 541 ºF and slowly dropping

To verify CEA position, the CRS should request indication on the ____(1)____. The CRS should enter OP-901-102, CEA or CEDMCS Malfunction, sub-section _____(2)_____.

	(1)	(2)
A.	CPC that CEA 38 is targeted to	E1, CEA Misalignment Greater than 7 inches
B.	CPC that CEA 38 is targeted to	E5, CEA Position Indication Malfunction
C.	CP-2 digital meter for CEA 38	E1, CEA Misalignment Greater than 7 inches
D.	CP-2 digital meter for CEA 38	E5, CEA Position Indication Malfunction

Proposed Answer: A

Explanation: (Optional)

A. **CORRECT**: CPC indication is fed from safety grade RSPT indication which provides actual rod position. All indications reported by the ATC with the exception of the PMC indication are consistent with a rod misalignment.
B. Incorrect. Part 1 is correct. PMC indication although erroneous would be expected to read 150 inches and therefore not an indication malfunction.
C. Incorrect: The CP-2 digital meter is fed by the same input as the PMC (pulse counter). In this case (slipped rod) the pulse counter will not see the change in rod position since the rod had no motion demand (from the joystick) and it did not drop to the bottom of the core. Part 2 is correct.
D. Incorrect: The CP-2 digital meter is fed by the same input as the PMC (pulse counter). In this case (slipped rod) the pulse counter will not see the change in rod position since the rod had no motion demand (from the joystick) and it did not drop to the bottom of the core. PMC indication although erroneous would be expected to read 150 inches and therefore not an indication malfunction.

Technical Reference(s): SD-CPC figure 4 and 28 Rev. 19
(Attach if not previously provided) SD-CED page 7, 26 Rev. 13
(including version/revision number) OP-901-102 page 9 Rev. 308

Proposed references to be provided
to applicants during examination: None

Learning Objective: WLP-OPS-PPO10 obj.1 (As available)

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

Question History: Last NRC Exam 2015 SRO 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 #		2
	K/A #	029 A2.06	
	Importance Rating		3.0

(029A2.06) **Containment Purge System:** Ability to (a) predict the impacts of the following on the (SF8 CPS) Containment Purge System and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal operations. CPS component malfunction

Proposed Question 93: SRO 18 Rev: 0

Given: (REFERENCE PROVIDED)

- Plant is in MODE 3
- Fuel movement is occurring in the Spent Fuel Pool

Containment Purge Monitor Reading	Monitor Alarm/Trip Setpoint
ARM-IRE-5024S reads 150 mR/hr	290 mR/hr
ARM-IRE-5025S reads 140 mR/hr	300 mR/hr
ARM-IRE-5026S reads 19 mR/hr	40 mR/hr
ARM-IRE-5027S reads 15 mR/hr	50 mR/hr

ARM-IRE-___(1)___ are inoperable. Technical Specification 3.3.3.1 entry is ___(2)___.

	(1)	(2)
A.	5025S and 5027S	required
B.	5024S and 5026S	not required
C.	5025S and 5027S	not required
D.	5024S and 5026S	required

Proposed Answer: C

Explanation: (Optional)

A. Incorrect. ARM-IRE-5025S is inoperable because its setpoint is greater than 2 times background. ARM-IRE-5027S is inoperable because its setpoint should be the higher of 2 times background (30 mR/hr) or 40 mR/hr. The applicant can determine the trains that the Rad Monitors serve by referring to OP-100-014 Attachment 6.6. Based on both monitors are in opposite trains and one remains operable in each train, Tech Spec 3.3.3.1 entry is not required. This question requires knowledge of the surveillance portion of TS 3.3.3.1.
B. Incorrect. ARM-IRE-5024S and ARM-IRE-5026S are operable. 5024S based on setpoint less than 2 times background and 5026S based on setpoint appropriately at 40 mR/hr. No Tech Spec entry is required for these monitors because they are operable. Tech Spec entry would be required if they were inoperable.
C. **CORRECT:** ARM-IRE-5025S is inoperable because its setpoint is greater than 2 times background. ARM-IRE-5027S is inoperable because its setpoint should be the higher of 2 times background (30 mR/hr) or 40 mR/hr. The applicant can determine the trains that the Rad Monitors serve by referring to OP-100-014 Attachment 6.6. Based on both monitors are in opposite trains and one remains operable in each train, Tech Spec 3.3.3.1 entry is not required. This question requires knowledge of the surveillance portion of TS 3.3.3.1.
D. Incorrect. ARM-IRE-5024S and ARM-IRE-5026S are operable. 5024S based on setpoint less than 2 times background and 5026S based on setpoint appropriately at 40 mR/hr. No Tech Spec entry is required for these monitors because they are operable. Tech Spec entry would be required if they were inoperable.

Technical Reference(s): TS 3.3.3.1 and OP-100-014 page 62 Rev. 366
(Attach if not previously provided)
(including version/revision number)

Proposed references to be provided
to applicants during examination: TS 3.3.3.1 and OP-100-014 page 62 Rev. 366

Learning Objective: WLP-OPS-RMS00 obj. 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 3

10 CFR Part 55 Content: 55.41
55.43 2

Comments:

2023 NRC Exam
SRO Written Exam Worksheet

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #		3
	Group #		1
	K/A #	G2.1.17	
	Importance Rating		4.0

K/A Statement

G2.1.17 **Conduct of Operations:** Ability to make accurate, clear, and concise verbal reports.

Proposed Question 94: SRO 19 Rev: 0

Given:

- Reactor Trip has occurred
- The BOP is Verifying RCS Heat Removal in accordance with OP-902-000, Standard Post Trip Actions
- The BOP informs the CRS that power to the Moisture Separator Reheater (MSR) Control Panel is not available

The CRS should direct the Turbine Building watch to isolate the MSR by _____.

A. isolating the air and gagging closed all 5 inch and 10 inch Temperature Control valves

B. de-energizing and manually closing the 5 inch and 10 inch Motor Operated valves only

C. de-energizing and manually closing the 1 inch, 5 inch and 10 inch Motor Operated valves only

D. isolating the air and opening the petcock to all 5 inch and 10 inch Temperature Control valves

Proposed Answer: D

Explanation: (Optional)

A. Incorrect. The TCVs are closed by isolating air to them and then opening the petcock to drive the closed. No gagging is required.
B. Incorrect. The goal is to close the Motor Operated valves, but these valves are closed through interlocks with the MSR TCV closed limit switches.
C. Incorrect. The goal is to close the Motor Operated valves, but these valves are closed through interlocks with the MSR TCV closed limit switches.
D. **CORRECT**: The Standard Post Trip Actions performed after a reactor trip directs the BOP to "verify the MSRs are reset". This step is to ensure that the MSR is isolated to prevent an excessive cooldown. If the panel has no power the isolation did not occur. OI-038-000 directs the control room to instruct the NAO to isolate air to the 5 inch and 10 inch TCV. The five inch and ten inch TCV closed limit switch is what drives the 5 inch and 10 inch MOVs closed. This question is generic because this step applies after any reactor trip. Also, the CRS has to be aware of the information in the EOP expectations procedure so that a concise verbal report can be given to the NAO. The NAO may not be aware of his/her required action if told to "reset the MSR".

Technical Reference(s): OP-902-000 page 11 Rev. 17
(Attach if not previously provided) OI-038-000 page 18 Rev. 21
(including version/revision number) SD-TUR page 10 and Figure 4 Rev. 14

Proposed references to be provided
to applicants during examination: None

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 2
Comprehension or Analysis

10 CFR Part 55 Content: 55.41
55.43 5

Comments:

2023 NRC Exam
SRO Written Exam Worksheet

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #		3
	Group #		1
	K/A #	G2.1.31	
	Importance Rating		4.3

K/A Statement

G2.1.31 **Conduct of Operations:** Ability to locate control room switches, controls, and indications to determine whether they correctly reflect the desired plant lineup.

Proposed Question 95: SRO 20 Rev: 0

Given:

- Plant is performing a cooldown for a refueling outage
- RCS temperature is 195 ºF
- RCS pressure is 350 psia
- EDG B is tagged out

Offsite power train A is then declared inoperable because of a voltage problem.

The CRS should ensure _____ is aligned as the operable boration flow path per OP-903-002, Boration Flow Path Valve Lineup Verification.

A. Boric Acid Makeup Tank B Gravity Feed Valve and Charging Pump B

B. Boric Acid Makeup Tank A Gravity Feed Valve and Charging Pump A

C. BAM Pump A and Charging Pump A

D. BAM pump B and Charging pump B

Proposed Answer: C

Explanation: (Optional)

A. Incorrect: Even though Boric Acid Makeup Tank B Gravity Feed Valve is operable and available to be used as a boration flow path, offsite train B cannot be credited as the operable power source. Boric Acid Makeup Tank B Gravity Feed Valve and Boric Acid Makeup Tank A Gravity Feed Valve are powered from the B train.
B. Incorrect. Even though Boric Acid Makeup Tank A Gravity Feed Valve is operable and available to be used as a boration flow path, offsite train B cannot be credited as the operable power source. Boric Acid Makeup Tank B Gravity Feed Valve and Boric Acid Makeup Tank A Gravity Feed Valve are powered from the B train.
C. **CORRECT:** OP-903-002 is the surveillance procedure used to verify SR 4.1.2.1. TS 3.1.2.1 bases specifies that the operable power source must be an EDG. Boric Acid Pump A and Charging Pump A is the only component that could be powered from EDG A. TS bases knowledge is required to determine the correct boration flow path. Boric Acid Pumps A and B are powered from the A train. Charging Pump A is powered from EDG A.
D. Incorrect: BAM pump B is powered from an emergency power source (EDG A) but Charging Pump B is not. Boric Acid Pumps A and B are powered from the A train.

Technical Reference(s): OP-903-002 page 18 Rev. 305
(Attach if not previously provided)
(including version/revision number)

Proposed references to be provided
to applicants during examination: None

Learning Objective: WLP-OPS-TS04 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
Comprehension or Analysis 3

10 CFR Part 55 Content: 55.41
55.43 2

Comments:

2023 NRC Exam
SRO Written Exam Worksheet

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #		3
	Group #		2
	K/A #	G2.2.25	
	Importance Rating		4.2

K/A Statement

G2.2.25 **Equipment Control:** Knowledge of the bases in TS for limiting conditions for operation and safety limits

Proposed Question 96: SRO 21 Rev: 0

Per TS 3.6.3, a locked closed containment isolation valve can be opened on an intermittent basis under administrative controls.

These administrative controls should include assigning an operator in constant communication with the control room ____(1)____. The list of containment isolation valves can be found in _____(2)____.

	(1)	(2)
A.	to close the valve within four hours of an accident situation	TS 3.6.3
B.	to be stationed at the valve controls	TS 3.6.3
C.	to close the valve within four hours of an accident situation	TRM 3.6.3
D.	to be stationed at the valve controls	TRM 3.6.3

Proposed Answer: D

Explanation: (Optional)

A. Incorrect. Four hours to close the containment isolation valve is plausible because this is the limiting time per TS 3.6.3 to close the CIV for a non-closed system. (TS 3.6.3.e). TS 3.6.3 is a plausible distractor because the list of Containment Isolation Valves were listed here at one time before being moved to TRM 3.6.3. (Table 3.6-2)
B. Incorrect. Part 1 is correct. TS 3.6.3 is a plausible distractor because the list of Containment Isolation Valves were listed here at one time before being moved to TRM 3.6.3.
C. Incorrect. Four hours to close the containment isolation valve is plausible because this is the limiting time per TS 3.6.3 to close the CIV for a non-closed system. (TS 3.6.3.e). Part 2 is correct.
D. **CORRECT**: TS 3.6.3 basis and OP-100-014, Technical Specification and Technical Requirements Compliance Procedure, list the requirements for administrative controls when opening a locked closed containment isolation valve. Stationing an operator at the valve controls while in constant communication with the control room is included in this list. The list of containment isolation valves is located in TRM 3.6.3. (Table 3.6-2)

Technical Reference(s): TS 3.6.3 and TS 3.6.3 basis
(Attach if not previously provided) TRM 3.6.3
(including version/revision number) OP-100-014 page 61 Rev. 366

Proposed references to be provided
to applicants during examination: None

Learning Objective: WLP-OPS-TS02 obj. 11 (As available)
OP-100-014 page 61 Rev. 366

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 2

Comments:

2023 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 **EQUIPMENT CONTROL:** Ability to determine operability or availability of safety-related equipment (SRO Only).

Proposed Question 97: SRO 22 Rev: 0

A required 72 hour technical specification surveillance was inadvertently missed and was last performed 7 days ago. 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 the time of discovery or the system/component must immediately be declared inoperable.

A. 18 hours

B. 24 hours

C. 72 hours

D. 90 hours

Proposed Answer: C

Explanation: (Optional)

A. Incorrect. Plausible because the applicant may apply the action of TS 4.0.2 and allow 25% of the time interval of 72 hours. (.25 of 72 hours = 18 hours). In this case, the action of TS 4.0.2 does not apply because the surveillance interval +.25% has expired.
B. Incorrect. The answer would be 24 hours if a risk evaluation had not been performed or the risk impact is not being managed.
C. **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".
D. Incorrect. Plausible because applying the 25% margin of LCO 4.0.2 to 72 hours would equal 90 hours.

Technical Reference(s): TS 4.0.3, TS 4.0.2
(Attach if not previously provided)
(including version/revision number)

Proposed references to be provided
to applicants during examination: None

Learning Objective: WLP-OPS-TS02 obj. 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
55.43 2

Comments:

2023 NRC Exam
SRO Written Exam Worksheet

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 **Radiation Control:** Knowledge of radiation or contamination hazards that may arise during normal, abnormal, or emergency conditions or activities, such as analysis and interpretation of radiation and activity readings as they pertain to administrative, normal, abnormal, and emergency procedures or to analysis and interpretation of coolant activity, including comparison to emergency plan or regulatory limits.

Proposed Question 98: SRO 23 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 sufficient water depth is available such that ___(2)___.

	(1)	(2)
A.	fuel seated in reactor pressure vessel	iodine released is within limits in the event of a rupture of an irradiated fuel assembly
B.	reactor pressure vessel flange	iodine released is within limits in the event of a rupture of an irradiated fuel assembly
C.	reactor pressure vessel flange	sufficient cooling capacity is maintained
D.	fuel seated in reactor pressure vessel	sufficient cooling capacity is maintained

Proposed Answer: B

Explanation: (Optional)

A. 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.

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 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” (fuel is at 9 feet, 23 feet+9 feet=32 feet). 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).

Technical Reference(s): TS 3.9.10.1 and TS 3.9.10.1 basis
(Attach if not previously provided) TS 3.9.10.2
(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 # X
Modified Bank # (Note changes or attach parent)
New

Question History: Last NRC Exam 2018 NRC SRO Exam

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

10 CFR Part 55 Content: 55.41
55.43 4

Comments:

2023 NRC Exam
SRO Written Exam Worksheet

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #		3
	Group #		4
	K/A #	G2.4.29	
	Importance Rating		4.4

K/A Statement

G2.4.29 **EMERGENCY PROCEDURES/PLAN:** Knowledge of the emergency plan implementing procedures.

Proposed Question:99 SRO 24 Rev:

Per EP-002-102, Emergency Operations Facility (EOF), Activation, Operation and Deactivation, the lowest level of event classification that requires activation of the Emergency Operations Facility (EOF) is an ____(1)____ . It is the responsibility of the _____(2)_____ to direct the activities of the EOF including overall management of the total emergency response.

	(1)	(2)
A.	Alert	Emergency Plant Manager
B.	Alert	Emergency Director
C.	Unusual Event	Emergency Plant Manager
D.	Unusual Event	Emergency Director

Proposed Answer: B

Explanation: (Optional)

A. Incorrect. Part 1 is correct, the EOF is activated at an Alert condition (EP-002-102 step 4.2). Part 2 is incorrect, the Emergency Plant Manager is in charge of the TSC and overall management of the onsite ERO.
B. **CORRECT: T**he EOF is activated at an Alert condition. The Emergency Director is in charge of the EOF and overall management of total emergency response.
C. Incorrect. Part 1 is incorrect, the EOF is activated at an Alert condition (EP-002-102 step 4.2). Part 2 is incorrect, the Emergency Plant Manager is in charge of the TSC and overall management of the onsite ERO.
D. Incorrect. Part 1 is incorrect, the EOF is activated at an Alert condition (EP-002-102 step 4.2). Part 2 is correct.

Technical Reference(s): EP-002-102, Emergency Operations Facility (EOF) Activation, Operation, and Deactivation. Rev 310.
(Attach if not previously provided)
(including version/revision number)

Proposed references to be provided to applicants during examination: None

Learning Objective: WLP-OPS-EP02 Obj. 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:

2023 NRC Exam
SRO Written Exam Worksheet

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #		3
	Group #		4
	K/A #	G2.4.40	
	Importance Rating		4.5

K/A Statement

G2.4.40 **EMERGENCY PROCEDURES/PLAN:** Knowledge of SRO responsibilities in emergency plan implementing procedures (SRO Only)

Proposed Question:100 SRO 25 Rev: 0

At time 0900, an Alert classification was declared

The Initial Notification to offsite agencies must be made no later than time ____(1)____. Without a change in emergency classification, subsequent notifications to offsite agencies must be made no later than 60 minutes of the ____(2)____.

	(1)	(2)
A.	0915	previous notification message
B.	0915	alert classification
C.	0930	previous notification message
D.	0930	alert classification

Proposed Answer: A

Explanation: (Optional)

A. **CORRECT:** EP-002-010 requires the Initial Notification to be made within 15 minutes of an emergency classification. EP-002-010 states that follow up notifications will be made no later than 60 minutes of the previous message.
B. Incorrect. Part 1 is correct. Part 2 is plausible since there are some time requirements that are based on when an event classification is made.
C. Incorrect. EP-002-010 requires the Initial Notification to be made within 15 minutes of an emergency classification. Part 2 is correct.
D. Incorrect. EP-002-010 requires the Initial Notification to be made within 15 minutes of an emergency classification. Part 2 is plausible since there are some time requirements that are based on when an event classification is made.

Technical Reference(s): EP-002-010 page 8 Rev. 317
(Attach if not previously provided)
(including version/revision number)

Proposed references to be provided
to applicants during examination: None

Learning Objective: WLP-OPS-EP02 Obj. 4,9 (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
55.43 5

Comments: