Question 76

Unit 1 initial conditions:

- Core Thermal Power = 100%

Unit 1 current conditions:

- Both Main Feedwater Pumps Tripped
- Wide Range Nuclear Instruments = 60% and slowly decreasing

Based on the current conditions, which ONE of the following completes the statement listed below?

In accordance with B&W analysis, a minimum of _(1)_ gallons per minute of Emergency Feedwater flow is required in order to limit the RCS pressure increase to less than (2) psig for the event in progress.

A. (1) 375
   (2) 2750

B. (1) 375
   (2) 4000

C. (1) 750
   (2) 2750

D. (1) 750
   (2) 4000

Proposed Answer: D

Explanation (Optional):

1. 375 gpm of emergency feedwater is required to limit RCS pressure to <2750 psig during a loss of all main feedwater only per the Emergency Feedwater DBD. This can be supplied by one EFDW pump.

2. 750 gpm of emergency feedwater is required to limit RCS pressure to <4000 psig during an ATWS per B&W ATWS analysis. This can be supplied by 2 EFDW pumps, but AMSAC starts all three.

3. The design basis for the EFDW system and knowledge of the transient requiring the most EFDW flow are SRO only objectives in the CF-EF lesson plan.

Answer Analysis

A. Incorrect. First part is incorrect, but is plausible because it would be correct for a loss of main feedwater only. Second part is incorrect, but is plausible because it would be correct for a loss of main feedwater only.

B. Incorrect. First part is incorrect, but is plausible because it would be correct for a loss of main feedwater only. Second Part is correct.

C. Incorrect. First part is correct. Second part is incorrect, but is plausible because it would be correct for a loss of main feedwater only.

D. Correct.

Technical Reference(s): EP/1/A/1800/001 (UNPP Tab and Rule 1) Rev. 039
(Attach if not previously provided) EAP-UNPP Lesson Plan Rev.18
(including version/revision number) CF-EF Lesson Plan Rev. 27a

Proposed references to be provided to applicants during examination: None

Learning Objective: CF-EF Lesson Plan Obj. 55, 56 & 61

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

Question History: Last NRC Exam _____
(Optional: Questions validated at the facility since 10/95 will generally undergo less rigorous review by the NRC; failure to provide the information will necessitate a detailed review of every question.)

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

10 CFR Part 55 Content: 55.41
55.43 _X____

Comments:
000007(BW/E02&E10; CE/E02) Reactor Trip - Stabilization - Recovery / 1 (SRO)

007EA2.04 Ability to determine or interpret the following as they apply to a reactor trip: If reactor should have tripped but has not done so, manually trip the reactor and carry out actions in ATWS EOP

Author: Dan Bacon

Question 77
Unit 1 initial conditions:

- Time = 0045
- Core Thermal Power = 100%

Unit 1 current conditions:

- LOCA occurred at time = 0100
- EOP LOCA Cooldown Tab in progress
- LPI FLOW TRAIN A = 1200 gpm
- LPI FLOW TRAIN B = 1100 gpm
- Core SCM ≤ 0° F

Based on the current conditions, which ONE of the following completes the statement listed below?

Per Oconee accident analysis, the Post LOCA Boron Dilute flowpath must be placed in service no later than _(1)_ for _(2)_.

A. (1) 1000
   (2) Boron dilution

B. (1) 1000
   (2) increased heat removal

C. (1) 1600
   (2) Boron dilution

D. (1) 1600
   (2) increased heat removal

Proposed Answer: D

Explanation (Optional):

1. From EAP-TCA Lesson Plan

   TCA #19 – Open gravity flow path from RV outlet piping to the RBES

   A. Required Action:
      1. Open Post LOCA Boron Dilution valves (LP-103, LP-104, LP-1, LP-2, LP-105) following a LOCA

   B. Time to Complete Action:
      1. LBLOCA within **9 hours** for boron dilution
      2. SBLOCA within **15 hours** for increased heat removal

   C. Start of Operator Action:
      1. Start of LOCA event

D. Action Completion Requirement:
   1. Gravity flow started from control room
E. Procedural/ Technical Reference:
   1. EOP LOCA Cooldown tab
F. Comments:
   1. Flow path must be established to prevent unacceptably high boric acid concentrations from developing in the RV for certain postulated cold leg breaks. Opening the flow path establishes a flow path for ECCS to pass from the RV down comer through the core and back to the RBES. Flow path must be open within 9 hours after the start of a LB LOCA (OSC-2820, rev.1 and OSC-4040, rev.5).
   2. For SBLOCA, flow path is used to increase RCS heat removal by increasing flow from the RCS to the RB sump. This action is currently credited for EQ and may be eliminated when the accident analysis and related UFSAR changes are completed. Action is credited 15 hours after the start of a SBLOCA (refer to OSC-5371)

2 This is SRO only because it requires knowledge of reasons/bases for EOP steps. This cannot be answered solely by knowledge of the major mitigation strategy or basic flow path of a procedure.

3 This matches the K/A because it requires knowledge of parameters and logic for procedural steps that provide for core cooling and heat removal. B & W does not use safety function status trees or SPDS in the EOP as Westinghouse does.

4 Step 87 of LOCA Cooldown Tab aligns Post LOCA Boron Dilute flowpath for a small break LOCA if SCM is ≤ 0° F.

Answer Analysis

A. Incorrect. First part is plausible because it would be correct for a LBLOCA. Second part is plausible because it would be correct for a LBLOCA.

B. Incorrect. First part is plausible because it would be correct for a LBLOCA. Second part is correct.

C. Incorrect. First part is correct. Second part is plausible because it would be correct for a LBLOCA.

D. Correct. Flow must be established through the Post LOCA Boron Dilution flow path within 15 hours for increased heat removal during a SBLOCA with a loss of SCM. This is a SBLOCA because LPI Flow Train A plus LPI Flow Train B is less than 3400 gpm.

Technical Reference(s): EAP-TCA Lesson Plan Rev. 05b
(Attach if not previously provided) EP/1/A/1800/001 Rev. 039 LOCA CD Tab
(including version/revision number)

Proposed references to be provided to applicants during examination: None

Learning Objective: EAP-TCA Lesson Plan Obj. R2

Question Source: Bank # _____
Modified Bank # ILT 1240 (attach parent)
New _____

Question History: Last NRC Exam _____
(Optional: Questions validated at the facility since 10/95 will generally undergo less rigorous review by the NRC; failure to provide thuthore *information will necessitate a detailed review of every question.)*

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

10 CFR Part 55 Content: 55.41 X
55.43 _____

Comments:
000009 Small Break LOCA / 3 (SRO)

009EG2.4.21 Knowledge of the parameters and logic used to assess the status of safety functions, such as reactivity control, core cooling and heat removal, reactor coolant system integrity, containment conditions, radioactivity release control, etc.

Author: Dan Bacon

Question 78

Proposed Question:
Unit 1 initial conditions:

- Reactor has been tripped
- 1A S/G has experienced a SGTR
- The EOP SGTR Tab is in progress
- 1B S/G is isolated due to a MSLB and cannot be steamed
- 1A S/G is being steamed to prevent overfill
- SCM is being minimized and = 10 degrees F

Unit 1 current conditions:

- 1A S/G has reached the level where water can enter the main steam lines
- Rule 4 has been initiated and the PORV has been opened
- SCM = 0 degrees F

Which ONE of the following completes the statements listed below?

Based on the initial conditions, if Technical Specification cooldown rate limits are exceeded while steaming to prevent overfill, steaming of 1A S/G should be (1).

And

Based on the current conditions, the EOP (2) Tab should be initiated.

A. (1) continued
   (2) LOSCM

B. (1) continued
   (2) HPI CD

C. (1) discontinued
   (2) LOSCM

D. (1) discontinued
   (2) HPI CD

Proposed Answer: B

Explanation (Optional):
1. Per note prior to step 49 of SGTR tab, steaming a SG to prevent overfill should continue even if Tech Spec cooldown rates are exceeded.
2. Per note prior to step 93 RNO of SGTR tab, SCM may be lost when the PORV is opened. Transition to LOSCM tab is **NOT** required.

Answer Analysis

A. Incorrect. First part is correct. Second part is incorrect, but is plausible because it would be correct if HPI forced cooling was not in progress.
B. Correct.
C. Incorrect. First part is incorrect, but is plausible because cooldown rate limits are always adhered to unless otherwise specified. Second part is incorrect, but is plausible because it would be correct if HPI forced cooling was not in progress.
D. Incorrect. First part is incorrect, but is plausible because cooldown rate limits are always adhered to unless otherwise specified. Second part is correct.

Technical Reference(s): EP/1/A/1800/001 (SGTR) Rev. 039
(Attach if not previously provided) EAP-SGTR Lesson Plan Rev. 21a
(including version/revision number)

Proposed references to be provided to applicants during examination: None

Learning Objective: EAP-SGTR Lesson Plan Obj. 27, 29 & 30

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

Question History: Last NRC Exam _____
(Optional: Questions validated at the facility since 10/95 will generally undergo less rigorous review by the NRC; failure to provide the information will necessitate a detailed review of every question.)

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

10 CFR Part 55 Content: 55.41 _____
55.43 X

Comments:
000038 Steam Gen. Tube Rupture / 3 (SRO)

038EG2.4.20 Knowledge of the operational implications of EOP warnings, cautions, and notes.

Author: Dan Bacon

Question 79

Unit 1 initial conditions:

- Reactor tripped at 0600
- AFIS header B initiated
- 1A S/G pressure = 800 psig and slowly decreasing
- ES 1 & 2 actuated
- RB pressure = 2 psig and increasing
- Core SCM = 0 degrees F
- Rule 2 (Loss of SCM) is in progress
-

Unit 1 current conditions:

- Time = 0608
- Core SCM = 15 degrees F
- Rule 5 is complete
- EHT Tab has been initiated
- Tcold = 460 degrees F
- HPI has been throttled with 1HP-120 fully open and 1HP-26 throttled open to maintain PZR level steady >100"

Based on the current conditions, which ONE of the following completes the statements listed below?

Rule 8 (PTS) _(1)_ required to be initiated.

And

In accordance with the EHT Tab, the _(2)_ Tab will be initiated.

A. (1) is
   (2) FCD

B. (1) is
   (2) LOCA CD

C. (1) is NOT
   (2) FCD

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

Proposed Answer: B

Explanation (Optional):

1. Step 53 RNO of EHT Tab directs entry into LOCA CD Tab if RCS makeup flow is not within normal makeup capability.

2. Per OMP 1-18, normal makeup capability is flow from 1 HPI pump through 1HP-120 with letdown isolated.

3. Step 55 of EHT Tab directs entry into FCD Tab if any steam generator is isolated or if any steam generator has an unisolable steam leak per step 54.

4. Rule 8 (PTS) is required if HPI operated in the injection mode while no RCPs were operating or a cooldown <400 degrees F at >100 degrees F/hr occurred.

Answer Analysis

A. Incorrect. First part is correct because HPI operated in the injection mode with no RCPs operating. Second part is incorrect, but is plausible (see explanation above).

B. Correct. See explanations above.

C. Incorrect. First part is incorrect because HPI operated in the injection mode with no RCPs operating. Second part is incorrect, but is plausible (see explanation above).

D. Incorrect. First part is incorrect because HPI operated in the injection mode with no RCPs operating. Second part is correct (see explanation above).

Technical Reference(s): EP/1/A/1800/001 (EHT Tab) Rev. 039
(Attach if not previously provided) EAP-EHT Lesson Plan Rev. 18c
(including version/revision number)

Proposed references to be provided to applicants during examination: None

Learning Objective: EAP-EHT Lesson Plan Obj.16

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

Question History: Last NRC Exam _____
(Optional: Questions validated at the facility since 10/95 will generally undergo less rigorous review by the NRC; failure to provide the information will necessitate a detailed review of every question.)

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

10 CFR Part 55 Content: 55.41 _____
55.43 X

Comments:
000040 (BW/E05; CE/E05; W/E12) Steam Line Rupture - Excessive Heat Transfer / 4 (SRO)

BE05EA2.1 Ability to determine and interpret the following as they apply to the (Excessive Heat Transfer) Facility conditions and selection of appropriate procedures during abnormal and emergency operations.

Author: Dan Bacon

Question 80

Unit 1 initial conditions:

- Core Thermal Power = 100%
- Entered TS 3.8.1 (AC Sources – Operating) Condition L at 0600 today
- Entered TS 3.8.6 (Vital Inverters – Operating) Condition A at 0600 today for emergent repairs on 1DIC inverter
- 1SA-06 A-2 (INVERTER 1DIC SYSTEM TROUBLE) is in alarm
- 1SA-13 D-7 (INVERTER 1DIC MANUAL BYPASS) is in alarm (alarmed at 0600 today)

Unit 1 current conditions:

- Time = 0700
- 1SA-6 E-4 (REGULATED PANELBOARD 1KRA-1KRB VOLTAGE LOW) alarms

Based on the current conditions, which ONE of the following completes the statements listed below?

REFERENCE PROVIDED

Entry into SLC 16.9.11 (TB Flood) __(1)__ required.

And

In accordance with TS 3.8.8 (Distribution Systems – Operating), proper voltage must be restored to affected panelboard by __(2)__.

A. (1) is
(2) 1100 today

B. (1) is
(2) 0700 tomorrow

C. (1) is NOT
(2) 1100 today

D. (1) is NOT
(2) 0700 tomorrow

Proposed Answer: C

Explanation (Optional):

A. **Alarms**

1. Each inverter has an Inverter System Trouble statalarm that will alarm in the Control Room:
   a) (1)(2)(3)SA5/A12 Inverter DIA System Trouble

b) (1)(2)(3)SA5/B12 Inverter DIB System Trouble
c) (1)(2)(3)SA6/A2 Inverter DIC System Trouble
d) (1)(2)(3)SA6/B2 Inverter DID System Trouble

2. These alarms are fed from local alarm panels (1) (2) (3)SA12 and (1) (2) (3)SA13 which will alarm for each of the following inverter parameters/conditions:
   a) Low input voltage
   b) Low output voltage
   c) Bypass voltage failure (low AC Line voltage)
   d) Manual bypass
3. The setpoints for these alarms are the same as the inverter panel light setpoints. If one of these alarms actuates, Control Room personnel will send an NLO to check the local panel. The NLO upon finding the statalarm on the local panel should be able to go to the inverter and see a corresponding alarm light and also be able to read most of the alarming voltages off of a panel meter.
4. These alarms are arranged on the local panel so that each inverters alarms are in one vertical row.
5. Each inverter has a fan that is used to dissipate the heat generated by the inverter during operation. A statalarm for the fan is located on the local panel. The alarm associated with the fan alerts the operator to the failure of the fan.
   a) The fan is not vital to inverter operation and therefore does not actuate the Control Room alarm.
6. There are no computer alarms or Event Recorder points associated with the vital inverters.

B. **Vital Instrumentation Power Panelboards**

1. Each Vital Bus Inverter supplies a separate 120VAC Vital Instrumentation Power Panelboard, KVIA, KVIB, KVIC, or KVID.
2. The power panelboards are located in the associated unit Cable Room.
3. A list of the specific equipment supplied by each power panelboard is shown on drawing VPC-1.

C. **Tech Specs**

120VAC Vital Power System

4. Operating (Mode 1, 2, 3, & 4)
   a) Tech Spec 3.8.8, Distribution Systems - Operating
      1) Applicable in Mode 1, 2, 3, or 4.
      2) All four Vital Power panelboards (KVIA, KVIB, KVIC, and KVID) must be operable.
      3) **(Obj. R11)** Condition F

(a) With one 120VAC vital panelboard inoperable, the required action is to restore the panelboard to operable status as follows:

(1) Within 4 hours if KVIA or KVIB is inoperable.

(2) Within 24 hours if KVIC or KVID is inoperable.

(b) KVIA or KVIB buses can only be inoperable for a maximum of four hours because these panelboards power the digital ES channels and they (the digital channels) cannot actuate without power.

(1) The 4 hours is longer than the Completion Time stated in TS 3.3.7, ES Digital Automatic Actuation Logic Channels. See the TS bases document for an explanation.

(c) KVIC or KVID can be inoperable for up to 24 hours, because the loads they carry (RPS) go to a tripped state when they lose power.

b) Tech Spec 3.8.6, Vital Inverters - Operating

1) Applicable in Mode 1, 2, 3, & 4.

2) Four vital inverters shall be operable.

3) Condition A

(a) When one vital inverter is inoperable, the required action is to restore the inverter to operable status within 7 days.

(b) **(Obj. R12)** With a required inverter inoperable, its associated 120 VAC Vital instrumentation panelboard becomes inoperable until it is manually re-energized from its alternate regulated voltage source. For this reason, Note 1 has been included for Required "Action A.1 requiring entry into the Conditions and Required Actions of LCO 3.8.8, "Distribution Systems-Operating."

This ensures the vital bus is re-energized within either 4 or 24 hours. Required Action A.1 allows 7 days to fix the inoperable inverter and return it to service. The 7 day limit is based upon engineering judgment, taking into consideration the time required to repair an inverter and the additional risk to which the unit is exposed because of the inverter inoperability.

This has to be balanced against the risk of an immediate shutdown, along with the potential challenges to safety systems such shutdown might entail.

5. Shutdown (Mode 5, 6 and anytime During movement of irradiated fuel)

a) Tech Spec 3.8.9, Distribution Systems - Shutdown

1) The necessary portion of 120VAC Vital Instrumentation power panelboards shall be operable to support equipment required to be operable.

b) Tech Spec 3.8.7, Vital Inverters - Shutdown

1) Vital inverters shall be operable to support the onsite 120VAC Vital instrumentation power panelboard(s) required by LCO 3.8.9, Distribution Systems - Shutdown.

Regulated Power Supply (KRA and KRB)

6. Tech Specs does not have a specific requirement for the Regulated Power Supply.
7. Tech Spec bases 3.8.8 does take credit for having it available so that a vital panelboard can be re-energized following a loss of a vital inverter.

D. NOTE: When power is removed from 1,2,3 KVID panelboards, either by shutting down the KVID Inverter by procedure or due to a loss of KVID output power, a loss of the ability to operate the CCW pump Discharge valves in a Turbine Building Flood scenario will occur. Therefore, an entry into SLC 16.9.11 (TB Flood) is required.

E. From 3.8.8 bases: The ACTIONS are modified by a Note indicating that the Completion Times for Required Actions A through F are reduced when in Condition L of LCO 3.8.1. Condition L limits the Completion Time for restoring inoperable power sources to 4 hours when emergency power source(s) or offsite power source(s) are inoperable for extended time periods or for specific reasons.

Answer Analysis:

A. Incorrect. First part is incorrect, but plausible because it would be correct for KVID Panelboard. Second part is correct due to note above line for TS 3.8.8.
B. Incorrect. First part is incorrect, but plausible because it would be correct for KVID Panelboard. Second part is incorrect, but plausible because it would be correct if not in TS 3.8.1 condition L as stated in stem.
C. Correct.
D. Incorrect. First part is correct. Second part is incorrect, but plausible because it would be correct if not in TS 3.8.1 condition L as stated in stem.

Technical Reference(s):	EL-VPC Lesson Plan Rev. 16b
(Attach if not previously provided)	TS 3.81, 3.86 & 3.88
(including version/revision number)	OP/1/A/6101/006 Rev. 039

OP/1/A/6101/013 Rev. 003

Proposed references to be provided to applicants during examination: TS 3.8.8, SLC 16.9.11

Learning Objective: EL-VPC Lesson Plan Obj. R2, R11, R12, R14, & R15

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

Question History: Last NRC Exam _____
(Optional: Questions validated at the facility since 10/95 will generally undergo less rigorous review by the NRC; failure to provide the information will necessitate a detailed review of every question.)

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

10 CFR Part 55 Content:
55.41 _____
55.43 X

Comments:
000057 Loss of Vital AC Inst. Bus / 6 (SRO)

057AA2.06 Ability to determine and interpret the following as they apply to the Loss of Vital AC Instrument Bus: AC instrument bus alarms for the inverter and alternate power source

Question 81

Unit 1 initial conditions:

- Core Thermal Power = 100%
- B SSW Header is inoperable
- Units 2 and 3 are in Mode 1
- 1SA-9 A-9 (LPSW Header A Pressure Low) is in alarm
- B LPSW Pump amps are erratic
- LPSW Header pressure is fluctuating

Unit 1 current conditions:

- AP/1/A/1700/024 (Loss of LPSW) has been initiated
- Unit 1/2 LPSW Pump Auto Start Circuit has been placed in DISABLE
- B LPSW Pump has been stopped & C LPSW Pump has been started

Which ONE of the following completes the statements listed below?

Per the TS 3.3.28 (Low Pressure Service Water (LPSW) Standby Pump Auto-Start Circuitry) bases, the LPSW Pump Auto-Start Circuitry is required to be operable on _(1)_ LPSW pump(s) in order to ensure LPSW cooling water is available following a Loss Of Off-site Power.

And

Based on the current conditions, a TS 3.3.28 action statement should be entered on _(2)_.

A. (1) all
   (2) Units 1, 2 & 3

B. (1) all
   (2) Units 1 & 2 only

C. (1) B only
   (2) Units 1, 2 & 3

D. (1) B only
   (2) Units 1 & 2 only

Proposed Answer: C

Explanation (Optional):

1. LCO 3.3.28– LPSW Standby Pump Auto Start Circuitry –
   The auto start circuitry consists of a sensor channel as well as a logic channel and is required to be OPERABLE on all Non-running required LPSW Pumps when in MODES 1, 2, 3, & 4. It is only required on Non-running pumps because a running pump will re-start following a LOOP. The Safety Analysis assumes this circuitry OPERABLE to mitigate a LOOP with a single failure, the failure being one of the running LPSW Pumps.
   For LOOP events, LPSW is required to support operability of SSW (which supports ECCW), HPI Pump Motors, and MDEFW Motors. There are two SSW headers. Since there are no active components in the SSW system, there is no single active failure that can render a SSW header inoperable. Therefore only one SSW header is required to be OPERABLE per SLC 16.9.12 (Additional LPSW & SSW System Operability Requirements). That one OPERABLE SSW header supports ESV Pump operations for all 3 units and therefore ECCW system operability for all 3 units. Since the LPSW auto start circuit is credited for ensuring LPSW to SSW following a LOOP with a failure of a running LPSW Pump, the LPSW Pump auto start circuit on the unit that has the OPERABLE SSW header is what all 3 units are relying on to ensure SSW to ESV and therefore ECCW operability on all 3 units. That being true, any time we have only one SSW header OPERABLE and the LPSW Pump auto start circuitry becomes inoperable on the unit that is supplying the OPERABLE SSW header, any unit in MODE 1, 2, 3, or 4 would be required to enter Condition A of 3.3.28. There is a Table in the BASES of 3.3.28 (LPSW Auto Start Circuitry) (Table 3.3.28-1) to help make the correct decision regarding which units should enter Condition A.
2. Unit 1&2's 'A' LPSW Header normally supplies the 'A' SSW Header.
3. Unit 3's 'A' LPSW Header normally supplies the 'B' SSW Header.

Answer Analysis:

A. Incorrect. First part is incorrect, but is plausible because the circuit sends a signal to **all** pumps on the applicable unit(s). Second part is correct.

B. Incorrect. First part is incorrect, but is plausible because the circuit sends a signal to **all** pumps on the applicable unit(s). Second part is incorrect, but is plausible because it would be correct if the A SSW header was inoperable instead of the B SSW header.

C. Correct.

D. Incorrect. First part is correct. Second part is incorrect, but is plausible because it would be correct if the A SSW header was inoperable instead of the B SSW header.

Technical Reference(s):	AP/1/A/1700/024 (Loss of LPSW) Rev. 26
(Attach if not previously provided)	SSS-LPW Lesson Plan Rev. 21
(including version/revision number)	TS 3.3.28, 3.7.7, 3.7.8
	ADM-TSS Lesson Plan Rev. 10a
	STG-SSW Lesson Plan Rev. 06b

Proposed references to be provided to applicants during examination: None

Learning Objective: ADM-TSS Lesson Plan Obj. R5 & R6

STG-SSW Lesson Plan Obj. R2

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

Question History: Last NRC Exam _____
(Optional: Questions validated at the facility since 10/95 will generally undergo less rigorous review by the NRC; failure to provide the information will necessitate a detailed review of every question.)

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

10 CFR Part 55 Content: 55.41 _____
55.43 X

Comments:
000062 Loss of Nuclear Svc Water / 4 (SRO)

062AG2.1.28 Knowledge of the purpose and function of major system components and controls.

Author: Dan Bacon

Question 82
Unit 1 initial conditions:

- Core Thermal Power = 100%
- ICS Reactor Bailey and Diamond panel are in Manual for maintenance

Unit 1 current conditions:

- 1SA-02 B-10 (CRD Asymmetric Rod Alarm) is received
- Asymmetric Rod Fault (amber light on Diamond) is illuminated
- Rod 4-2 dropped to 93% API
- AP/1/A/1700/001 (Unit Runback) has been initiated
- Recovery of Rod 4-2 is desired at this time

Based on the current conditions, which ONE of the following completes the statements listed below?

OP/1/A/1105/019 (Control Rod Drive System) Enclosure __(1)__ should be selected to restore rod 4-2 to its group average rod height.

And

In accordance with the enclosure selected above, __(2)__ must be selected on the Diamond panel prior to positioning regulating rods to stop a rise in Reactor power or Tave when restoring rod 4-2 to its group average rod height.

A. (1) 4.9 (Realignment Of Safety Rod, Regulating Rod, Or APSR)
   (2) SEQUENCE

B. (1) 4.6 (Recovery of Dropped/Misaligned Safety or Regulating Control Rods with Diamond in Manual)
   (2) SEQUENCE

C. (1) 4.9 (Realignment Of Safety Rod, Regulating Rod, Or APSR)
   (2) SEQUENCE OVERRIDE

D. (1) 4.6 (Recovery of Dropped/Misaligned Safety or Regulating Control Rods with Diamond in Manual)
   (2) SEQUENCE OVERRIDE

Proposed Answer: B

Explanation (Optional):
1. The CRD Asymmetric Rod Alarm (1SA-02 B-10) comes in at 7” difference between the rod API and the associated group average API.
2. The Asymmetric Rod Fault (amber light on Diamond panel) comes in at 9” (6.5%) difference between the rod API and the associated group average API.

3. Any control rod dropped or misaligned > 6.5% (9") from the group average is an entry condition into AP/1/A/1700/001 (Unit Runback). See Section H.
4. Per OP/1/A/1105/019 Encl.4.6 (Recovery of Dropped/Misaligned Safety or Regulating Control Rods with Diamond in Manual), SEQUENCE is selected on the Diamond to reduce power/Tave while recovering the dropped rod.
5. Enclosure 4.9 (Realignment Of Safety Rod, Regulating Rod, Or APSR) cannot be used for recovery of a dropped control rod or alignment of a Control Rod misaligned by ≥9" (6.5%).

Answer Analysis

A. Incorrect. First part is plausible because Enclosure 4.9 would be used to restore a control rod that was misaligned by <9". Second part is correct.
B. Correct. Enclosure 4.6 would be used to restore a rod misaligned ≥9" with the Diamond panel in Manual. SEQUENCE is selected in Enclosure 4.6 prior to positioning regulating rods to stop a rise in Reactor power or Tave.
C. Incorrect. First part is plausible because Enclosure 4.9 would be used to restore a control rod that was misaligned by <9". Second part is incorrect, but is plausible because SEQUENCE OVERRIDE is selected when actually withdrawing the dropped rod.
D. Incorrect. First part is correct. Second part is incorrect, but is plausible because SEQUENCE OVERRIDE is selected when actually withdrawing the dropped rod.

Technical Reference(s): AP/1/A/1700/001 Rev. 014
(Attach if not previously provided) OP/1/A/6101/002 Rev. 032
(including version/revision number) OP/1/A/1105/019 Rev. 023
IC-CRI Lesson Plan Rev. 13c

Proposed references to be provided to applicants during examination: None

Learning Objective: IC-CRI Lesson Plan Obj. R28 & R33

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

Question History: Last NRC Exam _____
(Optional: Questions validated at the facility since 10/95 will generally undergo less rigorous review by the NRC; failure to provide the information will necessitate a detailed review of every question.)

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

10 CFR Part 55 Content: 55.41 _____
55.43 X

Comments:
000003 Dropped Control Rod / 1 (SRO)

003AG2.4.50 Ability to verify system alarm setpoints and operate controls identified in the alarm response manual.

Author: Dan Bacon

Question 83

Unit 1 initial conditions:

- Core Thermal Power = 96% with power increase in progress
- Group 7 API average = 96%

Unit 1 current conditions:

- 1SA-02 B-10 (CRD Asymmetric Rod Alarm) is received
- Asymmetric Rod Fault (amber light on Diamond) is illuminated
- Rod 7-1 API is at 91% and is stuck
- Rod 7-3 has dropped fully into the core
- AP/1/A/1700/001 (Unit Runback) has been initiated

Based on the current conditions, which ONE of the following completes the statements listed below?

Use of Jog Speed may cause damage to the _(1)_.

And

In accordance with OP/1/A/1105/019 (Control Rod Drive System), Jog Speed may be used at some point in the process of restoring rod _(2)_ to its group average rod height.

A (1) CRDM Motor
(2) 7-1

B (1) Spider Assembly
(2) 7-1

C (1) CRDM Motor
(2) 7-3

D (1) Spider Assembly
(2) 7-3

Proposed Answer: D

Explanation (Optional):
6. The CRD Asymmetric Rod Alarm (1SA-02 B-10) comes in at 7” difference between the rod API and the associated group average API.
7. The Asymmetric Rod Fault (amber light on Diamond panel) comes in at 9” (6.5%) difference between the rod API and the associated group average API.

8. Any control rod dropped or misaligned > 6.5% (9") from the group average is an entry condition into AP/1/A/1700/001 (Unit Runback). See Section H.
9. Per OP/1/A/1105/019 (L&P), If partially withdrawn or fully withdrawn control rod is stuck or jammed, do **NOT** operate control rod in JOG speed. Operate in RUN speed only. Possibility of overloading spider exists if CRD is operated in JOG speed when CRD is **NOT** free running. If fully inserted control rod is stuck or jammed, control rod may be operated in JOG speed only for purpose of latching CRDM to lead screw.
10. OP/1/A/1105/019 Encl. 4.9 (Realignment Of Safety Rod, Regulating Rod, Or APSR) would be used to realign a rod that is not dropped and is less than 6.5% from its group average.
11. SRO only because it requires knowledge of content of selected procedure and reason/bases for procedural steps. Cannot be answered by systems knowledge or overall sequence of events/mitigation strategy alone.

Answer Analysis

E. Incorrect. First part is plausible because the motor is where the torque is produced. Second part is plausible because Jog Speed can be used on a rod that is fully inserted (to latch).
F. Incorrect. First part is correct. Second part is plausible because Jog Speed can be used on a rod that is fully inserted (to latch).
G. Incorrect. First part is plausible because the motor is where the torque is produced. Second part is correct.
H. Correct. The Spider Assembly could be damaged if Jog Speed is used to attempt to move a rod that is not free running. Jog Speed can be used to latch a stuck rod that is fully inserted.

Technical Reference(s):	AP/1/A/1700/001 Rev. 014
(Attach if not previously provided)	OP/1/A/6101/002 Rev. 032
(including version/revision number)	OP/1/A/1105/019 Rev. 023
	IC-CRI Lesson Plan Rev. 13c

Proposed references to be provided to applicants during examination: None

Learning Objective: IC-CRI Lesson Plan Obj. R16

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

Question History: Last NRC Exam _____
(Optional: Questions validated at the facility since 10/95 will generally undergo less rigorous review by the NRC; failure to provide the information will necessitate a detailed review of every question.)

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

10 CFR Part 55 Content:
55.41 _____
55.43 X

Comments:

000005 Inoperable/Stuck Control Rod / 1 (SRO)

005AA2.02 Ability to determine and interpret the following as they apply to the Inoperable / Stuck Control Rod:
Difference between jog and run rod speeds, effect on CRDM of stuck rod

Author: Dan Bacon

Question 84
Unit 1 initial conditions:

- Core Thermal Power = 100%
- 1SA-3 A-2 Condenser Vacuum Low is in alarm
- Main Condenser Vacuum = 25" and decreasing

Unit 1 current conditions:

- AP/1/A/1700/027 (Loss of Condenser Vacuum) has been initiated
- Main Condenser Vacuum = 21.5" and decreasing
- 1SA-3 A-2 EHC Low Vacuum Trip is in alarm
- 1SA-5 A-3 Turb/Rx Trip Alert is in alarm
- 1SA-1 A,B,C,D-1 1A,B,C,D RPS Trip are in alarm
- 1SA-1 E-2,3,4,5 CRD Trip Bkr A,B,C,D Trip are in alarm
- ETS system pressure = 820 psig

Based on the current conditions, which ONE of the following completes the statements listed below?

The RPS function that provided protection for the event in progress would be considered _(2)_ based on the parameter values indicated at the time of the trip.

And

The surveillance required to verify proper operation of the RPS function that provided protection for the event in progress is a _(1)_.

A. (1) OPERABLE
   (2) Channel Calibration

B. (1) OPERABLE
   (2) Channel Functional Test

C. (1) INOPERABLE
   (2) Channel Calibration

D. (1) INOPERABLE
   (2) Channel Functional Test

Proposed Answer: A

Explanation (Optional):

Answer Analysis
A. Correct. It was operable because the trip was above the minimum required TS value. Channel Calibrations are applicable for the digital RPS.

B. Incorrect. First part is correct. Second part is plausible because Channel Functional Tests were required for the analog RPS.
C. Incorrect. First part is plausible because the trip occurred at an ETS system pressure below the setpoint of 850 +/- 24 psig. Second part is correct.
D. Incorrect. First part is plausible because the trip occurred at an ETS system pressure below the setpoint of 850 +/- 24 psig. Second part is plausible because Channel Functional Tests were required for the analog RPS.

1. From TS 3.3.1 Bases:
Only the Allowable Values are specified for each RPS trip Function in the LCO. Nominal trip setpoints are specified in the setpoint calculations. The nominal setpoints are selected to ensure that the setpoint measured by **CHANNEL FUNCTIONAL TESTS** *(or CHANNEL CALIBRATIONS for Unit(s) with the RPS digital upgrade complete)* does not exceed the Allowable Value. A trip setpoint found less conservative than the nominal trip setpoint, but within its Allowable Value, is considered OPERABLE with respect to the uncertainty allowances assumed for the applicable surveillance interval provided that operation, testing and subsequent calibration are consistent with the assumptions of the setpoint calculations. Each Allowable Value specified is more conservative than instrument uncertainties appropriate to the trip Function.

Main Turbine Trip (Hydraulic Fluid Pressure)
The Main Turbine Trip Function trips the reactor when the main turbine is lost at high power levels. The Main Turbine Trip Function provides an early reactor trip in anticipation of the loss of heat sink associated with a turbine trip. The Main Turbine Trip Function was added to the B&W designed units in accordance with NUREG-0737 (Ref. 5) following the Three Mile Island Unit 2 accident. The trip lowers the probability of an RCS power operated relief valve (PORV) actuation for turbine trip cases. This trip is activated at higher power levels, thereby limiting the range through which the Integrated Control System must provide an automatic runback on a turbine trip.

Each of the four turbine hydraulic fluid pressure switches feeds one protective channel that continuously monitors the status of the contacts.

For the Main Turbine Trip (Hydraulic Fluid Pressure), the Allowable Value of 800 psig is selected to provide a trip whenever main turbine hydraulic fluid pressure drops below the normal operating range. This trip is bypassed at power levels < 30% RTP for unit startup. The turbine trip is not required to protect against events that can create a harsh environment in the turbine building. Therefore, errors induced by harsh environments are not included in the determination of the setpoint Allowable Value.

2. From IC-RPS Lesson Plan:

C. (Obj. R3, R4) Main Turbine Trip – Anticipatory Reactor Trip

1. If the MT trips during power operation (> ≈ 30% power) the RCS will heat up and trip on high RCS pressure.
2. To preclude waiting for the high pressure trip to actuate, the loss of MT anticipatory trip will automatically trip the reactor.
3. **Prevents challenging PORV**.

4. If the Emergency Trip System pressure (monitored by 4 PS's - 1 to each RPS Channel) in the EHC System ≤ 850 ± 24 psig (TS setpoint ≥ 800 psig), the respective channel will trip.
5. MT to Rx trip is automatically bypassed when reactor power ≤ 27.75% (for plant SU and SD operation). Analysis has shown that the PORV should not be challenged on the MT trip ≤ ≈ 50% power.
6. MT to Reactor trip is automatically armed when reactor power ≥ 29.75%.
7. **Digital RPS Trip # 10: Main Turbine Trip**

Trip:

[(PS $_{EHC}$ ≥ 2/4 open contact signals)]
AND
$\varphi_{2.MAX} \geq \varphi_{SP\ FLUX\ (ENABLE)}$

Auto Trip Bypass:

$\varphi_{2.MAX} \leq \varphi_{SP\ FLUX\ (BYPASS)}$

Setpoint:

- **$\Phi_{SP\ FLUX\ (ENABLE)}$ = 29.75% RTP**
- **$\Phi_{SP\ FLUX\ (BYPASS)}$ = 27.75% RTP**

a) Each RPS channel (A, B, C, D) monitors one of 4 hydraulic fluid PS contact inputs. The status of these 4 contact inputs is shared between channels over fiber optic communications links.
b) If the Rx Trip function is enabled and 2/4 MT hydraulic fluid PS contacts are open, that RPS Channel trips.
c) If two or more RPS Channels are tripped, a Rx trip is generated via the 2/4 Rx trip relay logic.
d) **(Obj. R9)** On decreasing reactor power, the reactor power comparator will reset when 2.MAX ≤ 27.75% power (TURB / RX TRIP BYP alarm will actuate).

With 4 channels operable, this effectively results in the MT function being Bypassed when 3 or more channels are ≤ 27.75%.
e) With all 4 channels operable, at least 3 channels must be below the Bypass value before the MT to Rx trip function is disabled and the Bypass alarm is actuated (will only be received when the trip function is actually bypassed).
f) **(Obj. R9)** The MT trip function uses a common annunciator (TURB / RX TRIP ALERT) for all 4 channels. The alarm will actuate when 1/4 hydraulic fluid PS contacts are open. The ALERT alarm is NOT blocked by the Turb / Rx Trip Bypass function (≤ 27.75% power).
g) MT to Rx Trip function is NOT bypassed in SD Bypass (should be auto bypassed at this point).

Technical Reference(s): TS 3.3.1 Bases
(Attach if not previously provided) IC-RPS Lesson Plan Rev. 18b
(including version/revision number) ADM-TSS Lesson Plan Rev 10a

Proposed references to be provided to applicants during examination: None

Learning Objective: IC-RPS Lesson Plan Obj. R3
ADM-TSS Lesson Plan Obj. R5

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

Question History: Last NRC Exam _____
(Optional: Questions validated at the facility since 10/95 will generally undergo less rigorous review by the NRC; failure to provide the information will necessitate a detailed review of every question.)

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

10 CFR Part 55 Content: 55.41 _____
55.43 X

Comments:
000051 Loss of Condenser Vacuum / 4 (SRO)

051AG2.2.12 Knowledge of surveillance procedures.

Question 85
Unit 1 initial conditions:

- Time = 0800:00
- Core Thermal Power = 100%
- Unit 2 and Unit 3 are at 100% power
- ACB-3 is closed
- 230 KV Switchyard Red and Yellow Bus voltage = 226.248 KV

Unit 1 current conditions:

- Time = 0800:10
- SA-16 C-1 (230 KV Switchyard Isolate ES Permit) alarm is received
- SA-15 C-1 (Channel 1 Undervoltage)
- SA-15 C-3 (Channel 2 Undervoltage)
- ES-1 and ES-2 actuate due to a LOCA

Based on the current conditions, which ONE of the following completes the statements listed below?

Unit 1 Main Feeder Busses will be energized from __(1)__.

And

When normal grid voltage is restored and ES is no longer required, recovery from Switchyard Isolation and shut down of the Keowee Hydro Units will be completed in accordance with __(2)__.

A. (1) KHU #1
   (2) EOP Enclosure 5.41 (ES Recovery)

B. (1) KHU #1
   (2) AP/1/A/1700/011 (Recovery from Loss of Power)

C. (1) KHU #2
   (2) EOP Enclosure 5.41 (ES Recovery)

D. (1) KHU #2
   (2) AP/1/A/1700/011 (Recovery from Loss of Power)

Proposed Answer: B

Explanation (Optional):
1. The LOCA/LOOP unit will receive power from the Underground KHU following a SY Isolation. KHU #1 is the Underground KHU with ACB-3 closed.
2. EOP Enclosure 5.41 (ES Recovery) will direct restoring ES Electrical and securing the KHUs for an event where the KHUs are not supplying the Main Feeder Busses.

3. AP/1/A/1700/011 (Recovery from Loss of Power) Enclosure 5.3 (Recovery from SY Isolation) will recover from SY isolation, restore ES Electrical and Secure the KHUs following SY isolation.

Answer Analysis

A. Incorrect. First part is correct. Second part is plausible because EOP Enclosure 5.41 (ES Recovery) will direct restoring ES Electrical and securing the KHUs for an event where the KHUs are not supplying the Main Feeder Busses.
B. Correct. The LOCA/LOOP unit will receive power from the Underground KHU following a SY Isolation. KHU #1 is the Underground KHU with ACB-3 closed. AP/1/A/1700/011 (Recovery from Loss of Power) Enclosure 5.3 (Recovery from SY Isolation) will recover from SY isolation, restore ES Electrical and Secure the KHUs following SY isolation.
C. Incorrect. First part is plausible because KHU #2 will be supplying power to Unit 2 and Unit 3. Second part is plausible because EOP Enclosure 5.41 (ES Recovery) will direct restoring ES Electrical and securing the KHUs for an event where the KHUs are not supplying the Main Feeder Busses.
D. Incorrect. First part is plausible because KHU #2 will be supplying power to Unit 2 and Unit 3. Second part is correct.

Technical Reference(s):	EL-EPD Lesson Plan Rev. 31c
(Attach if not previously provided)	EP/1/A/1800/001 Rev. 039
(including version/revision number)	AP/1/A/1700/011 Rev. 048
	OP/1/A/6100/015 Rev. 002
	OP/1/A/6100/016 Rev. 010

Proposed references to be provided to applicants during examination: None

Learning Objective: EL-EPD Lesson Plan R16, R17 and R18

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

Question History: Last NRC Exam _____
(Optional: Questions validated at the facility since 10/95 will generally undergo less rigorous review by the NRC; failure to provide the information will necessitate a detailed review of every question.)

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

10 CFR Part 55 Content:
55.41 _____
55.43 X

Comments:
BW/A05 Emergency Diesel Actuation / 6 (SRO)

BA05AA2.1 **Ability to determine and interpret the following as they apply to the (Emergency Diesel Actuation *Use Keowee Hydro Units*):** Facility conditions and selection of appropriate procedures during abnormal and emergency operations.

Author: Dan Bacon

Question 86

Given the following Unit 1 conditions:

Initial conditions:

- Time = 0400
- Reactor power = 100%
- Component Cooling Return Flow = 570 gpm
- 1A1 RCP radial bearing temperature = 180 F.
- 1A1 RCP seal inlet header flow is 6.8 gpm

Current conditions:

Time = 0405

- Component Cooling Return Flow = 323 gpm
- The Standby CC pumps has NOT started
- CC Surge Tank level = 18 inches stable
- 1A1 RCP radial bearing temperature 200 F.
- 1A1 RCP seal inlet header flow is 7.2 gpm

1) At 0400, the standby CC pump __(1)__ have started.

2) At 0405,___(2)___.

Which ONE of the following completes the statements above?

A
1. should
2. Increase seal inlet header flow in accordance with AP/1/A/1700/020 (Loss of Component Cooling).

B
1. should
2. Increase 1A1 seal injection flow in accordance with section 4E, Abnormal RCP Temperature, of AP/1/A/1700/016 (Abnormal RCP Operation).

C
1. should not
2. Increase seal inlet header flow in accordance with AP/1/A/1700/020 (Loss of Component Cooling)

D
1. Should not
2. Increase 1A1 seal injection flow in accordance with section 4E, Abnormal RCP Temperature, of AP/1/A/1700/016 (Abnormal RCP Operation).

Proposed Answer: A

K/A Match Analysis

Applicant must know the flow rate at which the CCW standby pump will start and use procedures to correct, control, or mitigate the consequences of low CCW flow rate and high RCP radial bearing temperature.

Answer Choice Analysis

A. CORRECT. Auto start setpoint for standby CC pump is 575 gpm.AP/1/A/1700/020 (Loss of Component Cooling) contains procedure steps to mitigate RCP radial bearing temperature rise.

B. INCORRECT. First part is correct. Second part is plausible because there are several steps in AP/20 that direct implementation of AP/16 if various RCP parameters reach certain thresholds.

C. INCORRECT. First part is plausible if the applicant misremembers the auto start set point for the standby CC pump. Second part is correct.

D. INCORRECT.

Technical Reference(s):

AP/1/A/1700/020 (Loss of Component Cooling)

Proposed references to be provided to applicants during examination: None

Learning Objective:

Lesson Plan PNS-CC, Rev 14a:

Obj. R17: Given a set of plant conditions, diagnose the cause of a CC System problem and/or determine the required corrective action.

Obj. R20: When AP/1700/20, Loss of CC, is required to be utilized by the operator be able to demonstrate the following: Based on plant data received, summarize proper operator actions and strategies required in the AP to mitigate the abnormal plant condition.

Question Source:	Bank #	_____
	Modified Bank #	_____
	New	_X_____
Question History:	Last NRC Exam: NEW	
Question Cognitive Level:	Memory or Fundamental Knowledge	_
	Comprehension or Analysis	X

10 CFR Part 55 Content:	55.41	X
	55.43	X

(5) Assessment of facility conditions and selection of appropriate procedures during normal, abnormal, and emergency situations.

Comments:

008A2.07 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: Consequences of high or low CCW flow rate and temperature; the flow rate at which the CCW standby pump will start.

Supporting References (excerpted from lesson plans)

Lesson Plan PNS-CC, Rev 14a:

D. Major Subsequent Actions:

Ensure CC-7 and CC-8 are open

NOTE: If manually opened, 1CC-8 **CANNOT** be operated from the Control Room.

IF 1CC-8 **CANNOT** be opened from the Control Room, **THEN** dispatch an operator with continuous communications with the Control Room to manually open 1CC-8 (CC RETURN OUTSIDE BLOCK) (A-4-409, West Pen Room (Pen 54)).

When an operator is dispatched to the Penetration Room to manually open CC-8 to ensure containment can be isolated, the operator must remain in the PR with continuous communications with the Control Room.

Verify ≥ one CC pump is operating. If not, check surge tank level ≥ 12" and attempt to start the standby CC pump.

(UNIT 1)IAAT RCP radial bearing temperature ≥ 225°F, take proper actions based on unit power level to secure RCP(s).

(UNIT 2/3) IAAT RCP seal inlet temperature ≥ 230°F, take proper actions based on unit power level to secure RCP(s).

If the loss of CC is due to system leakage then the operator needs to isolate leak (if possible), notify RP and Chemistry of potential CC spill, and makeup to CC storage tank as necessary to restore normal level.

NOTE: Operation of the RCPs without CC may continue indefinitely provided RCP seal injection is functioning properly to maintain pump temperatures within limits of Encl 5.1 (RCP Immediate Trip Criteria) of AP/16 (Abnormal RCP Operation)

Verify RCP seal injection flow is between 6 and 12 gpm/RCP. If not then, use AP/16 (Abnormal RCP Operation).

NOTE: Individual RCP seal injection flow should not exceed 15 gpm

UNIT 1 ONLY – If RCP temperature for radial bearing is ≥ 190°F or seal return ≥ 195°F then, increase seal injection flow as necessary to lower temperatures without exceeding 15 gpm/RCP.

UNIT 2 and 3 – If RCP seal inlet temperature is ≥ 185°F, or seal return temperature ≥ 185°F then, increase seal injection flow as necessary to lower temperatures without exceeding 15 gpm/RCP

Max flow through HP-31 is ≈ 60 gpm which is ≈15 gpm/RCP

Verify letdown in-service. If letdown temperature ≥ 130°F, ensure 1HP-5 is closed. And use AP/32 (Loss of Letdown)

NOTE

Operation of the RCPs without CC may continue indefinitely provided RCP seal injection is functioning properly to maintain pump temperatures within limits of Encl 5.1 (RCP Immediate Trip Criteria) of AP/16 (Abnormal RCP Operation).

4.25	__ Verify RCP seal injection flow is 6 - 12 gpm/RCP.	__ Initiate AP/16 (Abnormal RCP Operation).

NOTE

Individual RCP seal injection flow should not exceed 15 gpm.

4.26 __ **IAAT** RCP temperatures exceed the following:

9	Parameter	Limit
	RADIAL BEARING TEMP	190°F
	SEAL RETURN TEMP	195°F

(Turn-on code "RCP")

THEN increase SEAL INLET HDR FLOW using 1HP-31, as necessary, to lower temperatures without exceeding 15 gpm/RCP.

Question 87

Given the following conditions on Unit 1:

Time 1400:
- Reactor power = 98% decreasing
- Feedwater flow decreasing
- 1SA-02 D-3 (RC PRESS HIGH/LOW) is in alarm
- 1SA-02 D-4 (RC PRESS EMERG LOW) is in alarm
- OAC point O1D2742 (ICS Star Module Failure) is in alarm

Time 1405:
- Reactor is tripped
- 1RC-4 is closed
- 1RC-1 is closed
- 1RC-3 is closed

At time 1400, The RCS pressure alarms are __(1)__.

At time 1405, if the most limiting design basis RCS overpressure transient were to occur, the maximum RCS pressure __(2)__ exceed the RCS pressure safety limit.

Which ONE of the following completes the statement above?

A
1. valid
2. will

B
1. valid
2. will NOT

C
1. NOT valid
2. will

D
1. NOT valid
2. will NOT

Proposed Answer: B

K/A Match Analysis

010 Pressurizer Pressure Control (SRO)
010G2.4.50 Ability to verify system alarm setpoints and operate controls identified in the alarm response manual.

Requires the ability to verify validity of RCS pressure alarms and operate controls. The alarm response directs operators to AP/1/A/1700/044 (Abnormal Pressurizer Pressure Control). The

immediate manual actions of which direct the operation of controls associated with PZR pressure control.

SRO-only: meets 10CFR55.43(b)(2), requires knowledge of the PZR pressure control system design basis.
Can Q be answered solely by knowing ≤ 1 hour TS/TRM Action? NO
Can Q be answered solely by knowing the LCO/TRM information listed above-the-line? NO
Can Q be answered solely by knowing the TS Safety Limits? NO

Answer Choice Analysis

A. INCORRECT. First part correct.
Second part plausible because of the misconception that the safety analysis for the PZR pressure control system requires either one or both the PORV and / or PZR spray to mitigate a design basis pressure transient, a startup accident (rod withdrawal at hot zero power).

B. CORRECT. First part, a RCS pressure control ICS STAR module failed high will cause ICS to put in the "pressure kicker" signal to attempt to reduce pressure by automatically inserting control rods and simultaneously reducing feedwater flow. The PZR spray valve and the PZR PORV also receive control signals from the output of the median select processing from the ICS STAR module, and would fail open causing actual RCS pressure to decrease.
Second part, the startup accident (rod withdrawal at hot zero power) produces the most limiting RCS overpressure transient for design basis accidents. The analysis assumes three RCP flow and no PZR spray. Also, no credit is taken for the PORV.

C. INCORRECT. First part is plausible because of the misconception that the STAR module only provides input to the "kicker" signal to ICS components and not to the RCS pressure control system.
Second part is incorrect.

D. INCORRECT. First part is incorrect, Second part is correct.

Technical Reference(s):

Proposed references to be provided to applicants during examination: None

Learning Objective:

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

Question History: Last NRC Exam: NEW

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

10 CFR Part 55 Content: 55.41 X
55.43 X

Supporting References (excerpted from lesson plans)

OP-OC-PNS-PZR, Rev21, Objectives R21 and R28:

5 Explain the operation of the ICS RC pressure signal median select function as it relates to RC pressure control including: (R28)

5.1 How median select chooses the controlling signal

5.2 Which PZR components receive a median selected RC pressure signal

1. Explain the design basis of the PZR. (R21)

11.1 **(OBJ.R21)** Design Basis

A. The PZR and its associated pressure control components are designed to **establish and maintain RCS pressure within prescribed limits**. The PZR **accommodates reactor coolant density changes** during normal operations and anticipated operational transients.

B. The PZR and its associated pressure control components are also designed to protect the RCS pressure boundary against **over-pressurization**.

1. The Code Safety Valves in conjunction with the RPS shall provide protection for the RCS high pressure safety limit of 2750 psig during design basis accidents and design events. RCS overpressure protection is required to maintain the RCS integrity, which ensures a barrier against the uncontrolled release of radioactivity to the atmosphere.
2. The ONS Updated Final Safety Analysis Report of various accidents generally does not credit PZR Spray, Heaters, and the PORV for RCS pressure control.

3. The startup accident (rod withdrawal at hot zero power) produces the most limiting RCS overpressure transient for design basis accidents. The analysis assumes three RCP flow and no PZR spray. Also, no credit is taken for the PORV. The analyzed pressure responses consider maximum positive reactivity insertion rates up to16 pcm/sec. The maximum RCS pressure is 2746 psig, which is just below the safety limit of 2750 psig.

AP/1/A/1700/044
Page 3 of 11

3. Immediate Manual Actions

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
3.1 __ **IAAT** all of the following conditions exist: __ PORV open __ RC pressure < 2300 psig (HIGH) or 480 psig (LOW) __ PZR level ≤ 375" **THEN** close 1RC-4.	
3.2 __ **IAAT** all of the following conditions exist: __ RC pressure < 2155 psig __ RC pressure decreasing without a corresponding decrease in PZR level __ PZR heaters unable to maintain RCS pressure. **THEN** close the following: __ 1RC-1 __ 1RC-3	

D-3

RC PRESS HIGH/LOW

1. Alarm Setpoint

1.1 2255 psig (High)

1.2 2055 psig (Low)

2. Automatic Action

2.1 Reactor Demand will be reduced.

2.2 FDW Demand and Turbine Valve Demand will increase if pressure continues to increase, in order to lower reactor coolant temperature.

3. Manual Action

3.1 High Alarm

3.1.1 Refer to AP/1/A/1700/044 (Abnormal Pressurizer Pressure Control).

3.1.2 **IF** pressure continues to increase, lower reactor coolant temperature.

3.2 Low Alarm

3.2.1 Refer to AP/1/A/1700/044 (Abnormal Pressurizer Pressure Control).

3.2.2 Evaluate reducing or isolating letdown flow.

3.2.3 Increase makeup flow as required.

3.2.4 **IF** pressure continues to drop, investigate possibility of reactor coolant leak. Refer to AP/1/A/1700/002, (Excessive RCS Leakage).

4. Alarm Sources and References

4.1 Loop A or Loop B NR Pressure processor 1ICSCORC06.

4.2 OM 201.H-0201 001

D-4

RC PRESS EMERG LOW

1. Alarm Setpoint

1.1 1850 psig

2. Automatic Action

None

3. Manual Action

3.1 Verify all pressurizer heaters ON.

3.2 Verify pressurizer spray valve closed and/or pressurizer spray block valve closed.

3.3 Verify PORV closed, **OR** close 1RC-4 (PZR Power Relief Block).

3.4 Evaluate reducing or isolating letdown flow.

3.5 Increase makeup flow as required.

3.6 **IF** RC pressure continues to decrease, verify ES Channels actuate at appropriate setpoints.

3.7 **IF** reactor trip occurs (setpoint 1810 psig), refer to EP/1/A/1800/001 (Emergency Operating Procedure).

4. Alarm Sources and References

4.1 RC Pressure WR on Multipoint Recorder (1RC CR0045) fed by 1RC PT-21P with backup upon failure from 1RC PT-23P (Channel B)

4.2 OM 201.H-0202 001

SR 3.5.4.2 7 Days	BWST		**IF** Monday (D)		BWST borated water volume ≥ 350,000 gallons as follows: **NOTE:** It is preferable to verify volume on at least two instruments however, one instrument can be used to meet the surveillance requirement. Verify two of the following: • A 1LT-BWST 1 ICCM Plasma ≥ 47.0 ft. • B 1LT-BWST 2 ICCM Plasma ≥ 47.0 ft. • 1MSCCR0004 ≥ 47.0 ft. **IF** required conditions **NOT** met, BWST is inoperable, enter TS 3.5.4 Condition B.
SR 3.5.4.1	BWST Temperature	(N)	(D)	O1E0160	Verify BWST ≥ 52.5°F and ≤ 102.5°F as read on

References Provided to Applicant

- None

Question 88
Given the following Unit 3 conditions:

Time = 1000
- Reactor power = 100%
- 3A RBS pump is out of service
-

Time = 1001
- Seismic event
- 3SA09/C9 (RBCU B Cooler Rupture) actuated
- 3BRBCU inlet flow 750 gpm
- 3B RBCU outlet flow 920 gpm
- 3TE de-energized

Time = 1014
- 3SA09/C9 required actions are complete

Time = 1015
- Damage from seismic event results in a design basis LOCA

At 1001, 3SA09/C9 (RBCU B Cooler Rupture) alarm is __(1)__.

At 1015, the RBCUs and RBS systems __(2)__ sufficient to limit containment temperature and pressure within design limits.

Which ONE of the following completes the statements above?

A
1. valid
2. are

B
1. valid
2. are NOT

C
1. NOT valid
2. Are

D
1. NOT valid
2. are NOT

Proposed Answer: C

K/A Match Analysis

022 Containment Cooling (SRO)
022G2.4.46 Ability to verify that the alarms are consistent with the plant conditions.

Requires the ability to verify that the RBCU rupture alarm is not valid based on plant conditions and apply knowledge of Tech Spec basis information.

SRO only:
Meets 10CFR55.43(b)(2) Facility operating limitations in the technical specifications and their bases.

Answer Choice Analysis

E. INCORRECT. First part plausible because the applicant may misunderstand the flow difference between inlet and outlet flow is normal and due to the change in temperature across the RBCU cooling coil.
Second part is correct.
F. INCORRECT.First part incorrect, see A.
Second part plausible, applicant may under the misconception that the RBCU's follow the standard power distribution and believe TE supplies the 3C RBCU and may believe that acooler rupture has rendered the 3B RBCU inoperable or the applicant may believe two trains of RBS are out of service due to loss of 3TE, or various other combinations of misconceptions regarding power supplies to RBS and RBCUs, or may not know the design basis requires only one train of RBS and two RBCUs operating.
G. CORRECT.First part, the flows given are normal and above the alarm set points.
Second part, safety analysis has shown that two trains of RBCU and one train of RBS are sufficient to maintain containment within design temperature and pressure following a design basis LOCA.
H. INCORRECT. First part correct.
Second part incorrect, see above.

Technical Reference(s):

SLC 16.9.12

TS 3.6.5 and TS basis

Proposed references to be provided to applicants during examination: None

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

Question History: Last NRC Exam: NEW

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

10 CFR Part 55 Content: 55.41 X
55.43 X

Supporting References (excerpted from lesson plans)

OP-OC-ADM-ITS, Rev. 05d

8. State from memory selected Tech Spec LCO, and Bases where designated, as well as APPLICABILITY statements including any associated NOTES per Attachment 1. (R8)

ATTACHMENT 1

Tech Specs required to be committed to memory per Objective R8.

11. RBS/RBCU (3.6.5)

OP-OC-PNS-RBC, Rev 22b

from page 17 of 25:

2.4 Degraded Operation

C. In the unlikely event of a failure of one of the three RBCUs, the remaining two RBCUs will still provide sufficient cooling capacity to perform RBCUs Safety Function.

D. During an accident, a minimum of two RBC trains and one RBS train are required to maintain the containment pressure and temperature following a LOCA.

E. TS requires that two RBS trains and three RBCU trains be operable in MODE 1 and 2. The worst case single failure scenario (loss of one ES bus) would result in one train of RBS and one train of RBCU being inoperable.

F. Containment temperature response following a LOCA or MSLB will be within the equipment qualifications analysis conditions with one train of RBS and two RBCUs operable. Because the accident analysis of these two systems is tied together as such, the operability requirements (per TS) of these two systems are also interdependent.

Obj. 13, Describe two conditions that will activate a RBCU "Cooler Rupture" alarm.

from page 18 of 25:

5) **(Obj R13)** RBCU Rupture Alarms (1,2,3SA-9)

a) Two conditions will activate a cooler rupture alarm:

1) **327 gpm difference**inlet vs. outlet flow

(a) Uses flow transmitters that supply control room indications.

(b) A difference in flow indicates water being lost and is representative of a cooler rupture.

OR

2) **566 gpm LPSW flow, decreasing**, indicated at the cooler inlet.
   (a) This is indicative of cooler inlet valve not being open for some reason.
   (b) Since inlet valve is not ES valve, it will not auto open on an ES signal if it is shut.
   (c) If the inlet valve is not open, an ES 5 & 6 actuation should cause the cooler rupture alarm to be activated.
   (d) If received, the inlet valve should be verified to be fully open. (If not refer to Tech Spec/SLC)

b) If cooler rupture alarm is received, alarm response guide (ARG) should be consulted.
   1) Verify valid alarm – check inlet flow and delta flow.
   2) Verify LPSW outlet valve open.
   3) Verify adequate LPSW flow available; verify inlet valve open; check LPSW Pump operation.
   4) Monitor RBNS Level for any unexplained increase.
      - If RBNS Level is increasing, notify Chemistry to sample the RBNS for boron concentration to determine if a cooler rupture has occurred.
   5) IF RBCU Cooler rupture is indicated, then:
      - Isolate LPSW to affected RBCU. (follow prescribed sequence)
      - Refer to TS

C-9

LPSW

RBCU B COOLER RUPTURE

1. Alarm Setpoint

1.1 327 gpm Δ FLOW INCR.

1.2 566 gpm INLET FLOW DECR with RBCU 3B Outlet Valve Full Open

2. Automatic Action

None

3. Manual Action

3.1 Verify alarm condition is valid by checking RBCU 3B Inlet Flow and RBCU 3B Δ Flow.

3.2 Verify 3LPSW-21 (RBCU 3B OUTLET) open.

3.3 Verify adequate LPSW flow is available; check LPSW Pump operation.

3.3.1 Verify 3LPSW-19 (3B RBCU & AUX FAN CLR INLET) open.

3.3.2 **IF** 3LPSW-19 (3B RBCU & AUX FAN CLR INLET) **NOT** open, refer to Technical Specifications and Selected Licensee Commitments.

3.4 Monitor RBNS Level for any unexplained increase.

3.5 **IF** RBNS Level is increasing **AND** ES has actuated, notify Chemistry to sample the RBNS for boron concentration to determine if a cooler rupture has occurred based on sample results.

C-9

3.6 **IF** RBCU 3B Cooler rupture or line break is indicated, then:

NOTE:	This sequence prevents having to call LPSW and Containment inoperable per SLC 16.9.12.

3.6.1 Isolate the 3B RBCU Cooler as follows:

A. Close 3LPSW-19 (3B RBCU & AUX FAN CLR INLET).

B. Close 3LPSW-21 (RBCU 3B OUTLET).

C. Perform TS 3.6.3 Condition C for closed containment system.

D. Enter TS 3.6.5 for RBCU inoperable.

E. Continue to monitor RBNS level for increase.

F. **IF** RBNS level is still increasing, notify TSC to evaluate further isolation of 3B RBCU.

3.6.2 Refer to Technical Specifications.

3.6.3 Refer to SLC 16.9.12.

3.6.4 Refer to OP/3/A/1104/010 (Low Pressure Service Water).

3.6.5 Refer to OP/3/A/1104/015 (Reactor Building Cooling System).

4. Alarm Sources and References

4.1 3PS-57 RBCU 3B Flow Diff. Hi

4.2 3PS-362 RBCU 3B Inlet Flow

4.3 CBRX RBCU 3B Rupture Alarm Auxiliary Relay

4.4 OEE-338-28

16.9 AUXILIARY SYSTEMS

16.9.12 Additional Low Pressure Service Water (LPSW) And Siphon Seal Water (SSW) System OPERABILITY Requirements

COMMITMENT The following Structures, Systems and Components (SSCs) shall be OPERABLE:

a. LPSW-4 ("A" LPI COOLER SHELL OUTLET)
b. LPSW-5 ("B" LPI COOLER SHELL OUTLET)
c. LPSW Pump Minimum Flow Recirculation Lines
d. LPSW-139 (LPSW SUPPLY TO TB NON-ESSENTIAL HDR)
e. LPSW-251 (“A” LPI COOLER LPSW CONTROL)
f. LPSW-252 (“B” LPI COOLER LPSW CONTROL)
g. LPSW flow to each Reactor Building Cooling Unit (RBCU)
h. 2/3LPSW-577 (RB Vent Cooling Coil A1 Inlet)
i. 2/3LPSW-582 (RB Vent Cooling Coil A2 Inlet)
j. LPSW alignment to the RB Auxiliary Cooler (RBAC) Cooling Coils
k. One required SSW Header
l. LPSW Pump(s) required for SSW Header OPERABILITY as defined by TS 3.7.7

APPLICABILITY: MODES 1, 2, 3, and 4.

ACTIONS

K.	LPSW flow to any RBCU is less than 420 gpm. <u>AND</u> The LPSW inlet isolation valve for the associated RBCU is not closed.	K.1	Declare Containment inoperable. <u>AND</u>	Immediately
		K.2	Declare all required LPSW pumps inoperable.	Immediately

B 3.6 CONTAINMENT SYSTEMS

B 3.6.5 Reactor Building Spray and Cooling Systems

BASES

APPLICABLE SAFETY ANALYSES

The Reactor Building Spray System and Reactor Building Cooling System reduce the temperature and pressure following an accident. The limiting accidents considered are the loss of coolant accident (LOCA) and the steam line break. The postulated accidents are analyzed, with regard to containment ES systems, assuming the loss of one ES bus. This is the worst-case single active failure, resulting in one train of the Reactor Building Spray System and one train of the Reactor Building Cooling System beinginoperable.

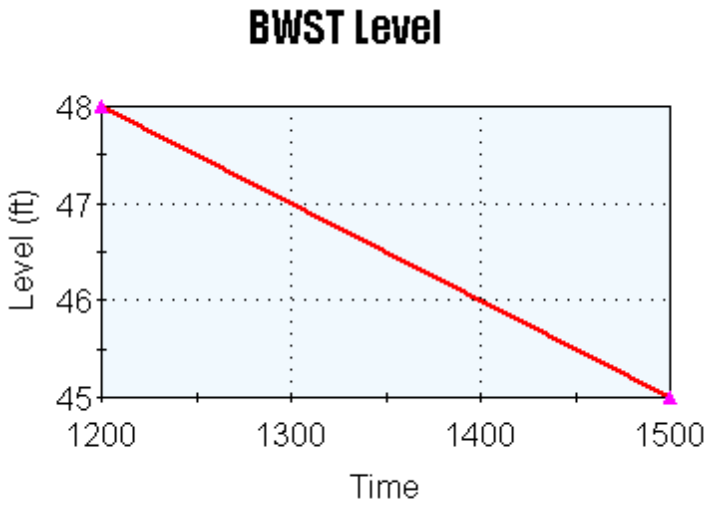
…The analyses and evaluations assume a power level of 2619 MWt, one reactor building spray train and two reactor building cooling trains operating…

References Provided to Applicant

- None

Question 89

Given the following Unit 1 conditions:



Referring to the chart of control room indicated BWST level above, the latest time that adequate NPSH for the LPI and RBS pumps after suction is swapped to the RBES is ___(1)___.

The minimum ___(2)___ limits of the BWST ensure the solution in the RB Emergency sump following a LOCA is within a specified pH range.

A
1. 1300
2. Level

B
1. 1300
2. boron concentration

C
1. 1400
2. Level

D
1. 1400
2. boron concentration

Proposed Answer: A

K/A Match Analysis

026 Containment Spray (SRO)
G2.4.47 Ability to diagnose and recognize trends in an accurate and timely manner utilizing the appropriate control room reference material.

Question requires ability to monitor a control room trend and determine if TS requirements are met.

SRO only:
Meets 10CFR55.43(b)(2) Facility operating limitations in the technical specifications and their bases.

Can Q be answered solely by knowing ≤ 1 hour TS/TRM Action? NO
Can Q be answered solely by knowing the LCO/TRM information listed above-the-line? NO
Can Q be answered solely by knowing the TS Safety Limits? NO

Answer Choice Analysis

I. INCORRECT. First part correct, per PT/600/001 the BWST level limit is 47 feet. This is the error corrected value. The TS value is 46 feet. Per the basis of TS 3.5.4: "A second factor that affects the minimum required BWST volume is the ability to support continued LPI pump operation after the manual transfer to recirculation occurs. When LPI pump suction is transferred to the sump, there must be sufficient water in the sump to ensure adequate net positive suction head (NPSH) for the LPI and reactor building spray pumps."
Second part incorrect, plausible because the minimum BWST level does NOT ensure the pH in the RBES, however ensuring pH is the basis for limiting the maximum level in the BWST.

J. CORRECT. First part is correct.
Second part is correct. The minimum and maximum concentration limits both ensure that the long term solution in the sump following a LOCA is within a specified pH range that will allow the BS system to minimize the evolution of iodine and the effect of chloride and caustic stress corrosion cracking on the mechanical systems and components.

K. INCORRECT. First part is plausible because it is the TS non instrument corrected value. Second part is incorrect.

L. INCORRECT. First part is plausible because it is the TS non instrument corrected value. Second part is correct

Technical Reference(s):

TS 3.5.4 basis Rev. dated 05/16/12
PT/1/A/0600/001 Rev. 328

SR 3.5.4.2 7 Days	BWST		**IF** Monday (D)		BWST borated water volume ≥ 350,000 gallons as follows: **NOTE:** It is preferable to verify volume on at least two instruments however, one instrument can be used to meet the surveillance requirement. Verify two of the following: • A 1LT-BWST 1 ICCM Plasma ≥ 47.0 ft. • B 1LT-BWST 2 ICCM Plasma ≥ 47.0 ft. • 1MSCCR0004 ≥ 47.0 ft. **IF** required conditions **NOT** met, BWST is inoperable, enter TS 3.5.4 Condition B.
SR 3.5.4.1	BWST Temperature	(ND)	(D)	Q1E0160	Verify BWST ≥ 52.5°F and ≤ 102.5°F as read on

Proposed references to be provided to applicants during examination: None

Learning Objective:

Question Source: Bank # _____
Modified Bank # ILT 42 Q87 (parent attached)
New _____

Question History: Last NRC Exam: ILT 42

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

10 CFR Part 55 Content: 55.41 X
55.43 X

Supporting References (excerpted from lesson plans)

References Provided to Applicant
- None

Question 90

Unit 1 Plant conditions are as follows

Initial Plant conditions:

- Rule 3 is in progress
- LOHT tab in progress
- NO SGs can be fed with FDW (Main/ CBP/Emergency)
- RCS pressure reached 2300 psig
- Rule 4 (Initiation of HPI Forced Cooling) is in progress
- SRO has transferred to HPI CD tab

Current Plant conditions:

- 1A Main Feed Pump is available to feed SGs, ability to feed has been verified
- 1A1 RCP is in operation
- RCS Tcold = 525 degrees
- TBVs available

Initially feed1A SGs at ___(1)___x 10^6lbm/hr until heat transfer is established.
The reason for the above limit is to prevent exceeding SG ___(2)___ stress limits.

Which ONE of the following completes the statement above?

A
1. 0.05
2. Tensile

B
1. 0.05
2. Compressive

C
1. 0.5
2. Tensile

D
1. 0.5
2. compressive

Proposed Answer: A

K/A Match Analysis

059A2.04Ability to (a) predict the impacts of the following malfunctions or operations on the MFW; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: Feeding a dry S/G

SRO only, seems like this should be SRO only but what exactly can I tie it to in 10CFR55.43 ?

Assessment of conditions and selection of appropriate procedures? This question requires knowledge of the basis for EOP steps.

Operating limitations in the TS? Don't have specific TS for feeding drySG.

Answer Choice Analysis

M. CORRECT. Part 1: Rule 7, table 1 establishes the allowable initial feed rate for a dry SG with no heat transfer.
Part 2: Based on listed plant conditions, HPI forced cooling has been adequately removing decay heat and the SG losing heat only via ambient losses, therefore the SG shell temperature will be higher than the RCS temperature and the SG tubes will be under tensile stress. Tensile stress is the limiting factor for initial feed rates to a dry SG with no heat transfer.

N. INCORRECT. Part 1 is correct.
Part 2 is plausible because if HPI forced cooling were inadequate then the RCS would be hotter than the SG and the stresses on the tubes would be compressive, however the procedural limit is based on tensile stress limits.

O. INCORRECT.Part 1 is plausible because this is the Rule 7, Table 1 limit for feeding a dry SG with heat transfer, and will be the procedural flow limit once heat transfer is established.
Part 2 is correct.

P. INCORRECT. See above.

Technical Reference(s):

Enclosure 5.40 **Recovery From HPI Forced Cooling**	EP/**1**/A/1800/001 Pages 1 thru 1 of 7

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
6 Direct the CR SRO to perform a briefing to discuss at least the following:	

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
__ Proximity to and consequences of ES actuation __ Operator roles including the following: • Designation of primary system RO and secondary system RO • Walkthrough of enclosure • Method for SG pressure control (manual or automatic) and control band for SG pressure. Ensure crew understands that steaming with the TBVs in manual should not be done until steam pressure equals P_{sat} for existing RCS temperature. • Ensure crew understands that SG levels will **NOT** be established until after steam pressure equals P_{sat} for existing RCS temperature. • Ensure crew understands which SGs to feed and the initial feed rates based on RCP operation.	
7 Perform the following: 7.1 __ Determine required 1RC-66 SETPOINT SELECTOR position for HPI recovery per the following: • RCS $T_{cold} \geq$ 325°F: HIGH • RCS $T_{cold} <$ 325°F: LOW 7.2 __ Record required 1RC-66 SETPOINT SELECTOR position in Step 12.	
8 Verify all of the following: __ T_{cold}>510°F __ TBVs available	1. __ Manually control SG pressure to match RCS P_{sat} during recovery. 2. __ **GOTO** Step 8.
9 __ Verify $T_{cold} \leq$ 547°F.	1. __ Ensure THP setpoint at 884 - 885 psig. 2. __ **GOTO** Step 7.
10 __ Determine P_{sat} for existing RCS temperature (RCS P_{sat}).	
11 __ Adjust TBV setpoint to RCS P_{sat} minus 140 psi: Setpoint = _____ - 140 = _____ RCS P_{sat} (psia)	
12 __ Place TBVs in AUTO for available SGs.	__ Manually control SG pressure to match RCS P_{sat} during recovery.
13 Perform the following:	

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
13.1 __ Determinefeedwater flow required for recovery from HPI per Encl 5.13 (Total Feedwater Flow Required to Match NSSS Heat). 13.2 __ Record flow in appropriate substep of Step 16.	
NOTE • Steps 9 - 15 are performed by primary system RO and Steps 16 - 20 are performed by the secondary system RO. • Steps 9 - 15 and Steps 16 - 20 are performed concurrently. • Head and highpoint vents are closed **IF** breakers are open. Sign off as intent met.	
14 __ Verify PORV open.	1. __ Notify secondary RO of intent to close 1RC-155 - 1RC-160. 2. Close the following: __ 1RC-155 __ 1RC-156 __ 1RC-157 __ 1RC-158 __ 1RC-159 __ 1RC-160 3. __ **GOTO** Step 13.
15 Close the following: __ 1RC-155 __ 1RC-156 __ 1RC-157 __ 1RC-158 __ 1RC-159 __ 1RC-160	
16 __ Notify secondary RO of intent to close PORV.	
17 Perform the following: 17.1 __ Position 1RC-66 SETPOINT SELECTOR to _____. 17.2 __ Verify 1RC-66 closed.	**NOTE** **IF** SSF-ASW is operating, the SSF operator has control of 1RC-4. __ Close 1RC-4.
18 __ Throttle HPI to provide only for RCS leakage and seal injection.	
19 __ Adjust 1HP-7 for ≈ 26 gpm.	
20 __ **WHEN** RCS P/T is stable, **THEN** notify secondary RO that primary RO actions are complete.	

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
NOTE • With both SGs available and **NO** RCPs operating, total feed flow should be split evenly between the SGs. • With one RCP operating, all the flow from Step 8 is fed to the SG with the RCP. The 100 gpm to the loop with **NO** RCP is **NOT** part of the total feed flow value determined in Step 8.	
21 __ **WHEN** 1RC-155 - 1RC-160 are closed, **AND** the PORV is closed, **THEN** feed available SGs per one of the following: __ **NO** RCPs operating: • Feed available SGs at an initial total feed flow of _____ gpm. __ One RCP operating: • Feed the SG with the RCP at an initial total feed flow of _____ gpm. • Feed the SG with **NO** RCP at an initial flow of 100 gpm.	
22 __ Adjust feed to available SGs to stabilize RCS P/T.	
23 __ Verify primary to secondary heat transfer exists.	__ Notify CR SRO that primary to secondary heat transfer does **NOT** exist.
24 __ Verify TBVs in AUTO.	__ Manually control SG pressure to match RCS P_{sat} as determined in briefing.
25 __ **WHEN** actions of the primary RO are complete, **THEN** notify CR SRO of completion of HPI forced cooling recovery.	

••• END •••

NOTE

Feed Rates listed in Table 1 are maximum allowable feed rates. Manual control of feed rates may be required for plant stabilization and are dependent on decay heat, RCP operation, and other factors. Feed rates for low decay heat conditions will be much lower and are determined by observing RCS indications for overcooling.

Table 1
Maximum Feed Rates When All SCMs are > 0°F

SG Condition	Flow Instrument	Maximum Feed Rate
Dry SG w/o Heat Transfer	EFDW flow indicator	100 gpm to affected SG
	S/U FDW flow indicator	0.05 x 10^6 lbm/hr to affected SG
	SSF ASW flow indicator	100 gpm total to Unit 1
Non-dry SG **OR** Dry SG with Heat Transfer	EFDW flow indicator	1000 gpm per header
	S/U FDW flow indicator	0.5 x 10^6lbm/hr per header
	SSF ASW flow indicator	500 gpm total to Unit 1
SSF Event* occurred while in MODE 1 or 2 with TD EFDWP **OR** alternate unit providing SG feed	EFDW flow indicator **OR** S/U FDW flow indicator	• Feed as needed to maintain RCS pressure band of 1950 - 2250 psig (1600 - 2200 psig if notified by SSF of PZR Solid Ops Control Band) • **WHEN** RCS pressure band is established, **THEN** feed to establish RCS Narrow Range T_c550 - 555°F.

also

AREVA EMERGENCY OPERATING PROCEDURES TECHNICAL BASES DOCUMENT
VOLUME 1
GENERIC EMERGENCY OPERATING GUIDELINES
Rev 10, page IV K20

Proposed references to be provided to applicants during examination: None

Learning Objective:

OP-OC-EAP-EHT,Rev 18c

1 INTRODUCTION

1.1 The shell of a SG that has been isolated because of a steam line break will remain hotter than the tubes (primary coolant) for some amount of time since, without feedwater, the only cooling that would be available for the very thick metal mass of the shell would be ambient cooling.

1.2 ***(Obj. R9)*** If the shell is allowed to remain much hotter than the tubes during the plant cooldown, tensile stresses will develop that can "stretch" tubes out of the tube sheet.

OP-OC-EAP-LOHT, Rev 16

18. Given plant conditions, determine appropriate actions based on Rule 7 (SG Feed Control). (R27)

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

Question History: Last NRC Exam: NEW

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

10 CFR Part 55 Content: 55.41 X
55.43 X

References Provided to Applicant
- None

Question 91

Given the following Unit 1 conditions:

Initial Conditions:

- Unit 1 has experienced a Small Break LOCA
- Loss of Subcooling Margin tab in progress
- No flow exists in the B HPI header

Current conditions

- An unexpected increase in neutron flux occurs

Which ONE of the following is correct?

A Direct the performance of Rule 1 and transfer to the UNPP tab.
Feed SG at 300 gpm per SG initially and throttle to control cooldown rate.

B Continue in LOSCM tab.
Feed SG at 1000 gpm per header to the LOSCM setpoint.

C Direct the performance of Rule 1 and transfer to the UNPP tab.
Feed SG at 1000 gpm per header to the LOSCM setpoint.

D Continue in the LOSCM tab.
Feed SG at 300 gpm per SG initially and throttle to control cooldown rate.

Proposed Answer: B

K/A Match Analysis

Requires knowledge of the operational implications of EOPwarnings, cautions, and notes regarding Nuclear Instrumentation.

Answer Choice Analysis

Q. INCORRECT. Part 1 plausible because this would be correct if not performing a rapid cooldown and depressurization due to inadequate HPI for an unexpected increase in neutron flux per the LOSCM tab foldout page. Part 2 plausible because this is directed by table 2 of Rule 7, which is for feed rates when NOT performing a rapid cooldown.

R. CORRECT .Part 1, the EOP note just prior to instructions for rapid cooldown states An unexpected increase in neutron flux may occur due to the rapid cooldown. The rapid cooldown and depressurization should continue. A significant return to power should not occur. Part 2, directions are given to feed initially at 300 gpm per S/G, then to increase flow to max allowed by rule 7 table 3 (1000 gpm per header).

S. INCORRECT. Part 1 incorrect, plausible explanation above. Part 2 correct.

T. CORRECT. Part 1 correct, Part 2 plausible explanation above.

Technical Reference(s):

EP/1/A/1800/001 rev 039

Rule 7 and LOSCM tab

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
Unit Status One or more of the following conditions exists: • Any RCP operating • **NO** HPI flow or HPI flow in only one header • Inadequate total HPI flow	
2 __ **IAAT**all SCMs are > 0°F, **OR** all the following exist: __ **NO** RCPs operating __ HPI flow in both HPI headers __ Adequate total HPI flow per Figure 1 (Total Required HPI Flow) **THENGO TO** Step 89.	
NOTE An unexpected increase in neutron flux may occur due to the rapid cooldown. The rapid cooldown and depressurization should continue. A significant return to power should not occur.	
3 Start both: __ 1A MDEFDW Pump __ 1B MDEFDW Pump	__ Continue.
4 __ Start the TDEFDWP.	__ **IFNO** EFDW pump is operating, **THENGOTO** Step 29.
5 Establish 300 gpm EFDW flow to each: __ 1A SG __ 1B SG	__ Establish 450 gpm EFDW flow to the available SG.
6 __ Verify both MDEFDW pumps are operating.	__ **IF** the TDEFDWP is the only operating EFDW pump, **AND**either exist: __ AS is isolated to the TDEFDWP __ Unit 1 is supplying the AS header **THENGO TO** Step 23.
7 Initiate full depressurization of both SGs utilizing either: __ TBVs __ ADVs	

8	_ Initiate EFDW flow to all available SGs to LOSCM setpoint at maximum allowable rate (per Table 3 (Emergency FDW Pump and Header Maximum Flow Limits) of Rule 7 (SG Feed Control)).	

Table 2
Feed Rates To Be Established When Any SCM is ≤ 0°F and Rapid Cooldown NOT in Progress

NOTE
After initial feed rates are established, flow may be throttled to control cooldown but SG levels must continue to increase until LOSCM setpoint is reached. This note does **NOT** apply to SSF Event.

FDW source	Flow Instrument	Initial Feed Rates	
Emergency FDW	EFDW total flow indicator	1 SG	450 gpm
		2 SGs	300 gpm each
	S/U FDW flow indicator	1 SG	0.23 x 10^6lbm/hr
		2 SGs	0.15 x 10^6lbm/hr each
Main FDW	S/U FDW flow indicator	1 SG	0.33 x 10^6lbm/hr
		2 SGs	0.22 x 10^6lbm/hr each
SSF ASW **AND NO** SSF Event*	SSF ASW flow indicator	400 gpm total to Unit 1	

Table 3
Emergency FDW Pump and Header Maximum Flow Limits

		EFDW flow indicator	S/U FDW flow indicator
MDEFDWP	**(suction from HW)**	440 gpm/pump	0.22 x 10^6lbm/hr
	(suction from UST)	600 gpm/pump	0.30 x 10^6lbm/hr
TDEFDWP (any suction source)		950 gpm	0.45 x 10^6lbm/hr
Emergency FDW Header Flow		1000 gpm	0.5 x 10^6lbm/hr

Proposed references to be provided to applicants during examination: None

Learning Objective:

OP-OC-EAP-LOSCM, rev18, Obj. R6

9 Explain why SG levels should be raised to the Loss of SCM (LOSCM) Setpoint. **(R6)**

9.1 Briefly explain the methods to determine the LOSCM setpoint

9.2 Discuss the time critical action to open all TBVs or ADVs to steam at least one SG with only one HPI pump available during SBLOCA

9.3 Discuss the time critical action to initiate SG level increase to LOSCM setpoint if HPI flow degraded during SBLOCA

Question Source: Bank # _____

Modified Bank # _____ (Note changes or attach parent)

New x

Question History: Last NRC Exam: New

Question Cognitive Level: Memory or Fundamental Knowledge _

Comprehension or Analysis X

10 CFR Part 55 Content: 55.41 X

55.43 X

(5) Assessment of facility conditions and selection of appropriate procedures during normal, abnormal, and emergency situations.

Comments:

015G2.4.20 Nuclear Instrumentation (SRO): Knowledge of the operational implications of EOP warnings, cautions, and notes.

Supporting References (excerpted from lesson plans)

Lesson plan page 18 of 40:

E. It is important that the SRO reading the EOP check the graph for total flow rather than removing the page and giving it to an NCO to check. The rapid cooldown that would be required if total HPI flow is found to be insufficient is a maneuver that we do not want to undertake unless it is absolutely necessary. *Because of the importance of this step it was intentionally placed in the body of the EOP and needs to be an SRO decision.*

References Provided to Applicant

- None

Question 92
Given the following conditions on Unit 3:

- Shutdown for refueling in progress
- Reactor in MODE 4
- Component Handling in progress in the Spent Fuel Pool
- A fuel assembly is currently in the mast and being moved
- 3RIA-6 (SFP Area Monitor) shows an observable increase, approximately one half (½) decade above background
- 3SA-8/B-9 (RM Process Monitor Radiation High) in alarm due to 3RIA-32
- Spent Fuel Pool level = minus (-) 2.7 feet decreasing

Which ONE of the following completes the statements below?

Enter __(1)__ to mitigate the event and the required Technical Specification entry and basis is __(2)__.

1) Which ONE of the following completes the statement above?

A
1. AP/35 (Loss of SFP Cooling and/or Level)
2. TS 3.10.1 (SSF) - Ensures the RC Makeup pump can maintain all three Oconee Units in MODE 3 for a minimum of 72 hours

B
1. AP/35 (Loss of SFP Cooling and/or Level)
2. TS 3.7.11 (Spent Fuel Pool Water Level) - Ensures adequate iodine removal during a fuel handling accident

C
1. AP/18 (Abnormal Release of Radioactivity)
2. TS 3.10.1 (SSF) - Ensures the RC Makeup pump can maintain all three Oconee Units in MODE 3 for a minimum of 72 hours

D
1. AP/18 (Abnormal Release of Radioactivity)
2. TS 3.7.11 (Spent Fuel Pool Water Level) - Ensures adequate iodine removal during a fuel handling accident

Proposed Answer: B

K/A Match Analysis

034 Fuel Handling Equipment (SRO)

034G2.4.11 Knowledge of abnormal condition procedures.

Requires knowledge of abnormal condition procedures for fuel handling.

SRO only:
Meets 10CFR55.43(b)(2) Facility operating limitations in the technical specifications and their bases.

Can Q be answered solely by knowing ≤ 1 hour TS/TRM Action? NO

Can Q be answered solely by knowing the LCO/TRM information listed above-the-line? NO
Can Q be answered solely by knowing the TS Safety Limits? NO

Answer Choice Analysis

U. INCORRECT. First part is correct. TS entry not required
V. CORRECT.AP/35 (Loss of SFP Cooling and/or Level) should be entered due to low SFP level. SFP water level limit is based on ensuring adequate iodine removal during a fuel handling accident.
W. INCORRECT.First part is incorrect because AP-35 is a higher priority. Plausible because a valid alarm on RIA-32 is an entry condition for AP/18, but AP/35 is a higher priority and the procedure used to mitigate this event.
Second part is plausible because this is true for 72 hours.
X. INCORRECT. First part is incorrect because AP-35 is a higher priority. Plausible because a valid alarm on RIA-32 is an entry condition for AP/18, but AP/35 is a higher priority and the procedure used to mitigate the event. Second part is incorrect. Plausible because the water does provide shielding and reduces dose rate

Technical Reference(s):

(including version/revision number)

Proposed references to be provided to applicants during examination: None

Learning Objective:

Question Source:	Bank #	_____
	Modified Bank #	EAP2109106 (Note changes or attach parent)
	New	_____
Question History:	Last NRC Exam: 2007 SRO retest exam	
Question Cognitive Level:	Memory or Fundamental Knowledge	_
	Comprehension or Analysis	X
10 CFR Part 55 Content:	55.41 X	
	55.43 X	

Supporting References (excerpted from lesson plans)

References Provided to Applicant

- None

Question 93
Given the following Unit 1 conditions:

Initial conditions:

- Unit 1 TDEFDW pump is out of service
- A lightning strike in the switchyard causes a reactor trip
- Incorrect wiring in 4160v relays cause a slow transfer of power to the startup transformer
- Rule 3 is in progress

Current conditions:

- Both MD EFDW pumps fail
- LOHT tab initiated
- ALL SCMs > 0°F

Condensate Booster Pump feed ___(1)____ be established.

RCS temperature subsequently increases and results in "A" core SCM = 0°F, this will cause a __(2)_____ .

Which ONE of the following correctly completes the statements above?

A
1. can
2. transfer to the LOSCM tab

B
1. can
2. transfer to the HPI CD tab

C
1. can **NOT**
2. transfer to the LOSCM tab

D
1. can **NOT**
2. transfer to the HPI CD tab

Proposed Answer: D

K/A Match Analysis

056 Condensate (SRO)
056A2.04 Ability to (a) predict the impacts of the following malfunctions or operations on the Condensate System; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those mal-functions or operations: Loss of condensate pumps.

Requires the ability to predict that impact of a slow transfer to the startup transformer will cause a loss of secondary pumps, including condensate pumps, and to use emergency procedures to mitigate the loss of condensate pumps.

SRO Only: 10CFR55.43(b)(5) Assessment of facility conditions and selection of appropriate procedures during normal, abnormal, and emergency situations.

Answer Choice Analysis

A. INCORRECT. First part is plausible because AP-11 will re-establish Condensate flow after the loss and regain of all 4160V switchgear (which was due to slow transfer to the startup transformer will cause a load shed), however the EOP procedures do not allow CBP feed to be established once it has been lost.
Second Part is plausible because it would be correct if subcooling were <0°F due to any other cause than RCS heatup.

B. INCORRECT. First part plausible, see A.
Second part is correct, LOHT tab IIAT step 2 goes to step 4 which directs performing Rule 4, and with HPI FC parameters acceptable a transfer to HPI CD tab is made in step 6.

C. INCORRECT. First part is correct: EOP procedures do not allow CBP feed to be established once it has been lost due to the slow transfer of power to the startup transformer, even though condensate flow is restored by AP-11.
Second part is plausible because , LOHT tab IIAT step 2 goes to step 4 which directs performing Rule 4, and with HPI FC parameters acceptable a transfer to HPI CD tab is made in step 6.

D. CORRECT. First part: EOP procedures do not allow CBP feed to be established once it has been lost due to the slow transfer of power to the startup transformer, even though condensate flow is restored by AP-11.
Second part: LOHT tab IIAT step 2 goes to step 4 which directs performing Rule 4, and with HPI FC parameters acceptable a transfer to HPI CD tab is made in step 6.

Technical Reference(s):
EP/1/A/1800/001, Rev. 39, LOHT tab

Proposed references to be provided to applicants during examination: None

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

Question History: Last NRC Exam: NEW

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

10 CFR Part 55 Content: 55.41 X

55.43 X

Supporting References (excerpted from lesson plans)

OP-OC-EL-EPD, Rev 31c, Obj. R-30 and R-50

28. Describe, briefly, the normal relaying logic that initiates automatic transfers to the startup source when normal source voltage is lost, including: (R-30)

    28.1 Type of transfer (live bus, rapid bus, dead bus)

    28.2 Time delay circuit

40. Evaluate the overall effect on plant operation from the loss of ALL or part of the Electrical Power Distribution System. (R-50)

page 105 of 114:

a) **Consequences of a "slow transfer**"

1) **4160V - 1.7 SECOND TIME DELAY** between the opening of the N1/N2 breakers and the closing of the E1/E2 breakers, will cause all loads supplied by that Unit's MFBs to lose power for 1.7 second.

(a) The 1.7 second power lose is long enough for equipment with **undervoltage relays (27) to activate**.

(b) Therefore ONLY previously running safety related equipment could be expected to still be running when power is restored after the one second time delay in swapping power sources.

(1) Examples of equipment **NOT** expected to return are **CBPs, HWPs, CCWPs, and HDPs**. This equipment would have to be restarted manually by procedure.

2) **6900V - 1.8 SECOND TIME DELAY** between the opening of the "normal" feeder breakers and the closing of the "startup" feeder breakers to 1TA and 1TB should have **no affect on RCP operation**, **however** the RCP Power Monitor will generate a trip signal and **if power is above 2% (actual SP is 1.5%) a Rx trip will occur**.

(a) There is a three **(3) second time delay before the RCPs will trip** on a undervoltage or loss of voltage condition.

NOTE: Operating Experience from 2007: A lightning strike caused Unit 1 and 2 to trip. Due to relay miswiring that had been present since the plant was constructed, Unit 1 had a slow transfer to the aux transformer and lost all secondary pumps. This resulted in off normal post trip actions to control the plant.

References Provided to Applicant

- None

Question # 94

Unit 3 Plant conditions:

Initial Plant conditions:

- Time = 0800
- Mode 4
- OAC computer point O3A1850 Unit 3 Cable Rm temperature = 77° F
- OAC computer point O3A1851 Unit 3 Equip Rm temperature = 82° F

Current Plant conditions:

- Time = 2000
- Mode 4
- OAC computer point O3A1850 Unit 3 Cable Rm temperature = 81° F
- OAC computer point O3A1851 Unit 3 Equip Rm temperature = 84° F

TS 3.7.16, (Control Room Area Cooling System) limits _____ been exceeded,
AND
SLC 16.8.1, (Control of Room Temperature for Station Blackout) limits _____ been exceeded.

Based on current plant conditions, which ONE of the following completes the statement above?

A
1. have
2. have

B
1. have NOT
2. have

C
1. have
2. have NOT

D
1. have NOT
2. have NOT

Proposed Answer: C

K/A Match Analysis

Requires ability to use plant computers to evaluate Control Room Area Cooling (CRACS) system status.

Answer Choice Analysis

A. INCORRECT. Part 1 is correct. The T.S. limits are applicable in Mode 1 through 4 and are 80° Cable Room and 85° Equipment Room based on values in SR 3.7.16.1. Part 2 is plausible because SLC 16.8.1 limits are applicable at all times and are 85° Cable

Room and 90° Equipment Room based on values in SR 16.8.1.2 and SR 16.8.1.3, and applicant may also confuse the entry conditions of AP/3/A/1700/036 (3° temperature rise over a shift).

B. INCORRECT. Part 1 is plausible because applicant may not recall TS 3.7.16 applicability or may not recall SR 3.7.16.1 values, and may also confuse the entry conditions of AP/3/A/1700/036 (3° temperature rise over a shift). Part 2 Plausible, see above.

C. CORRECT. Part 1, the T.S. limits are applicable in Mode 1 through 4 and are 80° Cable Room and 85° Equipment Room based on values in SR 3.7.16.1. Part 2, the SLC 16.8.1 limits are applicable at all times and are 85°Cable Room and 90° Equipment Room based on values in SR 16.8.1.2 and SR 16.8.1.3.

D. INCORRECT. Part 1 plausible, see above. Part 2 is correct.

Technical Reference(s):

AP/3/A/1700/036

1. Entry Conditions

1.2 Degraded CRACS as indicated by any of the following:

- Temperature increase exceeds 3°F per shift in Control Room or Cable Room or Equipment Room

CRACS spec 3.7.16

SR 3.7.16.1	Verify temperature in Control Room and Cable Room is ≤ 80°F and temperature in Electrical Equipment Room is ≤ 85°F.	In accordance with the Surveillance Frequency Control Program

CRACS SLC 16.8.1

	SURVEILLANCE	FREQUENCY
SR 16.8.1.1	Verify Control Room temperature is nominally ≤ 85°F.	24 hours
SR 16.8.1.2	Verify Cable Room temperature is nominally ≤ 85°F.	24 hours

Proposed references to be provided to applicants during examination: None

Learning Objective:

OP-OC-EAP-APG, Rev 3c

R1: Recognize plant conditions that require referencing applicable AP entry conditions for all APs.

OP-OC-ADM-TSS, Rev 10a

R1: Analyze plant conditions to determine any applicable TS or SLC Conditions, Actions, and/or Completion Times.

R6: Given a set of conditions, evaluate system, train, or component operability as defined in Tech Spec's and SLC's.

Question Source: Bank # _____

Modified Bank # _____ (Note changes or attach parent)

New ___X___

Question History: Last NRC Exam: NEW

Question Cognitive Level: Memory or Fundamental Knowledge _

Comprehension or Analysis X

10 CFR Part 55 Content: 55.41 X

55.43 X

10 CFR 55.43(b)(2) Facility operating limitations in the technical specifications and their bases.
For SRO-only: Application of Required Actions and Surveillance Requirements.

Comments:

2.1.19 Ability to use plant computers to evaluate system or component status.

Supporting References (excerpted from lesson plans)

References Provided to Applicant
- None

Question # 95

The following occurred while adding hydrogen to Unit 2 LDST:

At time 1000:

- LDST level = 75 inches stable
- LDST pressure = 35 psig stable
- Actions are being taken to vent the LDST

At time 1015:

- LDST venting complete
- LDST level = 74 inches
- LDST pressure = 12 psig stable

Based on the above level and pressure trend, at __(1)____ the HPI system was inoperable and in accordance with NSD 202 a ____(2)_____ is required.

REFERENCE PROVIDED

A
1. 1000
2. A 4 hour Emergency Notification System (ENS) notification **IS** required

B
1. 1000
2. A 4 hour Emergency Notification System (ENS) notification is **NOT** required

C
1. 1015
2. A 4 hour Emergency Notification System (ENS) notification **IS** required

D
1. 1015
2. 4 hour Emergency Notification System (ENS) notification is **NOT** required

Proposed Answer: A

K/A Match Analysis

Requires the ability to interpret reference materials, such as graph for LDST level vs. pressure, and make a Tech Spec determination, then apply NSD 200 for NRC notification.

Meets SRO only criteria 10CFR55.43(b)(2), requires knowing that both trains of HPI are inoperable when LDST pressure vs. level is above and to the left of the curve and with both trains of HPI out of service, TS 3.03 is entered. Also meets 10CFR55.43(b)(1), requires knowledge of the NRC reporting requirements conditions of the facility license.

Answer Choice Analysis

A. CORRECT. First part: In accordance with the note on the graph, operation above and to the left of the curve is not permitted, declare both trains of HPI inoperable. Second part: According to NSD 202, Section A13, Submit a Licensee Event Report (LER) within 60 days after discovery of any event where a single cause or condition caused two independent trains or channels of a listed system to become inoperable. HPI is a listed system.

B. INCORRECT. First part is correct.
Second part is plausible because a notification is required within 4 hours of initiation of a shutdown required by Tech Specs, however entering LCO 3.0.3, declaring an LCO not met and entering a TS Condition with a Required Action to be in Mode 3 within 6 hours or to otherwise reduce power does not constitute "initiation of a nuclear plant shutdown" unless a power reduction has occurred.

C. INCORRECT. First part is plausible because this time could be chosen if the applicant misapplies the required actions for being outside the "Permissible Operating Region" but still between curve 1 and curve 2 or if applicant thinks being below and to the right of the curve would make HPI inoperable due to low NPSH concerns.
Second part is correct.

D. INCORRECT. See plausibility statements above.

Technical Reference(s):

NSD 202, Rev 23:

A.3 INITIATION OF SHUTDOWN REQUIRED BY TS
Requirement(s)
1) **10 CFR 50.72(b)(2)(i)** – If not reported as a declaration of an Emergency Class under 10 CFR 50.72(a),
then notify the NRC as soon as practical and in all cases within four hours of the initiation of any nuclear
plant shutdown required by TS.
2) **10 CFR 50.72(a)(2)** – Notify the NRC via the Emergency Notification System (ENS). If the ENS is
nonfunctional, make the required notifications via commercial telephone service or other method which
will ensure that a report is made as soon as practical to the NRC Operations Center (301-816-5100)
Discussion
1) Entering LCO 3.0.3, declaring an LCO not met and entering a TS Condition with a Required Action to be
in Mode 3 within 6 hours or to otherwise reduce power does not constitute "initiation of a nuclear plant
shutdown" unless a power reduction has occurred.

2) “Initiation of a nuclear plant shutdown” does not include mode changes required by TS if initiated after the
plant is already in a shutdown condition. [NUREG-1022, “Event Reporting Guidelines 10 CFR 50.72 and
50.73, Revision 2 dated October 2000]

A.13 COMMON CAUSE INOPERABILITY OF INDEPENDENT TRAIN OR CHANNEL

Requirement(s)

1) **10 CFR 50.73(a)(2)(vii)** -- Submit a Licensee Event Report (LER) within 60 days after the discovery of
any event (within the past three years) where a single cause or condition caused at least one independent
train or channel to become inoperable in multiple systems or two independent trains or channels to become
inoperable in a single system designed to:

☐ **10 CFR 50.73(a)(2)(vii)(A) –** Shutdown the reactor and maintain it in a safe shutdown condition;

☐ **10 CFR 50.73(a)(2)(vii)(B) –** Remove residual heat;

☐ **10 CFR 50.73(a)(2)(vii)(C) –** Control the release of radioactive material; or

☐ **10 CFR 50.73(a)(2)(vii)(D) –** Mitigate the consequences of an accident

2) There is no corresponding requirement in 10 CFR 50.72.

Discussion

1) This Reportable Event requires those events to be reported where a single cause or condition caused
independent trains or channels to become inoperable. Common-causes may include such factors as high
ambient temperatures; heat up from energization; inadequate preventive maintenance; oil contamination of
air systems; incorrect lubrication; use of non-qualified components; or manufacturing or design flaws. The
event is reportable if the independent trains or channels were inoperable at the same time, regardless of
whether or not they were discovered at the same time. [NUREG-1022 Revision 2 dated 10/00].

Proposed references to be provided to applicants during examination:

OP/0/A/1108/001 (Curves and General Information) Enclosure 4.39 page 1 of 2 (redacted)

Learning Objective:

PNS-HPI Obj. R35

Question Source: Bank # _____

Modified Bank # _____

New X

Question History: Last NRC Exam: NEW

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

10 CFR Part 55 Content: 55.41 X
55.43 X

Comments:

G 2.1.25 Ability to interpret reference materials, such as graphs, curves, tables, etc.

Supporting References (excerpted from lesson plans)

OP/0/A/1108/001 (Curves and General Information) Enclosure 4.39 page 2 of 2

1. When HPI Pumps are operating: {3}
   1.1 LDST pressure and level should remain within "Permissible Op. Region" of "LDST Pressure Vs. Level" curves.
   - If system operation leaves the "Permissible Op. Region", but is still between Curve 1 and Curve 2, actions should be taken immediately to restore system to acceptable operating region.
   - "LDST Pressure Vs. Level" curves are also located on OAC.

NOTE: If LDST Pressure Vs. Level is above and to the left of Curve 1 and HPI emergency injection initiates, gas may be drawn into HPI Pump suctions resulting in HPI Pump damage.

2. If LDST Pressure Vs. Level is above and to the left of Curve 1, then declare **BOTH** trains of HPI INOPERABLE.
   2.1. Immediately depressurize LDST below Curve
   2.2. Refer to TS 3.0.3 for shutdown requirements.
   2.3. Make notifications as required by OMP 1-14 (Notifications).

NOTE: If LDST Pressure Vs. Level is below and to the right of Curve 2, it may be possible to draw a vacuum in LDST resulting in HPI Pump damage due to inadequate NPSH. This could occur even though sufficient LDST level exists.

3. If LDST Pressure Vs. Level is below and the right of Curve 2, then perform the following:
   3.1. Pressurize LDST back into "Permissible Op. Region" of "LDST Pressure Vs. Level" curve unless LDST is being depressurized intentionally by an approved procedure.
   3.2. Carry a note on the Turnover Sheet to the effect that if a transient occurs which requires additional HPI flow, immediately open (1)(2)(3)HP-24 and (1)(2)(3)HP-25 to provide an adequate suction source to HPI Pumps.
   3.3. **IF** LDST pressure **CANNOT** be maintained @ 0 psig, a LDST vent path must be established.

- (1)(2)(3)GWD-19 (LDST VENT) **AND** (1)(2)(3)GWD-20 (LDST Vent Blk) (LDST Hatch Area) must be open.

References Provided to Applicant

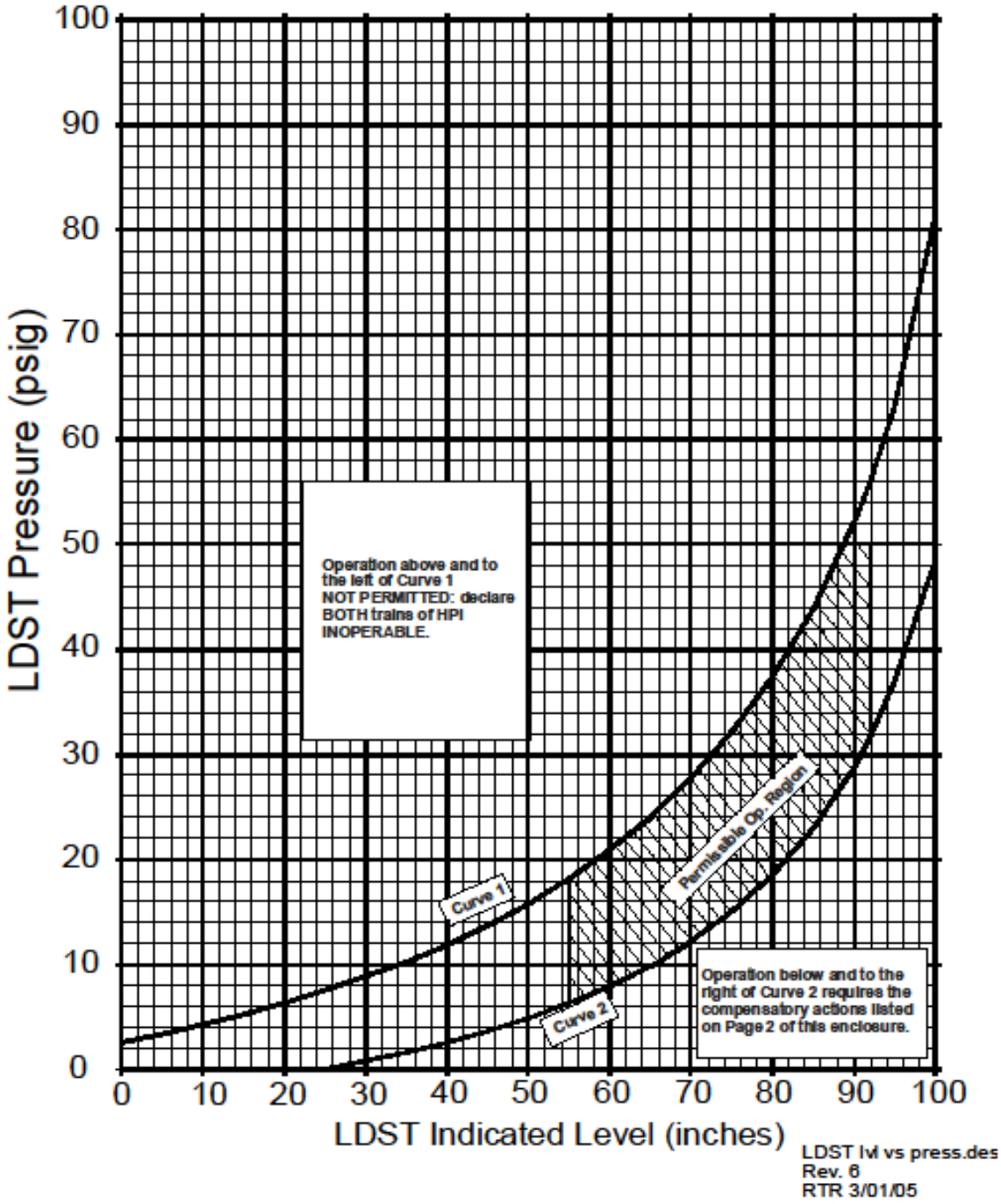
OP/0/A/1108/001 (Curves and General Information) Enclosure 4.39 page 1 of 2 (redacted)

Enclosure 4.39

LDST Pressure Vs. Level (All Units)

(Instrument Error Included)

OP/**0**/A/1108/001
Page 1 of 2



LDST lvl vs press.des
Rev. 6
RTR 3/01/05

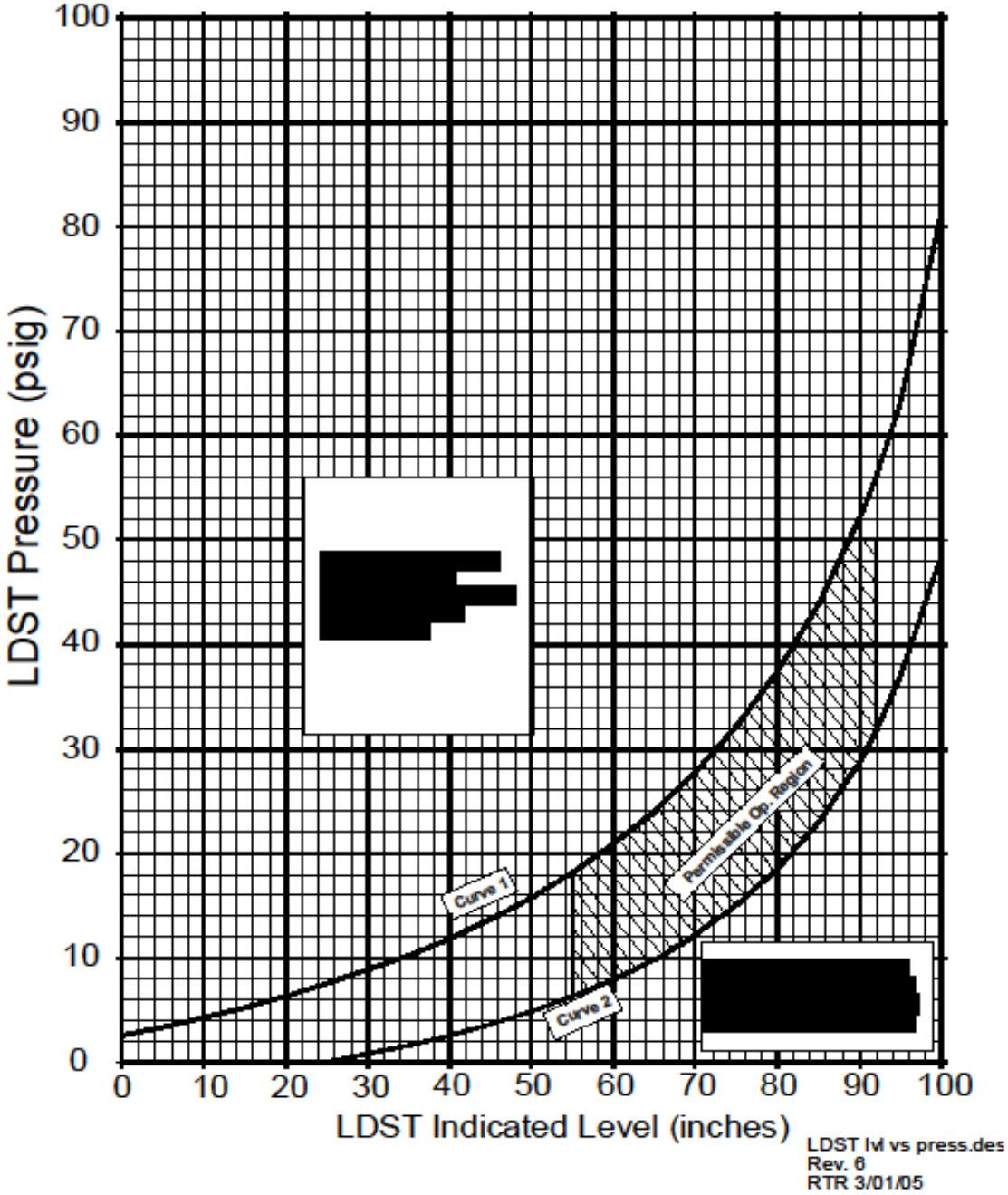
Enclosure 4.39

LDST Pressure Vs. Level (All Units)

(Instrument Error Included)

OP/0/A/1108/001

Page 1 of 2



LDST lvl vs press.des
Rev. 6
RTR 3/01/05

Question # 96

Given the following current conditions:

- Unit 2 has been shutdown 16 hours for a scheduled refueling outage
- The Condensate system has just been secured
- The Shift Manager is reviewing Engineering Change paperwork associated with a Major Design Change that will be installed during this outage

Based on the current conditions, which ONE of the following correctly completes the below statements?

(1) In accordance with procedures OMP 1-02, "Rules of Practice," and NSD 301, "Engineering Change Program," temporary hoses and fittings attached to Condensate system drain valves to place the system in a dry lay-up condition ___(1)___ required to follow the temporary modification process.

(2) In accordance with NSD 301, the Site Engineering Manager ___(2)___ authorized to sign for Design Engineering Manager approval for the Major Design Change.

A. (1) are
(2) is

B. (1) are NOT
(2) is

C. (1) are
(2) is NOT

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

Proposed Answer: B

Distractor Analysis/Explanation (Optional):

A. Oconee procedure OMP 1-02, "Rules of Practice," revision 081, section 5.9.3 (on p. 21 of 50) states the following: "Hoses and fittings may be attached to shutdown systems without following the temporary modification process." Therefore, because the question stem states that the Condensate system has already been shut down, the temporary hoses and fittings do <u>not</u> need to follow the temp. mod. process, and the first part of this distractor is incorrect. The first part distractor is plausible if an applicant confuses the requirements for an <u>operating</u> system vs. a <u>shutdown</u> system. Specifically, OMP 1-02, section 5.9.2 (on p. 21 of 50) states the following:

> If it becomes necessary to attach a hose to a drain or vent valve on an operating system, it should be done using the NSD 104, *Materiel*

> *Condition/Housekeeping, Cleanliness/Foreign Material*, guidelines. Hoses shall be attached under these guidelines for short periods of time only. A house keeping tag shall be used and the following criteria met:
>
> A. The hose does not cause a trip hazard and is attached securely to the drain.
>
> B. The hose does not constitute a temporary modification on an operable system per NSD 301, *Engineering Change Program*. This is due to seismic considerations for system operability. Contact the Design Engineering group if there are any questions about NSD 301, *Engineering Change Program*, application.
> Exception:
> Leakage control on operating systems may be accomplished by attaching lightweight funnels and polyethylene sleeving per NSD 413, *Fluid Leak Management Program*.
>
> C. A shift SRO has verified the need for the hose and agrees that the hose meets the preceding criteria.

As a note, the above section of the procedure is referenced in Oconee lesson plan OP-OC-ADM-OMP, revision 21a, on p. 24 of 66. Therefore, the requirements for an operating system are that a shift SRO verifies "the need for the hose and agrees that the hose [does not constitute a temporary modification on an operable system]." It is plausible that an applicant may confuse these administrative requirements for an operating system with those for a shutdown system. For the second part of the question, Oconee/Duke fleet procedure NSD 301, "Engineering Change Program," revision 40, section 301.6.4.4 states the following:

> Approval is required by the Design Engineering Manager or the Site Major Projects Engineering Manager for all Major Design Changes or Graded Design Changes developed by their respective organizations. This is not a "technical approval" but is intended to verify that all appropriate reviews (e.g., Integrated Design Reviews, App. U reviews, Failure Modes and Effects Analysis, Single Failure Analysis, etc.) have been performed commensurate with the complexity of the design and that the Engineering Change package is complete. The Design Engineering Manager approval may be delegated to the Site Engineering Manager, and the Site Major Projects Engineering Manager approval may be delegated to the Site General Manager - Major Projects. This approval cannot be delegated to a lower level individual within the organizations.

Therefore, per the above reference, the Site Engineering Manager is allowed to sign for the Design Engineering Manager approval, and the second part of distractor 'A' is correct.

B. Correct answer. Both first and second parts correct, see discussion for distractor 'A.'

C. First part incorrect, but plausible, see discussion for distractor 'A.' Second part incorrect—Site Engineering Manager is allowed to sign for the Design Engineering Manager approval. Second part of the distractor is plausible in large part due to the last sentence of NSD 301 section 301.6.4.4, namely that "This approval cannot be delegated to a lower level individual within the organizations." It is therefore plausible that an applicant may be confused as to who is specifically authorized to perform the approval review (because you can only delegate

approval authority to a specifically designated individual by title), or for an applicant to incorrectly believe that approval authority cannot be delegated at all.

D. First part is correct. Second part of distractor is incorrect but plausible—see discussion for distractor 'C' above.

K/A Match Analysis:

This question matches the K/A by giving an operationally valid situation and testing in a straight-forward manner an applicant's fundamental knowledge of (1) when temporary modification processes need to be followed during a commonly-encountered shutdown/refueling outage situation, and (2) the authorization approval/delegation process for Major Design Change temporary modifications.

SRO-Only Analysis:

This question is linked to 10 CFR 55.43(b)(3), "Facility licensee procedures required to obtain authority for design and operating changes in the facility." The first part of the Q is linked to SRO-only knowledge because it is a specific SRO function, as stated in OMP 1-02, to verify whether or not temporary hoses attached to operating systems fall under the temporary modification process; it is therefore logical for an SRO to be required to know that hoses attached to shutdown systems are not required to use the temporary modification process. The second part of the question is directly tied to the CFR reference above, and represents an SRO function of understanding/ensuring the appropriate authorizations are obtained before allowing temporary modifications to the facility.

Technical Reference(s): Oconee Lesson Plan OP-OC-ADM-OMP, "Operations Management Procedures (ADM-OMP)," Rev. 21a
(Attach if not previously provided) Oconee Procedure OMP 1-02, "Rules of Practice," Rev. 081, section 5.9.
(including version/revision number) Duke Energy NSD 301, "Engineering Change Program," Rev. 40, section 301.6.4.4.

Proposed references to be provided to applicants during examination: None

Learning Objective:

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

Question History: Last NRC Exam _____
(Optional: Questions validated at the facility since 10/95 will generally undergo less rigorous review by the NRC; failure to provide the information will necessitate a detailed review of every question.)

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

10 CFR Part 55 Content: 55.41 **X** .

55.43 **X .**

Comments:

2.2.5 **Knowledge of the process for making design or operating changes to the facility.**
(CFR: 41.10 / 43.3 / 45.13)
IMPORTANCE RO 2.2 SRO 3.2

Author: Michael Meeks

Question 97

Current Unit 1 conditions:

- Power = 100%
- SR 3.7.5.4 for the Turbine Driven Emergency Feedwater (TDEFW) Pump was last performed SAT on March 14, 2013
- SR 3.7.5.4 has a Frequency of 92 days
- The TDEFW pump received a valid auto-start actuation signal, auto-started, and ran successfully for several hours feeding the OTSGs when Unit 1 experienced a trip with complications on May 24, 2013

Based on the current conditions, which ONE of the following is the LATEST date SR 3.7.5.4 can be performed for the TDEFW pump (to prevent declaring SR 3.7.5.4 to be NOT MET), in accordance with Technical Specifications?

REFERENCE PROVIDED

E. June 14, 2013

F. July 07, 2013

G. August 24, 2013

H. September 16, 2013

Proposed Answer: D

Distractor Analysis/Explanation (Optional):

A. Oconee Technical Specifications (TS) Surveillance Requirement (SR) 3.0.2 states "The specified Frequency for each SR is met if the Surveillance is performed within 1.25 times the interval specified in the Frequency, as measured from the previous performance or as measured from the time a specified condition of the Frequency is met." Therefore, in accordance with SR 3.0.2, a SR with a nominal frequency of 92 days actually has a required interval of 115 days (92 days X 1.25 = 115 days) between performance. Furthermore, the BASES of SR 3.0.1 states: "Unplanned events may satisfy the requirements (including applicable acceptance criteria) for a given SR. In this case, the unplanned event may be credited as fulfilling the performance of the SR. This allowance includes those SRs whose performance is normally precluded in a given MODE or other specified condition." Therefore, given the conditions in the question stem, the operators can credit the unplanned TDEFW pump actuation on May 24 as satisfying all requirements of SR 3.7.5.4. The correct answer is therefore May 24 + 115 days, or September 16, 2013, as indicated above; 'A' is an incorrect distractor. Distractor 'A' is plausible if an applicant were to incorrectly believe (1) that the nominal frequency is not modified by the 1.25 factor; and (2) that one can not credit the unplanned TDEFW actuation for the SR. In these incorrect cases, you would have to re-perform the SR 3.7.5.4 within 92 days of the previous performance, March 14, 2013, and you would obtain an (incorrect) answer of June 14, 2013 (March 14 + 92 days, or June 14).

B. Distractor 'B' is incorrect per the discussion of distractor 'A' above. Distractor 'B' is plausible if an applicant correctly understood the 1.25 time factor, but incorrectly believed that the unplanned TDEFW pump actuation could not be credited for the Surveillance Requirement. In this case, the applicant would calculate that SR 3.7.5.4 would have to be re-performed within 115 days of the previous performance on March 14, 2013, and this applicant would obtain an (incorrect) answer of July 07, 2013 (March 14 + 115 days, or July 07).

C. Distractor 'C' is incorrect per the discussion of distractor 'A' above. However, distractor 'C' is plausible if an applicant correctly understood that the unplanned actuation of the TDEFW pump on May 24 satisfies the SR, but then failed to apply the 1.25 factor to the nominal 92-day frequency of the SR. In this case, the applicant would calculate that SR 3.7.5.4 would have to be re-performed within 92 days of the unplanned actuation of May 24, 2013, and this applicant would obtain an (incorrect) answer of August 24, 2013 (May 24 + 92 days, or August 24).

D. Correct answer. Station has 1.25 times the nominal surveillance frequency of 92 days to re-perform SR 3.7.5.4 following the unplanned actuation on May 24, which corresponds to September 16, 2013 (May 24 + 115 days, or September 16).

K/A Match Analysis:

This question matches the K/A by testing an SRO applicant's knowledge and understanding of the SR BASES. Specifically, given an operationally valid situation, the SRO applicant must apply knowledge of SR 3.0.2 and the BASES of SR 3.0.1 in order to analyze the situation and calculate the correct latest time re-performance of SR 3.7.5.4 must occur. Operationally valid because after the latest time, the SR must be declared NOT MET/system inoperable.

SRO-Only Analysis:

This question is linked to 10 CFR 55.43(b)(2), " Facility operating limitations in the technical specifications and their bases." The SRO Clarification Document Fig. 1 screening questions may be answered as follows: (1) Can question be answered solely by knowing < 1 hour TS/TRM Action? Answer: NO-continue. (2) Can question be answered solely by knowing the LCO/TRM information listed "above the line?" Answer: NO-continue. (3) Can question be answered solely by knowing the TS Safety Limits? Answer: NO-continue. (4) Does the question involve one or more of the following for TS, TRM, or ODCM? –Application of generic LCO requirements OR –Knowledge of TS bases that is required to analyze TS required actions and terminology? Yes—in order to answer the question, the applicant must apply generic LCO requirements AND TS bases/SR bases information in order to correctly analyze TS required actions. Therefore, the question meets SRO-only requirements.

Technical Reference(s): 2013 NRC Planning Guide (calendar)
(Attach if not previously provided) Oconee TS and TS Bases document.
(including version/revision number)

Proposed references to be provided to applicants during examination: (1) 2013 NRC Planning Guide (calendar), (2) Oconee TS p. 3.7.5-4.

Learning Objective:

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

Question History: Last NRC Exam _____
(Optional: Questions validated at the facility since 10/95 will generally undergo less rigorous review by the NRC; failure to provide the information will necessitate a detailed review of every question.)

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

10 CFR Part 55 Content: 55.41 _____
55.43 **X**

Comments:

2.2.12 **Knowledge of surveillance procedures.**
(CFR: 41.10 / 45.13)
IMPORTANCE RO 3.7 SRO 4.1

Author: Michael Meeks

Question 98

Initial conditions:

- A LOCA on Unit 2 has resulted in a declaration of General Emergency
- Emergency Worker Exposure Limits have been implemented

Current conditions:

- The below two tasks need to be performed
- Neither of the tasks are Planned Emergency Exposures

	Task 'A'	Task 'B'
Activity:	NOT Lifesaving, NOT protecting valuable property, NOT protection of large populations	Protecting Valuable Property
Round-trip Transit time:	23 min	19 min
Dose rate during Transit:	1.86E+02 mr/hr	2.47E+03 mr/hr
Time at work site (to do task):	16 min	13 min
Dose rate at work site:	3.39E+04 mr/hr	4.60E+04 mr/hr

Answer both parts of the question in accordance with the requirements of OMP 1-18, "Implementation Standard During Abnormal and Emergency Events," and RP/0/B/1000/002, "Control Room Emergency Coordinator Procedure." Calculate all quantities to two decimal places. Based on the current conditions, which ONE of the following correctly completes the below statements?

(1) The Emergency Coordinator __(1)__ authorize Task 'A' IN WRITING.

(2) The Emergency Coordinator __(2)__ VERBALLY authorize Task 'B'.

A. (1) can
   (2) can

B. (1) can NOT
   (2) can

C. (1) can
   (2) can NOT

D. (1) can NOT
   (2) can NOT

Proposed Answer: D

Explanation (Optional) and Distractor Analysis:

A. The Emergency Exposure Limits are listed in procedure OMP 1-18 section 5.4. Because Task 'A' does NOT involve Lifesaving, Protection of Large Populations, or Protecting Valuable Property, its TEDE limit is 5 rem. The estimated exposure for Task 'A' can be found as follows:

$$Dose\ During\ Transit\ (round\ trip) = \left(\frac{1.86 \times 10^2\ mr}{hr}\right)(23\ min)\left(\frac{1\ hr}{60\ min}\right) = 71.30\ mrem$$

$$Dose\ at\ Work\ Site\ = \left(\frac{3.39 \times 10^4\ mr}{hr}\right)(16\ min)\left(\frac{1\ hr}{60\ min}\right) = 9040.00\ mrem$$

$$Total\ Dose\ = \ 71.30\ mrem + 9040.00\ mrem\ = \ 9111.30\ mrem$$

$$\therefore Total\ Dose\ = \ (9111.30\ mrem)\left(\frac{1\ rem}{10^3\ mrem}\right) = 9.11\ rem\ TEDE\ > \ 5\ rem\ TEDE\ limit$$

Therefore, the Emergency Coordinator can NOT authorize Task 'A.' Task 'B' is designated as Protecting Valuable Property; therefore, its TEDE limit per OMP 1-18 is 10 rem. The estimated exposure for Task 'B' can be found as follows:

$$Dose\ During\ Transit\ (round\ trip) = \left(\frac{2.47 \times 10^3\ mr}{hr}\right)(19\ min)\left(\frac{1\ hr}{60\ min}\right) = 782.17\ mrem$$

$$Dose\ at\ Work\ Site\ = \left(\frac{4.60 \times 10^4\ mr}{hr}\right)(13\ min)\left(\frac{1\ hr}{60\ min}\right) = 9966.67\ mrem$$

$$Total\ Dose\ = \ 782.17\ mrem + 9966.67\ mrem\ = \ 10748.84\ mrem$$

$$\therefore Total\ Dose\ = \ (10748.84\ mrem)\left(\frac{1\ rem}{10^3\ mrem}\right) = 10.75\ rem\ TEDE\ > \ 10\ rem\ TEDE\ limit$$

Therefore, the Emergency Coordinator can NOT authorize Task 'B.' The first part of distractor 'A' is plausible if the applicant confuses the emergency exposure limits (*i.e.,* believes the limit for task 'A' was 10 rem instead of 5 rem). The plausibility of the first part of distractor 'A' is enhanced by specifying that that authorization would take place in writing vice verbally. However, a NOTE before step 1.14 of Enclosure 4.5, "Emergency Coordinator Parallel Actions," or procedure RP/0/B/1000/002, "Control Room Emergency Coordinator Procedure," states that: "The Emergency Coordinator may authorize (either verbal or signature) exposures greater than 25 rem TEDE (Total Effective Dose Equivalent) for life saving missions." Therefore, it does not matter whether the authorization is verbal or signature, the statement "in writing" just enhances the plausibility. The second part of distractor 'A' is plausible if the applicant confuses the emergency exposure limits (*i.e.,* believes the limit for task 'B' is 25 rem instead of 10 rem), or if the applicant incorrectly believes that emergency exposure limits must be authorized in writing only.

B. See above discussion. First part of distractor 'B' is plausible because it is correct; second part of distractor 'B' is plausible if the applicant confuses the emergency exposure limits (*i.e.,* believes the limit for task 'B' is 25 rem instead of 10 rem), or if the applicant incorrectly believes that emergency exposure limits must be authorized in writing only.

C. See discussion for distractor 'A.' First part of distractor 'C' is plausible if the applicant confuses the emergency exposure limits (*i.e.,* believes the limit for task 'A' was 10 rem instead of 5 rem). The plausibility of the first part of distractor 'C' is enhanced by specifying that that authorization would take place in writing vice verbally. Second part of distractor 'C' is correct.

D. See discussion for distractor 'A.' This is the correct answer—both tasks exceed their respective emergency exposure limits and can NOT be authorized as presented.

K/A Match Analysis:

Given an operationally valid emergency situation, the question requires the SRO applicant to apply knowledge of emergency radiation exposure limits with a simple dose calculation, in order to test knowledge of whether the SRO would correctly determine whether or not to authorize emergency radiological exposures for these hypothetical situations.

SRO Only Analysis:

This question is linked to 10 CFR 55.43(b)(4), "Radiation hazards that may arise during normal and abnormal situations, including maintenance activities and various contamination conditions." This question is specifically linked to an SRO function in that only the Emergency Director (potentially the Shift Manager position) is authorized to approve the emergency radiological exposures.

Technical Reference(s): OMP 1-18 Rev. 033; RP/0/B/1000/002 Rev. 024
(Attach if not previously provided)
(including version/revision number)

Proposed references to be provided to applicants during examination: None

Learning Objective:

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

Question History: Last NRC Exam _____
(Optional: Questions validated at the facility since 10/95 will generally undergo less rigorous review by the NRC; failure to provide the information will necessitate a detailed review of every question.)

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

10 CFR Part 55 Content: 55.41 _____

55.43 **X**

Comments:

2.3.4 **Knowledge of radiation exposure limits under normal or emergency conditions.**
(CFR: 41.12 / 43.4 / 45.10)
IMPORTANCE RO 3.2 SRO 3.7

Author: Michael Meeks

Question 99

Initial conditions:

- The shift fire brigade received an overall "unsatisfactory" grade during an unannounced drill (not involving offsite fire response assistance) during an otherwise uneventful nightshift of Sunday, May 5, 2013.

Current conditions:

- Time = 1800 on Thursday, May 9, 2013.
- After four (4) days off shift, the same fire brigade members and Fire Brigade Leader (FBL) report for duty.
- No remedial fire brigade training has occurred. The fire brigade has **NOT** been given a remedial/repeat drill.
- The Shift Manager is considering replacement of the designated FBL (SRO 'A') with another, more experienced SRO (SRO 'B'). SRO 'B' was previously qualified FBL, but was disqualified FBL when he missed last year's required training. SRO 'B' has been inactive as Fire Brigade Leader since March 2012.

Based on the current conditions, which ONE of the following correctly completes the below statements?

In accordance with NSD 112, "Fire Brigade Organization, Training, and Responsibilities," the above shift fire brigade ___(1)___ qualified to assume fire brigade duties for the May 9 shift.

In accordance with NSD 112, the MINIMUM required requalification program for SRO 'B' as FBL is to _____(2)_____ .

A. (1) is
   (2) attend a Fire Brigade practical training session and participate as FBL

B. (1) is
   (2) retake initial FBL training and practical

C. (1) is NOT
   (2) attend a Fire Brigade practical training session and participate as FBL

D. (1) is NOT
   (2) retake initial FBL training and practical

Proposed Answer: A

Distractor Analysis and Explanation (Optional):

A. Correct answer. Duke Energy procedure NSD 112, "Fire Brigade Organization, Training, and Responsibilities," rev. 10, section 112.5 (p. 7) states:

> A post-drill critique is held for personnel participating in the drill. Written critiques of quarterly fire drills will be distributed to each Fire Brigade team (or shift). Overall drill performance determined to be unsatisfactory will be followed by a repeat drill for that shift Fire Brigade within 30 days. Performance deficiencies of a shift Fire Brigade or individual Fire Brigade members will be noted and appropriate action taken as soon as possible (immediate remediation). The Fire Brigade is considered qualified and still able to perform its functions during the time period until completion of the repeat drill.

Therefore, the first part of distractor 'A' is correct in that the Fire Brigade is considered qualified and still able to perform its functions … until completion of the repeat drill. Regarding the second part of the question, NSD 112 section 112.4 (p. 6) states:

> Reinstating previously qualified Leaders
> If a Fire Brigade Leader is disqualified due to the failure to attend required training or drills, requalification shall be completed according to the following:
> –For previously qualified but inactive for greater than 25 months, retake Initial Fire Brigade Leader Training and practical.
> –For previously qualified but inactive for more than 12 months, but less than or equal to 25 months, attend a Fire Brigade practical training session and participate as Leader.

Therefore, the second part of distractor 'A' is correct, in that SRO 'B' has been inactive for 14 months—so the required training is to attend a Fire Brigade practical training session and participate as Leader.

B. Incorrect distractor. First part of distractor 'B' is correct; see above description for distractor 'A.' Second part of distractor 'B' is incorrect. The second part of distractor 'B' is plausible because, as shown above, it is the required re-training for a Fire Brigade Leader who has been inactive for greater than 25 months, instead of the 14 months as stated in the question. It is a plausible misconception to get the requirements confused between the two timeframes in question.

C. Incorrect distractor. First part of distractor 'C' is incorrect, per the discussion in distractor 'A' above, the fire brigade should be considered qualified. This choice is plausible if the SRO applicant misunderstood the Fire Brigade drill requirements, and incorrectly thought that a fire brigade with an overall failure on an evaluated drill would have to re-take a drill, or have required re-training, before re-assuming Fire Brigade duties. Second part of distractor 'C' is correct.

D. Incorrect distractor. Both first and second parts of this distractor are incorrect. See descriptions of 'B' and 'C' above for plausibility arguments.

K/A Match Analysis:

Part of the knowledge required of "fire in the plant" procedures is knowledge of fire brigade qualifications and training requirements. This question involves a straightforward assessment of an operationally valid situation that may happen on any given shift, and an

application of the relevant procedural requirements of the active fire brigade procedure to the situation.

SRO Only Analysis:

At Oconee, ROs do not participate in the fire brigade; SROs participate as Fire Brigade Leaders. Therefore, any question dealing with Fire Brigade requirements at Oconee is an SRO-only functional topic, exclusive of any RO-level knowledge. The question further stresses SRO-only aspects by testing knowledge of administrative requirements associated with requirements for watchstanders taking the shift, and requirements dealing with re-training and re-qualification of watchstanders taking the shift in accordance with the various procedures.

Technical Reference(s): NSD 112, "Fire Brigade Organization, Training, and Responsibilities," Rev. 10
(Attach if not previously provided)
(including version/revision number)

Proposed references to be provided to applicants during examination: None

Learning Objective:

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

Question History: Last NRC Exam _____
(Optional: Questions validated at the facility since 10/95 will generally undergo less rigorous review by the NRC; failure to provide the information will necessitate a detailed review of every question.)

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

10 CFR Part 55 Content: 55.41
55.43 X

Comments:

2.4.27 **Knowledge of "fire in the plant" procedures.**
(CFR: 41.10 / 43.5 / 45.13)
IMPORTANCE RO 3.4 SRO 3.9

Author: Michael Meeks

Question 100

Initial conditions:

- Unit 1 and unit 2 were operating at 100% power
- Unit 3 had just completed off-loading the core to the Spent Fuel Pool
- A complete Station Blackout/Loss of All AC Power occurs to all units

Current conditions:

- All units have been in Station Blackout for six (6) hours
- The Emergency Coordinator is considering implementing the Oconee Severe Accident Guidelines (OSAG)
- The TSC has just recommended an extreme measure to provide urgently needed cooling to the Spent Fuel Pool under the requirements of 10CFR50.54(x). This extreme measure is NOT in accordance with station procedures, and is a departure from the Oconee licensing basis and Technical Specifications.

Based on the current conditions, which ONE of the following correctly completes the below statements?

1) In accordance with RP/0/B/1000/002, "Control Room Emergency Coordinator Procedure," implementation of the OSAG ____(1)____ require the use of 10CFR50.54(x) and(y) provisions.

2) In accordance with RP/0/B/1000/002, the MINIMUM level of approval for the action to cool the Spent Fuel Pool per 10CFR50.54(x) is _____(2)_____.

Which ONE of the following completes the statements above?

A. 1. does
   2.a licensed SRO

B. 1. does NOT
   2.a licensed SRO

C. 1. does
   2.the Emergency Coordinator

D. 1. does NOT
   2.the Emergency Coordinator

Proposed Answer: A

Distractor Analysis and Explanation (Optional):

A. Correct answer. Oconee procedure RP/0/B/1000/002, "Control Room Emergency Coordinator Procedure," rev. 024, Enclosure 4.5, "Emergency Coordinator Parallel Actions," NOTE before IAAT step 1.17 reads as follows:

> 10CFR50.54(x) allows for reasonable actions that depart from a License Condition or Technical Specification to be performed in an emergency when this action is immediately needed to protect the health and safety of the public and no action consistent with the License Condition or Technical Specification that can provide adequate or equivalent protection is immediately apparent. 10CFR50.54(y) requires approval of any 10CFR50.54(x) actions by an SRO at minimum. Implementation of Oconee Severe Accident Guidelines (OSAG) requires the use of 10CFR50.54 (x) and (y) provisions.

Therefore, the first part of the question is correct in that any implementation of the OSAG requires a 10CFR50.54(x) declaration. The second part of the question is correct in that the MINIMUM level of approval for a 10CFR50.54(x) situation, per 10CFR50.54(y) is a licensed SRO.

B. Incorrect distractor. First part of distractor 'B' is incorrect, second part of distractor 'B' is correct. First part of distractor 'B' is plausible, because no other directed procedural transition requires a 50.54(x) declaration. A SRO applicant may incorrectly believe that use of approved procedures (OSAG) is not a departure from the license basis condition, and therefore may choose this incorrect distractor.

C. Incorrect distractor. First part of distractor 'C' is correct, second part of distractor 'C' is incorrect. Second part of distractor 'C' is plausible because the Emergency Coordinator is the highest level authority on site during an emergency, is granted the authority to make a 50.54(x) declaration, and probably would be the decision-maker in this situation. However, technically speaking the second part of this distractor is incorrect because the Emergency Coordinator is not the MINIMUM required level of approval; instead, 10CFR50.54(y) specifies that the minimum level of authorization is a licensed SRO.

D. Incorrect distractor. Both parts of this distractor are incorrect. For plausibility descriptions, see above discussions of distractor 'B' and 'C.'

K/A Match Analysis:

This question matches the K/A in that, given an extreme emergency situation (similar to Fukushima Dai-ichi), the question requires the SRO applicant to demonstrate knowledge of the requirements associated with OSAG entry and implementation of 10CFR50.54(x) and (y). These decisions are associated with the Emergency Coordinator function in the Emergency Plan implementation procedures.

SRO-Only Analysis:

This question is linked to 10CFR55.43(b)(1), "Conditions and limitations in the facility license," in that SRO-level authorization, at a minimum, is required to transition to the OSAG and declare a 10CFR50.54(x) condition. Licensed ROs are not allowed to make that determination.

Technical Reference(s): Oconee procedure RP/0/B/1000/002, "Control Room Emergency Coordinator Procedure," Rev. 024

(Attach if not previously provided) 10 CFR 55.54(x) and (y)
(including version/revision number)

Proposed references to be provided to applicants during examination: None

Learning Objective:

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

Question History: Last NRC Exam _____
(Optional: Questions validated at the facility since 10/95 will generally undergo less rigorous review by the NRC; failure to provide the information will necessitate a detailed review of every question.)

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

10 CFR Part 55 Content: **55.41** ____.
55.43 __X__

Comments:

2.4.38 **Ability to take actions called for in the facility emergency plan, including supporting or acting as emergency coordinator if required**.
(CFR: 41.10 / 43.5 / 45.11)
IMPORTANCE RO 2.4 SRO 4.4

Author: Michael Meeks