

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	_____	1
	Group #	_____	1
	K/A #	APE008AA2.25	
	Importance Rating	_____	3.4

Ability to determine and interpret the following as they apply to the Pressurizer Vapor Space Accident. Expected leak rate from open PORV or code safety

Proposed Question: SRO 76

Given the following:

- Unit 1 is implementing 1-EOP-02, 'Reactor Trip Recovery' following an inadvertent "A" train SIAS.
- The 1C Charging pump was out of service prior to occurrence of the event.
- The 1A Charging pump did not start on the SIAS and could not be manually started.
- BRCCO reports that for the last five (5) minutes the Quench Tank level has risen approximately 20%.
- Reactor Coolant System (RCS) pressure is 1950 psia and slowly lowering.
- Minimum subcooling is not being met.

Which ONE of the following states

- 1) The required action to take AT THIS TIME AND
- 2) The required Reactor Coolant System Leakage Technical Specification Action Statement that applies for the current conditions?

(References Provided)

- A. 1) Re-diagnose the event and enter 1-EOP-03, "LOCA"
2) Reduce the leakage rate to within limits within 4 hours or be in COLD SHUTDOWN within 30 hours
- B. 1) Enter 1-AOP-01.08, "RCS Leakage Abnormal" and perform the Safety Function Status Checks of 1-ONP-01.01, "Plant Condition 1 Steam Generator Heat Removal LTOP Not in Effect"
2) Reduce the leakage rate to within limits within 4 hours or be in COLD SHUTDOWN within 30 hours
- C. 1) Re-diagnose the event and enter 1-EOP-03, "LOCA"
2) be in COLD SHUTDOWN within 30 hours ONLY
- D. 1) Enter 1-AOP-01.08, "RCS Leakage Abnormal" and perform the Safety Function Status Checks of 1-ONP-01.01, "Plant Condition 1 Steam Generator Heat Removal LTOP Not in Effect"
2) be in COLD SHUTDOWN within 30 hours ONLY

Proposed Answer: A

Explanation (Optional): The crew correctly entered EOP-02 following an inadvertent SIAS. While in EOP-02, RCS leakage (~65 gpm) developed through a PORV/Pzr Safety. Leakage into the Quench Tank can be calculated using the conversion of 1% level rise equates to approximately 16 gallons (QT level went up 20% over 5 minutes). This yields a leak rate of approximately 65 gpm for this event. Only 1 of 3 Chg pumps is operable so the RCS leak is > Chg pp capacity (44 gpm). EOP-02 will no longer be the correct procedure to be in (EOP-02 SFSC's won't be met with minimum subcooling not met). It was not stated in the question that SIAS was blocked so using the RCS leakage 1-AOP-01.08 and performing a round of SFSC for Low Mode AOP for the current conditions would NOT be appropriate. Per Ops Policy 521 and 1-AOP-01.08, the event should be re-diagnosed then exit to the EOP-03. The candidate might think that SIAS has to be blocked in order to reset it from the inadvertent actuation but the block permissive isn't present (current RCS pressure >1700 psia).

- A. Correct. See explanation. The RCS leakage for this question is Identified leakage from either a PORV or Pzr Safety (leakage into a collecting tank). With the unit in Mode-3 (Hot Standby), additional time can't be taken for the LCO action of "be in Hot Standby within 6 hours". The action that applies is to reduce the leakage rate to within limits within 4 hours or be in Cold Shutdown within 30 hours.
- B. Incorrect. See explanation. ONLY Part of the entry conditions for entering the Low Modes are met (Mode-3) SIAS is NOT blocked. 2nd part correct.
- C. Incorrect. See explanation. Part 1 correct. Part 2 incorrect. This TS action applies (be in Cold Shutdown within 30 hours) for Pressure Boundary Leakage. It would be plausible for a candidate to interpret leakage through a code safety or PORV as pressure boundary.
- D. Incorrect. See explanation and selection "C"

Technical Reference(s): 1- AOP-01.08 General Actions, (Attach if not previously provided)
Ops Policy 521

TS 3.4.6.2 (0902723-1)

Proposed references to be provided to applicants during examination: TS 3.4.6.2

Learning Objective: 0702813-1&2, 0702822-11&12 (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: This meets SRO Only criteria (and the K/A) because the leak rate of a leaking PORV/Pzr Safety had to be determined. That is not SRO but once the leak rate is determined, EOP implementation and application of TSASs are required which satisfy (10CFR55.43 (b)) 2& 5).

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	_____	1
	Group #	_____	1
	K/A #	APE025AG2.2.40	
	Importance Rating	_____	4.7

Loss of RHR System. Ability to apply Technical Specifications for a system.

Proposed Question: SRO 77

Given the following conditions on Unit 1:

- A core RELOAD is 95% complete.
- The Refueling Cavity level is 60 ft.
- The 1A Low Pressure Safety Injection pump (LPSI) is operating and aligned to provide Shutdown Cooling (SDC) to the Reactor Coolant System (RCS).
- 1B LPSI pump is out of service for pump maintenance.
- The 1A LPSI pump has just tripped due to a motor fault.

For the given conditions, what is the required Tech Spec Action Statement that applies AND what are the associated Bases for the SDC Technical Specification (Tech Spec) Limiting Condition of Operation (LCO)?

With the Refueling Cavity level at 60 ft but NO SDC loops in operation, the core on load ___(1)___ all operations that would cause an introduction into the RCS, coolant with a boron concentration less than the Tech Spec refueling boron concentration are suspended AND all containment penetrations are CLOSED within the next four hours.

The consequences of NOT meeting the Mode 6 SDC LCO, as stated in the Tech Spec Bases, would be the loss of sufficient RCS circulation through the core to ___(2)___.

- A. 1) may continue for up to one hour provided that
2) ensure adequate mixing
- B. 1) may continue for up to one hour provided that
2) to provide decay heat removal capability AND minimize the effects of a boron dilution event
- C. 1) must be suspended and additionally,
2) ensure adequate mixing
- D. 1) must be suspended and additionally,
2) to provide decay heat removal capability AND minimize the effects of a boron dilution event

Proposed Answer: D

Explanation (optional): IAW the Unit 1 SDC Tech Spec for refueling operations, with less than ONE shutdown cooling loop in operation, suspend all operations involving an increase in reactor decay heat load (e.g. core reload) OR operations that would cause introduction into the RCS, coolant with boron concentration less than required to meet the boron concentration of Technical Specification 3.9.1(Refueling boron concentration). There are NO specific words in the Unit 1 TSAS that states a time for fuel movement suspension OR a time to restore at least one SDC to service – it just restricts the certain actions stated above from occurring and requires containment penetrations to be closed in 4 hours.

A. Incorrect. Both parts incorrect. It's plausible for the core reload to continue for up to one hour with all SDC secured for \leq one hour per 8 hr period while moving fuel in the vicinity of the Rx vessel hot legs (asterisked statement at the bottom of the LCO allows this). Also due to the Refueling Cavity being at 60 feet it provides an adequate heat sink until a SDC loop can be restored. Part 2 is plausible since the bases for the Boron Dilution LCO in the Reactivity Control TS (3.1.1.3) requires 3000 gpm of coolant flow to provide adequate mixing to prevent stratification.

B. Incorrect. Part 1 incorrect (see selection "A"). Part 2 correct (see explanation).

C. Incorrect. Part 1 correct. Part 2 incorrect (see comments section)

D. Correct. See explanation and comments section.

Technical Reference(s): TS 3.9.8.1 and associated bases (Attach if not previously provided)

Proposed references to be provided to applicants during examination: N/A

Learning Objective: 0902723-2&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 _____
Comprehension or Analysis X

10 CFR Part 55 Content: 55.41 10
55.43 2, 5

Comments: This question meets the KA AND the requirements of an SRO ONLY question because part 2 requires knowledge of the SDC TS LCO Bases in order to analyze applicable TS actions: The requirement that at least one shutdown cooling loop be in operation ensures that 1) sufficient cooling capacity is available to remove decay heat and maintain the water in the reactor pressure vessel below 140°F as required during the REFUELING MODE, and 2) sufficient coolant circulation is maintained through the reactor core to minimize the effects of a boron dilution incident and prevent boron stratification.

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	_____	1
	Group #	_____	1
	K/A #	APE026AA2.05	
	Importance Rating	_____	2.5

Loss of Component Cooling Water. Ability to determine and interpret the following as they apply to the Loss of Component Cooling Water: The normal values for CCW-header flow rate and the flow rates to the components cooled by the CCWS.

Proposed Question: SRO 78

Given that Unit 2 is in Mode 1 with the following conditions:

- The crew entered 2-AOP-14.01, "Component Cooling Water Abnormal Operations" due to a leak in the 2B CCW Heat Exchanger
- The Unit Supervisor has determined that the 2B Component Cooling Water (CCW) Heat Exchanger is to be isolated.
- AB Busses are aligned to "B" side
- The 2C CCW pump suction is aligned to the "B" CCW header and the discharge to the "A" CCW header.

Which ONE of the following describes how the 2A CCW header should be aligned to support the 2B CCW Heat Exchanger isolation?

In accordance with 2-AOP-14.01, ensure the 1C CCW pump is aligned with the Suction from the "B" train, Discharge to the "A" train AND Electrically to the __(1)__.

For the given alignment, CCW loads must be isolated to ensure the CCW Heat Exchanger design bases CCW flow limit will not exceed a MAXIMUM flow of __(2)__.

- A. 1) "B" train
2) 19,000 gpm.
- B. 1) "A" train
2) 14,600 gpm.
- C. 1) "B" train
2) 14,600 gpm.
- D. 1) "A" train
2) 19,000 gpm

Proposed Answer: C

Explanation (Optional): The candidate must recall that after all alignments are complete, the AB electrical bus will be aligned to the "B" side and the 2B CCW pump will be in pull to lock. With the non-essential header valves open, there will be supply and return flow to/from the "B" CCW header for cooling through the "A" CCW Hx via the 2C CCW pump suction aligned from the "B" train and the discharge aligned to the "A" train. IAW the Unit 2 CCW AOP, when aligning both CCW headers to 1 CCW Heat Exchanger, a NOTE prior to the evolution cautions that CCW flow on the non-faulted header must be lowered to less than 14,600 gpm to avoid damaging the internals of the CCW heat exchanger (Shell Side). 19,000 gpm is the design flow limit for ICW (Tube Side) to the CCW heat exchanger.

C. Correct. See explanation.

Technical Reference(s): 2-AOP-14.01 (Attach if not previously provided)

Proposed references to be provided to applicants during examination: N/A

Learning Objective: 0702209-3.b, 4.i, 9.a & 18.1 (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 X
Comprehension or Analysis _____

10 CFR Part 55 Content: 55.41 _____
55.43 5

Comments: This question is SRO because it requires assessing a plant condition and specific knowledge of the appropriate procedure section that provides specific guidance on how to uniquely align the system cross-tie components which will allow system operation during an abnormal operating condition. Additionally, the electrical/mechanical line up is significant for fault tolerance on loss of "A" CCW train. This satisfies (10CFR55.43 (b) 5). The KA is also met by requiring the SRO to know the max CCW flow limit is to the CCW HX.

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	_____	1
	Group #	_____	1
	K/A #	EPE055EA2.02	
	Importance Rating	_____	4.6

Station Blackout: Ability to determine or interpret the following as they apply to a Station Blackout: RCS core cooling through natural circulation cooling to S/G cooling

Proposed Question: SRO 79

Given the following:

At time 0210, a Station Blackout occurred on Unit 1.

At time 0225, the crew entered 1-EOP-10, "Station Blackout" with the following conditions:

- The Nuclear Watch Engineer (NWE) has locally throttled both Steam Generator (SG) Atmospheric Dump valves partially open.
- Reactor Coolant System (RCS) pressure is ~1925 psia and lowering slowly.
- Both SG water levels are being restored with Auxiliary Feedwater (AFW) at 200 gpm from the 2C AFW pump.
- Loop Tcold temperatures are 490°F and LOWERING RAPIDLY.
- Loop Thot temperatures are 540°F and RISING SLOWLY.
- REP CET is 542°F and RISING SLOWLY.

Complete the following statements:

To ensure that the RCS is cooled by Natural Circulation, safety related 4160Kv AC power must be connected to Unit 1 from a Unit 2 Emergency Diesel Generator by time _____ IAW the Unit 1 FSAR Station Blackout Analysis.

To maintain Natural Circulation conditions for the TEMPERATURES GIVEN ABOVE, the US should direct the NWE to locally throttle the Atmospheric Dump Valves _____.

- A. 0310; OPEN
- B. 0310; CLOSED
- C. 0610; OPEN
- D. 0610; CLOSED

Proposed Answer: B

Explanation (Optional): 15 minutes following the SBO, Natural Circulation is developing. Thot & Tcold separate but the ΔT between should be no more than 50°F per Natural Circ criteria. For the given conditions, the ΔT is at 50°F with Thot slowly rising. Since Tcold is lowering at an accelerated rate, the ADV's need to be throttled closed to reduce the cooldown rate in order to maintain loop Delta < 50°F.

A. Incorrect. See explanation.

B. Correct. See explanation. Unit 1 FSAR SBO Safety Analysis takes credit for the operator action of connecting Unit 1 to a Unit 2, 4.16 Kv safety bus powered from a Unit 2 EDG within an hour. Also credited to occur within one hour is the operator action of operating the ADV's to ensure Natural Circulation is maintained (need instrument air to operate the ADVs on Unit 1).

C. Incorrect. See explanation and selection "D".

D. Incorrect. See explanation. Unit 2 is a DC coping unit and the FSAR SBO analysis assumes a 4 hour duration until AC power has to be restored. Part 2 correct.

Technical Reference(s): Unit 1&2 FSAR, EOP-10 (Attach if not previously provided)
CEN-152 bases for EOP-10

Proposed references to be provided to applicants during examination: N/A

Learning Objective: 0702830-5&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 _____
55.43 5

Comments: This meets SRO criteria 10CFR55.43 (b)1 since the SBO safety analysis in the FSAR has time requirements as part of the facility license to ensure that RCS Core Cooling is established and maintained through Natural Circulation on Unit 1 (SBO unit). Safety Related 4.16Kv AC power is made available from Unit 2 via the SBO x-tie to start a Charging pump and operate the ADVs within one hour.

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	_____	1
	Group #	_____	1
	K/A #	056AG2.4.30	_____
	Importance Rating	_____	4.1

Loss of Offsite Power: Knowledge of events related to system operation/status that must be reported to internal organizations or external agencies, such as the State, the NRC, or the transmission system operator.

Proposed Question: SRO 80

A Loss of Offsite Power occurred with the following:

Time 0220

- Unit 1 was at 100% power and both Emergency Diesel Generators (EDGs) started
- Unit 2 is in a refueling outage, DEFUELED and (1) one EDG Generator started and the other EDG is Out of Service.

Time 0240

- On Unit 1, ONE of the running EDG's tripped on Overspeed.
- On Unit 2, the ONLY running EDG tripped on Differential Current.

For the given times, which ONE of the following identifies the Emergency Classifications that must be reported to the State Watch Office and NRC?

(References Provided)

- A. Time 0220, Alert - notifications required.
Time 0240, No change in classification - No additional notification required.
- B. Time 0220, Unusual Event - notifications required.
Time 0240, Site Area Emergency - notifications are required.
- C. Time 0220, Unusual Event - notifications required.
Time 0240, Alert - notifications required.
- D. Time 0220, Alert - notifications required.
Time 0240, Site Area Emergency - notifications are required.

Proposed Answer: C

Explanation (Optional): Time 0220 conditions for E-Plan consideration are since both EDG's started on Unit 1 (with the Unit in Hot conditions), the classification for a LOOP is Unusual event because with Unit 2 in Cold conditions - defueled, 1 EDG is allowed to be OOS without causing an Alert (one EDG away from an SBO on Unit 2). This would be plausible if Unit 2 was in Hot conditions. For time 0240, with 2 EDG's not running on Unit 2, this doesn't required classifying the event as a Site Area Emergency since the unit is defueled (SAE only applies for modes 1-4). However since only one EDG is running on Unit 1, that unit is one EDG away from an SBO so an Alert should be declared. Alert is the correct classification for the conditions on Unit 2 as well.

- A. Incorrect. See explanation. Part 2 correct.
- B. Incorrect. See explanation
- C. Correct. See explanation.
- D. Incorrect. See explanation

Technical Reference(s): EPIP-01 Classification Of Emergencies. (Attach if not previously provided)

Proposed references to be provided to applicants during examination: EPIP System Table

Learning Objective: 0902702-2&3 (As available)

Question Source: Bank # _____
Modified Bank # 4049 (Note changes or attach parent)
New _____

Question History: Last NRC Exam _____

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

10 CFR Part 55 Content: 55.41 10
55.43 5

Comments:

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	_____	1
	Group #	_____	1
	K/A #	077AG2.2.37	_____
	Importance Rating	_____	4.6

Generator Voltage and Electric Grid Disturbances: Ability to determine operability and/or availability of safety related equipment.

Proposed Question: SRO 81

Given the following conditions:

- Unit 1 is in Mode 3
- Switchyard Voltage is 231kV in support of system distribution work
- The Contingency Analysis program predicts no change in switchyard voltage
- Maintenance personnel are troubleshooting the control circuit for HVS-1B, "Containment Cooling Fan"
- Maintenance requests to stop the 1B Containment Cooling Fan and leave the control switch in AUTO and the breaker left ON while troubleshooting continues
- All other Containment Cooling Fans are in operation

In accordance with Ops Policy 503, Technical Specification Guidance, which ONE of the following describes the administrative requirement while the 1B Containment Cooling Fan is NOT running and in this configuration?

Declare:

- A. BOTH the 1B Offsite Power Circuit inoperable AND the 1B Emergency Diesel Generator inoperable.
- B. BOTH the 1A Offsite Power Circuit AND the 1A Emergency Diesel Generator inoperable.
- C. ONLY the 1A Offsite Power Circuit inoperable.
- D. ONLY the 1B Offsite Power Circuit inoperable.

Proposed Answer: C

Explanation (Optional): Ops Policy now states that with a CFC not running with switch in AUTO, declare that specific Offsite Power train inoperable ONLY when switchyard voltage is < 232 kV (in modes 1-3).

- A. Incorrect. 1B CFC is "A" train powered. This used to be an action when 2 CCW pp's were aligned electrically on the same train.
- B. Incorrect. This used to be an action when 2 CCW pp's were aligned electrically on the same train.
- C. Correct. See explanation.
- D. Incorrect. 1B CFC is "A" train powered.

Technical Reference(s): Ops Policy 503 3.6.2.1 (Attach if not previously provided)
0702210 power point

Proposed references to be provided to applicants during examination: N/A

Learning Objective: 0702210-8a & 16.c (As available)

Question Source: Bank # _____
Modified Bank # 4427 (Note changes or attach parent)
New _____

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 5

Comments:

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	_____	1
	Group #	_____	2
	K/A #	003AG2.1.7	_____
	Importance Rating	_____	4.7

Dropped Control Rod. Ability to evaluate plant performance and make operational judgments based on operating characteristics, reactor behavior, and instrument interpretation.

Proposed Question: SRO 82

Given the following:

- Unit 1 is at 100% power.
- All CEA's were at 136" when CEA 56 dropped with the rod bottom light lit on the core mimic display.
- Efforts to re-align CEA 56 have been in progress for 60 minutes, but CEA 56 has not been re-aligned to the proper height IAW 1-AOP-66.01, "Dropped or Misaligned CEA Abnormal Operations"

Which ONE of the following states:

- 1) The CEA 56 position indication on the Distributed Control System (DCS) at the beginning of the CEA recovery evolution.
 - 2) The procedure requirements of 1-AOP-66.01, "Dropped or Misaligned CEA Abnormal Operations" AT THIS TIME?
- A. 1) DCS would indicate 0"
2) Continue efforts to re-align CEA 56 while concurrently reducing power to $\leq 70\%$ IAW 1-AOP-22.01, 'Rapid Downpower'
- B 1) DCS would indicate 0"
2) Suspend efforts to re-align CEA 56 and reduce power to $\leq 70\%$ IAW 1-AOP-22.01, 'Rapid Downpower'
- C. 1) DCS would indicate 136"
2) Continue efforts to re-align CEA 56 while concurrently reducing power to $\leq 70\%$ IAW 1-AOP-22.01, 'Rapid Downpower'
- D. 1) DCS would indicate 136"
2) Suspend efforts to re-align CEA 56 and reduce power to $\leq 70\%$ IAW 1-AOP-22.01, 'Rapid Downpower'

Proposed Answer:

Explanation (Optional): B

- A. First part correct, DCS is pulse count system. To reset the position indication to 0" for this CEA on the DCS, the CEA would have to drop to the '0' inch indication and activate the dropped CEA contact (which it did for the stated conditions in the question). If CEA 56 was at any other position below the UEL, the DCS indication would remain at 136". Second part incorrect. The maximum time to re-align IAW the COLR curve is 60 minutes. IAW Attachment 1 of 1-AOP-22.01, efforts must be stopped to re-align and perform a rapid downpower to ≤70%.
- B. Correct
- C. Both parts incorrect
- D. First part incorrect, second part correct

Technical Reference(s): 1/2-AOP-66.01, T.S. 3.1.3.1 Movable Control Assemblies (Attach if not previously provided)
0702405 power point

Proposed references to be provided to applicants during examination: _____ N/A

Learning Objective: 0702405-14.b (As available)

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

Question History: Last NRC Exam HLC21 NRC Q#91 Modified Significantly

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

10 CFR Part 55 Content: 55.41 5
55.43 5

Comments: See comments on ES401-4. KA was changed.

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	_____	1
	Group #	_____	2
	K/A #	APE068AA2.09	
	Importance Rating	_____	4.3

068 Control Room Evacuation. Ability to determine and interpret the following as they apply to the Control Room Evacuation:
Saturation Margin

Proposed Question: SRO 83

Given the following:

- Unit 2 has evacuated the Control Room due to the presence of toxic fumes
- All Operator actions in the Control Room were performed prior to evacuation.
- RCO A is maintaining Hot Standby conditions at the Remote Shutdown Panel

Complete the following statements:

The Technical Specification (Tech Spec) Remote Shutdown System Instrumentation that should be used to determine subcooling margin IAW 2-ONP-100.02 "Control Room Inaccessibility" Figure 1, is Reactor Coolant System ____ (1) ____ and Pressurizer pressure.

Later on in the event, it was noted by RCO A that the Pressurizer Pressure instrument used to calculate subcooling margin had failed low. The Tech Spec Action that is applicable if ONLY ONE CHANNEL of the Remote Shutdown Panel Pressurizer Pressure instrumentation is NOT operable, is to restore the inoperable channel to operable status within __ (2) __ days.

(References Provided)

- A. 1) Thot instruments
2) 7
- B. 1) Thot instruments
2) 30
- C. 1) Tcold instruments + 50°F
2) 7
- D. 1) Tcold instruments + 50°F
2) 30

Proposed Answer: D

Explanation (Optional): For the given conditions, the unit is required to be tripped for CR evacuations (Mode 3) so the Tech Spec applies. The SRO applicant must have knowledge that there are two pressurizer pressure instruments on the Remote Shutdown Panel. Both Tcold instruments are used to determine subcooled margin but the procedure only requires use of one pressure instrument. If the applicant believes there is only ONE pressure instrument on the Remote Shutdown Panel then 7 days is plausible for a TSAS (i.e. with one instrument inoperable, the 1 below minimum action applies).

- A. Incorrect. Both parts wrong
- B. Incorrect. Part 2 correct but part 1 is wrong. There is no Tech Spec That Instrumentation of the Remote Shutdown Panel. It is plausible because That instruments TR-1112 and TR-1122 are Tech Spec Accident Monitoring Instruments on Unit 2.
- C. Incorrect. Part 1 true plausible because 7 days is the TSAS for BOTH channels of Remote Shutdown Instrumentation (Pressurizer Pressure).
- D. Correct. With the Unit in Mode 3, the TSAS for one channel of Remote Shutdown Instrumentation (Tcold) is restore in 30 days.

Technical Reference(s): TS 3.3.3.5, Table3.3-9 (Attach if not previously provided)

2-ONP-100.2 CRI

Proposed references to be provided to applicants during examination: TS 3.3.3.5 ONLY no instrumentation table

Learning Objective: 0702846-01.b, 0902723-1&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 _____
55.43 5

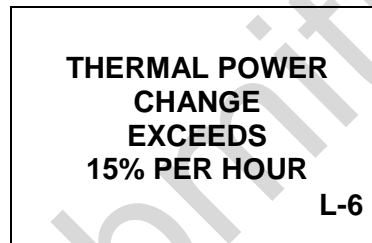
Comments: See comments on ES-401-4. KA was changed to 068AA2.09.

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	_____	1
	Group #	_____	2
	K/A #	076AG2.2.25	_____
	Importance Rating	_____	4.2

High Reactor Coolant Activity. Knowledge of the bases in Technical Specifications for limiting conditions for operations and safety limits.

Proposed Question: SRO 84

The following annunciator has just been received on Unit 1:



IAW Technical Specifications, with this annunciator in alarm, which ONE of the following states the bases for the required action?

Perform an isotopic analysis for:

- A. Iodine within 2 hrs of the receipt of annunciator L-6, due to the expected Iodine peak during the period.
- B. Iodine between 2 and 6 hrs from the receipt of annunciator L-6, due to the expected Iodine peak during the period.
- C. Xenon within 2 hrs of the receipt of annunciator L-6, due to the expected Xenon peak during the period.
- D. Xenon between 2 and 6 hrs from the receipt of annunciator L-6, due to the expected Xenon peak during the period.

Proposed Answer: B

Explanation (Optional): IAW annunciator L-6 and TS3.4.8, the sample frequency that Chemistry is required to perform is no sooner than 2 hrs but within 6 hrs after the receipt of annunciator L-6. Per the TS bases for RCS specific activity that frequency is established because the IODINE levels peak during this time following a iodine spike initiation.

A. Incorrect. The sample frequency of 2hrs is plausible because 2 hrs is part of the bases for maximum allowable doses to an individual at the exclusion area boundary distance for RCS specific activity. Part 2 is correct per Table 4.4-4

B Correct. See explanation.

C. Incorrect. Xenon is plausible because it is a required Tech Spec sample for RCS Specific Activity but it is wrong for this application.

D. Incorrect. Sample frequency is correct but the required sample should be Iodine.

Technical Reference(s): TS 3.4.8 Table 4.4-4 (Attach if not previously provided)

TS 3.4.8 bases

Proposed references to be provided to applicants during examination: N/A

Learning Objective: 0902723-2&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 5, 7
55.43 2

Comments: This question is SRO based on application of Tech Spec surveillances and knowledge of the bases for the LCO.

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	_____	1
	Group #	_____	2
	K/A #	CEA13AA2.2	_____
	Importance Rating	_____	3.8

Natural Circulation Operations. Adherence to appropriate procedures and operation within the limitations in the facility's license and amendments.

Proposed Question: SRO 85

Unit 2 is performing a Natural Circulation cooldown IAW 2-AOP-01.13, "Natural Circulation Cooldown".

At time 0220 the following conditions were noted:

- Pressurizer pressure is 1620 psia.
- SIAS has been blocked.
- Reactor Coolant System (RCS) temperature is 490°F and lowering.
- Boric Acid Makeup Tanks and Refueling Water Tank are NOT available for makeup to the RCS.
- Pressurizer level is 26% and slowly lowering, based on the Pzr Level Accuracy vs. Temperature curve and Pzr Level Cold Cal instrumentation (LI-1103).

Based on the conditions above, Unit 2 must be in Hot Shutdown within the following _____ in accordance with Technical Specifications 3.4.3, "Pressurizer."

In accordance with 2-AOP-01.13, "Natural Circulation Cooldown", the Unit Supervisor should direct RCS make up alignment FROM the Safety Injection tanks DIRECTLY to the _____.

- A. 6 hours; suction of the Charging Pumps
- B. 6 hours; Volume Control Tank
- C. 72 hours; suction of the Charging Pumps
- D. 72 hours; Volume Control Tank

Proposed Answer: B

Explanation (Optional): The correct lineup is the SIT's to the VCT then to the Charging Pumps. On Unit 2 the Pzr has an upper TS limit of 68% and a lower TS limit of 27% that applies in modes 1-4. The Unit 2 Pzr TSAS for Pzr level is 6 hrs. There is no reference to pressurizer heater status, but due to conditions giving, the heaters will be off due to potential uncover. Therefore, must determine most limiting action due to pressurizer level and heater status.

- A. Incorrect: Wrong suction source.
- B. Correct:
- C. Incorrect. 72 hours is plausible since it is a TSAS for the Pressurizer heaters which would be tripped due to current level.
- D. Incorrect. Correct suction source. See selection "C"

Technical Reference(s): T.S. 3/4.4.3 (Attach if not previously provided)
2-AOP-01.13 Natural Circulation Cooldown.

Proposed references to be provided to applicants during examination: N/A

Learning Objective: 0902723-1&2, 0702858-03, 0702206-12 (As available)

Question Source: Bank # 4047
Modified Bank # _____
New _____

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:

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	_____	2
	Group #	_____	1
	K/A #	008A2.05	_____
	Importance Rating	_____	3.5

Component Cooling Water. 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: Effect of loss of instrument and control air on the position of the CCW valves that are air operated

Proposed Question: SRO 86

Given the following:

- Unit 1 is in Mode 3
- The Reactor Coolant System is at normal operating temperature and pressure
- A FAILED SOLENOID on the air supply line to 1-HCV-14-1, "CCW to the Reactor Coolant Pump (RCPs)," has caused a loss of instrument air to 1-HCV-14-1.
- The Unit Supervisor directs the opening of 1-HCV-14-1 by installing a nitrogen jumper bypassing the failed solenoid in accordance with 1-NOP-01.02, "RCP Operation," section 5.2, "Local Restoration of CCW to RCPs,"

1) What is the impact of the loss of instrument air on RCP operation?

All RCPs (1)_____.

2) Following the system alteration, Technical Specification 3.6.3.1, "Containment Isolation Valves," 1-HCV-14-1 (2)_____.

- A. 1) must be secured due to a total loss of CCW to the RCPs.
2) is considered OPERABLE.
- B. 1) may continue to run, but CCW flow to the RCPs will be reduced.
2) is considered OPERABLE
- C. 1) may continue to run, but CCW flow to the RCPs will be reduced.
2) must be considered INOPERABLE.
- D. 1) must be secured due to a total loss of CCW to the RCPs.
2) must be considered INOPERABLE.

Proposed Answer: D

Explanation (Optional): For RCP's to operate; at least 200 gpm of CCW is required to each pump. CCW to all the RCP's is supplied from the non-essential ("N") CCW header. There are 2 N-header supply and return valves that tap off each of the "A" and "B" essential headers (4 valves total). Downstream of these valves are the four CCW to RCP supply and return Cont Isol valves (one of them is HCV-14-1). If the candidate were to confuse one of the N-header valves with the CCW to RCP supply and return Cont Isol valves, reduced CCW flow to the RCP's would be plausible because if an N-header valve failed closed due to a malfunction of the solenoid, the CCW N-header valves from the other CCW train would still be open and CCW would still be supplied to the RCP's from the non-affected CCW train. With one of the Cont. Isol valves closed (HCV-14-1, 2, 6 or 7) all CCW flow is interrupted to the RCP's.

A. Incorrect. Part 1 correct. If the solenoid failed and 1-HCV-14-1 was jumpered through the solenoid vent path, it could not change state (to vent air to the valve) to close the valve on an ESFAS signal. Therefore it would remain "failed open" and would not perform its intended function of a Cont. Isol valve. Part 2 would be plausible if the malfunction on HCV-14-1 were due to a loss of Instrument Air caused by an air line rupture. Backup nitrogen could be supplied from a jumper through the normal air supply line and operation of the solenoid for HCV-14-1 would not be affected if an ESFAS signal were to occur (i.e. the solenoid would change state to vent air to the valve), so it would remain operable for this alteration.

B. Incorrect. Part 1 incorrect, Part 2 incorrect (both parts plausible – see selection "A")

C. Incorrect. Part 1 incorrect, Part 2 correct. See selection "A"

D. Correct. See "A"

Technical Reference(s): 1-NOP-01.02, 'Reactor Coolant Pump Operation', Section 5.2

Proposed references to be provided to applicants during examination: N/A

Learning Objective: 0702209-4,17a,18 (As available)

Question Source: Bank # _____
Modified Bank # _____ modified
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 5 _____
55.43 5 _____

Comments: See comments on ES401-4. KA was changed.

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	_____	2
	Group #	_____	1
	K/A #	010G2.1.19	_____
	Importance Rating	_____	3.8

Pressurizer Pressure Control Ability to use plant computers to evaluate system or component status.

Proposed Question: SRO 87

Unit 2 was operating at 100% power. Given the following events and conditions on 8/20 at 1200:

- Proportional heater bank P1 breaker failed
- Surveillance 2-OSP-100.02 "Schedule of Periodic Tests, Checks and Calibrations Week 2" step 4.4.2.1 (Thursday) was conducted in order to verify adequate Pressurizer Heater Capacity.
- The Distributed Control System (DCS) direct reading point for Backup Heater B1 kW indicates 151 kW

Which ONE of the following statements correctly describes the required maintenance actions to allow continued operation at 100%?

- Power operations may continue with NO restrictions. Schedule maintenance to repair the proportional heater breaker during the next scheduled maintenance period.
- Schedule maintenance to repair and have the proportional heater group made operable NO later than 8/23 at 1200.
- Schedule maintenance to repair and have the backup heater group B1 made operable NO later than 8/23 at 1200.
- Schedule maintenance to repair and have the backup heater group B1 made operable NO later than 8/20 at 1800.

Proposed Answer: C

Explanation (Optional): The DCS is the main plant computer used in the control room. The acceptance criterion of 150 kW is the nominal TS requirement for Pzr Heater capacity. However since there are 5 kW of Transformer losses from the 4.16kV power supply to the Pzr LC power supply, that has to be added to the 150 kW in order to meet the TSAS surveillance. This is described in OSP-100.02 Ops Surveillances.

Since Pzr Htr bank B1 = 151 kW < 155 KW = does not meet surveillance requirement.

- A. Incorrect. with B1 < 155 KW, the plant is in a 72 hour LCO per action a
- B. Incorrect. Repairing the proportional heater bank does not restore pressurizer heater capacity per T.S. 3.4.3
- C. Correct. See explanation.
- D. Incorrect: 6 hours is plausible because the TSAS for the pressurizer being otherwise inoperable (e.g. Pzr level < 27% or > 68%) the TSAS is to be in HSB within 6 hours.

Technical Reference(s): 2-OSP-100.02 Schedule of Periodic Tests, Checks and Calibrations Week 2 (Attach if not previously provided)
T.S. 3.4.3

Proposed references to be provided to applicants during examination: N/A

Learning Objective: 0702206-14.e, 0902723-1&2 (As available)

Question Source: Bank # 4056
Modified Bank #
New

Question History: Last NRC Exam

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

10 CFR Part 55 Content: 55.41 10
55.43

Comments: This question is SRO ONLY because the applicant is required to apply the actions below the line.

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	_____	2
	Group #	_____	1
	K/A #	013G2.2.22	_____
	Importance Rating	_____	4.7

Engineered Safety Features Actuation. Knowledge of limiting conditions for operations and safety limits.

Proposed Question: SRO 88

Unit 2 is at 100% power.

LIS-07-2A, "Refueling Water Tank level instrument (RWT)", has just failed low.

Which ONE of the following identifies:

- 1) The Limiting Condition of Operation Action Time restraints for this instrumentation and
 - 2) The bases for it?
- A. 1) The RWT Level ESFAS Channel "A" may be left in bypass indefinitely but must be returned to operable status no later than the next Cold Shutdown.
2) If a safety related DC bus was lost, concurrent with a LOCA, RAS would fail to respond since there are not enough energized RAS channels available to actuate.
- B. 1) The time allowed for maintaining an inoperable RAS Channel in the tripped condition shall be limited to 48 hrs.
2) If a second RWT level channel failed, RAS actuation could occur prematurely and align ECCS pumps to an inadequate suction source during accident conditions.
- C. 1) The time allowed for maintaining an inoperable RAS Channel in the tripped condition shall be limited to 48 hrs.
2) If a safety related DC bus was lost, concurrent with a LOCA, RAS would fail to respond since there are not enough energized RAS channels available to actuate.
- D. 1) The RWT Level ESFAS Channel "A" may be left in bypass indefinitely but must be returned to operable status no later than the next Cold Shutdown
2) If a second RWT level channel failed, RAS actuation could occur prematurely and align ECCS pumps to an inadequate suction source during accident conditions.

Proposed Answer: B

Explanation (Optional):

- A. Incorrect. Part 1 incorrect but plausible because this is the action required for the ESFAS channels that are DE-ENERGIZED to actuate. Part 2 is incorrect but plausible because this is the bases for CSAS (must be placed in trip after 48 hrs), which is energize to actuate, so the candidate could apply the wrong bases.
- B. Correct. This restriction minimizes the probability of a single failure causing premature transfer of the ECCS pumps' to an inadequate suction source (containment sump might have low level) and damage the ECCS pumps.
- C. Incorrect. Part 1 correct. Part 2 incorrect.
- D. Incorrect. Part 1 incorrect. Part 2 correct.

Technical Reference(s): Tech Spec 3.3.2, Table 3.3-3 Action 19 (Attach if not previously provided)
Ops Policy 503

Proposed references to be provided to applicants during examination: N/A

Learning Objective: 0902723-1 & 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 _____
Comprehension or Analysis X

10 CFR Part 55 Content: 55.41 5
55.43 2

Comments:

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	_____	2
	Group #	_____	1
	K/A #	022A2.04	_____
	Importance Rating	_____	3.2

Containment Cooling. Ability to (a) predict the impacts of the following malfunctions or operations on the CCS; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: Loss of service water

Proposed Question: SRO 89

Given the following on Unit 2:

- The unit is at 100% power
- The 2A & 2B Component Cooling Water (CCW) Hx outlet temperatures rose from 88°F to 98°F over the last hour due to high DP conditions in CCW HX strainers and high ocean injection temperatures.
- The following annunciators have alarmed:

CNTMT FAN CLR HVS-1A/1B TEMP HIGH T-9

CNTMT FAN CLR HVS-1C/1D TEMP HIGH T-15
--

- The standby Containment Fan Cooler had been started IAW 2-NOP-25.04, "Containment Fan Cooler Operations," but has just tripped.
- 2-AOP-25.01, "Loss of RCB Cooling Fans," has been entered.
- Containment temperature is 121°F and slowly rising.

1) Which ONE of the following identifies the actions that should be directed per 2-AOP-25.01 "Loss of RCB Cooling Fans?"

Initiate a rapid downpower and in 45 minutes, trip the reactor and __ (1) __.

2) Which ONE of the following identifies the Bases for the actions?

To limit containment air temperature so that __ (2) __.

- A. 1) maintain stable HOT STANDBY conditions
 2) Containment Temperature does not exceed the design temperature of 264°F during steam line break and LOCA conditions
- B. 1) maintain stable HOT STANDBY conditions
 2) the Reactor Vessel Support Structure is maintained within its design basis of < 350°F during system operation
- C. 1) commence a cooldown to HOT SHUTDOWN
 2) Containment Temperature does not exceed the design temperature of 264°F during steam line break conditions and LOCA conditions
- D. 1) commence a cooldown to HOT SHUTDOWN
 2) the Reactor Vessel Support Structure is maintained within its design basis of < 350°F during system operation

Proposed Answer: D

Explanation (Optional): This is the bases for the TS LCO on Containment Temperature < 120 degrees.

- A. Incorrect. Both Parts wrong. See below.
- B. Incorrect. Part 1 wrong. This is plausible because the reactor is required to be tripped in 45 minutes with containment temperature > 120 degrees however, the FSAR requires the Unit to be < 350 degrees within 5 hours additionally. Part 2 correct.
- C. Incorrect. Part 1 correct. Part 2 wrong but plausible. This is the TS for Containment temperature < 120 degrees. This is plausible because this TS LCO does exist however; the more limiting condition is the overheating of the Reactor Vessel Support Structure. See explanation also.
- D. Correct.

Technical Reference(s): 2-AOP-25.01 Loss of RCB Cooling Fans (Attach if not previously provided)
TS bases for Containment Air Temp

Proposed references to be provided to applicants during examination: N/A

Learning Objective: 0702862-08 (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 5
55.43 5

Comments: This question meets the KA because with intake temp rising, clogged CCW HX strainers and T-9 & 15 in alarm with only 3 CFCs running (the 4th tripped when started) the candidate should be able to predict that containment temperature will rise and if it rises above 120 degrees, actions in AOP-25.01 are required to limit the effects of the high containment temperature.

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #		2
	Group #		1
	K/A #	039A2.03	
	Importance Rating		3.7

Main and Reheat Steam. Ability to (a) predict the impacts of the following malfunctions or operations on the MRSS; and (b) based on predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: Indications and alarms for main steam and area radiation monitors (during SGTR)

Proposed Question: SRO 90

Unit 1 is at 100% power. The crew has entered 1-AOP-08.02, "Steam Generator Tube Leak" and has been logging the following secondary radiation monitor readings every 15 minutes.

Time:	0105	0120	0135
Blowdown:	A S/G 980 cpm B S/G 120 cpm	A S/G 1090 cpm B S/G 125 cpm	A S/G 1620 cpm B S/G 125 cpm
Air Ejector:	420 cpm	720 cpm	920 cpm

Based on the above readings, which ONE of the following states when the initial entry conditions are met for:

- 1) 1-AOP-22.01, 'Rapid Downpower'
AND
 - 2) The time to be in Mode 3 IAW 1-AOP-08.02
- (References Provided)**

- A. 1) 0135
2) 0735
- B. 1) 0120
2) 0735
- C. 1) 0120
2) 0420
- D. 1) 0135
2) 0420

Proposed Answer: C

Explanation (Optional): If SGTL > 100 gpd, enter RDP and be in mode 3 in 3 hours. If SGTL > 75 gpd, Use GOP-123 and perform a controlled shutdown.

- A. Incorrect. 0135 is >150 gpd ("A" SGBD RM) which is T.S. limit for SG leakage. 1-AOP-08.02 requires @>100 gpd a RDP be performed (which occurred at 0120 on SJAE RM).
- B. Incorrect. 0120 is correct for starting RDP (Reading on SJAE RM). 0735 (6 hours) is the T.S. limit to be in Mode 3 based on "A" SGBD RM > 150 gpd. This would be correct if the question asked for the TS times for part 2.
- C. Correct. 0120 is correct for starting RDP (Reading on SJAE RM) and the question asked IAW 1-AOP-08.02 which states be in Mode 3 within 3 hours.
- D. Incorrect. 0135 is >150 gpd which is T.S. limit for SG leakage. Three hours to be in Mode 3 is correct IAW 1-AOP-08.02.

Technical Reference(s): 1-AOP-08.02, "Steam Generator Tube Leak" (Attach if not previously provided)
T.S. 3.4.6.2 RCS Leakage
Unit 1 Daily Chemistry Report

Proposed references to be provided to applicants during examination: Unit 1 Daily Chemistry Report & 1-AOP-08.02

Learning Objective: 0902723-1 & 2, 0702860-3&4 (As available)

Question Source: Bank # _____
Modified Bank # _____ See attached
New X

Question History: Last NRC Exam Q92 on HLC 20 NRC exam Modified Significantly

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

10 CFR Part 55 Content: 55.41 5
55.43 5

Comments: This question was on the HLC 20 NRC exam (Q92). The actions in the SGTL AOP are based on SJAE and SGBD monitors. Technically, the SJAE RM does sample main steam (going to the air ejector) so the KA is met. The Chemistry data sheet does not have a conversion for the Main Steam Line RM to SG leakage in gallons per day.

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	_____	2
	Group #	_____	2
	K/A #	015G2.1.7	_____
	Importance Rating	_____	4.7

Nuclear Instrumentation. Ability to evaluate plant performance and make operational judgments based on operating characteristics, reactor behavior, and instrument interpretation.

Proposed Question: SRO 91

Given the following conditions:

- Unit 2 is at 98% power – end of core life (EOC)
- Last shift completed an up power from 50% following completion of maintenance activities
- Group 5 CEAs are at 128 inches
- Tcold Avg is 550.1°F
- The BRCO reports Axial Shape Index (ASI) is +0.1 ASI units from Equilibrium Shape Index (ESI) and slowly trending positive
- Following the up power, Reactor Engineering expects divergent ASI behavior

In accordance with 0-NOP-100.02, Axial Shape Index, which ONE of the following identifies the Unit Supervisor direction to dampen the ASI oscillation?

- A. Withdraw Group 5 to drive BOTH ASI towards ESI and RCS temperature higher.
- B. Dilute the RCS to drive ASI towards ESI.
- C. Borate the RCS to drive ASI toward ESI followed by a dilution during the next half cycle of ASI oscillation to restore RCS temperature.
- D. Insert Group 5 to drive ASI towards ESI, then dilute the RCS to maintain RCS temperature.

Proposed Answer: A

Explanation (Optional): SRO Basis – Execution of the Axial Shape Index Control is managed by the SRO. As part of the prerequisites, the SRO is responsible for briefing the operating crew concerning the limits, precautions, and instructions of this procedure. All prerequisites of this procedure as signed for by the SRO. ASI control at the end of cycle is an infrequently performed reactivity management practice. Strategies for managing CEA/boron concentrations are closely observed and directed by the SRO to ensure an uncontrollable ASI oscillation is avoided.

- A. Correct – This is the correct action per 0-NOP-100.02. Also, the positive reactivity effects will result in a RCS temperature increase.
- B. Incorrect – dilution will maintain RCS temperature in the program band, but will drive flux to the bottom of the core resulting in a more positive ASI. This strategy is employed by the procedure for a negative trending ASI.
- C. Incorrect – Boration would be correct to drive ASI to ESI iaw 0-NOP-100.02, but would drive RCS temperature out of band. The xenon oscillation is approximately 26 hours peak to peak in duration. Waiting for the half cycle (13 hours) would exacerbate the RCS temperature management resulting in lower RCS temperature and would not be the correct operational strategy selected for ASI dampening.
- D. Incorrect -. Both strategies, though acceptable for RCS temperature maintenance will drive ASI more positive by pushing flux to the bottom of the core. It is plausible if the candidate has a conceptual error in analysis and understanding of reactor dynamics.

Technical Reference(s): 0-NOP-100.02 (Attach if not previously provided)

Proposed references to be provided to applicants during examination: N/A

Learning Objective: _____ (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 5
55.43 5

Comments:

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	_____	2
	Group #	_____	2
	K/A #	016G2.1.20	_____
	Importance Rating	_____	4.6

Non-nuclear Instrumentation. Ability to execute procedure steps

Proposed Question: SRO 92

Given the following information:

- Unit 1 is at 100% power
- Channel “A” Feedwater Header Pressure to “A” Steam Generator, PI-09-9A, has failed low
- The crew has entered 1-AOP-99, Loss of Tech Spec Instrumentation

Complete the following statement regarding the required actions 1-AOP-99.01 and Technical Specification 3.3.2.1 Table 3.3-3, “ESFAS Instrumentation”?

Within One (1) hour, place _____ in bypass or trip.

An AFAS channel in the TRIPPED condition is limited to _____.

- A. AFAS-1 ONLY; 48 hours
- B. AFAS-1 and AFAS-2; 48 hours
- C. AFAS-1 ONLY; the next cold shutdown
- D. AFAS-1 and AFAS-2; the next cold shutdown

Proposed Answer: B

Explanation (Optional): AFAS is considered non-nuclear instrumentation (per the KA). This is the correct application of the TSAS on AFAS rupture ID instrumentation as well as 1-AOP-99.01. The AOP does designate that BOTH AFAS 1 & 2 must be bypassed or tripped not just AFAS-1 (this would be true for SG level instrumentation failures). This matches the KA in that a note in AOP-99.01 states if the instrument is not returned to operable status within 48 hrs, ensure BOTH AFAS 1 & 2 are in BYPASS (this is also stated in the TSAS for AFAS). Operation with AFAS bypassed may continue until the next cold shutdown at which time the instrumentation must be returned to operable status.

- A. Incorrect. See explanation
- B. Correct. See explanation
- C. Incorrect. See explanation
- D. Incorrect. See explanation

Technical Reference(s): 1-AOP-99.01 (Attach if not previously provided)
Unit 1 Technical Specifications

Proposed references to be provided to applicants during examination: N/A

Learning Objective: 0902723-1 & 2, 0702412-3b, 14 (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 2, 5

Comments:

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	_____	2
	Group #	_____	2
	K/A #	072A2.03	_____
	Importance Rating	_____	2.9

Area Radiation Monitoring. Ability to (a) predict the impacts of the following malfunctions or operations on the ARM system- and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations.: Blown power-supply fuse.

Proposed Question: SRO 93

Given the following information:

- Unit 2 is at 100% power
- A team has entered the Unit 2 Containment for a valve inspection
- A blown fuse results in a loss of the power to RIS-26-3, “A Channel Containment (CIS) Radiation Monitor”
- The crew has entered 2-AOP-26.02, “Area Radiation Monitors”

Complete the following?

The containment evacuation alarm has ___(1)___ .

I&C has determined to special order a new power supply. Per the Unit 2 Technical Specifications, If RIS-26-3 is not restored to an operable status WITHIN 48 hours, ___(2)___.

- A. 1) sounded
2) maintain the bistable in either trip or bypass and restore to operability by the next Cold Shutdown
- B. 1) not sounded
2) maintain the bistable in either trip or bypass and restore to operability by the next Cold Shutdown
- C. 1) sounded
2) ensure the “A” CIS Radiation bistable is placed in trip
- D. 1) not sounded
2) ensure the “A” CIS Radiation bistable is placed in trip

Proposed Answer: A

Explanation (Optional): CIS radiation monitors are Area Radiation monitors. A blown power supply fuse for the Containment CIS rad monitors will cause that channel to go to trip and the containment evacuation alarm logic (1 out of 4) will be satisfied and an alarm will sound. Typical ESFAS bistable logic for going into trip is 2 out 4.

- A. Correct. Proper TS action for Unit 2
- B. Incorrect. The alarm will sound. Part 2 correct.
- C. Incorrect. Part 1 correct. Part 2 correct for Unit 1
- D. Incorrect. Both Parts wrong

Technical Reference(s): 2-AOP-26.02 (Attach if not previously provided)

Proposed references to be provided to applicants during examination: N/A

Learning Objective: 0702861-1 & 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 _____
Comprehension or Analysis X

10 CFR Part 55 Content: 55.41 5
55.43 5

Comments: This meets SRO criteria by requiring a TS action application for an inoperable CIS radiation monitor

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	_____	3
	Group #	_____	1
	K/A #	G2.1.37	_____
	Importance Rating	_____	4.6

Conduct of Operations. Knowledge of procedures, guidelines or limitation associated with reactivity management.

Proposed Question: SRO 94

The design bases event for Limiting Condition of Operation 3.1.1.1, "Shutdown Margin," is:

- A. Positive reactivity addition resulting from a Rod Ejection event at beginning of core life from 0% power conditions.
- B. Positive reactivity addition resulting from a Rod Ejection event at end of core life from 100% power conditions.
- C. Excessive cooldown resulting from a Main Steam Break at beginning of core life from 100% power conditions.
- D. Excessive cooldown resulting from a Main Steam Break at end of core life from 0% power conditions.

45 Day Submitted

Proposed Answer: D

Explanation (Optional): This is the plant specific Tech Spec bases for the Shutdown Margin LCO. This defines which Reactivity Transient is the MOST severe in the design analysis.

A. Incorrect. PDILs are based on Rod Ejection event.

B. Incorrect. PDILs are based on Rod Ejection event.

C. Incorrect. MTC less negative and less mass for boil-off.

D. Correct. From 0% power, there is more mass in the SG. End of cycle conditions have the most negative MTC. Therefore, this reactivity transient is the most severe.

Technical Reference(s): TS Bases 3.4.1.1.1 (Attach if not previously provided)

Proposed references to be provided to applicants during examination: N/A

Learning Objective: 0902723-2, 3 (As available)

Question Source: Bank # 4404
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 1
55.43 6

Comments:

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	_____	3
	Group #	_____	1
	K/A #	G2.1.40	_____
	Importance Rating	_____	3.9

Conduct of Operations. Knowledge of refueling administrative requirements.

Proposed Question: SRO 95

In accordance with 2-GOP-365 "Refueling Operations", to begin core alterations on Unit 2, Reactor Vessel minimum water level must be:

- 1) 23 feet above the _____.
- 2) The basis for this minimum water level is to ensure that sufficient water depth is available to remove 99% of the assumed 10% iodine gas activity released from the rupture of _____ fuel assembly.
 - A. 1) top of the reactor vessel flange
2) an irradiated
 - B. 1) top of the reactor vessel flange
2) ONLY a RECENTLY irradiated
 - C. 1) top of fuel assemblies seated in the reactor pressure vessel
2) ONLY a RECENTLY irradiated
 - D. 1) top of fuel assemblies seated in the reactor pressure vessel
2) an irradiated

Proposed Answer:

Explanation (Optional): A

- A. Correct: Part 1: Unit 2 TS requires 23 feet minimum water level ABOVE THE Rx Vessel flange. Unit 1 requires 23 feet of water over the top of the fuel assemblies. Part 2: This is the actual bases described in "TS Bases" Attachment 11 of ADM 25.04 section 3/4.9.8
- B. Incorrect. Part 1 is correct. Part 2 is a description of the bases for 23 feet however, the bases applies to irradiated fuel assemblies. Recently irradiated fuel is defined as fuel that has occupied part of a critical reactor core within the previous 72 hours. This term is now being incorporated into certain TS Refueling Ops LCO's to be in agreement with the adopted CE standardized TS's. Recently Irradiated fuel is used in fuel handling accidents. The minimum water depth basis deals with irradiated fuel that has ruptured. The LCO for refueling water level applies to irradiated fuel with no time constraints.
- C. Incorrect. Part 1 is incorrect. Part 2 – see selection "B" discussion
- D. Incorrect. Part 1: Unit 1 TS requires 23 feet minimum water level ABOVE THE FUEL. Unit 2 requires 23 feet of water over the REACTOR VESSEL FLANGE. Part 2: This is the actual bases described in "TS Bases" Attachment 11 of ADM 25.04 section 3/4.9.10 and 3/4.9.11.

Technical Reference(s): 1-ADM 25.04, TS Bases (Attach if not previously provided)
1-GOP-365, Refueling Seq. Guidelines

Proposed references to be provided to applicants during examination: N/A

Learning Objective: 0902723-1,2,3 (As available)

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

Question History: Last NRC Exam Significantly Modified
Q97 HLC20
NRC exam

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

10 CFR Part 55 Content: 55.41 10
55.43 5

Comments:

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	_____	3
	Group #	_____	2
	K/A #	G2.2.17	_____
	Importance Rating	_____	3.8

Equipment Control. Knowledge of process for managing maintenance activities during power operations.

Proposed Question: SRO 96

Given the following information:

- Unit 1 is at 100% power
- There is a planned cable repair on Containment Fan Cooler 1-HVS-1A
- The planned repair duration is 4 days

Complete the following:

In accordance with WM-AA-100-1000, Work Activity Risk Management, the work control process would classify this repair activity as _____, a Risk Management Plan _____ mandatory.

- A. High Risk; IS
- B. High Risk; IS NOT
- C. Medium Risk; IS
- D. Medium Risk; IS NOT

Proposed Answer: A

Explanation (Optional):

- A. Correct. WM-AA-100-1000, Attachment 1, Work Activity Risk Classification states any schedule work >50% of a shutdown action statement LCO is a mandatory high risk activity. Attachment 5, Mandatory Actions to Manage Work Activity Risk, makes a Risk Management Plan mandatory also.
- B. Incorrect. The classification is correct however misapplication of Attachment 5 for risk classification makes this plausible. The Work Activity High Risk and Site Level High Risk Activities specifically requires the use of mandatory actions to manage the work activity risk table.
- C. Incorrect. Plausible in that this work activity would normally be categorized as medium risk but since it is scheduled for 4 days, this exceeds 50% of the shutdown action LCO (7days). Therefor High Risk. See selection "B" for the second part explanation.
- D. Incorrect. See selections "C" & "D" for explanation.

Technical Reference(s): WM-AA-100-1000 (Attach if not previously provided)

Proposed references to be provided to applicants during examination: N/A

Learning Objective: 0902722-28 (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 5

Comments

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	_____	3
	Group #	_____	2
	K/A #	G2.2.38	_____
	Importance Rating	_____	4.5

Equipment Control. Knowledge of conditions and limitations in the facility license.

Proposed Question: SRO 97

Given the following:

- Unit 1 is in Mode 4 making preparations to enter Mode 3 following a 40 day refueling outage.

In accordance with TS 3.7.1.2, "Auxiliary Feedwater System" and Ops Policy 503, complete the following:

Mode 3 is allowed to be entered providing 1-OSP-09.01C, "1C AFW Pump Code Run" is performed within __(1)__.

- Once the 1C AFW Pump surveillance was commenced, the following annunciator comes in and REMAINS lit:

1C AFW Pump Turbine Failure/Trip/ SS Isol G-46
--

RTGB 202 indication for MV-08-3, 1C AFW Pump Throttle/Trip indicates dual position. The cause of the above alarm is due to a __(2)__.

- A. 1) 24 hours
2) Electrical overspeed trip
- B. 1) 24 hours
2) Mechanical overspeed trip
- C. 1) 72 hours
2) Electrical overspeed trip
- D. 1) 72 hours
2) Mechanical overspeed trip

Proposed Answer: B

Explanation (Optional): IAW 1-AOP-09.02, indication of a Mechanical Overspeed is G-46 locked in alarm with MV08-3 indication dual position.

- A. Incorrect. T.S surveillance 4.7.1.2 requires the C AFW surveillance to be performed within 24 hours of entering Mode 3 but if it can't be determined to be operable, a 72 hr action statement is entered.
- B. Correct. Part 2 is correct. Part 2: 4.7.1.2 requires the C AFW surveillance to be performed within 24 hours of entering Mode 3 which it was. Since the pump run was not satisfactory (it tripped on mechanical O.S) a 72 hour action statement is entered and therefore the required return to service date is 2/4/15. It should be noted that the unit cannot change modes (upward) until the 2C AFW pump run is sat.
- C. Incorrect. Part 1 incorrect, see explanation. Part 2 incorrect, see "B".
- D. Incorrect. Part 1 incorrect, see explanation .Part 2 correct.

Technical Reference(s): T.S. 4.7.1.2, Ops Policy 503 (Attach if not previously provided)
1-AOP-09.02, 'Auxiliary Feedwater'

Proposed references to be provided to applicants during examination: N/A

Learning Objective: PSL OPS 0702412 Obj. 3b, 4b (As available)

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

Question History: Last NRC Exam HLC20 NRC Q90

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

10 CFR Part 55 Content: 55.41 7,10
55.43 1

Comments: This question was a significantly modified version of Q90 on the HLC-20 NRC exam (Part 2). The correct answer is now "B". All new part 2 selections.

Examination Outline Cross-Reference	Tier #	_____	3
	Group #	_____	3
	K/A #	G2.3.14	_____
	Importance Rating	_____	3.8

Knowledge of radiation or contamination hazards that may arise during normal, abnormal, or emergency conditions or activities.

Proposed Question: SRO 98

Given the following conditions on Unit 1:

TIME 2000, March 16th

- A Work Execution Coordinator (WEC) SRO is observing the performance of a task in an area with maximum local contact readings of 3500 dpm/100 cm² on certain areas on the floor.
- The workers performing the task reported that the WEC SRO is acting erratically and believe he may not be fit for duty.
- While waiting for supervision and security to arrive, the individual falls on the floor and suffers an injury that requires immediate medical attention.
- The fall caused the individual's Protective Clothing to tear exposing his skin which was determined by Radiation Protection personnel to have a reading of 2500 DPM on a portable frisker.

TIME 2300, March 16th

- It was reported from the hospital to the Shift Manager that the individual's BAC was .05 as determined from a blood test drawn at 2100.
- Investigation revealed that the individual's consumption of alcohol occurred prior to arrival at work that night.

Given the conditions above, which ONE of the following is the LATEST time the required NRC notification(s) is (are) AND the reason?

(Reference Provided)

- A. by 0400 March 17th due to a contaminated injured person being transported offsite ONLY.
- B. by 2300 March 17th due to a Fitness for Duty violation ONLY.
- C. by 0400 March 17th AND 2300 March 17th due to a contaminated injured person being transported offsite AND a Fitness for Duty violation.
- D. Not reportable since the individual was not contaminated NOR were there any Fitness for Duty violations.

Proposed Answer: C

Explanation (Optional): An area or person is contaminated with readings over 1000/100 cm². A FFD issue for a licensed operator or supervisor is a 24 hour notification (if confirmed). A notification due to FFD is required since the BAC results are high enough (>.04%) to require reporting to the NRC except this only applies if the individual was a Licensed or a Supervisor. The individual was a WEC SRO which is a supervisor and a license holder so NRC notification due to FFD is required. Even though the WEC is not an active SRO, he is current so the notification is required. An 8 hr notification is required for the contaminated injured person sent off-site. The worker is Contaminated due to having contamination detected on his skin of 1500 DPM (> 1000 DPM). For the given conditions, the only required notification is the 8 hr for injured contaminated worker transported offsite.

- A. Incorrect. See explanation
- B. Incorrect. See explanation
- C. Correct. See explanation
- D. Incorrect. See explanation

Technical Reference(s): RP-AA-103-1001 (Attach if not previously provided)
LI-AA-102-1001

Proposed references to be provided to applicants during examination: Attachment 2, LI-AA-102-1001

Learning Objective: 0902733-4 & 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 X
Comprehension or Analysis _____

10 CFR Part 55 Content: 55.41 12
55.43 4

Comments: This K/A was changed. Refer to ES-401-4 for details.

Examination Outline Cross-Reference	Tier #	_____	3
	Group #	_____	4
	K/A #	G2.4.16	
	Importance Rating	_____	4.4

Emergency Procedures/Plans. Knowledge of EOP implementation hierarchy and coordination with other support procedures or guidelines.

Proposed Question: SRO 99

Unit 1 has entered EOP-06, Total Loss of Feedwater, with the following indications:

- 1A Steam Generator (SG) level is 21% wide range.
- 1B Steam Generator (SG) level is 13% wide range.
- With the Atmospheric Dump Valves (ADVs) wide open, Tcold has risen steadily from 535° to 541°F over the past few minutes.

What is the basis and the course of action the crew should implement?

- A. Based on SG levels, initiate once-through cooling by referring to EOP-15, HR-3 success path while remaining in EOP-06.
- B. Based on Tcold rise, exit EOP-06, go to EOP-15 Step 1 and initiate once-through cooling when the required HR-3 step is reached.
- C. Based on Tcold rise, initiate once-through cooling by referring to EOP-15, HR-3 success path 3 then exiting EOP-06 and entering EOP-15 at step1.
- D. Based on SG levels, initiate once-through cooling by referring to EOP-15, HR-3 success path 3 then exiting EOP-06 and entering EOP-15 at step1.

Proposed Answer C

Explanation (Optional): IAW EOP-06 an unexplained rise in Tcold > 5 degrees requires the use of OTC to remove heat (due to a TLOF). The other criteria is Both SG's < 15% WR. For the given condition, one SG still > 15%.. EOP-06 contingencies drive the crew to set aside EOP-06 and use EOP-15 HR-3 (OTC) to Open the PORV's and establish OTC. After those steps have been performed, the crew is to formally exit EOP-06 and enter EOP-15 from the beginning at step 1 (do not go back to HR-3).

- A. Incorrect. See explanation
- B. Incorrect. See explanation
- C. Correct. See explanation
- D. Incorrect. See explanation.

Technical Reference(s): EOP-06 (Attach if not previously provided)
EOP-15

Proposed references to be provided to applicants during examination: N/A

Learning Objective: 0702828-7,10 (As available)

Question Source: Bank # _____
Modified Bank # 4148 (Note changes or attach parent)
New _____

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 2

Comments:

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	_____	3
	Group #	_____	4
	K/A #	G2.4.44	_____
	Importance Rating	_____	4.4

Emergency Procedures/Plans. Knowledge of emergency plan protective action recommendations.

Proposed Question: SRO 100

Unit 1 has declared a General Emergency. In addition, a Main Steam Safety valve is stuck open on the "A" Main Steam header. Off-Site Dose Calculations are being performed. The following meteorological data has been collected:

- 10 Meter wind direction is 170°
- 57.9 Meter wind direction is 168°

The following 1A Main Steam Line radiation monitor readings were observed:

- Reading prior to event: 5×10^{-2} mr/hr
- Current reading 9×10^{-1} mr/hr with a steam release in progress

- 1) Which ONE of the following sectors will be included in the protective action recommendations?
- 2) Determine if a release is occurring?

Wind From	Sectors Affected	Wind From	Sectors Affected	Wind From	Sectors Affected
348-11	HLK	123-146	PQR	236-258	CDE
11-33	JKL	146-168	QRA	258-281	DEF
33-56	KLM	168-191	RAB	281-303	EFG
56-78	LMN	191-213	ABC	303-326	FGH
78-101	MNP	213-236	BCD	326-348	GHU
101-123	NPQ	There is <u>no</u> "0" sector		There is <u>no</u> "I" sector	

- 1) QRAB
2) A release IS occurring
- 1) RAB
2) A release IS occurring
- 1) QRAB
2) A release IS NOT occurring
- 1) RAB
2) A release IS NOT occurring

Proposed Answer: B

Explanation (Optional): For part 2 of the question, a release is defined as 10 times above pre-transient values, thus a release IS occurring for the conditions given in the question. The release will require dose assessment to follow up to the Recovery Mgr or the EC to see if PARs must be made based on off-site dose or plant conditions

- A. If applicant used 57.9 meter wind direction this would be the correct answer. Directions are to use the 10 meter wind direction.
- B. Correct
- C. Both parts incorrect
- D. Part 2 incorrect

Technical Reference(s): EPIP-08, "Off-Site Notifications And Protective Action Recommendations" (Attach if not previously provided)
EPIP-09, "Off-Site Dose Calculations"

Proposed references to be provided to applicants during examination: N/A

Learning Objective: 0902701-7 (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 10,12
55.43 5

Comments: This question was used on NRC exam HLC-20 (1 of 2 allowed).

References:

Q#5: Unit 1 CVCS drawing

Q#6: 1&2-AOP-03.02 Attachment 1

Q#33: Steam Tables – Mollier Diagram

Q#36: Linear Range Functional NI Diagram, Attachment 1 page 2 of 7 from 1-AOP-99.01, “Loss of Tech Spec Instrumentation”

Q#74: EPIP-01, ‘Classification of Emergencies’ page 20 –Hot Conditions SU5

Q#75: 1&2-EOP-99, Fig 1A, 1B & 2

Q#76: TS 3.4.6.2

Q#80: EPIP-01 ‘Classification of Emergencies’ System Malfunction Table (Hot and Cold Conditions)

Q#83: TS 3.3.3.5 (No Instrumentation Table)

Q#90: Unit 1&2 Daily Chemistry Report
1-AOP-08.02, “Steam Generator Tube Leak”

Q#98: Attachment 2, LI-AA-102-1001