2011 NRC Exam
RO Written Exam Worksheet

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #	1	
	Group #	1	
	K/A #	CE/E02 EK2.1	
	Importance Rating	3.3	

K/A Statement

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

Proposed Question: RO 1 Rev: 0

Given:

- Feedwater Control System (FWCS) 1 was in AUTO with a setpoint of 68% when FWCS 1 Master Controller output failed to 0%
- The operator depresses the MANUAL pushbutton on the FWCS 1 Master Controller and manually raises the output of FWCS 1 Master Controller
- Prior to matching steam flow and feed flow, the reactor trips on S/G 1 Low Level
- Final FWCS 1 Master Controller flow demand is 50% in MANUAL
- Reactor Trip Override (RTO) actions are verified
- S/G 1 level is currently rising

When S/G 1 level exceeds the automatic setpoint of 68% NR, RTO will _____(1)_____ in FWCS 1 and S/G 1 level will _____(2)_____.

	(1)	(2)
A.	reset	stabilize at setpoint
B.	remain active	stabilize at setpoint
C.	reset	continue to rise
D.	remain active	continue to rise

Proposed Answer: D

Explanation: (Optional)

A. Incorrect. RTO will not reset due to the Master Controller output being left at 50%. Level response is incorrect.
B. Incorrect. RTO will remain active due to the Master controller output being left at 50%. Level response is incorrect.
C. Incorrect. RTO will not reset due to the Master Controller output being left at 50%. Level response is correct.
D. **CORRECT**: Output of the Master Controller must drop below ~ 3.5 % for RTO to reset. With the Master Controller for FWCS 1 in manual with an output of 50% the RTO signal will remain active and the FWCS 1 components will not change position. Since S/G 1 level was rising after RTO occurred, S/G 1 level will continue to rise.

Technical Reference(s): SD-FWC 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-FWC00 Obj. 6 (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
Comprehension or Analysis X

10 CFR Part 55 Content: 55.41 7
55.43

Comments:

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RO Written Exam Worksheet

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #	1	
	Group #	1	
	K/A #	000008 AK2.01	
	Importance Rating	2.7*	

K/A Statement

Knowledge of the interrelations between the Pressurizer Vapor Space Accident and the following: Valves.

Proposed Question: RO 2 Rev: 0

Given:

- The plant is at 10% power following refueling
- A Pressurizer Relief Valve spuriously opens
- Reactor Coolant System pressure drops from 2250 PSIA to 1900 PSIA and then slowly recovers
- Quench Tank temperature rises to 135°F and stabilizes

The Pressurizer Relief Valve is currently ____(1)____. During this event, Pressurizer Level will _____(2)_____.

	(1)	(2)
A.	closed	lower due to mass loss
B.	closed	rise to 100% due to head bubble formation
C.	open	lower due to mass loss
D.	open	rise to 100% due to head bubble formation

Proposed Answer: A

Explanation: (Optional)

A. **CORRECT**: Based on pressure recovering and quench tank temperature stabilizing, the relief valve has closed. RCS pressure does not lower enough in this event to draw a bubble in the head (T_{hot} for 10% power is ~ 547°F saturation temperature for 1900 PSIA is ~ 629°F), therefore pressurizer level will be indicative of the mass lost and level will lower.
B. Incorrect. Correct valve position. The relief valve position indication is not a limit switch. Pressurizer level will not go to 100% until saturation conditions occur in the head. For the given conditions, significant margin to saturation exists throughout the event; therefore, level will not rise to 100%.
C. Incorrect. Pressure would continue to drop to saturation conditions and quench tank temperature would continue to rise if the valve were still open. Correct pressurizer level response.
D. Incorrect. Wrong valve position. Wrong pressurizer level response.

Technical Reference(s): Steam Tables
(Attach if not previously provided) Plant Data Book Figure 1, rev 0
(including version/revision number)

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

Learning Objective: WLP-OPS-RCS00, Obj. 4 & 16 (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
Comprehension or Analysis X

10 CFR Part 55 Content: 55.41 3
55.43

Comments:

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Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #	1	
	Group #	1	
	K/A #	000009 G2.1.20	
	Importance Rating	4.6	

K/A Statement

Conduct of Operations: Ability to interpret and execute procedure steps. (Small Break LOCA)

Proposed Question: RO 3 Rev: 0

Given:

- A Small Break Loss of Coolant Accident with a concurrent Loss of Offsite Power has occurred
- OP-902-002, Loss of Coolant Accident Recovery, is being implemented
- Containment pressure is 17.3 PSIA
- Reactor Coolant System pressure is 1380 PSIA
- Reactor Coolant System T_{cold} temperatures are 550°F in loops 1 and 2
- A cooldown to Shutdown Cooling entry conditions is commencing

The ATC should reset _____(1)_____ bistable setpoints during the cooldown to ensure continued _____(2)_____ availability.

	(1)	(2)
A.	Pressurizer Pressure Low and Steam Generator Pressure Lo	Pressurizer Heater and Emergency Feedwater
B.	Steam Generator Pressure Low only	Pressurizer Heater and Emergency Feedwater
C.	Pressurizer Pressure Low and Steam Generator Pressure Low	Emergency Feedwater
D.	Steam Generator Pressure Low only	Emergency Feedwater

Proposed Answer: D

Explanation: (Optional)

A. Incorrect. It would be inappropriate to attempt to reset the PZR pressure lo bistables because the trip setpoints have already been exceeded. PZR heaters is incorrect but plausible because an SIAS concurrent with a loss of offsite power (LOOP) locks out the 32 Bus feeder breakers that power the PZR heaters. Based on indications in the stem an SIAS and LOOP has already occurred.
B. Incorrect. Correct bistables. Incorrect basis. See explanations A and D.
C. Incorrect. Incorrect bistables. Correct basis. See explanations A and D.
D. **CORRECT**: It would be inappropriate to attempt to reset the PZR pressure lo bistables because the trip setpoints have already been exceeded. Based on normal MODE 3 Tcold it is appropriate to reset the S/G pressure lo bistables even though MSIS has already occurred due to Containment pressure. This action ensures that automatic EFW actuations will not be blocked as the cooldown progresses.

Technical Reference(s): OP-902-002, Rev. 012
(Attach if not previously provided) TG-OP-902-002, Rev. 012
(including version/revision number) SD-480, Rev. 4

Proposed references to be provided
to applicants during examination: None

Learning Objective: WLP-OPS-PPE02 Obj. 17 (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
Comprehension or Analysis X

10 CFR Part 55 Content: 55.41 7,10
55.43

Comments:

2011 NRC Exam
RO Written Exam Worksheet

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #	1	
	Group #	1	
	K/A #	000011 G2.4.18	
	Importance Rating	3.3	

K/A Statement

Emergency Procedures / Plan: Knowledge of the specific bases for EOPs (Large Break LOCA).

Proposed Question: RO 4 Rev: 0

OP-902-002, Loss of Coolant Accident Recovery procedure requires sampling both Steam Generators for activity. The Shift Chemist should be notified that _____(1)_____ has occurred to ensure actions are taken to _____(2)_____.

	(1)	(2)
A.	Safety Injection Actuation Signal/Containment Isolation Actuation Signal	minimize the potential for radioactive release
B.	Containment Spray Actuation Signal	ensure alternate sample cooling is established
C.	Safety Injection Actuation Signal/Containment Isolation Actuation Signal	ensure alternate sample cooling is established
D.	Containment Spray Actuation Signal	minimize the potential for radioactive release

Proposed Answer: C

Explanation: (Optional)

A. Incorrect. The secondary sample cooler CCW supply is isolated on an SIAS. Although the potential exists for activity to be detected in the secondary samples this is not the basis for the notification.
B. Incorrect. The secondary sample cooling is isolated on an SIAS not CSAS. When the Shift Chemist is notified to take S/G samples for activity they must also be informed that an SIAS has occurred so that they can implement procedures to ensure alternate cooling is align to cool the sample.
C. **CORRECT**: The secondary sample cooler CCW supply is isolated on an SIAS. When the Shift Chemist is notified to take S/G samples for activity they must also be informed that an SIAS has occurred so that they can implement procedures to ensure alternate cooling is align to cool the sample.
D. Incorrect. The secondary sample cooling is isolated on an SIAS not CSAS. Although the potential exists for activity to be detected in the secondary samples this is not the basis for the notification.

Technical Reference(s): OP-902-002, Rev. 012
(Attach if not previously provided) TG-OP-902-002, Rev. 012
(including version/revision number)

Proposed references to be provided
to applicants during examination: None

Learning Objective: WLP-OPS-PPE02 Obj. 17 (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 X
Comprehension or Analysis

10 CFR Part 55 Content: 55.41 10
55.43

Comments:

2011 NRC Exam
RO Written Exam Worksheet

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #	1	
	Group #	1	
	K/A #	000015/17 AK1.04	
	Importance Rating	2.9	

K/A Statement

Knowledge of the operational implications of the following concepts as they apply to Reactor Coolant Pump Malfunctions (Loss of RC Flow): Basic steady state thermodynamic relationship between RCS loops and S/Gs resulting from unbalanced RCS flow.

Proposed Question: RO 5 Rev: 0

Given:

- The reactor was operating at 100%
- Reactor Coolant Pump 2B experienced a Locked Rotor event

Post trip, Steam Generator ___(1)____ level will be lower than the other Steam Generator due to a __(2)___ rate of heat transfer to that Steam Generator.

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

Proposed Answer: C

Explanation: (Optional)

A. Incorrect. S/G 1 level will be lower. S/G 1 pressure will not be lower than S/G 2 because more heat will be transferred to S/G 1.
B. Incorrect. S/G 2 pressure will tend to be lower than S/G 1 due to less heat being transferred to S/G 2.
C. **CORRECT**: Due to a higher rate of heat transfer, S/G 1 pressure will tend to be higher than S/G2 pressure and the minimum post trip level will be lower in S/G 1 due to preferential steaming of the steam generator with the highest pressure.
D. Incorrect.

Technical Reference(s): USFAR Chapter 15, Section 15.3
(Attach if not previously provided)
(including version/revision number)

Proposed references to be provided to applicants during examination: None

Learning Objective: _____ (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 _____
Comprehension or Analysis X

10 CFR Part 55 Content: 55.41 5, 14
55.43 _____

Comments:

2011 NRC Exam
RO Written Exam Worksheet

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

K/A Statement

Ability to determine and interpret the following as they apply to the Loss of Reactor Coolant Makeup: Whether charging line leak exists.

Proposed Question: RO 6 Rev: 0

Given:

- The reactor was operating at 100% steady state
- Pressurizer level starts to lower
- Regen HX Tube Outlet temperature rises from 220°F to 300°F
- Regen HX Shell Outlet temperature rises from 430°F to 460°F
- Letdown Flow is 38 GPM
- Charging Header flow is 44 GPM with one charging pump running

Determine the location of the leak.

A. Charging header upstream of the Regenerative HX

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

C. Letdown header upstream of the Regenerative HX

D. Letdown header downstream of CVC-140, Ion Exchanger Bypass Valve

Proposed Answer: A

Explanation: (Optional)

A. **CORRECT**: Regenerative HX outlet temperature rising on both the tube and shell side would be indicative of a charging line leak upstream of the Regenerative HX. The Tube (Letdown) side goes up due to less cooling from the charging flow. The Shell (Charging) side also went up despite the fact that Letdown flow lowered. This would indicate the charging flow is staying within the Regen HX shell for a greater period of time (lower flow).
B. Incorrect. If the leak were located downstream of the Regen HX on the Charging side temperature would not rise on either side of the HX since charging flow through the HX would remain at 44 gpm due to the positive displacement charging pump.
C. Incorrect. A leak in this location would cause tube outlet temperature to lower even before letdown flow lowered due to lower letdown flow through the HX.
D. Incorrect. A leak in this location would cause tube outlet temperature to be unaffected until letdown flow lowered and then the tube outlet temperature would lower.

Technical Reference(s): SD-CVC, 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-PPO10 Obj. 1 (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
Comprehension or Analysis X

10 CFR Part 55 Content: 55.41 4
55.43

Comments:

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #	1	
	Group #	1	
	K/A #	000026 AA1.02	
	Importance Rating	3.2	

K/A Statement

Ability to operate and / or monitor the following as they apply to the Loss of Component Cooling Water: Loads on the CCWS in the control room.

Proposed Question: RO 7 Rev: 0

Given:

- The reactor is at 100% power
- A leak occurs in Component Cooling Water (CCW) that closes the A and B train CCW supply and return valves for the AB Loop

If neither train of Component Cooling Water (CCW) can be restored to the AB Loop within __(1)__ minutes, trip the reactor, secure all Reactor Coolant Pumps (RCPs). Isolation of the Component Cooling Water AB loop also causes loss of cooling to the _____(2)_____.

	(1)	(2)
A.	3	Containment Fan Coolers
B.	3	Letdown Heat Exchanger
C.	10	Containment Fan Coolers
D.	10	Letdown Heat Exchanger

Proposed Answer: B

Explanation: (Optional)

A. Incorrect. The time is correct per OP-901-510. Containment Fan Coolers are supplied from the safety headers not AB header. Plausible because other Containment ventilation systems such as CEDM cooling has coolers that are supplied from the AB header.
B. **CORRECT**: For the conditions given in the stem, RCPs must be secured and letdown isolated if flow can not be restored within 3 minutes, per OP-901-510.
C. Incorrect. The time is incorrect. Per OP-901-510 the RCPs should be tripped after a 3 minute loss of flow. Plausible because 10 minutes is the time after loss that flow is not to be restored to the RCP seals. Wrong load.
D. Incorrect. Wrong time. Correct load.

Technical Reference(s): OP-901-510, Rev. 4
(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. 6 (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 X
Comprehension or Analysis

10 CFR Part 55 Content: 55.41 10
55.43

Comments:

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #	1	
	Group #	1	
	K/A #	000027 AA1.04	
	Importance Rating	3.9*	

K/A Statement

Ability to operate and / or monitor the following as they apply to the Pressurizer Pressure Control Malfunctions: Pressure recovery, using emergency-only heaters.

Proposed Question: RO 8 Rev: 0

Given:

- The plant was operating at 2250 PSIA when the selected Pressurizer Pressure Control Channel, RC-IPT-0100X failed high.
- Operator action was taken to stabilize RCS pressure
- The lowest pressure seen was 2235 PSIA
- Backup Heater Bank 3 is in ON
- Backup Heaters Banks 1,2, 4-6 are in AUTO

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

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

Proposed Answer: B

Explanation: (Optional)

A. Incorrect. To restore the heaters both switches must be operated to cutout the faulted channel and restore heater capability. The Pressurizer backup heaters condition is correct.
B. **CORRECT**: To restore the heaters both switches must be operated to cutout the faulted channel and restore heater capability. Only back up heater bank 3 will reenergize. The remaining Backup heaters remain off because the RCS pressure given is > the setpoint to energize the heaters.
C. Incorrect. To restore the heaters both switches must be operated to cutout the faulted channel and restore heater capability. The heater status is incorrect..
D. Incorrect. To restore the heaters both switches must be operated to cutout the faulted channel and restore heater capability. The Pressurizer backup heaters will not energize.

Technical Reference(s): SD-PLC, 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-PPO10, Obj.4 (As available)
WLP-OPS-PLC00, Obj. 5 & 6

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
Comprehension or Analysis X

10 CFR Part 55 Content: 55.41 7, 10
55.43

Comments:

2011 NRC Exam
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Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #	1	
	Group #	1	
	K/A #	000029 EK2.06	
	Importance Rating	2.9*	

K/A Statement

Knowledge of the interrelations between the ATWS and the following: Breakers, relays, and disconnects.

Proposed Question: RO 9 Rev: 0

Which of the following describes how the Diverse Reactor Trip System (DRTS) interrupts power to the Control Element Drive Mechanism (CEDM) Coils during an Anticipated Transient Without Scram (ATWS) condition?

A. The shunt trip coils of the Reactor Trip Breakers are energized.

B. The undervoltage (UV) coils of the Reactor Trip Breakers are de-energized.

C. The CEDM Motor-Generator Set feeder breakers on busses 32A and 32B open.

D. The CEDM Motor-Generator Set output load contactors open.

Proposed Answer: D

Explanation: (Optional)

A. Incorrect. This coil is operated by the PPS system on an automatic reactor trip signal or from the Manual Trip Pushbuttons.
B. Incorrect. This coil is operated by the PPS system on an automatic reactor trip signal or from the Manual Trip Pushbuttons.
C. Incorrect. These breakers will operate on UV on the respective 32 Bus. This would occur as part of the Standard Post Trip Actions if AUTO and MANUAL reactor trips failed to open the reactor trip breakers and DRTS fails to operate the CEDM MG Set load contactors.
D. **CORRECT**: Diverse Reactor Trip opens both CEDM MG set load contactors whenever DRTS is automatically or manually actuated.

Technical Reference(s): SD-ATS, Rev. 4
(Attach if not previously provided)
(including version/revision number)

Proposed references to be provided to applicants during examination: None

Learning Objective: WLP-OPS-ATS00 Obj. 2 (As available)

Question Source: Bank # X WF3-OPS-2367-A
Modified Bank # (Note changes or attach parent)
New

Question History: Last NRC Exam N/A

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

10 CFR Part 55 Content: 55.41 7
55.43

Comments:

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #	1	
	Group #	1	
	K/A #	000038 EK3.08	
	Importance Rating	4.1	

K/A Statement

Knowledge of the reasons for the following responses as they apply to the SGTR: Criteria for securing RCP.

Proposed Question: RO 10 Rev: 0

Given:

- OP-902-007, Steam Generator Tube Rupture is being implemented and Steam Generator (S/G) 1 is diagnosed as the affected Steam Generator
- Reactor Coolant System (RCS) pressure is stable at 1300 PSIA
- A cooldown is performed and the RCS depressurizes to 900 PSIA
- Tcold is 525°F

___(1)___ Reactor Coolant Pumps should be secured at this time. Reactor Coolant Pumps in Loop 1 should be disabled by opening the DC Control Power knife switches to ___(2)___.

	(1)	(2)
A.	Two	prevent a dilution event
B.	All	prevent a dilution event
C.	Two	allow pressure equalization of RCS with S/G 1
D.	All	allow pressure equalization of RCS with S/G 1

Proposed Answer: B

Explanation: (Optional)

A. Incorrect. RCS pressure is below PT curve for RCPs all RCPs should be secured. Basis is correct for locking out affected loop RCPs per TG-OP-902-007.
B. **CORRECT**: RCS pressure is below PT curve for RCPs; all RCPs should be secured per OP-902-007. Basis is correct for locking out affected loop RCPs per TG-OP-902-007.
C. Incorrect. RCS pressure is below PT curve for RCPs all RCPs should be secured. Basis for locking out Loop 1 is incorrect per TG-OP-902-007.
D. Incorrect. RCS pressure is below PT curve for RCPs all RCPs should be secured. Basis for locking out Loop 1 is incorrect per TG-OP-902-007.

Technical Reference(s): OP-902-007, Rev. 012
(Attach if not previously provided) TG-OP-902-007, Rev. 302
(including version/revision number) OP-902-009, Att. 2A, Rev. 301

Proposed references to be provided
to applicants during examination: OP-902-009, Att. 2A

Learning Objective: WLP-OPS-PPE07, Obj. 3 (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
Comprehension or Analysis X

10 CFR Part 55 Content: 55.41 10
55.43

Comments:

2011 NRC Exam
RO Written Exam Worksheet

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #	1	
	Group #	1	
	K/A #	CE/E05 EK1.2	
	Importance Rating	3.2	

K/A Statement

Knowledge of the operational implications of the following concepts as they apply to the (Excess Steam Demand): Normal, abnormal and emergency operating procedures associated with (Excess Steam Demand).

Proposed Question: RO 11 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.	382**[384]**	prevent generating excessive core uplift forces
B.	382**[384]**	aid in stabilizing Reactor Coolant System temperature after Steam Generator dryout
C.	500**[502]**	prevent generating excessive core uplift forces
D.	500**[502]**	aid in stabilizing Reactor Coolant System temperature after Steam Generator dryout

Proposed Answer: A

Explanation: (Optional)

A. **CORRECT**: Per OP-902-004, Tc < 382[384] requires running no more than 2 RCPs. TG-OP-902-004 states that the PT limit curve specifies that one RCP should be tripped to prevent a core uplift problem. OP-902-004 is conservative and requires securing two.
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 used is a number that was previously considered valid at W3. The basis is correct per TG-OP-902-004.
D. Incorrect. The temperature is incorrect. The temperature used is a number that was previously considered valid at W3. 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): OP-902-004, Rev. 011
(Attach if not previously provided) TG-OP-902-004, Rev. 302
(including version/revision number)

Proposed references to be provided
to applicants during examination: None

Learning Objective: WLP-OPS-PPE04, Obj.4 & 7 (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 X
Comprehension or Analysis

10 CFR Part 55 Content: 55.41 10
55.43

Comments:

2011 NRC Exam
RO Written Exam Worksheet

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #	1	
	Group #	1	
	K/A #	000054 AK1.02	
	Importance Rating	3.6	

K/A Statement

Knowledge of the operational implications of the following concepts as they apply to Loss of Main Feedwater (MFW): Effects of feedwater introduction on dry S/G.

Proposed Question: RO 12 Rev: 0

1) What is the operational concern with feeding a dry Steam Generator
AND
2) Describe the appropriate method for restoring feedwater if both Steam Generators are dry.

A. 1) Steam Generator internal component damage could result
2) Slowly restore feed to only ONE Steam Generator.

B. 1) Steam Generator internal component damage could result
2) Slowly restore feed to BOTH Steam Generators.

C. 1) Main Steam piping support damage could result
2) Slowly restore feed to only ONE Steam Generator.

D. 1) Main Steam piping support damage could result
2) Slowly restore feed to BOTH Steam Generators.

Proposed Answer: A

Explanation: (Optional)

A. **CORRECT**. Per OI-038-00 if both S/Gs are dry, slowly refill only one S/G to reinitiate cooling. CEN-152 specifically discusses possible feed ring damage. During Steam Generator dryout RCS Pressure and temperature is high with low pressure in the S/G. The maximum D/P across S/G tubes would be exceeded then additional stress (thermal) is applied to the tubes when reinitiating flow which creates a higher possibility of tube damage.
B. Incorrect. Correct operational concern. Wrong method for restoring flow.
C. Incorrect. Wrong operational concern. Piping support damage is a concern during S/G over fill, vice dryout. Correct method for restoring flow.
D. Incorrect. Wrong operational concern. Wrong method for restoring flow.

Technical Reference(s): OI-038-00, Rev.2
(Attach if not previously provided) CEN-152, Loss of All Feedwater Recovery Bases
(including version/revision number)

Proposed references to be provided
to applicants during examination: None

Learning Objective: WLP-OPS-PPE08 obj 8, 9 (As available)

Question Source: Bank # 2007 RO Retake Q65
Modified Bank # X (Note changes or attach parent)
New

Question History: Last NRC Exam 2007 RO Retake Q65

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

10 CFR Part 55 Content: 55.41 10
55.43

Comments:

2011 NRC Exam
RO Written Exam Worksheet

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #	1	
	Group #	1	
	K/A #	000055 EA2.03	
	Importance Rating	3.9	

K/A Statement

Ability to determine or interpret the following as they apply to a Station Blackout: Actions necessary to restore power.

Proposed Question: RO 13 Rev: 0

Given:

- A Station Blackout occurred
- Offsite power is now available
- A Probable Maximum Precipitation (PMP) event just commenced

Power must be restored to the non-safety section of Motor Control Center _____(1)_____ and at least one Dry Cooling Tower Motor Driven Sump Pump aligned for operation within ___(2)___ of the PMP event.

	(1)	(2)
A.	312A or B	30 minutes
B.	314A or B	30 minutes
C.	312A or B	3 hours
D.	314A or B	3 hours

Proposed Answer: B

Explanation: (Optional)

A. Incorrect. Wrong MCCs, however, those MCCs also have a safety to non-safety.
B. **CORRECT**: Per OP-902-009, requires restoration of a DCT Motor Driven Sump Pump within 30 minutes. These pumps are powered from MCCs 314A and 314B..
C. Incorrect. Wrong MCCs. Wrong time frame. 180 minutes correlates to the time required to have a diesel driven sump pump aligned for operation from the DCT sumps.
D. Incorrect. Correct MCCs. Wrong time frame.

Technical Reference(s): OP-902-009, Rev. 301
(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. 6 & 7 (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 X
Comprehension or Analysis

10 CFR Part 55 Content: 55.41 10
55.43

Comments:

2011 NRC Exam
RO Written Exam Worksheet

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #	1	
	Group #	1	
	K/A #	000056 AK3.01	
	Importance Rating	3.5	

K/A Statement

Knowledge of the reasons for the following responses as they apply to the Loss of Offsite Power: Order and time to initiation of power for the load sequencer.

Proposed Question: RO 14 Rev: 0

The Undervoltage Override feature of the Load Sequencer provides protection against degraded voltage resulting from _____(1)_____.

The Undervoltage Override feature is active between the _____(2)_____ second load blocks.

	(1)	(2)
A.	the start of large transformer (inductive) loads	0.5 to 17
B.	failure of the Emergency Diesel Generator excitation system	0.5 to 17
C.	the start of large transformer (inductive) loads	17 to 200
D.	failure of the Emergency Diesel Generator excitation system	17 to 200

Proposed Answer: A

Explanation: (Optional)

A. **CORRECT** Loading large transformer loads is the basis for Under Voltage Override The time frame for Under Voltage Override is correct.
B. Incorrect: Per SD-EDG and the UFSAR the most likely failure that would cause degraded voltage with the EDG supplying the bus after the initial loading of large loads is a failure of EDG excitation and this is the basis for Sequencer Lockout. The Sequencer Lockout is blocked between the 0.5 and 17 second load blocks by Undervoltage Override. This is the time when the EDG experiences the highest loading. The time frame is correct.
C. Incorrect. Allowing loading of large transformer loads is the basis for Under Voltage Override. The time frame for Under Voltage Override is incorrect.
D. Incorrect. Per SD-EDG and the UFSAR the most likely failure that would cause degraded voltage with the EDG supplying the bus after the initial loading of large loads is a failure of EDG excitation and this is the basis for Sequencer Lockout. The Sequencer Lockout is blocked between the 0.5 and 17 second load blocks by Undervoltage Override. This is the time when the EDG experiences the highest loading. The time frame is incorrect.

Technical Reference(s): SD-EDG, 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-EDG00, Obj. 3 & 6 (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 X
Comprehension or Analysis

10 CFR Part 55 Content: 55.41 7
55.43

Comments:

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #	1	
	Group #	1	
	K/A #	000057 AK3.01	
	Importance Rating	4.1	

K/A Statement

Knowledge of the reasons for the following responses as they apply to the Loss of Vital AC Instrument Bus: Actions contained in EOP for loss of vital ac electrical instrument bus.

Proposed Question: RO 15 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.	controller on CP-8	closed
B.	controller on CP-8	open
C.	local air station	closed
D.	local air station	open

Proposed Answer: C

Explanation: (Optional)

A. Incorrect. With the failure given in the stem, ADV 1 can not be operated from CP-8. Correct failed position.
B. Incorrect. With the failure given in the stem ADV 1 can not be operated from CP-8. ADV 1 fails closed on loss of power or air. Open is plausible if the candidate thinks that the setpoint fails low but the controller is still capable of operating the valve.
C. **CORRECT**: Per OP-901-312, ADV 1 will be operated manually using the local air station. Per OP-901-312, ADV 1 fails closed on a loss of SUPS SMC.
D. Incorrect. Correct method of operation but incorrect failed position.

Technical Reference(s): OP-901-312, Rev. 301
(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. 3 (As available)

Question Source: Bank # X WF3-OPS-4243-B
Modified Bank # (Note changes or attach parent)
New

Question History: Last NRC Exam N/A

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

10 CFR Part 55 Content: 55.41 7,10
55.43

Comments:

2011 NRC Exam
RO Written Exam Worksheet

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #	1	
	Group #	1	
	K/A #	000058 AA2.03	
	Importance Rating	3.5	

K/A Statement

Ability to determine and interpret the following as they apply to the Loss of DC Power: DC loads lost; impact on ability to operate and monitor plant systems.

Proposed Question: RO 16 Rev: 0

Comparing a loss of the Train B DC Safety Busses to a loss of the Train AB DC Safety Busses, select the problem that occurs ONLY for a loss of Train B.

A. Emergency power to a Static Uninterruptible Power Supply is lost.

B. A reactor trip occurs due to loss of power to Reactor Trip Breaker UV coils.

C. Overcurrent protection is lost for associated 4.16 KV bus loads.

D. Control Power is lost to the associated 480V switchgear loads.

Proposed Answer: B

Explanation: (Optional)

A. Incorrect. Emergency power is lost to 3 safety SUPS on a loss of the B DC train. Power is lost to the AB SUPS if the AB DC train is lost.
B. **CORRECT**: Four reactor trip breakers lose power to their undervoltage coils, causing them to open and interrupt power to the Control Element Drive Mechanisms. This will only occur for loss of the A or B DC safety busses, not the AB.
C. Incorrect. Overcurrent protection is lost for both B and AB 4.16 KV loads when their respective DC bus is de-energized.
D. Incorrect. Control Power is lost for both B and AB 480v switchgear loads when their respective DC bus is de-energized.

Technical Reference(s): OP-901-313, Rev. 301
(Attach if not previously provided)
(including version/revision number)

Proposed references to be provided
to applicants during examination: None

Learning Objective: WLP-OPS-DC00 Obj. 8 (As available)

Question Source: Bank # X WF3-OPS-7226-A
Modified Bank # (Note changes or attach parent)
New

Question History: Last NRC Exam N/A

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

10 CFR Part 55 Content: 55.41 7
55.43

Comments:

2011 NRC Exam
RO Written Exam Worksheet

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #	1	
	Group #	1	
	K/A #	000062 AA1.07	
	Importance Rating	2.9	

K/A Statement

Ability to operate and / or monitor the following as they apply to the Loss of Nuclear Service Water (SWS): Flow rates to the components and systems that are serviced by the SWS; interactions among the components.

Proposed Question: RO 17 Rev: 0

In accordance with OP-002-001, Auxiliary Component Cooling Water (ACCW) A header flow should be at least ____(1)_____ GPM flow to minimize _____(2)_____.

	(1)	(2)
A.	100	ACC-126A, ACC Header A CCW HX Outlet Temp Control Valve seat and disc erosion
B.	100	ACC Pump A vibration
C.	1000	ACC-126A, ACC Header A CCW HX Outlet Temp Control Valve seat and disc erosion
D.	1000	ACC Pump A vibration

Proposed Answer: D

Explanation: (Optional)

A. Incorrect. Wrong flow. This flow would be comparable to the minimum recirculation flow required for other pumps which operate at similar flow rates such as LPSI pumps. Wrong basis. This is plausible since ACC-126 must be throttled open further to attain 1000 gpm which results in the valve disc being positioned significantly off its seat.
B. Incorrect. Wrong flow, correct basis per OP-002-001.
C. Incorrect. Correct flow, wrong basis per OP-002-001.
D. **CORRECT**: Per a note that appears throughout OP-002-001 the minimum recommended flow is 1000 gpm to minimize pump vibration.

Technical Reference(s): OP-002-001, Rev.302
(Attach if not previously provided)
(including version/revision number)

Proposed references to be provided
to applicants during examination: None

Learning Objective: WLP-OPS-CC00, Obj. 8 (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 X
Comprehension or Analysis

10 CFR Part 55 Content: 55.41 7, 8
55.43

Comments:

2011 NRC Exam
RO Written Exam Worksheet

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #	1	
	Group #	1	
	K/A #	000065 G2.4.6	
	Importance Rating	3.7	

K/A Statement

Emergency Procedures / Plan: Knowledge of EOP mitigation strategies. (Loss of Instrument Air)

Proposed Question: RO 18 Rev: 0

Given:

- The plant is at 100% Power
- Instrument Air pressure is 63 PSIG and lowering rapidly

The crew should:

A. Direct the turbine building watch to suspend all operations involving the condensate polisher operations.

B. Commence a rapid down power IAW OP-901-212, Rapid Plant Power Reduction.

C. Commence a normal plant shutdown when MSR temperature control valves fail closed to maintain Rx Power less than 100% Power.

D. Trip the reactor and enter OP-902-000, Standard Post Trip Actions.

Proposed Answer: D

Explanation: (Optional)

A. Incorrect. This may be desirable but not required by the off-normal.
B. Incorrect. A rapid plant shutdown is not required for this event.
C. Incorrect. A normal plant shutdown is warranted for IA pressure > 65 PSIG and < 80 PSIG.
D. **CORRECT**. The appropriate time to trip the reactor is 65 PSIG. Pressure is less than the trip criteria and dropping rapidly.

Technical Reference(s): OP-901-511, Rev. 008
(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)
WLP-OPS-AIR00 Obj. 5

Question Source: Bank #
Modified Bank # 2475-A (Note changes or attach parent)
New

Question History: Last NRC Exam N/A

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

10 CFR Part 55 Content: 55.41 10
55.43

Comments:

2011 NRC Exam
RO Written Exam Worksheet

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #	1	
	Group #	2	
	K/A #	000003 AA1.05	
	Importance Rating	4.1	

K/A Statement

Ability to operate and / or monitor the following as they apply to the Dropped Control Rod: Reactor power - turbine power.

Proposed Question: RO 19 Rev: 0

Given:

- The reactor was operating at 80%
- Control Element Assembly (CEA) 20 drops to 0.0”

Within 15 minutes, turbine load will be reduced at a rate of approximately _____(1)_____ MW/MINUTE. 45 minutes from the time the CEA dropped, reactor power must be reduced to _____(2)_____ %.

	(1)	(2)
A.	30	60
B.	30	70
C.	60	60
D.	60	70

Proposed Answer: A

Explanation: (Optional)

A. **CORRECT**: Per OP-901-212, turbine load will be reduced at ~ 30 MW/min. Reactor power at 45 minutes must be at the floor of 60% per COLR figure 3.
B. Incorrect. Load rate is correct per OP-901-212. 70% is wrong, but is plausible because 70% is the power that you must get below to start recovering the CEA per OP-901-102.
C. Incorrect. 60 MW/min is incorrect but plausible because this is equivalent to ~ 5%/min which is the design limit of the control systems. The power is correct per COLR figure 3.
D. Incorrect. 70% is wrong, but is plausible because 70% is the power that you must get below to start recovering the CEA per OP-901-102.

Technical Reference(s): OP-901-102, Rev. 5; OP-901-212, Rev. 3
(Attach if not previously provided) TS 3.1.3.1, Amendment 182
(including version/revision number) COLR Figure 3, Cycle 17, Rev. 0

Proposed references to be provided
to applicants during examination: COLR Fig 3

Learning Objective: WLP-OPS-PPO10 Obj. (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
Comprehension or Analysis X

10 CFR Part 55 Content: 55.41 10
55.43

Comments:

2011 NRC Exam
RO Written Exam Worksheet

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #	1	
	Group #	2	
	K/A #	000005 AK.3.06	
	Importance Rating	3.9	

K/A Statement

Knowledge of the reasons for the following responses as they apply to the Inoperable / Stuck Control Rod: Actions contained in EOP for inoperable/stuck control rod.

Proposed Question: RO 20 Rev: 0

Given:

- The plant is at 55% performing a power ascension
- Group P is at 140 INCHES for ASI control
- At 0335 Group P Control Element Assembly (CEA) 35 slips to 125”
- Power is stabilized at 55%
- The crew implements OP-901-102, CEA or CEDMCS Malfunction
- Attempts to move the CEA are unsuccessful, CEA 35 is declared INOPERABLE
- At 0420
    - Malfunctioning Automatic Control Timing Module (ACTM) card is replaced and
    - CEA 35 was realigned to 140” and CEA 35 is declared OPERABLE

The earliest that the crew can re-commence the power ascension is _____(1)_____ to _____(2)_____.

	(1)	(2)
A.	0535	minimize the effects of Xenon redistribution
B.	0535	allow for clad relaxation
C.	0620	minimize the effects of Xenon redistribution
D.	0620	allow for clad relaxation

Proposed Answer: D

Explanation: (Optional)

A. Incorrect. Per step16 of OP-901-102 Section E1, power must be maintained constant for 2 hours after realignment to allow for clad relaxation. The time in this selection is two hours from the initial event. Minimizing the effects of Xenon redistribution is part of the TS basis for allowing a one hour time limit for small misalignments.
B. Incorrect. Per step16 of OP-901-102 Section E1, power must be maintained constant for 2 hours after realignment to allow for clad relaxation. The time in this selection is two hours from the initial event. The basis given in this selection is correct.
C. Incorrect. Per step16 of OP-901-102 Section E1, power must be maintained constant for 2 hours after realignment to allow for clad relaxation. Minimizing the effects of Xenon redistribution is part of the TS basis for allowing a one hour time limit for small misalignments.
D. **CORRECT**: Per step16 of OP-901-102 Section E1, power must be maintained constant for 2 hours after realignment to allow for clad relaxation. This time would be 0620.

Technical Reference(s): OP-901-102, Rev. 5
(Attach if not previously provided) TS Bases B3/4.1.3, Change 38
(including version/revision number)

Proposed references to be provided
to applicants during examination: None

Learning Objective: WLP-OPS-PPO10, Obj. 3 & 4 (As available)

Question Source: Bank # _____ WF3-OPS-3290-A
Modified Bank # X (Note changes or attach parent)
New _____

Question History: Last NRC Exam N/A

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

10 CFR Part 55 Content: 55.41 10
55.43 _____

Comments:

2011 NRC Exam
RO Written Exam Worksheet

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #	1	
	Group #	2	
	K/A #	000028 G2.2.37	
	Importance Rating	3.6	

K/A Statement

Equipment Control: Ability to determine operability and/or availability of safety related equipment.(Pressurizer Level Malfunction)

Proposed Question: RO 21 Rev: 0

Given:

- The plant is at 50% power
- Tave and Tref are matched and stable
- The Standby Charging Pump Selector Switch is in AB-A
- Due to a PAC card failure the output of the Pressurizer Level Controller auto output failed to the high limit.
- The crew entered OP-901-110, took manual control of the Pressurizer Level Controller and stabilized level at 41% (lowest level attained)
- Charging Pumps B and AB are running

Charging pump A _____(1)_____ be running. The lowest pressurizer level the crew should maintain while operating is _____(2)_____%.

	(1)	(2)
A.	should	25
B.	should **NOT**	25
C.	should	30
D.	should **NOT**	30

Proposed Answer: D

Explanation: (Optional)

A. Incorrect. Charging Pump A should not be running and minimum level to operate is ~29% per Attachment 1.
B. Incorrect. Minimum level to operate is ~29% per Attachment 1.
C. Incorrect. Charging Pump A should not be running per Attachment 1.
D. **CORRECT**: At 50% power. Tave should be ~ 557.7°F. Per Attachment 1 of OP-901-110 programmed level should be 43%. Charging pump A is the second backup charging pump per the question stem. The second backup does not start until you reach a 3.9% deviation from setpoint current level is 41%; therefore, Charging Pump A should NOT be running. The minimum level that should be maintained to continue to operate is ~30% per Attachment 1

Technical Reference(s): OP-901-110, Rev. 005
(Attach if not previously provided) Plant Data Book (PDB) Figure 1, rev 0
(including version/revision number) SD-PLC, Rev. 5

Proposed references to be provided to applicants during examination: OP-901-110, Attachment 1, PDB Figure 1 RCS Temperature Bands vs Power

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 N/A

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

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

Comments:

2011 NRC Exam
RO Written Exam Worksheet

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #	1	
	Group #	2	
	K/A #	000032 AA2.03	
	Importance Rating	2.8	

K/A Statement

Ability to determine and interpret the following as they apply to the Loss of Source Range Nuclear Instrumentation: Expected values of source range indication when high voltage is automatically removed.

Proposed Question: RO 22 Rev: 0

Given:

- A reactor startup is in progress

Startup Channel 2 high voltage is automatically removed when power exceeds approximately _____(1)_____% on ENI Logarithmic Channel A, if the HV Control Switch in Startup Channel 2 is selected to _____(2)_____.

	(1)	(2)
A.	1.0×10^{-4}	Primary
B.	1.0×10^{-4}	Alternate
C.	5.3×10^{-6}	Primary
D.	5.3×10^{-6}	Alternate

Proposed Answer: C

Explanation: (Optional)

A. Incorrect. At $1X10^{-4}$% power other operating bypasses operate such as placing DNBR and LPD trips in service; however, the startup channels are de-energized by the $5X10^{-6}$% bistables of the selected log channel. Correct switch position.
B. Incorrect. Wrong power level. Wrong switch position. 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 A controls high voltage shutoff to Startup Channel 2 if the HV control Switch in Startup Channel 2 is selected to Primary..
D. Incorrect. The startup channels are de-energized by the $5X10^{-6}$% bistables of the selected log channel. Wrong switch position. Log Channel B controls high voltage shutoff to Startup Channel 2 if the HV control Switch in Startup Channel 2 is selected to Alternate.

Technical Reference(s): SD-NI, Rev.5
(Attach if not previously provided) OP-010-003, Rev. 316
(including version/revision number)

Proposed references to be provided
to applicants during examination: None

Learning Objective: WLP-OPS-NI00 Obj. 4 & 6 (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
Comprehension or Analysis X

10 CFR Part 55 Content: 55.41 6
55.43

Comments:

2011 NRC Exam
RO Written Exam Worksheet

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #	1	
	Group #	2	
	K/A #	000037 AK3.09	
	Importance Rating	2.7*	

K/A Statement

Knowledge of the reasons for the following responses as they apply to the Steam Generator Tube Leak: Maximum load change capability of facility.

Proposed Question: RO 23 Rev: 0

Given:

- Primary-to-Secondary leakage in Steam Generator 1 has changed over the last hour with a rate and value that requires the plant to be at 50% in one hour and MODE 3 in a total of 3 hours

Waterford 3 is designed for a ramp load change of ___(1)___ %/MINUTE between 100% and 15%; however, the target shutdown rate will be approximately ____(2)___ MW/MINUTE provided pressurizer level can be maintained.

	(1)	(2)
A.	10	60
B.	5	60
C.	10	30
D.	5	30

Proposed Answer: D

Explanation: (Optional)

A. Incorrect. Wrong design ramp load rate. 10% is the step change in power that the control systems are designed to handle. Wrong target shutdown rate. This is approximately equal to a 5%/ min ramp load change given in MW/minute.
B. Incorrect. The design ramp load change rate is correct. The target shutdown rate is wrong.
C. Incorrect. The design ramp load change rate is wrong. The target shutdown rate is correct.
D. **CORRECT**: The design of Waterford 3 control system is a load change of 5%/min between 15% and 100%. The target shutdown rate is consistent with OP-901-212 which would be entered concurrently with OP-901-202 for the conditions given.

Technical Reference(s): UFSAR Section 1.2, Rev. 304
(Attach if not previously provided) OP-901-202, Rev. 009
(including version/revision number) OP-901-212, Rev. 3

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 N/A

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

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

Comments:

2011 NRC Exam
RO Written Exam Worksheet

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

K/A Statement

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

Proposed Question: RO 24 Rev: 0

Which of the following would be a violation of operability requirements for Containment Integrity in MODE 1?

A. The Personnel Air Lock outer door is found unlocked.

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

C. The Personnel Air Lock door interlocks are inoperable for 48 hours.

D. The Escape Air Lock door position indications are inoperable on CP-8.

Proposed Answer: C

Explanation: (Optional)

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

Technical Reference(s): TS 3.6.1.1, Amendment 124
(Attach if not previously provided) TS 3.6.1.3, Amendment 124
(including version/revision number)

Proposed references to be provided
to applicants during examination: TS 3.6.1.3 all

Learning Objective: WLP-OPS-CB00, Obj. 6 & 7 (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
Comprehension or Analysis X

10 CFR Part 55 Content: 55.41 10
55.43

Comments:

2011 NRC Exam
RO Written Exam Worksheet

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #	1	
	Group #	2	
	K/A #	CE/A11 G2.2.25	
	Importance Rating	3.2	

K/A Statement

Equipment Control: Knowledge of the bases in Technical Specifications for limiting conditions for operations and safety limits. (RCS Overcooling-PTS)

Proposed Question: RO 25 Rev: 0

Given:

- The plant was in MODE 3 at Normal Operating Temperature and Pressure
- A steam line break occurs on Main Steam Line 1 outside Containment upstream of the Main Steam Isolation Valve
- After 5 minutes Steam Generator 1 completely blows down
- Representative Core Exit Thermocouple (CET) lower to 460°F
- T_{cold} lowers to 430°F

With Reactor Coolant Pumps in operation ____(1)____ should be used to monitor RCS cooldown limits. The Reactor Coolant System cooldown limits _____(2)_____ been exceeded.

	(1)	(2)
A.	T_{cold}	have
B.	T_{cold}	have **NOT**
C.	Representative CET	have
D.	Representative CET	have **NOT**

Proposed Answer: A

Explanation: (Optional)

A. **CORRECT**: Per TS Bases for 3.4.8.1, cooldown rates should be based on fluid entering the reactor vessel beltline area. With RCPs running this is Tcold, when on SDC it should be SDC HX outlet temperature. Tcold dropped greater than 100°F over 5 minutes. Cooldown rate limit of 100°F/hr has been exceeded.
B. Incorrect. Correct parameter. Cooldown rate has been exceeded.
C. Incorrect. Tcold should be used to monitor cooldown with RCPs running. Correct cooldown requirement evaluation.
D. Incorrect. Tcold should be used to monitor cooldown with RCPs running. Cooldown rate has been exceeded.

Technical Reference(s): TS Bases 3.4.8.1, Change 34
(Attach if not previously provided) TS 3.4.8.1, Amendment 196
(including version/revision number)

Proposed references to be provided
to applicants during examination: None

Learning Objective: WLP-OPS-RCS00, Obj. 8 (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
Comprehension or Analysis X

10 CFR Part 55 Content: 55.41 10
55.43

Comments:

2011 NRC Exam
RO Written Exam Worksheet

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #	1	
	Group #	2	
	K/A #	CE/A16 AK1.3	
	Importance Rating	3.2	

K/A Statement

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

Proposed Question: RO 26 Rev: 0

Given:

- RCS Tavg is 574°F and stable
- Letdown flow is 28 GPM
- All Charging Pumps are OPERABLE
- Pressurizer level is 49% and slowly lowering

Based on these conditions, pressurizer level will _____(1)_____ and the crew should _____(2)_____.

	(1)	(2)
A.	continue to lower	perform a rapid shutdown
B.	continue to lower	trip the reactor
C.	recover	perform a rapid shutdown
D.	recover	trip the reactor

Proposed Answer: B

Explanation: (Optional)

A. Incorrect. If leakage were within the capacity of the charging pumps a shutdown would be an option, however, with the conditions given level will not recover.
B. **CORRECT**: Based on Tavg being 574°F, the pressurizer level setpoint should be 55.6%. With a 6.5% deviation between level and setpoint all 3 charging pumps should be running. The letdown flow given is minimum flow. Based on the fact that Tavg is stable and pressurizer level is still lowering, RCS leakage is outside of the capacity of the charging pumps. Pressurizer level will continue to lower. Per OP-901-111 the crew should perform a reactor trip.
C. Incorrect. Pressurizer level will not recover based on the conditions given; however if the candidate determines that only two of three charging pumps are running this is a viable answer.
D. Incorrect. Pressurizer level will not recover based on the conditions given; however if the candidate determines that only two of three charging pumps are running this is a viable answer. Based on the conditions given, it is correct to trip the reactor.

Technical Reference(s): OP-901-111, Rev. 301
(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 N/A

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

10 CFR Part 55 Content: 55.41 5, 10
55.43

Comments:

2011 NRC Exam
RO Written Exam Worksheet

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #	1	
	Group #	2	
	K/A #	CE/E09 EK2.1	
	Importance Rating	3.6	

K/A Statement

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

Proposed Question: RO 27 Rev: 0

Given:

- The reactor tripped due to a loss of offsite power
- On the trip, a Main Steam Safety Valve on Main Steam Line 1 opened and will not reseat
- Steam Generator 1 pressure is 500 PSIA and lowering
- Main Steam Line 1 and Blowdown Radiation Monitors are in Hi-Hi alarm
- RCS pressure is 1300 PSIA and lowering
- Pressurizer level is 0%
- All engineering safeguards equipment is operable
- OP-902-000, Standard Post Trip Actions is being implemented

After Standard Post Trip Actions are complete, the crew will implement:

A. OP-902-003, Loss of Offsite Power/Loss of Forced Circulation Recovery

B. OP-902-004, Loss of Excess Steam Demand Recovery

C. OP-902-007, Steam Generator Tube Rupture Recovery

D. OP-902-008, Functional Recovery Procedure

Proposed Answer: D

Explanation: (Optional)

A. Incorrect. Wrong procedure. Would be correct if only LOOP occurred, Safety Function Status Checklist would not support staying in this procedure if selected.
B. Incorrect. Wrong procedure. Would be correct if only Excess Steam Demand and loss of offsite power occurred.
C. Wrong procedure. Would be correct if only a Steam Generator Tube Rupture and loss of offsite power occurred.
D. **CORRECT**. The Diagnostic Flow Chart would send you to OP-902-008 to combat this situation. Additionally if two events are occurring simultaneously OP-902-008 can be selected without having to use the Diagnostic Flow Chart.

Technical Reference(s): OP-902-009, Attachment 1, Rev. 301
(Attach if not previously provided)
(including version/revision number)

Proposed references to be provided
to applicants during examination: None

Learning Objective: WLP-OPS-PPE08, Obj. 2 & 4 (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
Comprehension or Analysis X

10 CFR Part 55 Content: 55.41 10
55.43

Comments:

2011 NRC Exam
RO Written Exam Worksheet

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #	2	
	Group #	1	
	K/A #	003 K5.02	
	Importance Rating	2.8	

K/A Statement

Knowledge of the operational implications of the following concepts as they apply to the RCPS: Effects of RCP coast down on RCS parameters.

Proposed Question: RO 28 Rev: 0

Given:

- The Reactor is operating at 100% Power
- A Loss Of Offsite Power occurs
- The Reactor fails to trip automatically

During coast down of the Reactor Coolant Pumps RCS, loop ΔT will __(1)__ and DNBR margin will __(2)__?

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

Proposed Answer: B

Explanation: (Optional)

A. Incorrect. DNBR will lower with lowering flow rate due to a rise in Th.
B. **CORRECT**. ΔT will rise due to reduced flow and DNBR will lower with lowering flow rate due to a rise in Th.
C. Incorrect. ΔT will rise due to lower flow rate.
D. Incorrect. ΔT will rise due to lowering flow rate and DNBR will lower with lowering flow rate due to a rise in Th.

Technical Reference(s): UFSAR 15.3-2
(Attach if not previously provided)
(including version/revision number)

Proposed references to be provided
to applicants during examination: None

Learning Objective: WLP-OPS-RCP Objective 1 (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
Comprehension or Analysis X

10 CFR Part 55 Content: 55.41 5
55.43

Comments:

2011 NRC Exam
RO Written Exam Worksheet

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #	2	
	Group #	1	
	K/A #	003 A2.01	
	Importance Rating	3.5	

K/A Statement

Ability to (a) predict the impacts of the following malfunctions or operations on the RCPS; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: Problems with RCP seals, especially rates of seal leak-off.

Proposed Question: RO 29 Rev: 0

Given:

- The reactor is operating at 100% power
- At 0100 RCP 1A Lower Seal fails and Controlled Bleedoff flow rises to 2.5 GPM
- OP-901-130, Reactor Coolant Pump Malfunction is implemented and the plant remains at 100% power
- At 0530 RCP 1A Middle Seal fails
- RCP 1A Controlled Bleedoff flow went out of range high and then went to 0 GPM

RCP 1A Controlled Bleedoff flow went low due to closure of _____(1)_____.
The crew should _____(2)_____ and secure RCP 1A.

	(1)	(2)
A.	a RCP Controlled Bleedoff Containment Isolation Valve	perform a shutdown to MODE 3 per OP-010-005, Plant Shutdown
B.	a RCP Controlled Bleedoff Containment Isolation Valve	manually trip the reactor and perform Standard Post Trip Actions
C.	the check valve on RCP 1A Controlled Bleedoff line	perform a shutdown to MODE 3 per OP-010-005, Plant Shutdown
D.	the check valve on RCP 1A Controlled Bleedoff line	manually trip the reactor and perform Standard Post Trip Actions

Proposed Answer: D

Explanation: (Optional)

A. Incorrect. Seal flow would not go to zero on the reactor coolant pump with normal RCS pressure. Instead the flow would be diverted to the Quench Tank via a relief valve on the common controlled bleedoff line (RC-603). A reactor trip is required vice a normal shutdown due the rapid failure of two RCP seals.
B. Incorrect. Seal flow would not go to zero on the reactor coolant pump with normal RCS pressure. Instead the flow would be diverted to the Quench Tank via a relief valve on the common controlled bleedoff line (RC-603).
C. Incorrect. A reactor trip is required vice a normal shutdown due the rapid failure of two RCP seals.
D. **CORRECT**. The RCP 1A Controlled Bleedoff excess flow check valve will seat at 10 GPM flow and isolate controlled bleedoff flow from the RCP. Two seals failing within a 12 hour period requires a reactor trip.

Technical Reference(s): OP-901-130, Rev. 007
(Attach if not previously provided) SD-CVC, Rev. 14
(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 N/A

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

10 CFR Part 55 Content: 55.41 3, 10
55.43

Comments:

2011 NRC Exam
RO Written Exam Worksheet

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #	2	
	Group #	1	
	K/A #	004 G2.4.4	
	Importance Rating	4.5	

K/A Statement

Emergency Procedures/Plan: Ability to recognize abnormal indications for system operating parameters that are entry-level conditions for emergency and abnormal operating procedures. (Chemical and Volume Control)

Proposed Question: RO 30 Rev: 0

Given

- The plant is at 100% power
- VCT Level Instrument, CVC-ILT-0227 fails low
- CVC-183, VCT Outlet Valve closes
- CVC-507, RWSP to Charging Pump Suction Isolation opens

The crew should enter __(1)__ and __(2)__ to match Tavg and Tref.

	(1)	(2)
A.	OP-901-113, Volume Control Tank Makeup Control Malfunction	lower turbine load
B.	OP-901-113, Volume Control Tank Makeup Control Malfunction	raise turbine Load
C.	OP-901-112, Charging or Letdown Malfunction	lower turbine load
D.	OP-901-112, Charging or Letdown Malfunction	raise turbine Load

Proposed Answer: A

Explanation: (Optional)

A. **CORRECT**: Failures of VCT level instruments are covered in OP-901-113. Turbine load must be lowered due to boration from the Refueling Water Storage Pool.
B. Incorrect. Correct procedure. Wrong turbine action. Raising turbine load while borating would cause Tavg and Tref to deviate further and cause problems with maintaining pressurizer pressure and level.
C. Incorrect. While the VCT is part of the CVC Charging and Letdown subsystems, OP-901-112 does cover failure of the VCT level instruments. Correct turbine action.
D. Incorrect. Wrong procedure. Wrong turbine action.

Technical Reference(s): OP-901-113, Rev. 1
(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 N/A

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

10 CFR Part 55 Content: 55.41 5
55.43

Comments:

2011 NRC Exam
RO Written Exam Worksheet

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #	2	
	Group #	1	
	K/A #	004 K4.13	
	Importance Rating	3.2*	

K/A Statement

Knowledge of CVCS design feature(s) and/or interlock(s) which provide for the following:
Interlock between letdown isolation valve and flow control valve.

Proposed Question: RO 31 Rev: 0

Given:

- The plant has tripped from 100% power
- Reactor Coolant System pressure lowered and stabilized at 1500 psia
- Containment Pressure is 17.3 PSIA and rising

Which of the following describes the condition of the Chemical Volume Control system?

A. CVC-101, Letdown Stop Valve is open.

B. CVC-103 & CVC-109, Letdown Isolation Valves are open.

C. CC-636, Component Cooling Water to Letdown Heat Exchanger is closed.

D. Charging Pumps A, B, and AB are running.

Proposed Answer: C

Explanation: (Optional)

A. Incorrect. CVC-101Closes on a SIAS. Both RCS pressure and Containment pressure have exceeded the SIAS setpoint.
B. Incorrect. CVC-103, receives a SIAS and CIAS signal to close, CVC 109 receives a CIAS close signal.
C. **CORRECT**. When CVC-103, or CVC-109 close, a close signal is sent to CC-636 to close.
D. Incorrect. Only two charging pumps will be running post SIAS, one shuts off. However, prior to the SIAS normally three charging pumps would be running to try and maintain pressurizer level.

Technical Reference(s): SD-CVC, 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-CVC Objective 3 (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
Comprehension or Analysis X

10 CFR Part 55 Content: 55.41 7
55.43

Comments:

2011 NRC Exam
RO Written Exam Worksheet

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #	2	
	Group #	1	
	K/A #	005 K1.01	
	Importance Rating	3.2	

K/A Statement

Knowledge of the physical connections and/or cause effect relationships between the RHRS and the following systems: CCWS.

Proposed Question: RO 32 Rev: 0

Given:

- The plant is in Mode 4
- Shutdown Cooling Train B is being placed in service

What actions are taken to compensate for the increased heat load on the Component Cooling Water system?

A. CC-963B, Shutdown HX B CCW Flow Control is placed to OPEN.

B. CC-963B, Shutdown HX B CCW Flow Control is placed to SETPNT.

C. Dry Cooling Tower fans are manually started in slow speed.

D. Dry Cooling Tower fans are manually started in fast speed.

Proposed Answer: D

Explanation: (Optional)

A. Incorrect: Opening of CC-963 puts a heat load on the CCW system
B. Incorrect. CC-963 is required to be in open by procedure but places a heat load on the system..
C. Incorrect. Placing DCT fan in slow makes them inoperable and is therefore incorrect.
D. **CORRECT**. Per step 6.2.2 of OP-009-005 verify sufficient number of Dry Cooling Fans running to accept increased heat load on CCW system.

Technical Reference(s): OP-009-005 Page 24, 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-SDC Objective 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 X
Comprehension or Analysis

10 CFR Part 55 Content: 55.41 5
55.43

Comments:

2011 NRC Exam
RO Written Exam Worksheet

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #	2	
	Group #	1	
	K/A #	006 K6.05	
	Importance Rating	3.0	

K/A Statement

Knowledge of the effect of a loss or malfunction on the following will have on the ECCS:
HPI/LPI cooling water.

Proposed Question: RO 33 Rev: 0

Given:

- A Loss Of Cooling Accident is in progress
- Reactor Coolant System (RCS) pressure is 800 PSIA
- High Pressure Safety Injection Pump B trips shortly after starting
- All other equipment functions as designed

The minimum required Safety Injection flow for High Pressure Safety Injection is ___(1)___ and __(2)__ is required for Low Pressure Safety Injection.

	(1)	(2)
A.	>125 GPM total flow to the cold legs	no flow
B.	>125 GPM total flow to the cold legs	>125 GPM flow to loop 2 cold legs
C.	>125 GPM to each cold leg	no flow
D.	>125 GPM to each cold leg	>125 GPM flow to loop 2 cold legs

Proposed Answer: C

Explanation: (Optional)

A. Incorrect HPSI >125 GPM to each cold leg not total flow to all legs is required .
B. Incorrect. HPSI flow should be to each cold leg not total flow to all legs and LPSI flow would be 0 GPM at 800 PSIA.
C. **CORRECT**. Flow should be >125GPM on each cold leg and 0 flow on the LPSI.
D. Incorrect. LPSI flow required is 0 GPM.

Technical Reference(s): OP-902-009 Attachment 2-E and 2-F, rev 301
(Attach if not previously provided) SD-SI Fig 1, rev 7
(including version/revision number)

Proposed references to be provided
to applicants during examination: OP-902-009 Attachment 2-E and 2-F

Learning Objective: WLP-OPS-PPE02 Objective 14 (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
Comprehension or Analysis X

10 CFR Part 55 Content: 55.41 8
55.43

Comments:

2011 NRC Exam
RO Written Exam Worksheet

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #	2	
	Group #	1	
	K/A #	007 A1.01	
	Importance Rating	2.9	

K/A Statement

Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating the PRTS controls including: Maintaining quench tank water level within limits

Proposed Question: RO 34 Rev: 0

Given

- Reactor Coolant System Code safety valve has been weeping for the past week
- Quench tank level is 81%
- Quench tank temperature is 147°F

Control Room Supervisor orders the ATC operator to fill and drain the Quench Tank to reduce Quench Tank temperature.

The Quench Tank will be drained to the ___(1)___ and it will be filled from the ___(2)___ system.

	(1)	(2)
A.	Containment Sump	Condensate Make Up
B.	Reactor Drain Tank	Primary Make Up
C.	Containment Sump	Primary Make Up
D.	Reactor Drain Tank	Condensate Make Up

Proposed Answer: B

Explanation: (Optional)

A and C are incorrect based on the Containment Sump in column 1. The Quench Tank is drained to the Reactor Drain Tank. Both the Reactor Drain Tank and Quench Tank are located in Containment. Various Containment sources such as the Safety Injection Tank, can be drained to the Containment Sump.
A and D are incorrect based on Condensate Makeup in column 2. Both Primary Make Up and Condensate Make Up can be aligned to containment. Primary Make Up is the water source for the Quench Tank.

Technical Reference(s): OP-007-001, Rev. 020
(Attach if not previously provided)
(including version/revision number)

Proposed references to be provided to applicants during examination: None

Learning Objective: WLP-OPS-BM00 Objective 8 (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 X
Comprehension or Analysis

10 CFR Part 55 Content: 55.41 5
55.43

Comments:

2011 NRC Exam
RO Written Exam Worksheet

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #	2	
	Group #	1	
	K/A #	008 K2.02	
	Importance Rating	3.0*	

K/A Statement

Knowledge of bus power supplies to the following: CCW pump, including emergency backup.

Proposed Question: RO 35 Rev: 0

Given:

- The plant is at 100% power
- Emergency Diesel Generator A is running paralleled to the 3A bus in TEST Mode
- The Unit Auxiliary Transformer A 4.16 KV feeder breaker to the 2A bus trips on overcurrent

Component Cooling Water Pump A will start on the __(1)__ Second load block of the Sequencer and will be powered from __(2)__.

	(1)	(2)
A.	7	Emergency Diesel Generator A
B.	168	Emergency Diesel Generator A
C.	7	Startup Transformer A
D.	168	Startup Transformer A

Proposed Answer: A

Explanation: (Optional)

A. **CORRECT**: CCW Pumps start on the 7 second load block and EDG A will supply the 3A buss with a loss of power to the 3 bus.
B. Incorrect. CCW pump start signal is on 7 second load block.
C. Incorrect. EDG A will carry safety loads on a loss of power to the 3 bus.
D. Incorrect. CCW pump starts on 7 second load block and EDG will supply power on a loss of power to the 3 bus.

Technical Reference(s): SD-CC table 1.1 (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-CC00 Objective 4 (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
Comprehension or Analysis X

10 CFR Part 55 Content: 55.41 7
55.43

Comments:

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #	2	
	Group #	1	
	K/A #	010 K3.02	
	Importance Rating	4.0	

K/A Statement

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

Proposed Question: RO 36 Rev: 0

Given

- The plant is at 100% steady state
- Pressurizer Pressure Controller, RC-IPIC-0100, output fails to 100%

If no operator actions are taken which of the following describes the plant response:

A. Pressurizer pressure would rise and be controlled by the spray valves at 2275 PSIA.

B. Pressurizer pressure will rise until all back up and proportional heaters secure at 2270 PSIA.

C. Pressurizer pressure would lower until the reactor trips on low Reactor Coolant System pressure.

D. Pressurizer pressure would lower until all Pressurizer heaters are energized which will maintain RCS pressure at 2225 PSIA.

Proposed Answer: C

Explanation: (Optional)

A. Incorrect When the Pressurizer pressure instrument fails the spray valve will open and actual RCS pressure will lower.
B. Incorrect. Pressure would lower due to spray valve opening:
C. **CORRECT.** When the Pressurizer pressure instrument fails the spray valve will open and actual RCS pressure will lower until an aux trip on low RCS pressure trips the Reactor.
D. Incorrect. When the Pressurizer pressure instrument fails the spray valve will open and actual RCS pressure will lower the backup heaters will energize at 2200 PSIA and pressure will continue to lower until the plant trips due to an aux trip on low RCS pressure.

Technical Reference(s): SD-PLC Figure10 (Rev 4)
(Attach if not previously provided)
(including version/revision number)

Proposed references to be provided
to applicants during examination: None

Learning Objective: WLP-OPS-PLC00 Objective 3 (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
Comprehension or Analysis X

10 CFR Part 55 Content: 55.41 3
55.43

Comments:

2011 NRC Exam
RO Written Exam Worksheet

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #	2	
	Group #	1	
	K/A #	012 K4.06	
	Importance Rating	3.2	

K/A Statement

Knowledge of RPS design feature(s) and/or interlock(s) which provide for the following:
Automatic or manual enable/disable of RPS trips.

Proposed Question: RO 37 Rev: 0

Given

- The Reactor Coolant System (RCS) pressure is 350 PSIA
- The plant is raising pressure to 2250 PSIA

As RCS pressure rises above 500 PSIA the Pressurizer Pressure Operating Bypass __(1)__ from service. The set point tracks __(2)__ below actual Reactor coolant System pressure during the pressure rise.

	(1)	(2)
A.	must be manually removed	400 PSIA
B.	is automatically removed	400 PSIA
C.	must be manually removed	184 PSIA
D.	is automatically removed	184 PSIA

Proposed Answer: B

Explanation: (Optional)

A and C are incorrect because the Pressurizer Pressure Operating Bypass will be automatically removed from service. The Steam Generator High Level Operating Bypass must be manually removed from service.
C and D are incorrect because the setpoint will track 400 PSIA below actual RCS pressure to 1684 PSIA. The Main Steam low pressure setpoint in PPS tracks 184 PSIA below actual pressure as Steam Generator pressure is raised.

Technical Reference(s): WLP-OPS-PPS, 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-PPS Objective 4 (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 X
Comprehension or Analysis

10 CFR Part 55 Content: 55.41 3
55.43

Comments:

2011 NRC Exam
RO Written Exam Worksheet

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #	2	
	Group #	1	
	K/A #	012 A4.04	
	Importance Rating	3.3*	

K/A Statement

Ability to manually operate and/or monitor in the control room: Bistable, trips, reset and test switches.

Proposed Question: RO 38 Rev: 0

Given

- A Safety Injection Actuation Signal (SIAS) was inadvertently actuated
- The CRS directs the BOP operator to reset the SIAS

The SIAS initiation relays are reset at ___(1)___ and the actuation relays are reset at ___(2)___.

	(1)	(2)
A.	CP-10	CP-33
B.	CP-10	CP-10
C.	CP-33	CP-33
D.	CP-33	CP-10

Proposed Answer: A

Explanation: (Optional)

A. **CORRECT**. Per OP-901-504. Initiation relays are reset at CP-10 and actuation relays are reset at CP-33.
B. Incorrect. Correct initiation relay reset location. Wrong actuation relay reset location.
C. Incorrect. Wrong initiation relay reset location. Correct actuation relay reset location.
D. Incorrect. Wrong initiation relay reset location. Wrong actuation relay reset location.

Technical Reference(s): OP-901-504, Steps 14 and 15, rev 5
(Attach if not previously provided)
(including version/revision number)

Proposed references to be provided
to applicants during examination: None

Learning Objective: WLP-OPS-PPS00 Objective 12 (As available)

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

Question History: Last NRC Exam NA

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

10 CFR Part 55 Content: 55.41 7
55.43

Comments:

2011 NRC Exam
RO Written Exam Worksheet

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #	2	
	Group #	1	
	K/A #	013 K2.01	
	Importance Rating	3.6*	

K/A Statement

Knowledge of bus power supplies to the following: ESFAS/safeguards equipment control.

Proposed Question: RO 39 Rev: 0

Given:

- The plant is at 100% Power
- Emergency Diesel Generator A is Out of Service for Maintenance
- A Loss Of Off Site Power Occurs

Which of the following is available to Emergency Borate the RCS?

A. Charging Pump B and Boric Acid Makeup pump B

B. Charging Pump A and Boric Acid Make up pump A

C. Charging Pump B and Gravity Feed Valve BAM-113A

D. Charging Pump A and Gravity Feed Valve BAM-113B

Proposed Answer: C

Explanation: (Optional)

A. Incorrect. Power supply to Boric acid pump B is powered from BAM EBKR-312A2D which is not powered up due to EDG A being out of service with a LOOP
B. Incorrect. Charging Pump A is powered form CVC-EBKR- 31A 5C and Boric acid pump B is powered from BAM EBKR-312A 2D Which are not power up due to EDG A being out of service with a LOOP
C. **CORRECT** Charging Pump is Powered from CVC-EBKR-31B 6C and Boric Acid Makeup Tank A Gravity Feed Valve BAM-113A is powered from 312B -2J which are both being powered from EDG B
D. Incorrect. Charging Pump A is powered form CVC-EBKR- 31A 5C which is not power up due to EDG A being out of service with a LOOP.

Technical Reference(s): OP-002-005 Breaker line ups, rev 32
(Attach if not previously provided)
(including version/revision number)

Proposed references to be provided
to applicants during examination: None

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

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

Question History: Last NRC Exam

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

10 CFR Part 55 Content: 55.41 6
55.43

Comments:

2011 NRC Exam
RO Written Exam Worksheet

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #	2	
	Group #	1	
	K/A #	013 G 2.4.11	
	Importance Rating	4.0	

K/A Statement

Emergency Procedures / Plan: Knowledge of abnormal condition procedures. (Engineered Safety Features Actuation)

.

Proposed Question: RO 40 Rev: 0

Plant Conditions are as follows:

- Power is 100%, 300 EFPD
- Reactor Power Cutback is in service with subgroups 5 and 11 selected
- A Shutdown Bank CEA drops into the core
- The crew entered OP-901-102, CEA or CEDMCS Malfunction

Subsequently conditions are as follows:

- Power is 80%
- Main Feedwater pump A trips on overspeed

Based on this event, the crew should

A. Exit OP-901-102 and enter OP-901-101, Reactor Power Cutback.

B. Remain in OP-901-102 and adjust turbine load to maintain Tavg -Tref matched.

C. Remain in OP-901-102 and perform OP-901-101, Reactor Power Cutback concurrently.

D. Trip the reactor, exit OP-901-102, and enter OP-902-000, Standard Post Trip Actions.

Proposed Answer: D

Explanation: (Optional)

A. Incorrect a shutdown bank CEA is not a CEA that would be dropped by RXC and therefore you are in an unanalyzed CEA configuration and the Reactor should be tripped.
B. Incorrect. A shutdown bank CEA is not a CEA that would be dropped by RXC and therefore you are in an unanalyzed CEA configuration and the Reactor should be tripped.
C. Incorrect. A shutdown bank CEA is not a CEA that would be dropped by RXC and therefore you are in an unanalyzed CEA configuration and the Reactor should be tripped.
D. **CORRECT**. CEA 3 is not a CEA that would be dropped by RXC and therefore you are in an unanalyzed CEA configuration and the Reactor should be tripped.

Technical Reference(s): OP-901-101, Section E0, 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-PP01 4 (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
Comprehension or Analysis X

10 CFR Part 55 Content: 55.41 5
55.43

Comments:

2011 NRC Exam
RO Written Exam Worksheet

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #	2	
	Group #	1	
	K/A #	022 A1.04	
	Importance Rating	3.2	

K/A Statement

Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating the CCS controls including: Cooling water flow.

Proposed Question: RO 41 Rev: 0

Given

- Reactor Coolant System pressure 1600 PSIA
- Containment Pressure 17.5 PSIA and rising
- The crew has diagnosed into OP-902-002, Loss of Coolant Accident Recovery
  The BOP operator reports that Containment Fan Cooler A has tripped

For the given conditions what actions are required with regards to the Containment Cooling System?

A. No additional actions are required for the given conditions.

B. Override and close the Containment Fan Cooler A Component Cooling Water isolation valves.

C. Verify Containment Cooling Safety Damper, CCS-102A, closed when CFC A tripped.

D. Verify Containment Spray flow >1750 GPM for both Containment Spray Trains.

Proposed Answer: B

Explanation: (Optional)

A. Incorrect: OP-902-002 Step 14 contingency action b.1 state if any containment fan cooler is not operating and containment press greater than 17.1 PSIA then refer to appendix 21-b CC CCW override and close the associated containment fan cooler CCW isolation valve
B. **CORRECT**. OP-902-002 Step 14 contingency action b.1 state if any containment fan cooler is not operating and containment press greater than 17.1 PSIA then refer to appendix 21-b CC CCW override and close the associated containment fan cooler CCW isolation valve
C. Incorrect. Ring header safety Dampers open on an SIAS signal, CFC configurations is not considered for their operations
D. Incorrect. Containment fan cooler average air temperature is a TS limit prior to the actuation of an SIAS, with the given conditions temperatures would be expected to rise above 120°F.

Technical Reference(s): OP-902-002 page 15, 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-CCS00 objective 1 (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
Comprehension or Analysis X

10 CFR Part 55 Content: 55.41 8
55.43

Comments:

2011 NRC Exam
RO Written Exam Worksheet

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #	2	
	Group #	1	
	K/A #	026 A2.02	
	Importance Rating	4.2*	

K/A Statement

Ability to (a) predict the impacts of the following malfunctions or operations on the CSS; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: Failure of automatic recirculation transfer.

Proposed Question: RO 42 Rev: 0

Given the following:

- A Loss of Coolant Accident has occurred
- Reactor Coolant System pressure is 700 PSIA
- Containment pressure is 18 PSIA
- Refueling Water Storage Pool level is 9% and lowering
- No operator actions have been taken
- Low Pressure Safety Injection pumps A and B are running
- High Pressure Safety Injection pumps A and B are running

Based on the given conditions the Balance of Plant operator should:

A. Close SI-602A and B, ESF Pump Suction Valves from the SI Sump.

B. Open SI-120A and B, SI Pumps Recirculation Isolation Valves.

C. Secure High Pressure Safety Injection Pumps A and B.

D. Secure Low Pressure Safety Injection Pumps A and B.

Proposed Answer: D

Explanation: (Optional)

A. Incorrect: SI-602A(B) ESF pump suction SI sump valves, should be verified Open
B. Incorrect. SI-120A(B) SI pumps recirculation Isolation Valves, are manually Closed on RAS signal.
C. Incorrect. High Pressure Safety Injection Pump A and B are not secured on RAS signal.
D. **CORRECT**. Low Pressure Safety Injection Pumps A and B should have tripped on the RAS signal and should be secured by the operator.

Technical Reference(s): OP-902-002 step 42, 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-PPE02 Objective 17 (As available)

Question Source: Bank #
Modified Bank # 07235 (Note changes or attach parent)
New

Question History: Last NRC Exam NA

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

10 CFR Part 55 Content: 55.41 5
55.43

Comments:

2011 NRC Exam
RO Written Exam Worksheet

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #	2	
	Group #	1	
	K/A #	039 K5.05	
	Importance Rating	2.7	

K/A Statement

Knowledge of the operational implications of the following concepts as they apply to the MRSS: Bases for RCS cooldown limits.

Proposed Question: RO 43 Rev: 0

Given:

- Reactor Coolant System Tcold is 500°F and lowering
- 15 minutes ago the Reactor Coolant System Tc was 515°F when a controlled cool down was established
- The cool down is being controlled using MS-319A, Main Steam Bypass 1A, at 15% open

IF MS-319A failed open, the maximum allowed cool down rate of ___(1)____ which protects the ___(2)_____, would be exceeded.

	(1)	(2)
A.	60°F/Hr	The most limiting component in Reactor Coolant System under all conditions
B.	60°F/Hr	SG tube sheet from cyclic stress which is the most limiting component under all conditions
C.	100°F/Hr	SG tube sheet from cyclic stress which is the most limiting component under all conditions
D.	100°F/Hr	The most limiting component in Reactor Coolant System under all conditions

Proposed Answer: D

Explanation: (Optional)

A. Incorrect. 60°F/Hr is heat up rate.
B. Incorrect. 60°F/Hr is heat up rate and the tube sheet is not the most limiting component
C. Incorrect. Tube sheet is not the most limiting component under all conditions
D. **CORRECT** 100°F/Hr is the maximum allowed cool down rate and this protects the most limiting component from cyclic stress under all conditions

Technical Reference(s): TS Bases 3.4.4.8, change 18
(Attach if not previously provided)
(including version/revision number)

Proposed references to be provided
to applicants during examination: None

Learning Objective: WLP-OPS-RCS00 objective 8 (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 X
Comprehension or Analysis

10 CFR Part 55 Content: 55.41 3
55.43

Comments:

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #	2	
	Group #	1	
	K/A #	039 A4.01	
	Importance Rating	2.9*	

K/A Statement

Ability to manually operate and/or monitor in the control room: Main steam supply valves.

Proposed Question: RO 44 Rev: 0

Given

- The plant is performing an up power
- Dilution to the Volume Control Tank is in progress for power ascension
- Reactor Power is 70%
- Turbine is in GO with a rate of 2MW/MIN
- Tave is 565°F
- Tref is 561°F

To match Tave and Tref, The BOP operator should ____(1)____ the rate the Main Turbine governor valves open. To accomplish this task, the BOP operator is required to ___(2)_____.

	(1)	(2)
A.	raise	depress LOAD RATE pushbutton, entering new value, and press ENTER
B.	raise	place the Main Turbine in HOLD, depress LOAD RATE pushbutton, enter new value, and push GO
C.	lower	depress LOAD RATE pushbutton, entering new value, and press ENTER
D.	lower	place the Main Turbine in HOLD, depress LOAD RATE pushbutton, enter new value, and push GO

Proposed Answer: A

Explanation: (Optional)

A. **CORRECT**: To change load rate the turbine does not go to hold or need to be in hold and a higher turbine rate is required to match Tave and Tref
B. Incorrect. Procedure does not direct the operator to place turbine in hold
C. Incorrect. A higher turbine rate is required to match Tave and Tref
D. Incorrect. Procedure does not direct the operator to place turbine in hold A higher turbine rate is required to match Tave and Tref

Technical Reference(s): PDB Book 2 Fig 1, rev 0
(Attach if not previously provided) OP-005-007 section 6.2, rev 14
(including version/revision number)

Proposed references to be provided
to applicants during examination: None

Learning Objective: WLP-OPS-MS00 Objective 9 (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
Comprehension or Analysis X

10 CFR Part 55 Content: 55.41 1
55.43

Comments:

2011 NRC Exam
RO Written Exam Worksheet

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #	2	
	Group #	1	
	K/A #	059 A3.04	
	Importance Rating	2.5*	

K/A Statement

Ability to monitor automatic operation of the MFW, including: Turbine driven feed pump.

Proposed Question: RO 45 Rev: 0

Plant Conditions are as Follows:

- 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-7 are indicating 68%
- A reactor trip occurs
- All systems performed as designed before and after the trip

The expected post trip responses to these conditions are that FW IHIC 1107 Main Feedwater Pump A speed controller ___(1)___ and FW IHIC1111, Main Feedwater Regulating Valve A and FW IHIC1105 Startup Feedwater Regulating Valve A Controller __(2)__.

.

	(1)	(2)
A.	lowers to 3900 RPM	remain at their pre trip positions
B.	lowers to 3900 RPM	reposition to their Reactor Trip Positions
C.	remains at 4500 RPM	remain at their pre trip positions
D.	remains at 4500 RPM	reposition to their Reactor Trip Positions

Proposed Answer: A

Explanation: (Optional)

A. **Correct** Feed pump speed goes to 3900 RPM. FW IHIC 1111 Main Feedwater Regulating Valve Controller and FWIHIC1105 Startup Feedwater Regulating Valves shift to manual do to level deviation and do **NOT** go to Reactor Trip Override position
B. Incorrect Feed pump speed goes to 3900 RPM, FW IHIC 1111 Main Feedwater Regulating Valve Controller and FWIHIC1105 Startup Feedwater Regulating Valves shift to manual do to level deviation and do **NOT** go to Reactor Trip Override position
C. Incorrect FW IHIC1107 Main Feedwater Pump Speed Controller goes to 3900 RPM on reactor trip
D. Incorrect FW IHIC1107 Main Feedwater Pump Speed Controller goes to 3900 RPM on reactor trip and , FW IHIC 1111 Main Feedwater Regulating Valve Controller and FWIHIC1105 Startup Feedwater Regulating Valves shift to manual do to level deviation and do **NOT** go to Reactor Trip Override

E.

Technical Reference(s): OP-902-000 Page 12 of 15, rev 10
(Attach if not previously provided)
(including version/revision number)

Proposed references to be provided
to applicants during examination: None

Learning Objective: WLP-OPS-FW00 objective 4 (As available)

Question Source: Bank #
Modified Bank # 2918 (Note changes or attach parent)
New

Question History: Last NRC Exam N/A

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

10 CFR Part 55 Content: 55.41 4
55.43

Comments:

2011 NRC Exam
RO Written Exam Worksheet

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #	2	
	Group #	1	
	K/A #	061 K5.05	
	Importance Rating	2.7	

K/A Statement

Knowledge of the operational implications of the following concepts as they apply to the AFW: Feed line voiding and water hammer.

Proposed Question: RO 46 Rev: 0

How is protection against water hammer provided for the Emergency Feedwater system piping in the event of an actuation in modes 1-3?

A. The sequential opening operation of MS-401A and B Steam Supply Valves.

B. By the EFW Pump AB Ramp Generator slowly ramping up pump speed.

C. Positioning the Emergency Feedwater Pumps below the Condensate Storage Pool.

D. The orificed line tapping off the Main Feedwater header keeps the EFW lines pressurized.

Proposed Answer: D

Explanation: (Optional)

A. Incorrect: The sequencing of MS supply valve prevents over speeding of the AB Emergency Feedwater pump.
B. Incorrect. The Ramp generator prevents overspeed of the AB Emergency Feedwater pump
C. Positioning of EFW pumps below the Condensate Storage Pool provides Net positive suction head to the EFW Pump and does not protect the pump discharge lines from water hammer
D. **CORRECT**. The EFW piping is kept pressurized using orifice lines off the main feed line to prevent water hammer events

.

Technical Reference(s): UFSAR Section 10.4
(Attach if not previously provided)
(including version/revision number)

Proposed references to be provided
to applicants during examination: None

Learning Objective: WLP-OPS-EFW Objective 7 (As available)

Question Source: Bank #
Modified Bank # X 2340A
New

Question History: Last NRC Exam N/A

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

10 CFR Part 55 Content: 55.41 5
55.43

Comments:

2011 NRC Exam
RO Written Exam Worksheet

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #	2	
	Group #	1	
	K/A #	062 K1.03	
	Importance Rating	3.5	

K/A Statement

Knowledge of the physical connections and/or cause effect relationships between the ac distribution system and the following systems: DC distribution.

Proposed Question: RO 47 Rev: 0

Static Uninterruptable Power Supply SMA requires maintenance to the inverter section requiring the Inverter to be secured. How will the AC loads remain powered up with the Inverter de energized?

A. Loads will be powered from the Normal AC supply through the rectifier.

B. Loads will be powered from the DC supply through the rectifier.

C. Loads will be powered from the Bypass AC supply.

D. Loads will be powered from the DC Bypass supply.

Proposed Answer: C

Explanation: (Optional)

A. Incorrect. Rectifier converts AC to DC and does not supply power to the AC components.
B. Incorrect. Rectifier converts AC to DC therefore cannot supply AC loads.
C. **CORRECT.** AC loads will be manually transferred to the bypass prior to securing the SUPS to prevent loss of vital loads.
D. Incorrect. There is no DC bypass for the SUPS.

Technical Reference(s): SD-ID Fig 4 and Page 6, rev 5
(Attach if not previously provided)
(including version/revision number)

Proposed references to be provided
to applicants during examination: None

Learning Objective: WLP-OPS-ID00 Objective 3 (As available)

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

Question History: Last NRC Exam NA

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

10 CFR Part 55 Content: 55.41 7
55.43

Comments:

2011 NRC Exam
RO Written Exam Worksheet

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #	2	
	Group #	1	
	K/A #	063 A2.01	
	Importance Rating	2.5	

K/A Statement

Ability to (a) predict the impacts of the following malfunctions or operations on the DC electrical systems; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: Grounds.

Proposed Question: RO 48 Rev: 0

Given:

- The plant is at 100% power
- The RAB watch reports that the AB battery bus indicates a positive 125 volt DC ground.

A new ___(1)___ ground of the same magnitude on the AB battery bus, would require implementing OP-901-313, Loss of a 125 Volt DC Bus. This will require the crew to ___(2)___.

	(1)	(2)
A.	negative	declare Emergency Feedwater Pump AB inoperable and enter TS 3.7.1.2
B.	negative	manually trip the reactor if bus AB-DC can not be restored
C.	positive	declare Emergency Feedwater Pump AB inoperable and enter TS 3.7.1.2
D.	positive	manually trip the reactor if bus AB-DC can not be restored

Proposed Answer: A

Explanation: (Optional)

A. **CORRECT.** A large positive and negative ground on Waterford's ungrounded system would result in a direct short that could cause loss of the DC bus. This would require entry into OP-901-313. The AB EFW Pump Steam supply valves will be unavailable and the governor valve fails open resulting in the AB EFW Pump being inoperable. At 100% power the EFW TS 3.7.1.2 would need to be entered.
B. Incorrect. Correct ground polarity. Wrong action. OP-901-313 dictates a normal shutdown be performed if the DC bus can not be re-energized.
C. Incorrect. Wrong ground polarity. An additional positive ground would not result in loss of the bus. Therefore, OP-901-313 would not be entered. Correct action.
D. Incorrect. Wrong ground polarity. Wrong action.

Technical Reference(s): SD-DC page 13, rev 8
(Attach if not previously provided) WLP-OPS-DC00 Slide 64, rev 16
(including version/revision number)

Proposed references to be provided
to applicants during examination: None

Learning Objective: WLP-OPS-DC00 Objective 10 (As available)

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

Question History: Last NRC Exam

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

10 CFR Part 55 Content: 55.41 7
55.43

Comments:

2011 NRC Exam
RO Written Exam Worksheet

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #	2	
	Group #	1	
	K/A #	064 K3.02	
	Importance Rating	4.2	

K/A Statement

Knowledge of the effect that a loss or malfunction of the ED/G system will have on the following: ESFAS controlled or actuated systems.

Proposed Question: RO 49 Rev: 0

Given:

- Reactor Coolant System Pressure is 1600 PSIA and lowering slowly
- Containment pressure is 19 PSIA and rising
- A Loss Of Offsite Power has occurred
- Five minutes into this event Emergency Diesel Generator A tripped on Overspeed

What of the following describes the MINIMUM actions required to maintain containment integrity?

A. CS-125A, Containment Spray Header Isolation, must be closed by taking the CP-8 control switch to open and closed only.

B. CS-125A, Containment Spray Header Isolation, must be closed by taking the override switch in the +35 Relay Room to OVERRIDE only.

C. Containment integrity will be automatically maintained by Containment Isolation Actuation System initiation closing all required containment penetrations.

D. CS-125A, Containment Spray Header Isolation, must be closed by taking the override switch in the +35 relay room to OVERRIDE, followed by taking the CP-8 control switch to open and then closed.

Proposed Answer: D

Explanation: (Optional)

A. Incorrect. Containment integrity will be lost when CS pump trips due to loss of power when the EDG A trips. Taking Control switch to open and then closed will not close the valve.
B. Incorrect. The manual key switch on the Aux relay panel must being actuated will not close CS-125A.
C. Incorrect Containment isolation actuation will not close CS-125.
D. **CORRECT**. Override on +35 must be placed in override followed by CS to open then closed to override the CS open signal to CS-125.

Technical Reference(s): OP-902-002 Page 15, rev 12
(Attach if not previously provided) OP-902-009, Appendix 21-A, rev 301
(including version/revision number)

Proposed references to be provided
to applicants during examination: None

Learning Objective: WLP-OPS-CS00 Objective 4 (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 X
Comprehension or Analysis

10 CFR Part 55 Content: 55.41 7
55.43

Comments:

2011 NRC Exam
RO Written Exam Worksheet

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

K/A Statement

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

Proposed Question: RO 50 Rev: 0

Given:

- An earthquake has occurred at Waterford 3
- A loss of offsite power has occurred .
- Emergency Diesel Generator A and B have started to supply in house loads
- A support beam in the A Emergency Diesel Generator room has fallen on and damaged both Air compressors A1 and A2
- Both air receiver pressures are 0 PSIG.
- Emergency Diesel Generator A develops an oil leak requiring it to be shutdown.

What action is required to shutdown Emergency Diesel Generator A?

A. Depress the Emergency Shutdown push buttons on CP-1.

B. Select STOP on the local Emergency Diesel Generator control panel.

C. Pull the Overspeed Trip Plunger located on the Overspeed Governor.

D. Pull and hold the manual Fuel Rack Override lever to the no fuel position.

Proposed Answer: D

Explanation: (Optional)

A. Incorrect: Emergency pushbutton on CP 1 is not Active in the Emergency Mode.
B. Incorrect. Emergency pushbutton on Local EDG control panel is not Active in Emergency Mode.
C. Incorrect. Due to no air available the manual overspeed trip will not function.
D. **CORRECT**. The fuel rack must be pulled and held down until the diesel comes to a rest to shutdown the EDG.

Technical Reference(s): OP-902-002 pages 44 and 45, rev 311
(Attach if not previously provided)
(including version/revision number)

Proposed references to be provided
to applicants during examination: None

Learning Objective: WLP-OPS-EDG00 Objective 2 (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
Comprehension or Analysis X

10 CFR Part 55 Content: 55.41 7
55.43

Comments:

2011 NRC Exam
RO Written Exam Worksheet

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #	2	
	Group #	1	
	K/A #	073 A4.02	
	Importance Rating	3.7	

K/A Statement

Ability to manually operate and/or monitor in the control room: Radiation monitoring system control panel.

Proposed Question: RO 51 Rev: 0

Given:

- A Main Steam Line break has occurred inside containment
- Safety Injection Actuation Signal, Containment Isolation Actuation Signal, Main Steam Isolation Signal and, Containment Spray Actuation are all actuated
- The crew has entered OP-902-004, Excess Steam Demand Recovery
- Containment Temperature is 204°F
- ARM-IRE 5400A and ARM-IRE-5400B, Containment High Range Radiation Monitors alarmed 15 minutes into the event and radiations levels are trending down
- No other Containment Radiation monitors are in alarm

For the given conditions the crew should:

A. Remain in OP-902-004 and monitor the Containment radiation monitors for thermally induced current effects.

B. Enter OP-901-403, High Airborne Activity inside Containment, and perform concurrently with OP-902-004.

C. Take no action since these area monitors are isolated on a CIAS and are unreliable.

D. Enter OP-902-008, Functional Recovery, due to high activity in Containment.

Proposed Answer: A

Explanation: (Optional)

A. **CORRECT**: The containment High Range Rad monitors are subject to TIC in post accidents conditions. There are no other Containment monitors in alarm and therefore the crew should remain in OP-902-004, Excess Steam Demand Procedure.
B. Incorrect. The spike on the high range monitor is expected with High Temperatures and entry into the High Airborne procedure is not necessary.
C. Incorrect. The containment High range monitors are not isolated on CIAS; the Containment PIG radiation monitor is isolated on CIAS.
D. Incorrect. Only one event is indicated with the High Range Rad Monitor spiking; entry into the Function Recovery procedure is not required.

Technical Reference(s): OP-902-004 Safety Function , rev 11
(Attach if not previously provided) SD-RMS pages 43 and 44, rev 11
(including version/revision number)

Proposed references to be provided
to applicants during examination: None

Learning Objective: WLP-OPS-RMS Objective 6 (As available)

Question Source: Bank #
Modified Bank # 2008 NRC RO Q61 (Note changes or attach parent)
New

Question History: Last NRC Exam 2008 RO Exam

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

10 CFR Part 55 Content: 55.41 11
55.43

Comments:

2011 NRC Exam
RO Written Exam Worksheet

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #	2	
	Group #	1	
	K/A #	076 A1.02	
	Importance Rating	2.6*	

K/A Statement

Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating the SWS controls including: Reactor and turbine building closed cooling water temperatures.

Proposed Question: RO 52 Rev: 0

Given

- A Loss Of Coolant Accident is in Progress
- Loss Of Off Site Power has occurred
- Emergency Diesel Generator A has tripped on overspeed
- Component Cooling Water temperature is 98°F and rising
- B Train Dry Cooling Tower Fans 1-4 are operating in Fast Speed
- B Train Dry Cooling Tower Fans 5-15 are operating in Slow Speed

Based on the given conditions how will the Component Cooling Water system respond as Component Cooling Water temperature raises to 115°F?

A. Dry Cooling Tower B fans 5-15 will start in fast speed at 60 second intervals until temperature reach 115°F, then any Dry Cooling Tower B fans still in slow speed start in fast speed immediately.

B. Dry Cooling Tower B fans 5-15 will start in fast speed at 60 second internals until Component Cooling Water temperature reaches 100°F, at which point Auxiliary Component Cooling Water Pump B starts in Automatic and sequencing of Dry Cooling Tower B fans is halted.

C. Dry Cooling Tower B fans 5-15 will start in fast speed at 60 second intervals until Component Cooling Water temperature reaches 100°F, then any Dry Cooling Tower B fans still in slow speed start in fast speed immediately.

D. Dry Cooling Tower B fans stop sequencing upon actuation of Safety Injection Actuation System when Auxiliary Component Cooling Water Pump B is started to control Component Cooling Water temperature. Wet Cooling Tower B fans start at 100°F Component Cooling Water temperature.

Proposed Answer: C

Explanation: (Optional)

A. Incorrect. At 100 °F all DCT fans start in Fast immediately.
B. Incorrect. ACCW starting does not affect sequencing of DCT fans; they continue to cycle Based on CCW temperature.
C. **CORRECT**: DCT fans start at 60 second interval until 100 °F then all DCT fans start in fast immediately.
A. Incorrect. SIAS does not affect sequencing of DCT fans; they continue to cycle based on CCW temperature.

Technical Reference(s): OP-002-003, rev 305
(Attach if not previously provided) UFSAR section 9.2.2.1
(including version/revision number)

Proposed references to be provided
to applicants during examination: None

Learning Objective: WLP-OPS-CC00 Objective 3 (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
Comprehension or Analysis X

10 CFR Part 55 Content: 55.41 7
55.43

Comments:

2011 NRC Exam
RO Written Exam Worksheet

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #	2	
	Group #	1	
	K/A #	076 G2.1.25	
	Importance Rating	3.9	

K/A Statement

Conduct of Operations: Ability to interpret reference materials, such as graphs, curves, tables, etc. (Service Water)

Proposed Question: RO 53 Rev: 0

Given

- Dry Cooling Tower fans 7B and 2B are out of service.
- Outside air temperature is 99°F.
- Wet Bulb temperature is 75°F.
- The National Weather Service declares St. Charles Parish under a tornado watch.

What is the most limiting time to restore Dry Cooling Tower fans to comply with Tech Spec 3.7.4?

A. 1 Hour

B. 2 Hour

C. 72 Hour

D. 7 Days

Proposed Answer: A

Explanation: (Optional)

A. **CORRECT**: Per TS 3.7.4 all DCT fans beneath the missile Shield must be operable with a tornado watch in effect. DCT 7B is under the missile shield. Per 3.7.4 action c this is a one hour action.
B. Incorrect. 2 hours is the time to verify that the minimum fan requirements of table 3.7-3 are satisfied if the UHS is operable
C. Incorrect. 72 hours is the time limit of action a to restore the UHS
D. Incorrect. 7days is a common action time requirement for TS related equipment.

Technical Reference(s): TS 3.7.4, Amendment 123
(Attach if not previously provided)
(including version/revision number)

Proposed references to be provided
to applicants during examination: TS 3.7.4

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

Question Source: Bank # 7024-A
Modified Bank # _____ (Note changes or attach parent)
New _____

Question History: Last NRC Exam N/A

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

10 CFR Part 55 Content: 55.41 2
55.43 _____

Comments:

2011 NRC Exam
RO Written Exam Worksheet

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

K/A Statement

Ability to monitor automatic operation of the IAS, including: Air pressure.

Proposed Question: RO 54 Rev: 0

Given the following conditions:

- Instrument Air Header pressure has lowered to 100 psig due to a leak
- SA-125, Station Air Backup is at its normal setpoint

SA-125 is _____ and SA-123, Air Dryer Bypass is _____.

A. OPEN, OPEN

B. CLOSED, OPEN

C. OPEN, CLOSED

D. CLOSED, CLOSED

Proposed Answer: C

Explanation: (Optional)

A. Incorrect. SA-125 starts to open at 105 psig SA-123 opens at 95 psig.
B. Incorrect. SA-125 starts to open at 105 psig SA-123 opens at 95 psig.
C. **CORRECT**. SA-125 starts to open at 105 psig SA-123 opens at 95 psig.
D. Incorrect. SA-125 opens at 105 psig SA-123 opens at 95 psig.

Technical Reference(s): OP-901-511, Rev. 008
(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 # X 2010 RO Audit Exam Q27
Modified Bank # (Note changes or attach parent)
New

Question History: Last NRC Exam N/A

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

10 CFR Part 55 Content: 55.41 4
55.43

Comments:

2011 NRC Exam
RO Written Exam Worksheet

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #	2	
	Group #	1	
	K/A #	103 K3.03	
	Importance Rating	3.7	

K/A Statement

Knowledge of the effect that a loss or malfunction of the containment system will have on the following: Loss of containment integrity under refueling operations.

Proposed Question: RO 55 Rev: 0

Given:

- The plant is in Mode 6
- Core alterations are in progress
- The Reactor Auxiliary Building watch reports that train A Main Steam Line Bellows has been removed from the containment penetration for replacement
- Control room staff verified that the Bellows work is not being tracked by a containment impairment

Containment integrity is __(1)__. The crew should __(2)__.

	(1)	(2)
A.	met	immediately suspend core alterations
B.	met	isolate the affected penetration within 4 hours or suspend core alterations
C.	not met	isolate the affected penetration within 4 hours or suspend core alterations
D.	not met	immediately suspend core alterations

Proposed Answer: D

Explanation: (Optional)

A. Incorrect. Containment integrity not met flow path from containment through MS line A bellows opening.
B. Incorrect. Containment integrity not met flow path from containment through MS line A bellows opening and 72 hour action for containment integrity is in TS 3.6.3. not applicable in mode 6
C. Incorrect. Containment integrity not met flow path from containment through MS line A bellows opening, however 4 hour limitation is in TS 3.6.3 action e, not applicable in mode 6.
D. **CORRECT** Containment integrity not met flow path from containment through MS line A bellows opening, TS 3.9.4 for refueling containment integrity required core alterations be immediately suspended.

Technical Reference(s): T.S 3.6.3, Amendment 217
(Attach if not previously provided) T.S 3.9.4, Amendment 169
(including version/revision number)

Proposed references to be provided
to applicants during examination: None

Learning Objective: WLP-OPS-CB0 Objective 6 (As available)

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

Question History: Last NRC Exam

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

10 CFR Part 55 Content: 55.41 9
55.43

Comments:

2011 NRC Exam
RO Written Exam Worksheet

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #	2	
	Group #	2	
	K/A #	001 K1.01	
	Importance Rating	3.0*	

K/A Statement

Knowledge of the physical connections and/or cause effect relationships between the CRDS and the following systems: CCW.

Proposed Question: RO 56 Rev: 0

Given

- Reactor Coolant System temperature is 275°F
- 3 Reactor Coolant Pump are running
- Reactor Coolant System heat up rate is 25°F/HR
- Control Element Drive Cooling (CDC) is secured

When must the Control Element Drive Cooling Fans be started and when will Component Cooling Water flow be established to the Control Element Drive cooling system?

A. Prior to entering Mode 3, flow will be established to **all** coolers when the first Control Element Drive Cooling fan is started

B. Prior to entering Mode 3, Component Cooling Water flow will be supplied to **each** cooler when the Control Element Drive Cooling fan is started

C. Prior to going above 300°F RCS temperature, flow will be established to **all** coolers when the first Control Element Drive Cooling fan is started

D. Prior to going above 300°F RCS temperature, Component Cooling Water flow will be supplied to **each** cooler when their respective Control Element Drive Cooling fan is started

Proposed Answer: C

Explanation: (Optional)

A. Incorrect: Mode 3 is 350°F and cooling required above 300 °F.
B. Incorrect: Mode 3 is 350°F and cooling required above 300 °F. Component Cooling Water flow is established to all coolers when the first fan is started.
C. **CORRECT** Fans must be started prior to 300 °F Reactor Coolant System temperature and Component Cooling Water flow is established to all coolers when the first fan is started.
D. Incorrect: Component Cooling Water flow is established to all coolers when the first fan is started.

Technical Reference(s): SD-CC page 39 and Fig 13, rev 12
(Attach if not previously provided) OP-004-004 Prerequisites, rev 16
(including version/revision number)

Proposed references to be provided
to applicants during examination: None

Learning Objective: WLP-OPS-CED00 Objective 2 (As available)

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

Question History: Last NRC Exam NA

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

10 CFR Part 55 Content: 55.41 4
55.43

Comments:

2011 NRC Exam
RO Written Exam Worksheet

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #	2	
	Group #	2	
	K/A #	002 K4.03	
	Importance Rating	2.9	

K/A Statement

Knowledge of RCS design feature(s) and/or interlock(s) which provide for the following: Venting the RCS.

Proposed Question: RO 57 Rev: 0

Given

- A small break loss of coolant accident is in progress
- A Safety Injection Actuation Signal (SIAS) has occurred
- Voids in the Reactor Coolant System (RCS) are indicated
- The CRS directs the NPO to vent non-condensable gases from the Reactor Vessel Head

The Reactor Vessel Head Vent valves _____(1)_____. The Reactor Vessel Head is vented to the ____(2)____.

	(1)	(2)
A.	can not be opened until SIAS is reset	Quench Tank
B.	must be energized from CP-8 and the valves can then be opened	Quench Tank
C.	can not be opened until SIAS is reset	Reactor Drain Tank
D.	must be energized from CP-8 and the valves can then be opened	Reactor Drain Tank

Proposed Answer: B

Explanation: (Optional)

A. Incorrect: The system has parallel vent paths with isolation valves powered form redundant safety related 120VAC power supplies. The power is removed from the fail closed valves by utilizing key locked control switches located on CP-8
B. **CORRECT**. The system has parallel vent paths with isolation valves powered form redundant safety related 120VAC power supplies. The power is removed from the fail closed valves by utilizing key locked control switches located on CP-8 Vents go to the Quench Tank.
C. Incorrect. Vents to the quench tank and power is removed from valves
D. Incorrect. Vents to the quench tank

Technical Reference(s): SD-RCS, rev 14
(Attach if not previously provided) OP-902-009 Appendix 11, rev 301
(including version/revision number)

Proposed references to be provided
to applicants during examination: None

Learning Objective: WLP-OPS-RCS00 Objective 4 (As available)

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

Question History: Last NRC Exam NA

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

10 CFR Part 55 Content: 55.41 3
55.43

Comments:

2011 NRC Exam
RO Written Exam Worksheet

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #	2	
	Group #	2	
	K/A #	015 K2.01	
	Importance Rating	3.3	

K/A Statement

Knowledge of bus power supplies to the following: NIS channels, components, and interconnections.

Proposed Question: RO 58 Rev: 0

Given

- Plant is at 100% power steady state conditions
- Static Uninterruptable Power Supply SMA fails

Core Protection Calculator A and ____(1)____ deenergize. TCB 1, 2, 5, and 6 Open and the reactor ___(2)___.

	(1)	(2)
A.	Linear Channel A	trips
B.	Control Channel #1	does not trip
C.	Linear Channel A	does not trip
D.	Control Channel #1	trips

Proposed Answer: C

Explanation: (Optional)

A. Incorrect Linear channel A is powered from SMA and is deenergized. Reactor does not trip power to CEDMC is supplied through Trip Breakers 3, 4, 7, and 8
B. Incorrect Control Channel 1 is powered from PDP AB1 and remains energized. Reactor does not trip power to CEDMC is supplied through Trip Breakers 3, 4, 7, and 8.
C. **Correct** Linear Channel A is powered from SMA and deenergizes. Reactor does not trip power to CEDMC is supplied through Trip Breakers 3, 4, 7, and 8
D. Incorrect I Control Channel 1 is powered from PDP AB1 and remains energized. Reactor does not trip power to CEDMC is supplied through Trip Breakers 3, 4, 7, and 8

Technical Reference(s): OP-901-312 section B2, rev 302
(Attach if not previously provided) SD-NI Table 3 power supplies, rev 5
(including version/revision number)

Proposed references to be provided
to applicants during examination: None

Learning Objective: WLP-OPS-ENI00 Objective 9 (As available)

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

Question History: Last NRC Exam

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

10 CFR Part 55 Content: 55.41 6
55.43

Comments:

2011 NRC Exam
RO Written Exam Worksheet

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

K/A Statement

Knowledge of the operational implications of the following concepts as they apply to the ITM system: Temperature at which cladding and fuel melt.

Proposed Question: RO 59 Rev: 0

Given the following conditions

- A Loss Of Coolant Accident has occurred

Which of the following describes the temperature when Zr-Water reaction becomes self sustaining?

A. 1700°F

B. 2200°F

C. 2750°F

D. 3350°F

Proposed Answer: B

Explanation: (Optional)

A. Incorrect: 1600-1800°F is the threshold for Zr-H_20 Reaction to occur
B. **CORRECT**. 2200°F Zr Water interaction becomes self sustaining 2200-1400= 800°F
C. Incorrect. 2750°F is when Reaction rate is 5 time the rate at 2200 °F which is self sustaining
D. Incorrect. 3350°F is when reaction rate about 25 time the rate seen at 2000°F

Technical Reference(s): WLP-OPS-MCD03, rev 1
(Attach if not previously provided)
(including version/revision number)

Proposed references to be provided
to applicants during examination: None

Learning Objective: WLP-OPS-MCD03 Objective 3 (As available)

Question Source: Bank # 08461
Modified Bank # _____ (Note changes or attach parent)
New _____

Question History: Last NRC Exam

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

10 CFR Part 55 Content: 55.41 5
55.43 _____

Comments:

2011 NRC Exam
RO Written Exam Worksheet

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #	2	
	Group #	2	
	K/A #	028 A4.03	
	Importance Rating	3.1	

K/A Statement

Ability to manually operate and/or monitor in the control room: Location and operation of hydrogen sampling and analysis of containment atmosphere, including alarms and indications.

Proposed Question: RO 60 Rev: 0

The containment atmosphere Hydrogen Analyzer takes a suction from ___(1)___ and provides indication of Hydrogen concentration on CP-___(2)___

	(1)	(2)
A.	Below the Missile Shield	33
B.	Lower Reactor Cavity	8
C.	Below the Missile Shield	8
D.	Lower Reactor Cavity	33

Proposed Answer: A

Explanation: (Optional)

A. **Correct** the hydrogen analyzer samples the area under the missile shield and indication is provided on CP-33 in the control room
B. Incorrect the hydrogen analyzer does not sample the lower reactor cavity in containment and indication is provided on CP-33
C. Incorrect indication for hydrogen concentration is provide on CP-33
D. Incorrect hydrogen analyzer does not sample the lower reactor cavity

Technical Reference(s): SD-HRA Figure 6, rev 1
(Attach if not previously provided) SD-HRA pages 12-13, rev 6
(including version/revision number)

Proposed references to be provided to applicants during examination: None

Learning Objective: WLP-OPS-HRA00 Obj 2 (As available)

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

Question History: Last NRC Exam

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

10 CFR Part 55 Content: 55.41 8
55.43

Comments:

2011 NRC Exam
RO Written Exam Worksheet

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #	2	
	Group #	2	
	K/A #	033 K3.03	
	Importance Rating	3.0	

K/A Statement

Knowledge of the effect that a loss or malfunction of the Spent Fuel Pool Cooling System will have on the following: Spent fuel temperature.

Proposed Question: RO 61 Rev: 0

Given

- Plant is in Mode 1
- CCW Surge Tank Level Switch CC-ILS-7013A fails low
- Both Train A and Train B CC-620 Fuel Pool Heat Exchanger Temperature Control valve switches are in the CONTROL position

Based on the given condition CC-620 Fuel Pool HX Temperature control valve goes fully ___(1)___, which will cause spent fuel pool temperature to ___(2)___.

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

Proposed Answer: B

Explanation: (Optional)

A. Incorrect: CC-620 Fuel Pool HX Temperature control valve goes closed on low CCW surge tank level on either side, which will cause Spent fuel pool temperature to rise.
B. **Correct** . CC-620 Fuel Pool HX Temperature control valve goes closed on low CCW surge tank level on either side, which will cause Spent fuel pool temperature to rise
C. Incorrect. CC-620 Fuel Pool HX Temperature control valve goes closed on low CCW surge tank level on either side, which will cause Spent fuel pool temperature to rise
D. Incorrect. Fuel Pool Temperature Control valve going closed will cause temperature to rise

Technical Reference(s): OP-901-510, rev 4
(Attach if not previously provided) SD-FS, rev 7
(including version/revision number)

Proposed references to be provided
to applicants during examination: None

Learning Objective: WLP-OPS-FS00 Objective 3 (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
Comprehension or Analysis X

10 CFR Part 55 Content: 55.41 7
55.43

Comments:

2011 NRC Exam
RO Written Exam Worksheet

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #	2	
	Group #	2	
	K/A #	035 G2.4.49	
	Importance Rating	4.6	

K/A Statement

Emergency Procedures/Plan: Ability to perform without reference to procedures those actions that require immediate operation of system components and controls. (Steam Generator)

Proposed Question: RO 62 Rev: 0

Given

- The Reactor tripped from 100% power
- OP-902-000, Standard Post Trip Actions, has been entered and is being performed
- Reactor Coolant System (RCS) pressure is 2115 PSIA and rising
- One Control Element Assembly is stuck out
- Reactor power is 10^{-4}% and lowering
- Steam Generator 1 level is 25% NR and lowering
- Steam Generator 2 level is 29% NR and lowering
- Pressurizer level is 28% and rising
- 3 Charging pumps are operating
- Steam Generator 1 and 2 pressures are 950 PSIA
- All ESFAS systems are in standby

Based on the given conditions the Reactor Operator should _____.

A. commence emergency boration

B. secure Charging pump AB

C. take manual control of RCS pressure and control between 2125 to 2275 PSIA

D. manually initiate Emergency Feedwater Actuation Signal for Steam Generator 1

Proposed Answer: D

Explanation: (Optional)

A. Incorrect: Emergency Boration required for 2 or more CEA stuck out
B. Incorrect. Pressurizer level control is responding properly SIAS has not occurred therefore 3 charging pumps should be running
C. Incorrect. Pressurizer level is trending to 2125to 2275 no action required
D. **CORRECT**. Initiate EFW #1 SG level is below 27.4%

Technical Reference(s): OP-902-000, rev 10
(Attach if not previously provided)
(including version/revision number)

Proposed references to be provided to applicants during examination: None

Learning Objective: WLP-OPS-EP Objective 9 (As available)

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

Question History: Last NRC Exam NA

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

10 CFR Part 55 Content: 55.41 5
55.43

Comments:

2011 NRC Exam
RO Written Exam Worksheet

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

K/A Statement

Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating the SDS controls including: Steam pressure.

Proposed Question: RO 63 Rev: 0

The following plant conditions exist:

- The plant is at 25% power
- Spurious operation of the Steam Bypass Control System resulted in MS-319A, Main Steam Bypass 1A and MS-320A, Main Steam Bypass 2A opening

Based on this event Steam Generator pressure will initially ___(1)___ and then steady out at a pressure ___(2)___than the original Pressure.

	(1)	(2)
A.	lower	lower
B.	rise	higher
C.	lower	higher
D.	rise	lower

Proposed Answer: A

Explanation: (Optional)

A. **CORRECT**: approximately 20 % power rise caused by lowering Tc which will result in a lower S/G press
B. Incorrect. SG press will not rise when steam demand goes up
C. Incorrect. SG pressure will stabilize at a pressure below the original SG pressure
D. Incorrect. SG press will not rise when steam demand goes up

Technical Reference(s): WLP-OPS-TYR08, rev 3
(Attach if not previously provided)
(including version/revision number)

Proposed references to be provided
to applicants during examination: None

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

Question Source: Bank # 2009 RO 61
Modified Bank # X (Note changes or attach parent)
New

Question History: Last NRC Exam 2009

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

10 CFR Part 55 Content: 55.41 1
55.43

Comments:

2011 NRC Exam
RO Written Exam Worksheet

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #	2	
	Group #	2	
	K/A #	068 K6.10	
	Importance Rating	2.5	

K/A Statement

Knowledge of the effect of a loss or malfunction on the following will have on the Liquid Radwaste System: Radiation monitors.

Proposed Question: RO 64 Rev: 0

Given

- Plant is 100% Power
- A Waste Condensate Tank is being discharged
- A power supply on PRM-IRE-0647 Liquid Waste Management Radiation Monitor fails

As a result of this failure ___(1)___ and ___(2)___.

	(1)	(2)
A.	LWM-441, Liquid Waste to Circulating Water Shutoff Valve, closes	LWM-442, Liquid Waste to Circulating Water Control Valve, remains open
B.	LWM-441, Liquid Waste to Circulating Water Shutoff Valve, closes	LWM-442, Liquid Waste to Circulating Water Control Valve, closes
C.	LWM-441, Liquid Waste to Circulating Water Shutoff Valve, remains open	LWM-442, Liquid Waste to Circulating Water Control Valve, remains open
D.	LWM-441, Liquid Waste to Circulating Water Shutoff Valve, remains open	LWM-442, Liquid Waste to Circulating Water Control Valve, closes

Proposed Answer: B

Explanation: (Optional)

There is no control switch for LWM-442 on control panel CP-4, but there is indication for LWM-442 valve position. The operator opens LWM-441 and adjusts controller LWM-IFIC-0647 to control LWM-442. On a failure of the Rad Monitor PRM-IRE-0647, both LWM-441 and LWM-442 close. A, C, and D are incorrect and B is correct since both valves close.

Technical Reference(s): OP-007-004 Att. 11.4 page 1, rev 302
(Attach if not previously provided) OP-901-412, rev 1
(including version/revision number)

Proposed references to be provided
to applicants during examination: None

Learning Objective: WLP-OPS-LWM00 Objective 10 (As available)

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

Question History: Last NRC Exam NA

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

10 CFR Part 55 Content: 55.41 11
55.43

Comments:

2011 NRC Exam
RO Written Exam Worksheet

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #	2	
	Group #	2	
	K/A #	086 A2.04	
	Importance Rating	3.3	

K/A Statement

Ability to (a) predict the impacts of the following malfunctions or operations on the Fire Protection System; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: Failure to actuate the FPS when required, resulting in fire damage.

Proposed Question: RO 65 Rev: 0

Given

- Fire alarms are received for the +35 Cable Vault area.
- The Fire Brigade leader has reported that the automatic deluge actuation has failed and the fire is not under control.
- The Control Room Supervisor has entered OP-901-502, Evacuation of Control Room and Subsequent Plant Shutdown.
- The Control Room Supervisor has directed the immediate actions be completed and the Control Room evacuated.

Based on the given conditions the AT-THE-CONTROLS Operator will (1) and (2) .

	(1)	(2)
A.	trip 2 Reactor Coolant Pumps	secure Charging and Letdown
B.	trip 2 Reactor Coolant Pumps	start all available Charging Pumps
C.	trip all 4 Reactor Coolant Pumps	secure Charging and Letdown
D.	trip all 4 Reactor Coolant Pumps	start all available Charging Pumps

Proposed Answer: C

Explanation: (Optional)

A. Incorrect. Trip 2 leave 2 RCP strategy applies to a loss of coolant accident and does not apply to these conditions.
B. Incorrect. Trip 2 leave 2 RCP strategy applies to a loss of coolant accident and does not apply to these conditions.
C. **CORRECT.** If evacuating the Control Room due to a fire, all 4 RCPs must be secured, CVC-101 and CVC-103 closed, and all Charging Pumps must be secured.
D. Incorrect. All Charging Pump control switches must be placed in OFF, not RUN.

Technical Reference(s): OP-901-502, section D, rev 19
(Attach if not previously provided)
(including version/revision number)

Proposed references to be provided
to applicants during examination: None

Learning Objective: WLP-OPS-PPN05 Objective 3 (As available)

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

Question History: Last NRC Exam

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

10 CFR Part 55 Content: 55.41 10
55.43

Comments:

2011 NRC Exam
RO Written Exam Worksheet

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #	3	
	Group #	1	
	K/A #	G2.1.4	
	Importance Rating	3.3	

K/A Statement

Conduct of Operations: Knowledge of individual licensed operator responsibilities related to shift staffing, such as medical requirements, "no-solo" operation, maintenance of active license status, 10CFR55, etc.

.

Proposed Question: RO 66 Rev: 0

Per OI-024-000, Maintaining Active SRO/RO Status, to maintain your Reactor Operator license in an "ACTIVE" status, you must stand a minimum of _____(1)_____ 12 hour shifts in a calendar quarter. ROs with a "corrective lens" restriction must also have _____(2)_____ eyewear available in the Control Room.

	(1)	(2)
A.	five	safety
B.	five	respirator
C.	seven	safety
D.	seven	respirator

Proposed Answer: B

Explanation: (Optional)

A. Incorrect. The minimum number of watches is correct per OI-024-000. While there is a requirement that Operators have safety glasses making tours in the plant, it is not a license requirement and is not called out in OI-024-000.
B. **CORRECT**: Per OI-024-000, section 5.1 an RO must stand a minimum of 5 complete 12 Hr shifts in a calendar quarter to maintain "active" status. Per Att. 6.5, personnel with "corrective lens" restrictions on their license must have respirator glasses available and located in the Control Room.
C. Incorrect. Seven watches would be the minimum required in a quarter if Waterford ROs stood 8 hr shifts, per 10CFR55. Waterford ROs stand and only take credit for 12 hr shift. While there is a requirement that Operators have safety glasses making tours in the plant, it is not a license requirement and is not called out in OI-024-000.
D. Incorrect. Seven watches would be the minimum required in a quarter if Waterford ROs stood 8 hr shifts, per 10CFR55. Waterford ROs stand and only take credit for 12 hr shift.

Technical Reference(s): OI-024-000, 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-PPA02, Obj. 2 (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 X
Comprehension or Analysis

10 CFR Part 55 Content: 55.41 10
55.43

Comments:

2011 NRC Exam
RO Written Exam Worksheet

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #	3	
	Group #	1	
	K/A #	G2.1.26	
	Importance Rating	3.4	

K/A Statement

Conduct of Operations: Knowledge of industrial safety procedures (such as rotating equipment, electrical, high temperature, high pressure, caustic, chlorine, oxygen and hydrogen).

Proposed Question: RO 67 Rev: 0

In accordance with EN-OP-102, Protection and Caution Tagging, _____ should have double valve isolation and tagging applied during removal and replacement of the component.

A. Instrument Air Compressor A Unloader Valve

B. Turbine Cooling Water pump A

C. Containment Fan Cooler C Cooling Coils

D. Hydrogen Excess Flow Control Valve

Proposed Answer: D

Explanation: (Optional)

A. Incorrect. This component does not operate in an environment considered to be a high energy system or hazardous substance per EN-OP-102. (max operating pressure of Instrument Air is ~ 120 PSIG at < 100°F)
B. Incorrect. During normal expected conditions the environment at the TCW pumps should be < 200°F and < 100 PSIG.
C. Incorrect. During normal expected conditions the environment at the CFC Cooling Coils should be < 200°F and < 100 PSIG.
D. **CORRECT**: Per EN-OP-102, H_2 is combustible and would be considered a hazardous substance which should have double isolation.

Technical Reference(s): EN-OP-102, Rev. 13
(Attach if not previously provided)
(including version/revision number)

Proposed references to be provided
to applicants during examination: None

Learning Objective: FLP-OPS-ESOMS, Obj. 3 (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
Comprehension or Analysis X

10 CFR Part 55 Content: 55.41 10
55.43

Comments:

2011 NRC Exam
RO Written Exam Worksheet

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #	3	
	Group #	1	
	K/A #	G2.1.40	
	Importance Rating	2.8	

K/A Statement

Conduct of Operations: Knowledge of refueling administrative requirements.

Proposed Question: RO 68 Rev: 0

Given:

- The plant is in MODE 6
- The Upper Guide Structure is removed
- Core offload is suspended
- Reactor Cavity Level is 44 ft MSL
- The plant has been shutdown for 200 Hours

_____(1)_____ train(s) of Shutdown Cooling must be OPERABLE and Shutdown Cooling flow must be at least _____(2)_____ GPM.

	(1)	(2)
A.	One	2000
B.	Two	2000
C.	One	3000
D.	Two	3000

Proposed Answer: C

Explanation: (Optional)

A. Incorrect. Correct number of trains. Wrong flow rate. Per TS 3.9.8.1 the reactor must be shutdown a minimum of 375 hrs to reduce flow to 2000 gpm.
B. Incorrect. Only one train is required to be operable at the level given in the stem. Wrong flow rate, see explanation A.
C. **CORRECT**: Per TS 3.9.8.1 one train shall be operable when Reactor Cavity level is > 23' above the fuel seated in the vessel. This level equates to approximately 32' MSL. The duration of reactor shutdown given is 200 hrs. Per TS 3.9.8.1, SDC flow is required to be at least 3000 GPM.
D. Incorrect. Wrong train quantity. Correct flow rate.

Technical Reference(s): TSs 3.9.8.1 and 3.9.8.2, Amendment 185
(Attach if not previously provided) OP-009-005, rev 26
(including version/revision number)

Proposed references to be provided
to applicants during examination: None

Learning Objective: WLP-OPS-REQ04, Obj. 2 (As available)

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

Question History: Last NRC Exam N/A

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

10 CFR Part 55 Content: 55.41 10
55.43

Comments:

2011 NRC Exam
RO Written Exam Worksheet

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #	3	
	Group #	2	
	K/A #	G2.2.21	
	Importance Rating	2.9	

K/A Statement

Equipment Control: Knowledge of pre- and post-maintenance operability requirements.

Proposed Question: RO 69 Rev: 0

Given

- The plant is at 100% Power
- At 0100, the BOP operator bypasses the Channel C High LPD and Low DNBR trip bistables for a scheduled 2 hour I&C surveillance on Channel C Core Protection Calculator.
- The I&C technician informs the CRS that the CPC has failed the surveillance and will require a card replacement.

Operability will be tracked by ___(1)___ when the work begins. The Shift Manager will authorize operability following retest on ___(2)___.

	(1)	(2)
A.	the work package	OP-100-010, Att. 7.1, TS/TRM Entry Guidelines
B.	OP-100-010, Att. 7.1, TS/TRM Entry Guidelines,	OP-100-010, Att. 7.2, EOS Checklist
C.	the work package	OP-100-010, Att. 7.2, EOS Checklist
D.	OP-100-010, Att. 7.1, TS/TRM Entry Guidelines,	OP-100-010, Att. 7.1, TS/TRM Entry Guidelines

Proposed Answer: B

Explanation: (Optional)

A. Incorrect the work package is not used to track operability and OP-100-010 ATT 7.2 is used for when component fails the surveillance
B. **CORRECT** IAW OP-100-010 the initial work is performed using OP-100-010 Att. 7.1 TS/TRM Entry guidelines when work components fails surveillance OP-100-010 ATT 7.2 EOS checklist is required.
C. Incorrect the work package is not used to track operability and when component fails OP-100-010 ATT 7.2 EOS Checklist is required.
D. Incorrect OP-100-010 the initial work is performed using OP-100-010 Att. 7.1 TS/TRM Entry guidelines and OP-100-010 ATT 7.2 is required when component surveillance

Technical Reference(s): OP-100-010 , 5.1 – 5.3 , rev 304
(Attach if not previously provided)
(including version/revision number)

Proposed references to be provided to applicants during examination:

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

Question Source: Bank #
Modified Bank # M 2105-B (Note changes or attach parent)
New

Question History: Last NRC Exam N/A

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

10 CFR Part 55 Content: 55.41 10
55.43

Comments:

2011 NRC Exam
RO Written Exam Worksheet

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #	3	
	Group #	2	
	K/A #	G2.2.25	
	Importance Rating	3.2	

K/A Statement

Equipment Control: Knowledge of the bases in Technical Specifications for limiting conditions for operations and safety limits.

Proposed Question: RO 70 Rev: 0

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

	(1)	(2)
A.	5080	as specified in the COLR
B.	5080	of 21 KW/Ft
C.	5022	as specified in the COLR
D.	5022	of 21 KW/Ft

Proposed Answer: B

Explanation: (Optional)

A. Incorrect. 5080°F is the fuel centerline melt temperature at 10,000 MWD/MTU for fuel with no burnable poison. The limiting Safety System setting is 21KW/FT.
B. **Correct.** 5080°F is the fuel centerline melt temperature at 10,000 MWD/MTU for fuel with no burnable poison. The limiting Safety System setting is 21KW/FT.
C. Incorrect. 5022°F (5080-58) is the fuel centerline melt temperature at 10,000 MWD/MTU for fuel with no burnable poison. The basis in this selection is incorrect.
D. Incorrect. 5022°F (5080-58) is the fuel centerline melt temperature at 10,000 MWD/MTU for fuel with no burnable poison. Per Bases 2.1.1 the LSSS is based on normal steady state operation is 21KW/FT.

Technical Reference(s): TS Bases 2.1.1 Change 64 & 12
(Attach if not previously provided)
(including version/revision number)

Proposed references to be provided
to applicants during examination: None

Learning Objective: WLP-OPS-CPC00, Obj. 8 & 9 (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 X
Comprehension or Analysis

10 CFR Part 55 Content: 55.41 2,10
55.43

Comments:

2011 NRC Exam
RO Written Exam Worksheet

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #	3	
	Group #	3	
	K/A #	G2.3.12	
	Importance Rating	3.2	

K/A Statement

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

Proposed Question: RO 71 Rev: 0

Given the following:

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

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

A. Pressurizer Cubicle below +21' elevation

B. +46' elevation at the Quench Tank

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

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

Proposed Answer: D

Explanation: (Optional)

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

Technical Reference(s): HP-001-213, Rev. 301
(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. 3 (As available)

Question Source: Bank # X 2010 NRC Q72
Modified Bank # (Note changes or attach parent)
New

Question History: Last NRC Exam 2010 NRC Exam

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

10 CFR Part 55 Content: 55.41 9, 12
55.43

Comments:

2011 NRC Exam
RO Written Exam Worksheet

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #	3	
	Group #	3	
	K/A #	G2.3.15	
	Importance Rating	2.9	

K/A Statement

Radiation Control: Knowledge of radiation monitoring systems, such as fixed radiation monitors and alarms, portable survey instruments, personnel monitoring equipment, etc.

Proposed Question: RO 72 Rev: 0

A high activity detected by the Industrial Waste Sump Radiation Monitor results in the discharge path of Industrial Waste Sump 2 pumps swapping from _____(1)_____ to _____(2)_____.

A. (1) Industrial Waste Sump 1
   (2) Waste Tanks

B. (1) Industrial Waste Sump 1
   (2) RAB Oil Sump 3

C. (1) Oil Separator Sump
   (2) Waste Tanks

D. (1) Oil Separator Sump
   (2) RAB Oil Sump 3

Proposed Answer: C

Explanation: (Optional)

A. Incorrect. The initial discharge path is incorrect. . However, Industrial Waste Sump 1 does have an interconnection with Industrial Waste Sump 2 but it is on the common discharge to the Oil Separator Sump/Waste Tanks.
B. Incorrect. The initial and final flow paths are incorrect. However, Industrial Waste Sump 1 and RAB Oil Sump 3 do have an interconnection with Industrial Waste Sump 2 on the common discharge to the Oil Separator Sump/Waste Tanks.
C. **CORRECT**. Industrial Waste Sump 2 normally discharges to the Oil Separator Sump. On a High Rad signal, the path is swapped to the Waste Tanks.
D. Incorrect. The final discharge path is incorrect. However, RAB Oil Sump 3 does have an interconnection with Industrial Waste Sump 2 on the common discharge to the Oil Separator Sump/Waste Tanks.

Technical Reference(s): OP-500-002, Rev. 22
(Attach if not previously provided) SD-SP, Rev. 13
(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 #
Modified Bank # (Note changes or attach parent)
New X

Question History: Last NRC Exam N/A

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

10 CFR Part 55 Content: 55.41 11, 13
55.43

Comments:

2011 NRC Exam
RO Written Exam Worksheet

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #	3	
	Group #	4	
	K/A #	G2.4.13	
	Importance Rating	4.0	

K/A Statement

Emergency Procedures / Plan: Knowledge of crew roles and responsibilities during EOP usage.

Proposed Question: RO 73 Rev: 0

Which of the following describes the requirement to monitor Critical Safety Functions while performing Emergency Operating Procedures?

A. Continuously

B. Every 10 minutes

C. Every 15 minutes

D. Every 25 minutes

Proposed Answer: A

Explanation: (Optional)

A. **CORRECT**. CSF monitoring is continuously required
B. Incorrect. STA does CSFSC every 30 minutes
C. Incorrect. Logical because it is close to actual time for CSFSC
D. Incorrect. Crew continuously monitors CSFs, STA will do CSFSC at least every 30 minutes

Technical Reference(s): OP-100-017, Rev. 0
(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 # X 2007 RO Retake Q75
Modified Bank # (Note changes or attach parent)
New

Question History: Last NRC Exam 2007 RO Retake Q75

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

10 CFR Part 55 Content: 55.41 10
55.43

Comments:

2011 NRC Exam
RO Written Exam Worksheet

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #	3	
	Group #	4	
	K/A #	G2.4.29	
	Importance Rating	3.1	

K/A Statement

Emergency Procedures / Plan: Knowledge of the emergency plan.

Proposed Question: RO 74 Rev: 0

When an Emergency Plan classification is upgraded from an Unusual Event to an Alert and no site evacuation is required, _____(1)_____ must be notified within _____(2)_____ minutes of the upgrade.

	(1)	(2)
A.	US Coast Guard	15
B.	Waterford 1 & 2	15
C.	US Coast Guard	60
D.	Waterford 1 & 2	60

Proposed Answer: B

Explanation: (Optional)

A. Incorrect. Per EP-002-010, the USCG is only notified in the event of an SAE or when a site evacuation is required. The notification time frame is correct for Operations Hotline facilities; however, no specific time frame for notification is called out for the USCG.
B. **CORRECT**: Per EP-002-010, Waterford 1&2 should be notified within 15 minutes of a change in E-Plan classification.
C. Incorrect. Per EP-002-010, the USCG is only notified in the event of an SAE or when a site evacuation is required. The notification time frame given is the time frame for updates of Operations Hotline facilities if conditions are unchanged.
D. Incorrect. Per EP-002-010, Waterford 1&2 should be notified within 15 minutes of a change in E-Plan classification. The notification time frame given is the time frame for updates of Operations Hotline facilities if conditions are unchanged.

Technical Reference(s): EP-002-010, 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-EP00, Obj. 9 (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 X
Comprehension or Analysis

10 CFR Part 55 Content: 55.41 10
55.43

Comments:

2011 NRC Exam
RO Written Exam Worksheet

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #	3	
	Group #	4	
	K/A #	G2.4.34	
	Importance Rating	4.2	

K/A Statement

Emergency Procedures / Plan: Knowledge of RO tasks performed outside the main control room during an emergency and the resultant operational effects.

Proposed Question: RO 75 Rev: 0

Given:

- A Control Room Evacuation is in progress due to a fire in CP-2.
- Immediate Actions of OP-901-502, Evacuation of Control Room and Subsequent Plant Shutdown, have been completed
- The BOP is currently performing Attachment 4, BOP Time Critical Actions

After completion of the attachment, only the ____(1)____ 4.16 KV Safety bus will be energized and the bus will be loaded through the _____(2)_____ sequencer.

	(1)	(2)
A.	A3	mini
B.	A3	normal
C.	B3	mini
D.	B3	normal

Proposed Answer: C

Explanation: (Optional)

A. Incorrect. Step 3 of Attachment 4 disables EDG A by disabling power to the air start solenoids; therefore, EDG A will not start when the BOP manually opens the 3A bus Tie to 2A Bus breaker, which de-energizes the A3 bus. The mini sequencer is correct but it applies to the B3 Safety bus.
B. Incorrect. Step 3 of Attachment 4 disables EDG A by disabling power to the air start solenoids; therefore, EDG A will not start when the BOP manually opens the 3A bus Tie to 2A Bus breaker, which de-energizes the A3 bus. The normal sequencer for the B train is disabled by Fire Isolation Switch, FR-2 in Aux Panel 2B which is operated by the BOP in Step 1 of Attachment 4.
C. **CORRECT**: Step 3 of Attachment 4 disables EDG A by disabling power to the air start solenoids; therefore, EDG A will not start when the BOP manually opens the 3A Bus Tie to 2A Bus breaker, which de-energizes the A3 bus. The normal sequencer for the B train is disabled by Fire Isolation Switch, FR-2 in Aux Panel 2B which is operated by the BOP in Step 1 of Attachment 4. Additionally, the 3B Bus Tie to 2B Bus breaker trips when the FR-2 switch is operated, de-energizing the B3 bus and starting EDG B. If for some reason EDG B failed to start, Step 4 of Attachment 4 provides actions to ensure EDG B is manually started.
D. Incorrect. The normal sequencer for the B is disabled by Fire Isolation Switch, FR-2 in Aux Panel 2B which is operated by the BOP in Step 1 of Attachment 4.

Technical Reference(s): OP-901-502, Rev. 019
(Attach if not previously provided) SD-480 Fig. 01, Rev. 3
(including version/revision number)

Proposed references to be provided
to applicants during examination: None

Learning Objective: WLP-OPS-PPO51, Obj. 9 (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 X
Comprehension or Analysis

10 CFR Part 55 Content: 55.41 10
55.43

Comments:

2011 NRC Exam
SRO Written Exam Worksheet

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #		1
	Group #		1
	K/A #	000025 AA2.02	
	Importance Rating		3.8

K/A Statement

Ability to determine and interpret the following as they apply to the Loss of Residual Heat Removal System: Leakage of reactor coolant from RHR into closed cooling water system or into reactor building atmosphere.

Proposed Question: SRO 1 Rev: 0

Given:

- A planned Reactor Coolant System (RCS) cooldown is in progress
- RCS pressure is 350 psia
- Shutdown Cooling (SDC) Trains A and B are in service
- Component Cooling Water (CCW) Surge Tank A and B levels are rising
- CCW Radiation Monitors AB and B are in Alert Alarm and rising
- CCW Radiation Monitor A is in High Alarm
- Pressurizer level is being maintained at setpoint by Charging and Letdown

Which of the following describes:

1) The potential source of the leak?
2) The action required per OP-901-411, High Activity in Component Cooling Water System?

	(1)	(2)
A.	Low Pressure Safety Injection Pump A seal cooler	GO TO OP-901-111, Reactor Coolant System Leak
B.	Low Pressure Safety Injection Pump B seal cooler	GO TO OP-901-111, Reactor Coolant System Leak
C.	Low Pressure Safety Injection Pump A seal cooler	Refer to Attachment 1, Auxiliary Equipment Supplied by CCW, secure affected Low Pressure Safety Injection Pump, and isolate CCW to seal cooler
D.	Low Pressure Safety Injection Pump B seal cooler	Refer to Attachment 1, Auxiliary Equipment Supplied by CCW, secure affected Low Pressure Safety Injection Pump, and isolate CCW to seal cooler

Proposed Answer: C

Explanation: (Optional)

A. Incorrect. OP-901-411 only sends the operator to OP-901-111 if the leak is suspected in the Reactor Coolant System.
B. Incorrect. While Rad Monitor indications are rising on Train B the highest reading rad monitor is in Train A based on the high alarm vice the alert alarm status in Train B. Train B rad monitor would rise due to the fact that the A and B trains of CCW are cross-connected at several points and flow mixing would occur.
C. **CORRECT**: Based on Rad Monitor indications the leak originated in Train A. OP-901-411 contains steps for securing the affected LPSI pump and isolating the leak per Attachment 1.
D. Incorrect. While Rad Monitor indications are rising on Train B the highest reading rad monitor is in Train A based on the high alarm vice the alert alarm status in Train B. OP-901-411 only sends the operator to OP-901-111 if the leak is suspected in the Reactor Coolant System.

Technical Reference(s): OP-901-411, Rev. 1
(Attach if not previously provided) SD-CC, Rev. 2
(including version/revision number)

Proposed references to be provided
to applicants during examination: None

Learning Objective: WLP-OPS-PPO40, Obj. 3 (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
Comprehension or Analysis X

10 CFR Part 55 Content: 55.41
55.43 5

Comments:

2011 NRC Exam
SRO Written Exam Worksheet

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #		1
	Group #		1
	K/A #	000038 EA2.08	
	Importance Rating		4.4

K/A Statement

Ability to determine or interpret the following as they apply to a SGTR: Viable alternatives for placing plant in safe condition when condenser is not available.

Proposed Question: SRO 2 Rev: 0

Given:

- The Plant was operating at 100% with all safety related equipment OPERABLE when a reactor trip is initiated due to a Steam Generator Tube Rupture in Steam Generator 1
- OP-902-007, Steam Generator Tube Rupture Recovery was entered
- When the Control Room Supervisor reaches the step to implement the Placekeeper a Loss of Offsite Power occurs
- Emergency Diesel Generator B trips on Overspeed

The rapid cooldown to T_{hot} of 520°F will be performed in accordance with _____(1)_____, using the Atmospheric Dump Valve(s) on ____(2)____ Steam Generator(s).

	(1)	(2)
A.	OP-902-007, Steam Generator Tube Rupture Recovery	the unaffected
B.	OP-902-007, Steam Generator Tube Rupture Recovery	both
C.	OP-902-008, Functional Recovery	the unaffected
D.	OP-902-008, Functional Recovery	both

Proposed Answer: B

Explanation: (Optional)

A. Incorrect. The Optimal Recovery Procedures are written to be performed with a Loss of Offsite power. The Safety Function Status Checklist would still be met as long as the equipment from one safety train is OPERABLE and operating; therefore, OP-902-007 would be the appropriate procedure to use. OP-902-007 requires use of both ADVs.
B. **CORRECT**: The Optimal Recovery Procedures are written to be performed with a Loss of Offsite power. The Safety Function Status Checklist would still be met as long as the equipment from one safety train is OPERABLE and operating; therefore, OP-902-007 would be the appropriate procedure to use. OP-902-007 requires use of both ADVs during the rapid cooldown to 520°F when the condenser is unavailable. The Loss of Offsite power causes loss of the Circulating Water Pumps and a corresponding loss of vacuum which would necessitate use of the ADVs.
C. Incorrect. The Safety Function Status checklist will remain satisfactory with one Safety Train operable; therefore, OP-902-008 would not be the correct procedure to use. OP-902-007 requires use of both ADVs.
D. Incorrect. The Safety Function Status checklist will remain satisfactory with one Safety Train operable; therefore, OP-902-008 would not be the correct procedure to use. OP-902-007 does require use of both ADVs.

Technical Reference(s): OP-902-007, Rev.012
(Attach if not previously provided)
(including version/revision number)

Proposed references to be provided
to applicants during examination: None

Learning Objective: WLP-OPS-PPE07, Obj. 8 (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
Comprehension or Analysis X

10 CFR Part 55 Content: 55.41
55.43 5

Comments:

2011 NRC Exam
SRO Written Exam Worksheet

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #		1
	Group #		1
	K/A #	000040 G2.4.6	
	Importance Rating		4.7

K/A Statement

Emergency Procedures / Plan: Knowledge of EOP mitigation strategies. (Steam Line Rupture - Excessive Heat Transfer)

Proposed Question: SRO 3 Rev: 0

The following plant conditions exist:

- The plant was operating in Mode 3
- A Main Steam line break occurs
- S/G 1 pressure is 650 PSIA and very slowly lowering
- S/G 2 pressure is 300 PSIA and lowering
- The crew is performing OP-902-004, Excess Steam Demand Recovery

Based on these conditions, the CRS should stabilize RCS Temperature by directing the BOP operator to fully open _____(1)_____ when _____(2)_____ starts to rise.

	(1)	(2)
A.	ADV 1 and feed S/G 1 with EFW in manual	CET temperatures and Pressurizer pressure
B.	ADV 1 and feed S/G 1 with EFW in manual	S/G 2 level reaches 10% WR and S/G 1 pressure
C.	ADV 2 and feed S/G 2 with EFW in manual	CET temperatures and Pressurizer pressure
D.	ADV 2 and feed S/G 2 with EFW in manual	S/G 2 level reaches 10% WR and S/G 1 pressure

Proposed Answer: A

Explanation: (Optional)

A. **CORRECT**. ADV 1 is opened fully and supplemented with EFW to stabilize RCS temperature. This is not performed until both CET temperatures and RCS pressure are rising per OP-902-004.
B. Incorrect. Describes the correct S/G, but the trigger points listed are not correct.
C. Incorrect. Action correct but performed on wrong S/G. The actions described should be performed on the least effected S/G.
D. Incorrect. Action correct but performed on wrong S/G. The actions described should be performed on the least effected S/G. Annunciator Diverse Emergency Feed Active comes in at 10% WR S/G level. Steam Generator dryout does occurs shortly after this point, but the actions for Pressurized Thermal Shock should not be taken until after CET temperature and Pressurizer pressure start to rise.

Technical Reference(s): OP-902-004, Rev. 011, OP-902-009, rev 301
(Attach if not previously provided) TGOP-902-009, rev 301
(including version/revision number)

Proposed references to be provided
to applicants during examination: None

Learning Objective: WLP-OPS-PPE04, Obj. 4 & 7 (As available)

Question Source: Bank # ____ 2010 W3 NRC SRO Q16
Modified Bank # X (Note changes or attach parent)
New ____

Question History: Last NRC Exam N/A

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

10 CFR Part 55 Content: 55.41 ____
55.43 5

Comments:

2011 NRC Exam
SRO Written Exam Worksheet

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #		1
	Group #		1
	K/A #	000054 G2.4.9	
	Importance Rating		4.2

K/A Statement

Emergency Procedures / Plan: Knowledge of low power/shutdown implications in accident (e.g., loss of coolant accident or loss of residual heat removal) mitigation strategies. (Loss of Main Feedwater)

Proposed Question: SRO 4 Rev: 0

Given:

- The plant is at the Point of Adding Heat, preparing to start the first Feedwater Pump
- Feedwater Pump A is being warmed up in accordance with, OP-003-033, Main Feedwater; the Feedwater Pump Casing to Feedwater ΔT is 100°F
- The Auxiliary Feedwater Pump trips on overcurrent and can not be restarted
- The crew manually trips the reactor and Emergency Feedwater Actuation Signal 1 and 2 occur
- Emergency Feedwater Pump AB trips on overspeed and can not be restored

The crew should GO TO _____(1)_____. To conserve Steam Generator inventory ___(2)___ Reactor Coolant Pumps should be secured.

	(1)	(2)
A.	OP-902-000, Standard Post Trip Actions and then transition to OP-902-006, Loss of Main Feedwater Recovery	Two
B.	OP-902-000, Standard Post Trip Actions and then transition to OP-902-006, Loss of Main Feedwater Recovery	All
C.	OP-902-006, Loss of Main Feedwater Recovery directly	Two
D.	OP-902-006, Loss of Main Feedwater Recovery directly	All

Proposed Answer: A

Explanation: (Optional)

A. **CORRECT**: With the plant in MODE 1 or 2 the crew would be required to implement Standard Post Trip Actions. In MODE 3 or below the Loss of Main Feedwater Recovery procedure can be entered directly. Per initial conditions the plant is in MODE 2 and therefore the crew will implement OP-902-000. The Loss of Main Feedwater Recovery procedure secures two RCPs early in the procedure to conserve Steam Generator inventory. All RCPs are only secured if no EFW pumps are available or only one motor driven EFW Pump is available for > 30 minutes.
B. Incorrect. Correct procedure implementation. Wrong RCP combination.
C. Incorrect. Wrong procedure implementation. Correct RCP combination.
D. Incorrect. Wrong procedure implementation and wrong RCP combination.

Technical Reference(s): OP-902-006, Rev. 012
(Attach if not previously provided) TGOP-902-006, Rev. 012
(including version/revision number)

Proposed references to be provided
to applicants during examination: None

Learning Objective: WLP-OP-PPE06, Obj. 4 & 9 (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
Comprehension or Analysis X

10 CFR Part 55 Content: 55.41
55.43 5

Comments:

2011 NRC Exam
SRO Written Exam Worksheet

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #		1
	Group #		1
	K/A #	000057 G2.1.32	
	Importance Rating		4.0

K/A Statement

Conduct of Operations: Ability to explain and apply system limits and precautions. (Loss of Vital AC Inst. Bus)

Proposed Question: SRO 5 Rev: 0

Given:

- The plant is in MODE 1
- All SUPS are in a normal alignment
- Battery Charger A1 is Out of Service due to a previous High Voltage Shutdown
- The normal AC input to SUPS MA trips open

These conditions require that _____(1)_____ be restored within 24 hours to prevent _____(2)_____.

	(1)	(2)
A.	BOTH the SUPS A Rectifier and Battery Charger A1	battery discharge
B.	BOTH the SUPS A Rectifier and Battery Charger A1	damage to the rectifier assembly
C.	EITHER the SUPS A Rectifier OR Battery Charger A1	battery discharge
D.	EITHER the SUPS A Rectifier OR Battery Charger A1	damage to the rectifier assembly

Proposed Answer: C

Explanation: (Optional)

A. Incorrect. Wrong action requirement. Correct bases.
B. Incorrect. Wrong action requirement. Wrong bases. The bases as stated is the reason for applying a pre-charge from the battery before closing in the normal AC input breaker.
C. **CORRECT**: Per TRM 3.8.3.1 and bases, either the rectifier or the battery charger must be restored to prevent discharge of the battery.
D. Incorrect. Correct action requirement. Wrong bases.

Technical Reference(s): TRM 3.8.3.1, Amendment 111
(Attach if not previously provided) Bases TRM 3/4.8.3, Amendment 91
(including version/revision number) OP-006-005, Rev. 303

Proposed references to be provided
to applicants during examination: TRM 3.8.3.1, Amendment 111

Learning Objective: WLP-OPS-ID00, Obj. 5 & 6 (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 X
Comprehension or Analysis

10 CFR Part 55 Content: 55.41
55.43 2

Comments:

2011 NRC Exam
SRO Written Exam Worksheet

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #		1
	Group #		1
	K/A #	000077 AA2.04	
	Importance Rating		3.6

K/A Statement

Ability to determine and interpret the following as they apply to Generator Voltage and Electric Grid Disturbances: VARs outside the capability curve.

Proposed Question: SRO 6 Rev: 0

Given:

- Generator load is currently 1230 MWe and 0 MVARs
- The Systems Operation Center (Pine Bluff) issues a Transmission Loading Relief Request to reduce load to 1000 MWe and adjust Generator Voltage/Reactive Load to lower grid voltage

The crew should enter _____(1)_____ and comply with the Transmission Loading Relief Request . The administrative limit for Reactive Load that applies when lowering voltage is _____(2)_____.

	(1)	(2)
A.	OP-901-211, Generator Malfunction	400 MVARs Out
B.	OP-901-314, Degraded Grid Conditions	400 MVARs Out
C.	OP-901-211, Generator Malfunction	75 MVARs In
D.	OP-901-314, Degraded Grid Conditions	75 MVARs In

Proposed Answer: D

Explanation: (Optional)

A. Incorrect. Wrong procedure. OP-901-314 covers the actions for complying with a Transmission Loading Relief Request. Incorrect MVAR limit. This limit would tend to raise grid voltage.
B. Incorrect. Correct procedure. Incorrect MVAR limit. This limit would tend to raise grid voltage.
C. Incorrect. OP-901-314 covers the actions for complying with a Transmission Loading Relief Request. Correct MVAR limit. This limit would tend to lower grid voltage.
D. **CORRECT**: OP-901-314 covers the actions for complying with a Transmission Loading Relief Request. The generator should be adjusted to the admin limit that will support the lowest grid voltage; therefore reactive load should be adjusted to 75 MVARS In.

Technical Reference(s): Waterford Generator Capability Curve
(Attach if not previously provided) OP-901-314, Rev. 001
(including version/revision number)

Proposed references to be provided
to applicants during examination: Waterford Generator Capability Curve

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 N/A

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

10 CFR Part 55 Content: 55.41
55.43 5

Comments:

2011 NRC Exam
SRO Written Exam Worksheet

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #		1
	Group #		2
	K/A #	000033 G2.1.20	
	Importance Rating		4.6

K/A Statement

Conduct of Operations: Ability to interpret and execute procedure steps. (Loss of Intermediate Range NI)

Proposed Question: SRO 7 Rev: 0

Given

- The plant is in MODE 3
- Reactor Power is 5 X 10-7% power
- The following operating bypasses are enabled on all channels:
  - CPC Trip Bypass
  - Reactor Coolant Flow Low Trip Bypass
  - High SG Level Trip Bypass
- The middle detector for Excore Instrument Channel A has failed low

In addition to bypassing the trip bistables for Hi Log Power, Hi Local Power, and Low DNBR on Channel A, the trip bistable(s) for _____ must also be bypassed due to the loss of the __(2)__% bistable.

	(1)	(2)
A.	SG Lo Flow	10^{-4}
B.	Hi SG-1 and 2 Level	10^{-4}
C.	SG Lo Flow	65
D.	Hi SG-1 and 2 Level	65

Proposed Answer: A

Explanation: (Optional)

A. **CORRECT**: Per OP-009-007, the Reactor Coolant Low (SG Lo Flow) trip is inoperable if the Log channel is inoperable. This is due to the inability of the Log channel to automatically enable the trip when power exceeds $1X10^{-4}$%. OP-009-007 precautions and limitations direct the Operator to comply with TS 3.3.1 which requires bypassing or tripping the channel within one hour.
B. Incorrect. Incorrect trip. These bistables are also affected by an operating bypass but it is manually disabled. Correct PPS/Log Power bistable.
C. Incorrect. Correct trip bistable. Incorrect PPS/Log Power bistable.
D. Incorrect. Incorrect trip. These bistables are also affected by an operating bypass but it is manually enabled and disabled. Incorrect PPS/Log Power bistable

Technical Reference(s): OP-009-007, Rev. 011
(Attach if not previously provided) TS 3.3.1, Amendment 94, 185, 188, 225, 228
(including version/revision number)

Proposed references to be provided
to applicants during examination: None

Learning Objective: WLP-OPS-PPS00 Obj. 8 &10 (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 X
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 #	000036 AA2.02	
	Importance Rating		4.1

K/A Statement

Ability to determine and interpret the following as they apply to the Fuel Handling Incidents: Occurrence of a fuel handling incident.

Proposed Question: SRO 8 Rev: 0

Initial conditions:

- Fuel movement was in progress
- Containment Purge was aligned for service under the Continuous Release Permit

Current conditions:

- An irradiated fuel assembly is significantly bent due to a Containment Upender malfunction
- Large bubbles are noted coming to the surface of the Reactor Cavity
- The Refueling Machine Radiation Monitor, ARM-IRE-5013 is in Hi-Hi Alarm
- All other radiation monitors servicing the Containment have risen but have not reached an alarm condition
- No RAB radiation monitors are in an alarm condition

Containment Purge _____(1)_____. After entering the appropriate offnormal procedure the CRS will initiate action to _____(2)_____.

	(1)	(2)
A.	remains in service	isolate the Control Room Envelope
B.	isolated	isolate the Control Room Envelope
C.	remains in service	complete OP-901-131, Shutdown Cooling Malfunction, Attachment 1, Containment Closure Checklist
D.	isolated	complete OP-901-131, Shutdown Cooling Malfunction, Attachment 1, Containment Closure Checklist

Proposed Answer: C

Explanation: (Optional)

A. Incorrect. Correct Containment Purge status. Wrong action. This action would not be required unless Control Room Outside Air Intake Radiation Monitors are in alarm state.
B. Incorrect. Wrong Containment Purge status. Wrong action.
C. **CORRECT**: Based on conditions given the Containment Purge Isolation Radiation Monitors have not exceeded their Hi-Hi alarm setpoint; therefore, Containment Purge should remain aligned. OP-901-405 requires implementation of OP-901-131, Attachment 1 to isolate the containment from outside atmosphere.
D. Incorrect. Wrong Containment Purge status. Correct Action.

Technical Reference(s): OP-901-405, Rev. 3
(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. 4 & 5 (As available)

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

Question History: Last NRC Exam

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

10 CFR Part 55 Content: 55.41
55.43 6

Comments:

2011 NRC Exam
SRO Written Exam Worksheet

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #		1
	Group #		2
	K/A #	000051 AA2.02	
	Importance Rating		4.1

K/A Statement

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

Proposed Question: SRO 9 Rev: 0

Given:

- The plant is at 90% and performing a power reduction from 100% due to lowering condenser vacuum

Per OP-901-220, Loss of Condenser Vacuum, the reactor will be tripped if condenser vacuum is approaching ___(1)____ Inches Hg. The crew will _____(2)_____.

	(1)	(2)
A.	14	perform OP-902-000, Standard Post Trip Actions, concurrently with OP-901-220
B.	20	perform OP-902-000, Standard Post Trip Actions, concurrently with OP-901-220
C.	14	go to OP-902-000, Standard Post Trip Actions, exit OP-901-220
D.	20	go to OP-902-000, Standard Post Trip Actions, exit OP-901-220

Proposed Answer: B

Explanation: (Optional)

A. Incorrect. 14" HG Vacuum requires taking action to protect the main condenser by isolating steam inputs to the condenser. This is done after the reactor is tripped which should occur when approaching 20" Hg Vacuum. Correct procedure implementation strategy.
B. **CORRECT**: The Main Turbine trip setpoint for lo vacuum is 20" Hg Vacuum. OP-901-220 requires tripping the reactor at this point to prevent intentionally putting the primary through a loss of load transient which would result in potentially quick opening all 6 Steam Bypass Valves and directing high energy steam into the condenser when vacuum is already challenged. In most cases, the offnormal procedures are exited or suspended while performing OP-902-000. OP-901-220 specifically states to implement the procedure concurrently with OP-902-000.
C. Incorrect. 14" HG Vacuum requires taking action to protect the main condenser by isolating steam inputs to the condenser. This is done after the reactor is tripped which should occur when approaching 20" Hg Vacuum. Incorrect procedure implementation strategy.
D. Incorrect. Correct action point. Incorrect procedure implementation strategy.

Technical Reference(s): OP-901-220, Rev.2, Change 4
(Attach if not previously provided) OP-100-015, Rev.0
(including version/revision number)

Proposed references to be provided
to applicants during examination: None

Learning Objective: WLP-OPS-PPO20, Obj. 3 (As available)
WLP-OPS-PPE01, Obj. 4

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
Comprehension or Analysis X

10 CFR Part 55 Content: 55.41
55.43 5

Comments:

2011 NRC Exam
SRO Written Exam Worksheet

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #		1
	Group #		2
	K/A #	000061 G2.2.25	
	Importance Rating		4.2

K/A Statement

Equipment Control: Knowledge of the bases in Technical Specifications for limiting conditions for operations and safety limits. (ARM System Alarms)

Proposed Question: SRO 10 Rev: 0

Given:

- The plant is in MODE 4
- A large leak on Train A Component Cooling Water (CCW) Supply Header resulted total isolation of the AB CCW Header
- Prior to isolation, all Component Cooling Water components and support systems were OPERABLE
- The ATC Operator notes that CCW AB Radiation Monitor is flashing light blue on CP-6 Radiation Monitoring CRT after the isolation

CCW AB radiation monitor should be considered _____(1)_____. The radiation monitor is _____(2)_____ for the given MODE.

	(1)	(2)
A.	INOPERABLE	**not** required to be OPERABLE
B.	INOPERABLE	required to be OPERABLE
C.	OPERABLE	**not** required to be OPERABLE
D.	OPERABLE	required to be OPERABLE

Proposed Answer: D

Explanation: (Optional)

A. Incorrect. Wrong operability call. Wrong TS applicability.
B. Incorrect. Wrong operability call. Correct TS applicability.
C. Incorrect: Correct operability call Correct TS applicability.
D. **CORRECT.** Per the Bases for TS 3.3.3.1 the CCW AB Radiation Monitor is still considered OPERABLE with no flow provided it was OPERABLE prior to isolating flow. This was stated in the initial conditions in the stem. By design, the flow through the radiation monitor is established by the hydraulic head of the monitored system when it is in operation. The bases also states that the radiation monitor is essentially in a standby condition and is capable of performing its function when flow is restored. The Rad Monitor is required in MODE 4.

Technical Reference(s): TS Bases 3/4.3.3.1, Change 27
(Attach if not previously provided)
(including version/revision number)

Proposed references to be provided
to applicants during examination: TS 3.3.3.1

Learning Objective: WLP-OPS-RMS00, Obj. 7 (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 X
Comprehension or Analysis

10 CFR Part 55 Content: 55.41
55.43 2

Comments:

2011 NRC Exam
SRO Written Exam Worksheet

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #		2
	Group #		1
	K/A #	003 A2.03	
	Importance Rating		3.1

K/A Statement

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

Proposed Question: SRO 11 Rev: 0

Given:

- Mode 1 100% Power
- RCP 1B THRUST BRNG TEMPERATURE HI annunciator is in alarm
- RCP 1B Motor Lube Oil Reservoir Cooler CCW return temperature is rising.
- RCP 1B Motor Oil Cooler Differential Temperature is 27°F and rising
- PMC and CP-2 indication for RCP 1B UPR THRST BRG TEMP indicates 228°F and rising
- CCW temperature has been lowered from 90°F to 76°F over the past 90 minutes

The CRS should:

A. Trip the reactor, secure RCP 1B, and enter OP-902-000, Standard Post Trip Actions.

B. Make the required notifications only (Duty Plant Manager and Systems Engineering).

C. Start an ACCW pump only, while continuing to cool down CCW to 70°F in the next 30 minutes.

D. Start RCP 1B Oil Lift Pump A or B only, while monitoring thrust bearing temperature.

Proposed Answer: A

Explanation: (Optional)

A. **CORRECT**: Per OP-901-130 if the bearing temperature is > 225°F and is still rising after CCW has been cooled, a reactor trip is required. Per the given conditions CCW has been cooled essentially as low as it can go without potentially causing operability problems with the safety related Essential Chillers.
B. Incorrect. The notification trigger for the Duty Plant Manager is 205°F and is not the only action that needs to be taken. Reactor trip criteria has been exceeded.
C. Incorrect. Temperature has dropped 8°F in 45 minutes the limit is 10°F in 1 hour. Additionally the given CCW temperature is 76°F and should not be cooled to < 75°F.
D. Incorrect. Starting a lift oil pump should have occurred at 205°F. The reactor trip criteria has been exceeded so starting a lift oil pump is not the only required action.

Technical Reference(s): OP-901-130, rev 7
(Attach if not previously provided)
(including version/revision number)

Proposed references to be provided
to applicants during examination: None

Learning Objective: WLP-OPS-RCP Objective 9 (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
Comprehension or Analysis X

10 CFR Part 55 Content: 55.41
55.43 5

Comments:

2011 NRC Exam
SRO Written Exam Worksheet

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #		2
	Group #		1
	K/A #	008 A2.01	
	Importance Rating		3.6

K/A Statement

Ability to (a) predict the impacts of the following malfunctions or operations on the CCWS, and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: Loss of CCW pump.

Proposed Question: SRO 12 Rev: 0

Given:

- Plant is at 100% Power
- Component Cooling Water Pump B trips
- Attempts to start AB Component cooling water pump were unsuccessful

Which of the following will be performed:

A. Split out Component Cooling Water Headers and isolate the AB header from Train A to protect Train A cooled components.

B. Split out Component Cooling Water Headers, isolate the AB header from Train B, verify selected Train B components secured.

C. Trip the reactor, secure Reactor Coolant Pumps, and enter OP-902-000, Standard Post Trip Actions.

D. Verify Containment Fan Coolers B and D are operating and Containment Average Temperature is maintained within limits.

Proposed Answer: B

Explanation: (Optional)

A. Incorrect: OP-901-510 isolates the faulted train from the AB loop.
B. **CORRECT** . OP-901-510 isolates the faulted train from the AB loop and protects components by taking control switches to Off.
C. Incorrect. This is not required because CCW flow though degraded has not been isolated to the Reactor Coolant Pumps.
D. Incorrect. OP-901-510 verifies the operating train Containment Fan Coolers are operating.

Technical Reference(s): OP-901-510, rev 4
(Attach if not previously provided)
(including version/revision number)

Proposed references to be provided
to applicants during examination: None

Learning Objective: WLP-OPS-PPO5 Objective 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
Comprehension or Analysis X

10 CFR Part 55 Content: 55.41
55.43 5

Comments:

2011 NRC Exam
SRO Written Exam Worksheet

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #		2
	Group #		1
	K/A #	010 A2.02	
	Importance Rating		3.9

K/A Statement

Ability to (a) predict the impacts of the following malfunctions or operations on the PZR PCS; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: Spray valve failures.

Proposed Question: SRO 13 Rev: 0

Given:

- The plant is at 100% power
- RC-IPR-0100, Pressurizer Pressure Channels X and Y, indicate 2225 PSIA and lowering on CP-2
- RC-IPIC-0100, Pressurizer Pressure Controller output is 0%
- Both RC-301A(B), Pressurizer Spray Valves are open

The CRS should order the ATC to take manual control of RC-IHIC-0100, Pressurizer Spray Valve Controller, adjust output to __(1)__%, and enter OP-901-120, Pressurizer Pressure Control Malfunction, Section __(2)__.

	(1)	(2)
A.	0	E-3, Pressurizer Spray Valve Malfunction
B.	0	E-1, Pressurizer Pressure Control Channel Instrument Failure
C.	100	E-3, Pressurizer Spray Valve Malfunction
D.	100	E-1, Pressurizer Pressure Control Channel Instrument Failure

Proposed Answer: A

Explanation: (Optional)

A. OP-901-120 states for a failed open spray valve adjust spray controller to 0. Spray valves are failed open at 30% output on the controller the heaters should be on and spray valves closed indicating a controller malfunction. Conditions given indicate that the spray valves should not be open and the cause is not from a failed pressure instrument since both instruments are indicating the same.
B. Correct action. Wrong procedure section; however, a high failure of the selected pressure instrument will also cause spray valve to open.
C. Wrong action. Would be correct if the controller was reverse-acting. Correct procedure implementation.
D. Wrong action. Wrong procedure implementation.

Technical Reference(s): OP-901-120, rev 301
(Attach if not previously provided)
(including version/revision number)

Proposed references to be provided
to applicants during examination: None

Learning Objective: WLP-OPS-PPO20 Objective 3 (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
Comprehension or Analysis X

10 CFR Part 55 Content: 55.41
55.43 5

Comments:

2011 NRC Exam
SRO Written Exam Worksheet

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #		2
	Group #		1
	K/A #	059 G2.1.23	
	Importance Rating		4.4

K/A Statement

Conduct of Operations: Ability to perform specific system and integrated plant procedures during all modes of plant operation. (Main Feedwater)

Proposed Question: SRO 14 Rev: 0

Given:

- The plant is at normal steady state 100% power
- Annunciator N-2, Cabinet M, SG 1 FW ISOL VLV ACCU PRES LO is received on CP-8
- The white light on the test switch is illuminated
- An NAO is dispatched to the +46 wing area and reports the following:
  - MFIV 1 Accumulator A pressure reads 4700 PSIG
  - MFIV 1 Accumulator B pressure reads 4970 PSIG

What actions are required as a result of these accumulator pressures?

A. The MFIV is inoperable due to the low accumulator pressure, enter TS 3.7.1.6.

B. Re-pressurize Accumulator A above the alarm set point within 6 hours and enter TS 3.6.3.

C. The MFIV is operable. Re-pressurize Accumulator A if desired.

D. Enter a 72 hour administrative time limit to restore Accumulator A pressure to an acceptable pressure.

Proposed Answer: C

Explanation: (Optional)

A. Incorrect: MFIV remains operable for MFW; however, it would be inoperable is AFW supplying feed water (see OP-100-014)
B. Incorrect. MFIV remain operable therefore TS 3.6.3 is not applicable
C. **CORRECT**. Per attachment 6.6 of OP-100-014 the MFIV is operable. The action required is to re-pressurize the accumulator to clear the alarm.
D. Incorrect. Administrative Action was incorporated into TS 3.7.1.6. MFIV remain operable.

Technical Reference(s): OP-100-014 ATT 6.6, rev 307
(Attach if not previously provided) OP-500-011 ATT 4.112, rev 27
(including version/revision number) TS 3.6.3, Amendment 217,
TS 3.7.1.6, Amendment 199

Proposed references to be provided
to applicants during examination: OP-100-014 Att 6.6 page 15

Learning Objective: WLP-OPS-FW00 Objective 6 (As available)

Question Source: Bank # X 2234-A
Modified Bank # _____ (Note changes or attach parent)
New _____

Question History: Last NRC Exam NA

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

10 CFR Part 55 Content: 55.41 _____
55.43 2

Comments:

2011 NRC Exam
SRO Written Exam Worksheet

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #		2
	Group #		1
	K/A #	062 G2.4.47	
	Importance Rating		4.2

K/A Statement

Emergency Procedures / Plan: Ability to diagnose and recognize trends in an accurate and timely manner utilizing the appropriate control room reference material. (AC Electrical Distribution)

Proposed Question: SRO 15 Rev: 0

Given

- Reactor tripped
- CEA 1 stuck out
- Start up rate is negative
- Pressurizer level 28% and rising
- 1A and 1B Buses are de-energized
- 2A and 2B Buses are de-energized
- A Emergency Diesel Generator tripped on over speed
- B Emergency Diesel Generator is supplying the 3B Bus
- A and B 125 VDC buses are energized

Which of the following procedures should be implemented?

A. OP-902-003, Loss Of Off Site Power/Loss Of Forced Circulation Recovery

B. OP-902-006, Loss of Main Feedwater Recovery

C. OP-902-005, Station Blackout Recovery

D. OP-902-008, Functional Recovery

Proposed Answer: A

Explanation: (Optional)

A. **CORRECT**: One 4 KV bus is energized from the Emergency Diesel Generator with its associated 125 VDC bus energized.
B. Incorrect. OP-902-006 requires at least one 7KV non safety bus and one 4 KV safety pus powered. Both 7KV buss are de energized.
C. Incorrect. OP-902-005 requires both 7KV and 4KV busses to be de-energized one 4 KV buss has remained energized with its associated 125V DC bus energized.
D. Incorrect. OP-902-008 requires both 7KV and 4KV busses and 125 VDC busses de-energized to enter

Technical Reference(s): OP-902-009 Appendix 1 Flow Chart, rev 301
(Attach if not previously provided)
(including version/revision number)

Proposed references to be provided to applicants during examination: None

Learning Objective: WLP-OPS-PPE01 Objective 1 (As available)

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

Question History: Last NRC Exam

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

10 CFR Part 55 Content: 55.41
55.43 5

Comments:

2011 NRC Exam
SRO Written Exam Worksheet

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #		2
	Group #		2
	K/A #	011 A2.04	
	Importance Rating		3.7

K/A Statement

Ability to (a) predict the impacts of the following malfunctions or operations on the PZR LCS; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: Loss of one, two or three charging pumps.

Proposed Question: SRO 16 Rev: 0

Given

The reactor is operating at 50% and power ascension is in progress

- Pressurizer level is 41%
- Charging Pump A is running with Charging Pumps B and AB in standby
- Letdown flow is 40 GPM with Normal Letdown Flow Control Valve and Backpressure Regulating Valve in service
- Charging flow is 44 GPM
- The Main Turbine load is rising at 10 MW/MINUTE

The Charging Pump Header Flow Lo and Charging pump A Trip Trouble alarms were just received, Charging flow indicates 0 GPM.

- RCS Pressure is 2245 PSIA and lowering slowly
- Letdown flow control valve controller output is at 35%
- Normal letdown flow indicates 0 GPM
- Regenerative Heat Exchanger outlet temperature is 475°F

The CRS should direct entry into __(1)__ and __(2)__

	(1)	(2)
A.	OP-901-112, Charging or Letdown Malfunction	verify first backup charging pump starts at a level deviation of 3.9%
B.	OP-901-112, Charging or Letdown Malfunction	stop all Turbine load changes
C.	OP-901-110, Pressurizer Level Control Malfunction	verify first backup charging pump starts at a level deviation of 3.9%
D.	OP-901-110, Pressurizer Level Control Malfunction	stop all Turbine load changes

Proposed Answer: B

Explanation: (Optional)

A. Incorrect.. Action is incorrect. The first backup charging pump starts at 2.5%. The procedure will have the operator verify a suction path for the charging pumps and start one manually.
B. **CORRECT**: For the conditions given, a loss of Letdown and Charging has occurred due to a Charging Pump Trip. This is covered in OP-901-112. Step one in OP-901-112 general section is to stop all load changes.
C. Incorrect. Indications given are for OP-902-112. Charging or letdown Malfunction not OP-901-110, Pressurizer Level Control Malfunction. Wrong action.
D. Incorrect. Wrong procedure. The action is correct.

Technical Reference(s): OP-901-112, rev 3
(Attach if not previously provided)
(including version/revision number)

Proposed references to be provided
to applicants during examination: None

Learning Objective: WLP-OPS-CVC Objective 12 (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
Comprehension or Analysis X

10 CFR Part 55 Content: 55.41
55.43 5

Comments:

2011 NRC Exam
SRO Written Exam Worksheet

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #		2
	Group #		2
	K/A #	034 G2.1.32	
	Importance Rating		4.0

K/A Statement

Conduct of Operations: Ability to explain and apply system limits and precautions.(Fuel Handling Equipment)

Proposed Question: SRO 17 Rev: 0

Given:

- Core alterations are in progress
- Communications with control room were verified 30 minutes ago
- The audible count rate in Containment has been lost

Based on the given conditions what actions are required by the refueling SRO?

A. Verify communications with the Control Room and continue with core alterations.

B. Verify audible count rate in the Control Room and continue core alterations.

C. Suspend core alterations until Control Room indications are verified.

D. Suspend core alterations until audible count rate is established in Control Room and Containment

Proposed Answer: D

Explanation: (Optional)

A. Incorrect: Communications is required by TS 3.9.5 however can not be substituted for audible count rate in containment
B. Incorrect. Count rate must be available in the control room and containment
C. Incorrect. Suspend core alterations however count rate in containment must be verified prior to reestablishing core alterations.
D. **CORRECT.** Core alterations must be suspended until count rate is verified in containment and the control room.

Technical Reference(s): TS 3.9.2, Amendment 185
(Attach if not previously provided) TS 3.9.5, rev 0
(including version/revision number) RF-005-001, rev 305

Proposed references to be provided
to applicants during examination: None

Learning Objective: WLP-OPS-FHS Objective 6 (As available)

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

Question History: Last NRC Exam

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

10 CFR Part 55 Content: 55.41
55.43 5

Comments:

2011 NRC Exam
SRO Written Exam Worksheet

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #		2
	Group #		2
	K/A #	045 A2.15	
	Importance Rating		2.6*

K/A Statement

Ability to (a) predict the impacts of the following malfunctions or operation on the MT/G system; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: Turbine overspeed.

Proposed Question: SRO 18 Rev: 0

Given

- The plant is at 100% power
- Plant is at 450 EFPD
- All systems are aligned per OP-010-004, Power Operations
- Main Turbine trips on over speed
- ALL Steam Bypass Valves are available

The CRS should order entry into __(1)__ and __(2)__.

	(1)	(2)
A	OP-901-001, Reactor Power Cutback	break Condenser vacuum
B	OP-901-001, Reactor Power Cutback	perform OP-901-210, Turbine Trip concurrently
C	OP-902-000, Standard Post Trip Actions	break Condenser vacuum
D	OP-902-000, Standard Post Trip Actions	perform OP-901-210, Turbine Trip concurrently

Proposed Answer: B

Explanation: (Optional)

A. Incorrect. Condenser Vacuum is not broken for an overspeed condition in and of itself. It is broken for high vibration or oil system malfunction
B. **CORRECT**: Per OP-004-015 and the Plant Data Book the Reactor Power Cutback System. Therefore, OP-901-101 is the correct procedure to implement for the given conditions. OP-901-210 is required to be implemented concurrently per OP-901-101.
C. Incorrect. The reactor should not trip with Reactor Power Cutback in service. Condenser Vacuum is not broken for an overspeed condition in and of itself. It is broken for high vibration or oil system malfunction.
D. Incorrect. The reactor should not trip with Reactor Power Cutback in service.

Technical Reference(s): OP-901-101, rev 6
(Attach if not previously provided) OP-901-210, rev 3
(including version/revision number)

Proposed references to be provided to applicants during examination: OP-004-015, Att 11.1, rev 9
PDB Curve 1.7.2.1, rev 0

Learning Objective: WLP-OPS-PPO20 Objective 3
WLP-OPS-PPO10 Objective 1 (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
Comprehension or Analysis X

10 CFR Part 55 Content: 55.41
55.43 5

Comments:

2011 NRC Exam
SRO Written Exam Worksheet

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #		3
	Group #		1
	K/A #	G2.1.37	
	Importance Rating		4.6

K/A Statement

Conduct of Operations: Knowledge of procedures, guidelines, or limitations associated with reactivity management.

Proposed Question: SRO 19 Rev: 0

Given:

- The plant was performing initial power ascension following a refueling outage
- 12 hrs ago the plant commenced raising power from 50% at a steady rate of 2%/hour
- At 72% power, two Control Element Assemblies in Regulating Group 6 drop and the crew performs a manual reactor trip

If the plant performed a startup and power ascension and reached 70% power five days later, the power ascension limit in effect should be ___(1)___ to prevent fuel damage due to _____(2)_____.

	(1)	(2)
A.	3%/hour	pellet clad interaction
B.	3%/hour	radial power peaking
C.	30%/hour	pellet clad interaction
D.	30%/hour	radial power peaking

Proposed Answer: A

Explanation: (Optional)

A. **CORRECT**: Per Att 9.6, Fuel Preconditioning Guidelines, the power change limit is 3% /hr for powers that have not been sustained for at least 3 hours in the last 60 days. It also states that the 3%/hr limit applies for initial power ascension from refueling. In this case, 70% power was not sustained for 3 hrs based on the conditions given in the stem. The basis for the limits is to prevent excessive stress on the clad by the pellet due to the pellet expanding faster than the cladding due to the trapped fission product gasses. These gases attack the cladding which is already under stress. This is known as Pellet Clad Interaction and can result in cladding failure.
B. Incorrect. Correct limit. Incorrect effect. Radial power peaking can be a factor in fuel damage in the case of dropped CEAs, however in this case the crew is required to trip the reactor as an immediate operator action per OP-901-102, CEA or CEDMCS Malfunction, therefore there is no concern with radial power peaking. Additionally the time frame for the startup would allow Xenon to decay away, so power peaking would be insignificant insignificant.
C. Incorrect. Wrong limit, however 30%/hr is correct for the powers between 50% and 66%. Correct effect.
D. Incorrect. Wrong limit. Wrong effect.

Technical Reference(s): OP-010-004, Rev. 311
(Attach if not previously provided)
(including version/revision number)

Proposed references to be provided to applicants during examination: OP-010-004, Att 9.6, Fuel Preconditioning Guidelines

Learning Objective: WLP-OPS-PPN01, Obj. 3 (As available)
WLP-OPS-TYR10, Obj. 19
WLP-OPS-RVI00, Obj. 6

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
Comprehension or Analysis X

10 CFR Part 55 Content: 55.41
55.43 6

Comments:

2011 NRC Exam
SRO Written Exam Worksheet

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #		3
	Group #		1
	K/A #	G2.1.42	
	Importance Rating		3.4

K/A Statement

Conduct of Operations: Knowledge of new and spent fuel movement procedures.

Proposed Question: SRO 20 Rev: 0

Given:

- A full core offload is in progress
- The Normal Spent Fuel Pool Heat Exchanger (SFPHX) is in service

Fuel transfer to the Spent Fuel Pool (SFP) will be suspended if Spent Fuel Pool temperature exceeds _____°F. One acceptable way to lower Spent Fuel Pool temperature is to _____.

	(1)	(2)
A.	155	Align the Backup SFPHX to replace the Normal SFPHX
B.	200	Align the Backup SFPHX to replace the Normal SFPHX
C.	155	remove transferred fuel from the SFP and return it to the Refueling Cavity
D.	200	remove transferred fuel from the SFP and return it to the Refueling Cavity

Proposed Answer: C

Explanation: (Optional)

A. Incorrect. Correct temperature. The Backup SFPHX can be placed in service to supplement the Normal SFPHX but is does not as much heat removal capability of the Normal SFPHX therefore it would be inappropriate to replace the Normal HX with the Backup HX.
B. Incorrect. Wrong temperature. This temperature is used in other places such as the break point between MODE 4 and 5 and in the SDC Malfunction procedure as a limit, but it is not the number used in OP-010-006. With instrument error, the SFP could be in a boiling condition when 200°F is indicated. Wrong methodology for reducing SFP temperature.
C. **CORRECT**: OP-010-006 requires suspending movement of spent fuel into the SFP when the SFP temperature reaches 155°F. Returning spent fuel to the reactor cavity is a valid way to lower SFP temperature as listed in OP-010-006.
D. Incorrect. Wrong temperature. Correct method for reducing SFP temperature..

Technical Reference(s): OP-010-006, Rev. 311
(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. 4 & 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 X
Comprehension or Analysis

10 CFR Part 55 Content: 55.41
55.43 7

Comments:

2011 NRC Exam
SRO Written Exam Worksheet

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #		3
	Group #		2
	K/A #	G2.2.23	
	Importance Rating		4.6

K/A Statement

Equipment Control: Ability to track Technical Specification limiting conditions for operations.

Proposed Question: SRO 21 Rev: 0

Given:

- The plant is in MODE 1
- On 3/11 at 0500 the Control Room Supervisor determines that the 7 day surveillance for sampling Boric Acid Makeup Tank A was last completed on 3/1 at 0500
- Boric Acid Makeup Pump A is currently Out of Service, but is expected to return to service in 5 days

Per Technical Specification 4.0.3, provided that _____(1)_____ is approved and risk impact is managed, the surveillance must be completed by 0500 on ___(2)___ or Boric Acid Makeup Tank A must be declared inoperable.

	(1)	(2)
A.	NRC enforcement discretion	3/12
B.	a satisfactory risk evaluation	3/12
C.	NRC enforcement discretion	3/18
D.	a satisfactory risk evaluation	3/18

Proposed Answer: D

Explanation: (Optional)

A. Incorrect. Tech Spec 4.03 limits the duration to 24 hours when the frequency of the surveillance is less than 24 hours or a risk assessment is either not performed or does not support extension to the longer surveillance frequency limit. NRC enforcement discretion is not required.
B. Incorrect. Wrong date. Correct process.
C. Incorrect. Correct date. Wrong process.
D. **CORRECT**. Per TS 4.0.3 the equipment does not have to be declared inoperable until reaching the Tech Spec Surveillance interval (7 days) from the time of discovery provided a risk evaluation justifies the extension and risk is managed during the extension period. NRC enforcement discretion is not required.

Technical Reference(s): Tech Spec 4.0.3, Amendment 187
(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. 9 (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
Comprehension or Analysis X

10 CFR Part 55 Content: 55.41
55.43 2

Comments:

2011 NRC Exam
SRO Written Exam Worksheet

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

K/A Statement

Radiation Control: Ability to use radiation monitoring systems, such as fixed radiation monitors and alarms, portable survey instruments, personal monitoring equipment, etc.

Proposed Question: SRO 22 Rev: 0

The following plant conditions exist:

- RAD MONITOR SYS ACTIVITY HI-HI annunciator is in alarm
- Plant Stack PIG A and B show rising activity
- HVAC Duct PIG D shows rising activity
- HVAC Duct PIG A is in alarm
- Chemistry Tech reports HIGH airborne activity in the lab following sampling.

The CRS should carry out the actions in:

A. OP-901-401, High Airborne Activity in Control Room

B. OP-901-402, High Airborne Activity in Reactor Auxiliary Building

C. OP-901-403, High Airborne Activity in Containment

D. OP-901-404, High Airborne Activity in Fuel Handling Building

Proposed Answer: B

Explanation: (Optional)

A. Incorrect. CROAI (North & South) must be in alarm with rising activity
B. **CORRECT**. RAB HVAC D (RAB +46) and RAB HVAC A (RAB -4) are in alarm with Plant Stack activity rising.
C. Incorrect. RCB +46 and +21 monitors must be in alarm with rising activity
D. Incorrect. FHB EXH monitors must be in alarm with rising activity

Technical Reference(s): OP-901-402, Rev. 3
(Attach if not previously provided) SD-RMS Tables 4 & 5, Rev. 11
(including version/revision number)

Proposed references to be provided to applicants during examination: None

Learning Objective: WLP-OPS-RMS00 Obj 2 (As available)

Question Source: Bank # X Q24 2009 SRO Exam
Modified Bank # (Note changes or attach parent)
New

Question History: Last NRC Exam 2009 W3 SRO Exam

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

10 CFR Part 55 Content: 55.41
55.43 4

Comments:

2011 NRC Exam
SRO Written Exam Worksheet

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #		3
	Group #		3
	K/A #	G2.3.6	
	Importance Rating		3.8

K/A Statement

Radiation Control: Ability to approve release permits.

Proposed Question: SRO 23 Rev: 0

Given:

- The plant is shutdown and in MODE 5 for a forced outage
- Waste Condensate Tank A is on recirculation in preparation for discharge
- The Liquid Waste Management discharge flow rate instrumentation is out of service
- Circulating Water Waterboxes A1, B1, and C1 are out of service
- Minimum dilution flow required is 250,000 gpm and discharge flow rate limit is 50 gpm
- Circulating Water Pumps A and B are running

Which of the following must be done to discharge Waste Condensate Tank A?

A. Start either Circulating Water Pump C or D.

B. Complete independent valve lineups by two qualified persons.

C. Restore either Circulating Water Waterbox A1 or B1 to service.

D. Ensure flow rate is estimated every 4 hours during the release.

Proposed Answer: D

Explanation: (Optional)

A. Incorrect. An additional CW pump would provide additional margin to minimum dilution but it is not required to approve the release. Running 3 CW Pumps with 3 waterboxes out of service is not desirable from a condenser tube wear standpoint.
B. Incorrect. TRM 3.3.3.10 requires that independent lineups be performed by two technically qualified individuals if the LWM Radiation Monitor is out of service.
C. Incorrect. Two of the 3 waterboxes that provide flow through the discharge block that the LWM discharge line connects to, are in service. The procedure only requires one.
D. **CORRECT**: The flow instrumentation being out of service does not prevent approving a release. Per TRM 3.3.3.10 the flow must be estimated every 4 hours during the release.

Technical Reference(s): OP-007-004, Rev. 302
(Attach if not previously provided) TRM 3.3.3.10, Amendment 51
(including version/revision number)

Proposed references to be provided
to applicants during examination: None

Learning Objective: WLP-OPS-LWM00, Obj. 7 (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
Comprehension or Analysis X

10 CFR Part 55 Content: 55.41
55.43 1

Comments:

2011 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

Emergency Procedures / Plan: Knowledge of the emergency plan.

Proposed Question: SRO 24 Rev: 0

Given:

- Emergency Diesel Generator B is OOS for preventive maintenance and is expected to be restored in 2 hours
- The reactor was at 100%
- 20 minutes ago the Main Generator tripped and Offsite power was lost
- Emergency Diesel Generator A started and then tripped immediately on Generator Differential
- The reactor failed to trip automatically
- All CEAs inserted when the RPS manual trip pushbuttons were depressed

As Emergency Coordinator you should implement _____.

A. EP-001-010, Unusual Event

B. EP-001-020, Alert

C. EP-001-030, Site Area Emergency

D. EP-001-040, General Emergency

Proposed Answer: C

Explanation: (Optional)

A. Incorrect. Would be correct if classified only on the Loss of Offsite power.
B. Incorrect. Would be correct if classified on RPS failure to trip.
C. **CORRECT**: The classification is correct because a station blackout has been in progress for > 15 minutes and the duration is expected to be < 4 hours.
D. Incorrect. Would be correct if the time requirements were expected to be met for the duration of the Station Blackout.

Technical Reference(s): EP-001-001, Rev. 026
(Attach if not previously provided)
(including version/revision number)

Proposed references to be provided
to applicants during examination: EP-001-001 (all)

Learning Objective: WLP-OPS-EP02, Obj. 17 (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
Comprehension or Analysis X

10 CFR Part 55 Content: 55.41
55.43 5

Comments:

2011 NRC Exam
SRO Written Exam Worksheet

Examination Outline Cross-Reference:	Level	RO	SRO
	Tier #		3
	Group #		4
	K/A #	G2.4.44	
	Importance Rating		4.4

K/A Statement

Emergency Procedures / Plan: Knowledge of emergency plan protective action recommendations.

Proposed Question: SRO 25 Rev: 0

Given:

- A General Emergency was declared
- A release of unknown duration is in progress
- The initial Protective Action Guideline issued for a wind direction of 0° were as follows:
  - Evacuate A1, B1, C1, D1, D2
- A wind shift has occurred to 180°
- Dose downwind of 0° is now projected to be < 1000 mrem TEDE and < 5000 mrem CDE THYROID at 2 miles and 5 miles
- Projected Dose in mrem for the new wind direction is:

EAB TEDE	EAB CDE THYROID	2 MILE TEDE	2 MILE CDE THYROID	5 MILE TEDE	5 MILE CDE THYROID
3000	7500	2000	3000	1200	1500

The Protective Action Recommendation update will be to Evacuate Protective Response Areas A1, B1, C1, D1 and:

A. A2, C2

B. A2, C2, D2

C. A2, C2, A3, A4

D. A2, C2, D2, A3, A4

Proposed Answer: D

Explanation: (Optional)

A. Incorrect. This is the PAR that would be made if the candidate does not take the PAR to 10 miles as required by conditions and relaxes PARs from the initial par.
B. Incorrect. This is the PAR that would be made if the candidate does not take the PAR to 10 miles as required by conditions.
C. Incorrect. This is the PAR that would be made if the candidate relaxes PARs from the initial par.
D. **CORRECT**. Based on given conditions, the PARs should be extended out to 10 miles. Once PARs are established, they are not to be relaxed until the until the source of the threat is clearly under control.

Technical Reference(s): EP-002-052, Rev. 21
(Attach if not previously provided)
(including version/revision number)

Proposed references to be provided
to applicants during examination: EP-002-052 all

Learning Objective: WLP-OPS-EP00, Obj. 24 (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
Comprehension or Analysis X

10 CFR Part 55 Content: 55.41
55.43 4

Comments: