QUESTION 1

Per OT-112, "Recirculation Pump Trip," Core Plate ΔP indication must be used to estimate Core Flow when:

- Speed of the operating Recirc pump is ≤ 1000 RPM (Unit 1 only)
- Speed of the operating Recirc pump is ≤ 60% (Unit 2 only)

The reason for using Core Plate ΔP indication is to account for ...

A. forward flow through the idle loop jet pumps.

B. reverse flow through the idle loop jet pumps.

C. lower core plate differential pressures.

D. stall flow in the idle loop jet pumps.

Proposed Answer: A

Level: RO
Tier #: 1
Group #: 1

K&A Rating: 295001 AK3.06 (2.9/3.0)

K&A Statement: **Knowledge of the reasons for the following responses as they apply to PARTIAL OR COMPLETE LOSS OF FORCED CORE FLOW CIRCULATION:** Core flow indication

Justification:

A. **Correct:** For Recirc pump speed ≤ 1000 RPM (Unit 1 only) and Recirc pump speed ≤ 60% (Unit 2 only), idle loop flow is forward through the jet pumps. Since actual flow is forward, the total core flow determination should not subtract the idle loop flow, as is done when flow is reversed. The correct Core Flow is therefore determined based on Core Plate ΔP measurement.

B. **Incorrect but plausible:** Above 1000 RPM Recirc pump speed (Unit 1 only) and 60% Recirc pump speed (Unit 2 only), idle loop flow is reversed, resulting in an erroneously high Core Flow indication. Idle loop flow must therefore be subtracted when determining total core flow.

C. **Incorrect but plausible:** Core Plate ΔP impacts Core Plate Flow (which is indicated on the same Control Room recorder, XR-042-*R613), but does not impact Indicated Core Flow.

D. **Incorrect but plausible:** Stall flow occurs at or near 1000 RPM Recirc pump speed (Unit 1 only) and 60% Recirc pump speed (Unit 2 only).

References: Lesson Plan LGSOPS0042, Rev. 000 Applicant Ref: NONE
OT-112, Rev. 50

Learning Objective: LGSOPS0042 (IL6)

Question source: Modified from PB 12/09 Exam (Q 47)

Question History: None

Cognitive level: Memory/Fundamental knowledge: X
Comprehensive/Analysis:

10CFR Part 55: 41.5

Comments:

QUESTION 2

Unit 1 was operating at rated power when a bus lockout occurs on the 11 Unit Auxiliary SWGR (10A101).

After 5 minutes, which one of the following describes the effects on the plant? (Assume NO operator actions)?

A. The plant has NOT scrammed, however, reactor power will lower and RFPTs will be available to control RPV level.

B. The plant has scrammed and RPV level is being controlled by HPCI and RCIC. RPV pressure is being controlled by bypass valves and augmented by SRVs.

C. The plant has scrammed and RPV level is being controlled by HPCI and RCIC. RPV pressure is being controlled by SRVs ONLY.

D. The plant has NOT scrammed, however, reactor power will rise and RFPTs will be available to control RPV level.

Level: RO
Tier #: 1
Group #: 1

K&A Rating: 295003 AA2.02 (4.2/4.3)

K&A Statement: **Ability to determine and/or interpret the following as they apply to PARTIAL OR COMPLETE LOSS OF A.C. POWER :** Reactor power / pressure / and level

Justification:

A. **Incorrect but plausible:** Plausible if the applicant does not understand that a loss of bus 10A101 would cause a loss of condensate pump 1A and 1C, which would result in decrease RPV water level leading to Rx scram.

B. **Correct:** With this loss of condensate pumps 1A and 1C, the plant will scram on low level. HPCI and RCIC will be available to control RPV level. The bypass valves will be available to control RPV pressure. HPCI and RCIC function independent of AC power.

C. **Incorrect but plausible:** Plausible if the applicant determines that loss of bus 10A101 would cause a loss of condensate pump 1A, 1C and also cause loss of circulation water system, resulting in loss of vacuum and MSIV closure.

D. **Incorrect but plausible:** Plausible if the applicant determines that loss of FW heating would cause reactor power to rise, and does not understand that a loss of bus 10A101 would cause a loss of condensate pump 1A and 1C, which would result in decrease RPV water level leading to Rx scram.

References: Lesson Plan LGSOPS0005, Rev. 000 Applicant Ref: NONE

Learning Objective: LGSOPS0005 (EO 7d, 7e, and 7g; IL 8d, 8e, and 8g)

Question source: New

Question History: None

Cognitive level: Memory/Fundamental knowledge:
Comprehensive/Analysis: X

10CFR Part 55: 41.10 / 43.5 / 45.13

Comments:

QUESTION 3

Unit 1 is operating at 100% power when the following alarm annunciates in response to a single failure:

- 1B RPS & UPS DIST PNL TROUBLE (122 F4)

No other alarms or automatic actions occur.

WHICH one of the following is a cause of the alarm?

A. Both RPS Electrical Power Monitoring [series] breakers failed to trip in response to 1B RPS UPS Static Inverter output undervoltage

B. Both RPS Electrical Power Monitoring [series] breakers are inoperable due to a loss of Division 2 125 VDC breaker control power

C. One of the two RPS Electrical Power Monitoring [series] breakers failed to trip in response to 1B RPS UPS Static Inverter output undervoltage

D. One of the two RPS Electrical Power Monitoring [series] breakers is inoperable due to a loss of Division 4 125 VDC breaker control power

Proposed Answer: D

Level: RO
Tier #: 1
Group #: 1

K&A Rating: 295004 AK1.05 (3.3/3.4)

K&A Statement: **Knowledge of the operational implications of the following concepts as they apply to PARTIAL OR COMPLETE LOSS OF D.C. POWER:** Loss of breaker protection

Justification:

A. **Incorrect but plausible:** The 1B RPS UPS Static Inverter does not have an output undervoltage condition as evidenced by the absence of '1B RPS & UPS STATIC INVERTER TROUBLE' alarm (122 A5). The RPS Electrical Power Monitoring [series] breakers will trip in response to an undervoltage of 113 VAC (decreasing) for 4 seconds. The RPS UPS Static Inverter will automatically transfer to the [selected] alternate source at 114 VAC (decreasing); this occurs before any trip of the series breakers is expected. Transfer of the inverter to the alternate source would be annunciated by receipt of the '1B RPS & UPS STATIC INVERTER TROUBLE' alarm (122 A5), which did not occur.

B. **Incorrect but plausible:** Only one of the two 'B' RPS Electrical Power Monitoring [series] breakers is made inoperable by loss of the single 125 VDC source. This design configuration prevents a single failure from disabling both RPS Electrical Power Monitoring [series] breakers.

C. **Incorrect but plausible:** The 1B RPS UPS Static Inverter does not have an output undervoltage condition as evidenced by the absence of '1B RPS & UPS STATIC INVERTER TROUBLE' alarm (122 A5). The RPS Electrical Power Monitoring [series] breakers will trip in response to an undervoltage of 113 VAC (decreasing) for 4 seconds. The RPS UPS Static Inverter will automatically transfer to the [selected] alternate source at 114 VAC (decreasing); this occurs before any trip of the series breakers is expected. Transfer of the inverter to the alternate source would be annunciated by receipt of the '1B RPS & UPS STATIC INVERTER TROUBLE' alarm (122 A5), which did not occur.

D. **Correct:** DIV 2 125 VDC (from 1PPB1, circuit 17), supplies control power for the power monitoring relays, logic, and shunt trip of one of the two 'B' RPS Electrical Power Monitoring [series] breakers; DIV 4 125 VDC (from 1PPD1, circuit 4), supplies control power to the other breaker. This design configuration prevents a single failure from disabling both RPS Electrical Power Monitoring [series] breakers. The loss of either of these power sources (e.g., fuse failure) will render one of the two breakers inoperable. This condition is the cause of the '1B RPS & UPS DIST PNL TROUBLE' alarm (122 F4).

References: Lesson Plan LGSOPS0095, Rev. 000 Applicant Ref: NONE
ARC-MCR-122 F4, Rev. 0
ARC-MCR-122 A5, Rev. 0
E-0392, Rev. 19
E-33 (Sh 2 of 3), Rev. 44
S94.9.A, Rev. 15

Learning Objective: LGSOPS0095 (IL6)

Question source: LGS Bank (ID: 715395)

Question History: Not used on 2008 or 2010 LGS Written Exam

Cognitive level: Memory/Fundamental knowledge:
Comprehensive/Analysis: X

10CFR Part 55: 41.8 to 41.10

Comments:

- Re-sequenced the answers (A/B →C/D; C/D→A/B)

- Changed the wording in Answers 'C' and 'D' above (Bank ID 715395 Answers 'A' and 'B') to both read "One of ..." rather than "Either of...," to eliminate a potential ambiguity in Correct Answer 'D' in which the wording "either of ..." implies that RPS Electrical Power Monitoring [series] breaker 52-BY24801 or breaker 52-DY24801 could be inoperable as a result of the loss of Division 4 125 VDC breaker control power (i.e., only 52-DY24810 would be inoperable).

- Changed "overvoltage" to "undervoltage" in Answer 'C' above (Bank ID 715395 Answer 'A') to improve the plausibility of distracters 'A' and 'C' (would be very easy to eliminate both 'A' and 'C' unless the 1B RPS UPS Static Inverter output conditions are the same (e.g. undervoltage / undervoltage <u>OR</u> overvoltage / overvoltage).

- Changed the 'undervoltage' value specified in Bank ID 715395 Answer Explanation, section, from 112 VAC to 113 VAC based on information provided in PRECAUTIONS Section 3.0 of S94.9.A, "Routine Inspection of *A(B) RPS UPS Static Inverter," Rev. 15.

QUESTION 4

Unit 2 plant conditions as follows:

- Reactor power is steady at 46%
- GEN STATOR COOLANT TROUBLE (225 B-4) alarm is annunciated
- Loss of both Stator Cooling Water pumps has been confirmed

No other operator action is taken

Which one of the following describes the plant's status 15 seconds later?

A. "2A" & "2B" Recirc pumps running, all Turbine Bypass valves closed

B. "2A" & "2B" Recirc pumps running, some Turbine Bypass valves open

C. "2A" Recirc pump tripped, "2B" Recirc pump running, some Turbine Bypass valves open

D. "2A" Recirc pump tripped, "2B" Recirc pump tripped, some Turbine Bypass valves open

K&A #	295005 G2.1.32
Importance Rating	3.8

QUESTION 4

K&A Statement: Ability to explain and apply system limits and precautions as they relate to MAIN TURBINE GENERATOR TRIP.

Justification:

A. Incorrect but plausible if the candidate does not recognize that with reactor power at 46%, total feedwater flow is >6.7Mlbm/hr which initiates EHC load set runback and recirc pump trip

B. Incorrect but plausible if candidate recognizes that the EHC load set runback should occur but does not recognize that 1A recirc pump trip should have occurred at this time

C. Correct – with feedwater flow >6.7Mlbm/hr (44%), an EHC load set runback is initiated with an 8 second time delay. To maintain reactor pressure constant, this requires the turbine bypass valves to open as the turbine control valves close. Additionally, with total feedwater flow >6.7Mlbm/hr the reactor recirc pumps will be tripped sequentially; 1A after a 9 second time delay, and 1B after an additional 9 seconds

D. Incorrect but plausible if the candidate recognizes that the EHC load set runback should be occurring, but that only the 1A recirc pump should be tripped at this time; 1B should not be tripped until after 18 seconds

References: ON-114, Rev. 28
LGSOPS0033, Rev. 2

Student Ref: None

Learning Objective: LGSOPS0033: IL3b

Question source: Modified LGS bank 556029

Question History: None

Cognitive level: Memory/Fundamental knowledge:
Comprehensive/Analysis: X

10CFR55 41.10

QUESTION 5

Given:

- The “TURBINE CONTROL VALVE / STOP VALVE SCRAM BYPASSED” annunciator is clear for both Units 1 and 2.
- Unit 1 TCV 3 RETS pressure 685 psig
- Unit 1 TCV 4 RETS pressure 690 psig
- Unit 2 TCV 1 RETS pressure 695 psig
- Unit 2 TCV 2 RETS pressure 698 psig

Which of the following describes ‘A’ and ‘B’ RPS Trip System status for Units 1 and 2?

	UNIT 1	UNIT 2
A.	Both Tripped (Full Scram)	Both Tripped (Full Scram)
B.	Both Tripped (Full Scram)	One Tripped (Half Scram)
C.	One Tripped (Half Scram)	Both Tripped (Full Scram)
D.	One Tripped (Half Scram)	One Tripped (Half Scram)

Proposed Answer: B

Level: RO
Tier #: 1
Group #: 1

K&A Rating: 295006 AK2.04 (3.6/3.7)

K&A Statement: **Knowledge of the interrelations between SCRAM and the following:** Turbine trip logic: Plant Specific

Justification:

A. **Incorrect but plausible:** RPS Trip System status resulting in a Unit 1 Full Scram / Unit 2 Full Scram, is not an outcome supported by the LGS plant specific RPS Turbine Trip Logic for the stated conditions.

B. **Correct:** LGS plant specific RPS Turbine Trip Logic for the given conditions, with turbine first stage pressure permissive above the TCV/MSV Scram setpoint, results in a Unit 1 Full Scram and a Unit 2 Half Scram.

C. **Incorrect but plausible:** RPS Trip System status resulting in a Unit 1 Half Scram / Unit 2 Full Scram, is not an outcome supported by the LGS plant specific RPS Turbine Trip Logic for the stated conditions.

D. **Incorrect but plausible:** RPS Trip System status resulting in a Unit 1 Half Scram / Unit 2 Half Scram, is not an outcome supported by the LGS plant specific RPS Turbine Trip Logic for the stated conditions.

References: Lesson Plan LLOT0071, Rev. 000; Applicant Ref: NONE

Learning Objective: LLOT0071 (IL4)

Question source: New

Question History: None

Cognitive level: Memory/Fundamental knowledge:
Comprehensive/Analysis: X

10CFR Part 55: 41.7

Comments:

QUESTION 6

Unit 1 was operating at 100% reactor power with all systems normal.

- A fire started in the main Control Room which required an entry into SE-1, Remote Shutdown.
- The Control Room has been evacuated.
- RPV water level is +55 inches and rising.

Per SE-1, which of the following **prompt** actions is required to be performed.

A. Trip RCIC from the Remote Shutdown Panel using emergency shutdown key

B. Trip HPCI locally

C. Trip HPCI from the Remote Shutdown Panel using emergency shutdown key

D. Trip RCIC locally

Level: RO
Tier #: 1
Group #: 1

K&A Rating: 295016 AA1.06 (4.0/4.1)

K&A Statement: **Ability to operate and/or monitor the following as they apply to CONTROL ROOM ABANDONMENT :** Reactor water level

Justification:

A. **Incorrect but plausible:** Plausible if the applicant does not recall that HPCI emergency shutdown key is installed in the remote shutdown panel for prompt action required by the safe shutdown analysis within 4 minutes to prevent reactor overfill. Also, plausible due to the fact that RCIC can be operated from the remote shutdown panel (RSP), and emergency transfer functions are available to RSP to prevent spurious operation during fire.

B. **Incorrect but plausible:** Plausible if the applicant does not recall that HPCI emergency shutdown key is installed in the remote shutdown panel for prompt action required by the safe shutdown analysis within 4 minutes to prevent reactor overfill. Applicant may determine that HPCI needs to be tripped locally prior to establishing RSP control.

C. **Correct:** If Rx level is above +54 inches and continues to rise, then HPCI is tripped using HS-56-*62, "HPCI EMERG S/D SWITCH," IAW SE-1, prompt actions.

D. **Incorrect but plausible:** Plausible if the applicant does not recall that HPCI emergency shutdown key is installed in the remote shutdown panel for prompt action required by the safe shutdown analysis within 4 minutes to prevent reactor overfill. Also, plausible due to the fact that RCIC can be operated from the remote shutdown panel, and emergency transfer functions are available to RSP to prevent spurious operation during fire. Applicant may determine that RCIC needs to be tripped locally prior to establishing RSP control.

References: Lesson Plan LGSOPS0055, Rev. 000 Applicant Ref: NONE
SE-1, Remote Shutdown
Lesson Plan LLOT0735, Rev. 013

Learning Objective: LGSOPS0055 and SE-1 prompt action bases
LLOT0735, Objective 4 and 5.

Question source: New

Question History: None

Cognitive level: Memory/Fundamental knowledge: X
Comprehensive/Analysis:

10CFR Part 55: 41.7 / 45.6

Comments:

QUESTION 7

Unit 2 is in OPCON 1 at 85% power. All cooling water systems are normally aligned.

RWCU Non-Regenerative HX Outlet temperature and RWCU Pump Seal temperatures are trending up due to an equipment malfunction.

Which of the following is also observed as a direct result of the same malfunction?

A. Rising Drywell Equipment Drain Sump temperatures

B. Rising Recirc Pump Motor Air Cooler temperatures

C. Rising Fuel Pool Cooling and Cleanup HX Outlet temperatures

D. Rising Primary Containment Instrument Gas Compressor temperatures

Proposed Answer: D

Level: RO
Tier #: 1
Group #: 1

K&A Rating: 295018 AA2.01 (3.3/3.4)

K&A Statement: **Ability to determine and /or interpret the following as they apply to PARTIAL OR COMPLETE LOSS OF COMPONENT COOLING WATER:** Component temperatures

Justification:

A. **Incorrect but plausible:** The RECW system supplies cooling water to numerous components in both the Reactor Enclosure and the Drywell. The Drywell Equipment Drain Sump is cooled by the Drywell Chilled Water system. RECW cools the Reactor Enclosure Equipment Drain Sump.

B. **Incorrect but plausible:** The RECW system supplies cooling water to numerous components in both the Reactor Enclosure and the Drywell. The Recirc Pump Motor Air Coolers are cooled by the Drywell Chilled Water system. RECW cools the Recirc Pump Shaft Seal and Motor Oil Coolers.

C. **Incorrect but plausible:** RECW provides the <u>backup</u> cooling supply to the Fuel Pool Cooling and Cleanup HXs. Normal cooling is supplied by the Service Water system.

D. **Correct:** The RWCU Non-Regenerative HX and RWCU Pump Seals are cooled by the RECW system, which supplies cooling water to numerous components in both the Reactor Enclosure and the Drywell. Of the component options provided, only the Primary Containment Instrument Gas (PCIG) compressor is cooled by RECW.

References: Lesson Plan LLOT0013, Rev. 000 Applicant Ref: NONE
ON-113, Rev. 22
M-13 (sh 2), Rev. 15
M-44 (sh 3), Rev. 49
M-59 (sh 4), Rev. 10

Learning Objective: LLOT0013 (IL3)

Question source: New

Question History: None

Cognitive level: Memory/Fundamental knowledge:
Comprehensive/Analysis: X

10CFR Part 55: 41.10

Comments:

QUESTION 8

Unit 2 plant conditions as follows:

- Reactor power is steady at 35%
- The crew has entered ON-119 due to lowering pressure on both Instrument Air headers
- Due to inability to restore Instrument Air header pressure, a GP-4 shutdown was performed, all operator actions are complete

30 minutes later, Unit 2 plant conditions are as follows:

- RPV Pressure is 930 psig and steady
- RPV water level is +18" and down very slowly
- 'A' Instrument Air header pressure is 65 psig and lowering slowly
- 'B' Instrument Air header pressure is 62 psig and lowering slowly

Which of the following describes the position of PV-015-167, "Service Air Backup Valve," and HV-006-138, "Reactor Feed Pump A Discharge Level Bypass Valve", at this time?

	PV-015-167	**HV-006-138**
A.	CLOSED	FULL OPEN
B.	CLOSED	FULL CLOSED
C.	OPEN	FULL OPEN
D.	OPEN	FULL CLOSED

K&A # 295019 AA1.01
Importance Rating 3.5

QUESTION 8

K&A Statement: Ability to operate and/or monitor the backup air supply as it applies to PARTIAL OR COMPLETE LOSS OF INSTRUMENT AIR

Justification:

A. Correct - with both Instrument Air headers below 70 psig, PV-015-167 will close to isolate the service air header to allow Service Air to supply the Instrument Air headers via check valves. Additionally, due to level being far below setpoint, HV-006-138 should be full open.

B. Incorrect but plausible – with both Instrument Air headers below 70 psig, PV-015-167 will close to isolate the service air header to allow Service Air to supply the Instrument Air headers via check valves. Failure position of HV-006-138 is closed, and applicant may believe that valve has failed closed due to level being below setpoint and lowering.

C. Incorrect but plausible if candidate does not recall operation or setpoint of PV-015-167.

D. Incorrect but plausible if the candidate does not recall operation or setpoint of PV-015-167; additionally, failure position of HV-006-138 is closed, and applicant may believe that valve has failed closed due to level being below setpoint and lowering

References: LGSOPS0015, Rev. 1 Student Ref: None

Learning Objective: LGSOPS0015: E09, E010

Question source: New

Question History: Not used on last two LGS NRC exams

Cognitive level: Memory/Fundamental knowledge: X
Comprehensive/Analysis:

10CFR55 41.7

QUESTION 9

Unit 1 is shutdown for a refueling outage after an extended run. Plant conditions are as follows:

- Plant is in MODE 4 with 'A' RHR in Shutdown Cooling (SDC)
- Upset Range reactor level indicates 55 inches
- Shutdown Range reactor level indicates 53 inches
- Average RCS temperature is 185 °F and stable
- No Reactor Recirc Pumps are running

An inadvertent SDC isolation is caused by the 'A' AND 'B' "Reactor Level 3 - Low" channels. Attempts by I&C to bypass and reset the Low Level isolations have been unsuccessful.

Following the Loss of SDC, RPV water level is raised.

Raising RPV water level to:

A. 70 inches by Shutdown Range indication, ensures adequate Natural Circulation exists for preventing thermal stratification,
AND also ensures adequate decay heat removal.

B. 70 inches by Shutdown Range indication ensures adequate Natural Circulation exists for preventing thermal stratification,
BUT does not ensure adequate decay heat removal.

C. 70 inches by Upset Range indication, ensures adequate Natural circulation exists for preventing thermal stratification,
AND also ensures adequate decay heat removal.

D. 70 inches by Upset Range indication, ensures adequate Natural Circulation exists for preventing thermal stratification,
BUT does not ensure adequate decay heat removal.

Proposed Answer: B

Level: RO
Tier #: 1
Group #: 1

K&A Rating: 295021 AK1.01 (3.6/3.8)

K&A Statement: **Knowledge of the operational implications of the following concepts as they apply to LOSS OF SHUTDOWN COOLING:** Decay heat

Justification:

A. **Incorrect but plausible:** Natural circulation is credited as an alternative method of reactor coolant circulation above 60 inches on Shutdown Range indication. Adequate decay heat removal is not ensured. Forced circulation must be re-established to preclude an inadvertent MODE change (Mode 4 to Mode 3).

B. **Correct:** Per S51.8.B, "Shutdown Cooling/Reactor Coolant Circulation Operation Start-Up and Shutdown," Precaution 3.4, maintaining vessel level above 60 inches Shutdown Range and 78 inches Upset Range, provides for crediting natural circulation as an alternative method of reactor coolant circulation. In addition, Precaution 3.5 states that for level below 60 inches Shutdown Range and 78 inches Upset Range, <u>additional</u> forced circulation is required to ensure adequate decay heat removal. Forced circulation is therefore required above the 60 inch Shutdown Range and 78 inch Upset Range levels. Significant decay heat exists in the core when entering a refueling outage after an extended run.

C. **Incorrect but plausible:** Natural circulation is credited as an alternative method of reactor coolant circulation above 78 inches on Upset Range indication. Adequate decay heat removal is not ensured. Forced circulation must be re-established to preclude an inadvertent MODE change (Mode 4 to Mode 3).

D. **Incorrect but plausible:** Natural circulation is credited as an alternative method of reactor coolant circulation above 78 inches on Upset Range indication. Adequate decay heat removal is not ensured. Forced circulation must be re-established to preclude an inadvertent MODE change (Mode 4 to Mode 3).

References: Lesson Plan LLOT0051, Rev. 000 — Applicant Ref: NONE
ON-121, "Loss of Shutdown Cooling," Rev. 29
S51.8.B, Shutdown Cooling/Reactor Coolant Circulation Operation Start-Up and Shutdown," Rev. 71

Learning Objective: LLOT0051(IL13)

Question source: New

Question History: None

Cognitive level: Memory/Fundamental knowledge:

	Comprehensive/Analysis:	X
10CFR Part 55:	41.8	
Comments:		

QUESTION 10

Unit 1 plant conditions are as follows:

- OPCON 5
- Fuel bundle 43-20 has just been seated in the Core
- The main hoist grapple is released and is being raised

SRM 'C' count rate has changed from 70 to 300 cps and continues to rise.

All other SRMs remain at 70 cps or less.

WHICH ONE of the following describes the required actions?

A. Notify Health Physics to determine dose rates.

B. Re-grapple fuel bundle 43-20 and raise it until it clears the top guide.

C. Determine if SRM 'C' is INOPERABLE due to noise induced SRM spiking.

D. Evacuate the fuel floor and ensure all insertable control rods are inserted.

Level: RO
Tier #: 1
Group #: 1

K&A Rating: 295023 AK1.03 (3.7/4.0)

K&A Statement: **Knowledge of the operational implications of the following concepts as they apply to REFUELING ACCIDENTS :** Inadvertent criticality

Justification:

A. **Incorrect but plausible:** Plausible if the applicant does not understand that count rate has more than doubled and has not stabilized and is increasing, indicating criticality. Condition exists for an evacuation and HP is notified to assist with evacuation.

B. **Incorrect but plausible:** Plausible if the applicant does not understand that count rate has more than doubled and has not stabilized and is increasing, indicating criticality. If the count rate had stabilized then the correct action would be to raise the bundle until it clears the upper guide, however, after grapple has been released there is no direction to re-grapple.

C. **Incorrect but plausible:** Plausible if the applicant does not understand that this action is not correct due to the information provided that all other SRM indications are stable.

D. **Correct:** Continuing increase in SRM count rates is an unexpected increase which indicates criticality and requires prompt operator action. Evacuate the fuel floor and ensure all insertable control rods are inserted is required action IAW ON-120, Fuel handling problems.

References: ON-120, Rev. 22
LLOT0760 Rev015

Applicant Ref: NONE

Learning Objective: LLOT0760 Rev015 Obj. 10 & 11.

Question source: Limerick Bank # 559945

Question History: Not used in Last 2 NRC exam.

Cognitive level: Memory/Fundamental knowledge: X
Comprehensive/Analysis:

10CFR Part 55: 41.10 and
41.11

Comments:

QUESTION 11

Given:

- Unit 1 reactor has scrammed from 100% power on High Drywell Pressure (all control rods are at position 00)
- Reactor level is -55 inches and rising
- Reactor pressure is 45 psig
- Drywell pressure is 17.5 psig
- Drywell temperature is 290 °F
- Suppression Pool pressure is 16.0 psig
- Suppression Pool level is 39.2 feet
- Suppression Pool temperature is 115 °F

To control the primary containment under these conditions, operators should monitor and control hydrogen concentration in the Suppression Pool and Drywell, and:

A. place two loops of RHR in Suppression Pool cooling and Suppression Chamber spray.

B. place one loop of RHR in Suppression Pool cooling and the other loop in Drywell spray.

C. place one loop of RHR in Suppression Pool cooling and Suppression Chamber spray, and the other loop in Drywell spray.

D. place two loops of RHR in Drywell spray.

Proposed Answer: A

Level: RO
Tier #: 1
Group #: 1

K&A Rating: 295024 G2.4.21 (4.0/4.6)

K&A Statement: **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,** as they apply to High Drywell Pressure.

Justification:

A. **Correct:** Adequate core cooling is assured (-55 inches and rising), Suppression Pool level is < 48 ft, and Suppression Pool temperature/pressure require Suppression Pool cooling/spray. Although Drywell pressure and temperature parameters are within the SAFE Region of the "Drywell Spray Initiation Limit" Curve, Drywell sprays cannot be initiated because Suppression Pool level is above 38.7 feet (T-102, Step PC/P-9).

B. **Incorrect but plausible:** Although Drywell pressure and temperature parameters are within the SAFE Region of the "Drywell Spray Initiation Limit" Curve, Drywell sprays cannot be initiated because Suppression Pool level is above 38.7 feet (T-102, Step PC/P-9). In addition, a plausible misconception may be associated with T-102, Step PC/P-5, which provides direction to spray the Suppression Pool "BEFORE" Suppression Pool pressure reaches 7.5 psig. "BEFORE" indicates that Suppression Pool sprays should be initiated, other conditions permitting, before Suppression Pool pressure reaches the Suppression Chamber Spray Initiation Pressure of 7.5 psig. If Suppression Pool pressure is already at or above 7.5 psig when this step is reached, Suppression Pool sprays should also be initiated.

C. **Incorrect but plausible:** Although Drywell pressure and temperature parameters are within the SAFE Region of the "Drywell Spray Initiation Limit" Curve, Drywell sprays cannot be initiated because Suppression Pool level is above 38.7 feet (T-102, Step PC/P-9).

D. **Incorrect but plausible:** Although Drywell pressure and temperature parameters are within the SAFE Region of the "Drywell Spray Initiation Limit" Curve, Drywell sprays cannot be initiated because Suppression Pool level is above 38.7 feet (T-102, Step PC/P-9). In addition, two loops of RHR should never be placed in Drywell spray as this action may exceed the makeup capacity of the vacuum breakers and draw the containment negative, resulting in potential damage to the containment. The plausible misconception discussion provided in the Justification for Answer B above, is applicable here as well.

References: T-102, "Primary Containment Control," Rev. 24

T-102 Bases, Rev. 24

T-225 (U1), "Startup and Shutdown of Suppression Pool and Drywell Spray Operation," Rev. 21

Applicant Ref: T-102, PC/P Leg and SP/T Leg

Lesson Plan LLOT1560, Rev. 014

Learning Objective:	LLOT1560 (EO5)	
Question source:	New	
Question History:	None	
Cognitive level:	Memory/Fundamental knowledge: Comprehensive/Analysis:	 X
10CFR Part 55:	41.7	
Comments:		

QUESTION 12

Unit 1 is operating at 100% power when an EHC malfunction results in the following events:

- Turbine control valves swing partially closed then back open
- REACTOR HI PRESS (107 G-2) alarm is received
- Reactor power initially rises then returns to the pre-transient level
- Reactor pressure peaks at ~1065 psig, then returns to the pre-transient level

Which one of the following actions is required by OT-102, "Reactor High Pressure" for these conditions?

A. Perform GP-4, "Rapid Plant Shutdown to Hot Shutdown"

B. Place the Mode Switch in SHUTDOWN

C. Reduce reactor power in accordance with GP-5, Steady State Operations & RMSI

D. Maintain reactor pressure ≤1053 psig using bypass valve jack or pressure set

K&A # 295025 EA 2.01
Importance Rating 4.3

QUESTION 12

K&A Statement: Ability to determine and/or interpret Reactor Pressure as it applies to HIGH REACTOR PRESSURE.

Justification:

A. Incorrect but plausible if candidate believes that a rapid shutdown is required. GP-4 prerequisite is "Plant conditions require rapid Rx Power reduction to Hot Shutdown". None of the given conditions require a reactor SCRAM. No protective setpoints were reached that would require this action.

B. Incorrect but plausible if candidate believes that a protective system setpoint has been reached and an RPS failure exists. Plausible if applicant does not recall RPS SCRAM setpoint of 1096 psig or mistakes the given alarm for the adjacent alarm (107 G-1) that is indication that the RPS SCRAM setpoint has been reached.

C. Incorrect but plausible if candidate believes that the operator immediate action is required. This action is only required to maintain pressure below 1053 psig if pressure remains above 1053 psig or continues to rise. In this case, pressure has returned to NOP.

D. Correct - The given conditions indicate reactor pressure exceeded the RPV Hi Press alarm setpoint of 1053 psig but not the RPS SCRAM setpoint of 1096 psig which is annunciated by an adjacent alarm (107 G-1). Since RPV power and pressure returned to pre-transient levels, the action required by OT-102 is to maintain RPV pressure less than or equal to 1053 psig using the bypass valve jack or pressure set.

References: OT-102, Rev. 20 Student Ref: None

Learning Objective: N/A

Question source: Bank, PB 1/11

Question History: Not used on 2008 or 2010 LGS initial exams

Cognitive level: Memory/Fundamental knowledge:
Comprehensive/Analysis: X

10CFR 41.10

QUESTION 13

Given:

- A LOCA has occurred at Unit 2
- C and D RHR pumps are injecting to maintain RPV water level (8000 gpm each)
- Containment Sprays have been utilized to lower Containment pressure
- Suppression Pool level has stabilized at 24 feet

Equipment Operator reports that both the C and D RHR pumps are making a great deal of noise (like marbles rattling inside the pump casing) and that pump discharge pressures are fluctuating.

Which one of the following conditions would most likely lead to the symptoms described by the Equipment Operator for the C and D RHR pumps?

	Suppression Pool Temperature	Suppression Pool Airspace Pressure
A.	150 °F	1.5 psig
B.	150 °F	6.0 psig
C.	175 °F	1.5 psig
D.	175 °F	6.0 psig

Proposed Answer: C

Level: RO
Tier #: 1
Group #: 1

K&A Rating: 295026 EK1.01 (3.0/3.4)

K&A Statement: **Knowledge of the operational implications of the following concepts as they apply to SUPPRESSION POOL HIGH WATER TEMPERATURE:** Pump NPSH

Justification:

A. **Incorrect but plausible:** Initially plausible in that temperature and pressure associated with the pump suction source (suppression pool) have face validity (directly impact pump NPSH).

B. **Incorrect but plausible:** Initially plausible in that temperature and pressure associated with the pump suction source (suppression pool) have face validity (directly impact pump NPSH).

C. **Correct:** Requires the applicant to (1) analyze and conclude that the symptoms reported by the Equipment Operator are indicative of pump cavitation, and (2) determine that the conditions most likely to cause cavitation are the combination of highest pool temperature (lowest density water) and lowest airspace pressure, resulting in lower pump suction pressures at higher flows (pool level stable). T-101 Bases states that "NPSH limits are defined to be the highest suppression pool temperature values which provide adequate NPSH for the pumps which take a suction on the suppression pool. The NPSH Limits are functions of pump flow and suppression pool overpressure (*airspace pressure plus the hydrostatic head of water over the pump suction*), and are utilized to preclude pump damage from cavitation." <u>Note</u> that Limerick RHR Pump Specific NPSH Limit Curves are not available.

D. **Incorrect but plausible:** Initially plausible in that temperature and pressure associated with the pump suction source (suppression pool) have face validity (directly impact pump NPSH).

References: T-101, Rev. 021 — Applicant Ref: NONE
T-101 BASES, Rev. 020
Lesson Plan LLOT1560, Rev. 014

Learning Objective: LLOT1560 (EO3)

Question source: New

Question History: None

Cognitive level: Memory/Fundamental knowledge:
Comprehensive/Analysis: X

10CFR Part 55: 41.8 to 41.10

Comments:

QUESTION 14

A LOCA is in progress on Unit 2.

- Drywell Temperature is 148°F
- The CRS directs the PRO to maximize drywell cooling.

Per T-102 Bases, WHICH ONE of the following describes the minimum number of Drywell Fans that must be in service in order to maximize drywell cooling for the above conditions, and which indication may be used to determine the availability of RECW system?

	Drywell Fans	Availability of RECW
A.	One Fan per Cooler	RECW pump suction pressure > 35 psig
B.	One Fan per Cooler	RECW pump suction pressure > 80 psig
C.	Two Fans per Cooler	RECW pump suction pressure > 35 psig
D.	Two Fans per Cooler	RECW pump suction pressure > 80 psig

Level: RO
Tier #: 1
Group #: 1

K&A Rating: 295028 AK2.04 (3.6)

K&A Statement: **Knowledge of the interrelations between HIGH DRYWELL TEMPERATURE and the following:** Drywell ventilation

Justification:

A. **Incorrect but plausible:** Plausible if the applicant does not understand the availability requirements of RECW of suction pressure > 80 psig. Suction pressure greater than 35 psig is a requirement for DWCW pump.

B. **Correct:** Per T-102 Bases, minimum number of drywell fan is defined for each unit cooler as operation of one fan, two loops of cooling water, and the use of both DWCW circulating water pumps. Also the bases states that availability of RECW system can be determined by RECW Head Tank High/Low Level Alarm (annunciator H-5 SERVICES PANEL *18) <u>not</u> being in alarm <u>OR</u> RECW pump suction pressure greater than 80 psig as read on PI-013-*05A(B).

C. **Incorrect but plausible:** Plausible if the applicant does not understand that the minimum number of fans required per T-102 Bases, is defined for each unit cooler as operation of one fan and the availability requirements of RECW of suction pressure > 80 psig. Suction pressure greater than 35 psig is a requirement for DWCW pump.

D. **Incorrect but plausible:** Plausible if the applicant does not understand that the minimum number of fans required per T-102 Bases, is defined for each unit cooler as operation of one fan. Also, plausible due to partially correct that availability of RECW is determined by RECW suction pressure > 80 psig.

References: T-102 Bases, Rev. 24
LLOT1560 Rev. 14

Applicant Ref: NONE

Learning Objective: LLOT1560, Rev. 14 Obj. #5.

Question source: Modified from Limerick Bank (591088)

Question History: Not used in Last 2 NRC exam.

Cognitive level: Memory/Fundamental knowledge: X
Comprehensive/Analysis:

10CFR Part 55: 45.8

Comments:

QUESTION 15

RHR pumps 'A' and 'B' were placed in Suppression Pool Cooling just after Unit 2 experienced a full MSIV isolation. The following plant conditions exist:

• RPV water level	-83 inches
• RPV pressure	1050 psig
• Drywell pressure	1.3 psig
• Suppression Pool level	17.5 feet
• Suppression Pool temperature	113 °F

Which one of the following is available to provide a valid Suppression Pool temperature

A. 'A' and 'B' RHR pump suction temperature indications

B. 'A' and 'C' Core Spray pump suction temperature indications

C. Suppression Pool Temperature Monitoring System (SPOTMOS)

D. RCIC pump suction temperature indication

Proposed Answer: A

Level: RO
Tier #: 1
Group #: 1

K&A Rating: 295030 EA2.02 (3.9/3.9)

K&A Statement: **Ability to determine and/or interpret the following as they apply to LOW SUPPRESSION POOL WATER LEVEL:** Suppression pool temperature

Justification:

A. **Correct:** T-102, "Primary Containment Control," BASES pertaining to T-102 NOTE 2, states that the "SPOTMOS probes are located in the suppression pool at an elevation which corresponds to an indicated suppression pool level of 17.8 ft. If indicated suppression pool level drops below 17.8 ft, RHR pump suction temperature can be used as a valid alternate method for determining suppression pool temperature provided an RHR pump is running.

B. **Incorrect but plausible:** Initially plausible in that 'A' and 'C' Core Spray pumps have face validity (take suction from the suppression pool, similar to the RHR pumps). 'A' and 'C' Core Spray pumps do not have suction temperature indication. In addition, 'A' and 'C' Core Spray pumps will not be running based on stem information.

C. **Incorrect but plausible:** SPOTMOS temperature indication is invalid below 17.8 ft. T-102 NOTE 2 provides guidance to use RHR pump suction temperatures below 17.8 ft.

D. **Incorrect but plausible:** Initially plausible in that RCIC has face validity (takes suction from the suppression pool). The RCIC pump does not have suction temperature indication.

References: T-102 (sheet 1 of 2), Rev. 024 Applicant Ref: NONE
T-102 BASES, Rev. 24

Learning Objective: LLOT1560 (EO5)

Question source: LGS Bank (ID: 555774)

Question History: Not used on 2008 or 2010 LGS Written Exam

Cognitive level: Memory/Fundamental knowledge:
Comprehensive/Analysis: X

10CFR Part 55: 41.10

Comments:

- Re-sequenced the answers (B→A; A→B)
- Changed the '<u>or</u>' to an '<u>and</u>' in Answer 'B' above (Bank ID 555774, Answer 'A') to improve the plausibility of Answer 'B' by making it consistent with the wording in Correct Answer 'A'.

QUESTION 16

At T=0, Unit 2 plant conditions are as follows:

- Reactor power is 100%
- Division I DC is de-energized
- A Digital FWLCS malfunction occurs, resulting in a large reduction in feedwater flow

At T=1 minute, plant conditions are as follows:

- RPV water level has just reached -38" and down slow
- RPV pressure reached 1140 psig at its peak and cycling with manual SRV operation
- Reactor Power is 28% steady

Which one of the following describes the expected status of the ARI valves and the Recirc Pumps at T=1 minute?

	ARI Valves	Recirc Pumps
A.	All eight energized	Both 'A' and 'B' are tripped
B.	All eight energized	'B' tripped, 'A' running at 28% speed
C.	Four energized	Both 'A' and 'B' are tripped
D.	Four energized	Both 'A' and 'B' running at 28% speed

K&A # 295031 EK 2.10
Importance Rating 4.0

QUESTION 16

K&A Statement: Knowledge of the interrelations between REACTOR LOW WATER LEVEL and Redundant Reactivity Control

Justification:

A. Incorrect but plausible if the candidate does not recognize that with Division I DC de-energized, ARI will function, but only 4 of 8 valves will energize. Also, candidate may also fail to recall that ATWS RPT does not initiate immediately at -38" RPV water level, but after a 9 second time delay

B. Incorrect but plausible if the candidate does not recognize that with Division I DC de-energized, ARI will function, but only 4 of 8 valves will energize. Also, candidate may not recall that each division of ATWS RPT trips one RPT breaker for *each* Recirc Pump, and believe that only one Recirc Pump will trip also immediately instead of following a 9 second time delay

C. Incorrect but plausible if candidate does not recall that ATWS RPT does not initiate immediately at -38" RPV water level, but after a 9 second time delay

D. Correct – <u>ARI initiation setpoints</u>: 1149 psig RPV pressure OR -38" RPV water level. <u>ATWS RPT initiation setpoints</u>: 1149 psig RPV pressure OR -38" RPV water level *after a 9 second time* delay. With RPV water level having just reached -38", ARI is actuated at this time. ATWS RPT is also initiated at this RPV water level, but not until after a 9 second time delay

References: LGSOPS0036A, Rev. 2a Student Ref: None

Learning Objective: LGSOPS0036A: E04, E05

Question source: Modified LGS bank 833611

Question History: Not used on 2008 or 2010 LGS exams

Cognitive level: Memory/Fundamental knowledge:
Comprehensive/Analysis: X

10CFR 41.7

QUESTION 17

Given the following:

- A Full Core ATWS is in progress on Unit 1
- APRMs indicate 55% reactor power
- T-101, "RPV Control," has been entered
- ARI has been initiated
- No rod motion observed
- All Scram Solenoid Group lights are extinguished
- All Blue "SCRAM" lights on the full core display are extinguished
- Running CRD pump has tripped, Standby CRD pump is unavailable

Which one of the following methods in the RC/Q leg of T-101 can be used to insert control rods?

A. Venting/draining the Scram Discharge Volume (T-217)

B. Maximizing CRD cooling water flow (T-219)

C. Pulling RPS fuses in the 10C609/10C611 panels (T-215)

D. Venting the Scram air header (T-216)

Proposed Answer: D

Level: RO
Tier #: 1
Group #: 1

K&A Rating: 295037 EK3.07 (4.2/4.3)

K&A Statement: **Knowledge of the reasons for the following responses as they apply to SCRAM CONDITION PRESENT AND REACTOR POWER ABOVE APRM DOWNSCALE OR UNKNOWN:** Various alternate methods of control rod insertion: Plant-Specific

Justification:

A. **Incorrect but plausible:** The ATWS is not due to a hydraulic lock. HCU Scram Inlet/Outlet valves are closed and the SDV vent and drain valves are open. The Scram air header would have to be depressurized for the SDV vent and drain valves to close, allowing the SDV to fill with water from the exhaust side of the HCU pistons.

B. **Incorrect but plausible:** Maximizing CRD cooling water flow raises the differential pressure across the CRDM drive piston, allowing control rods to drift in. With no CRD pumps in service, this method of rod insertion is unavailable.

C. **Incorrect but plausible:** RPS is already de-energized as indicated by the Scram Solenoid Group lights being extinguished. Removing Fuses C71A-F14A and C71A-F14B in the 10C609/10C611 panels de-energizes both the 'A' and 'B' RPS trip systems, which has already been accomplished by the initial reactor Scram.

D. **Correct:** Venting the Scram air header will accomplish the Scram action intended by both RPS and ARI initiation. The fact that all Blue "SCRAM" lights on the full core display are extinguished indicates that both the Scram Inlet and Outlet valves for the individual HCUs are not fully open. Venting of the header will open all HCU Scram Inlet and Outlet valves, and close the SDV vents and drains.

References: T-101, Rev. 021
T-101 BASES, Rev. 020
Lesson Plan LGSOPS2003, Rev. 001
Lesson Plan LLOT-0071, Rev. 000

Applicant Ref: NONE

Learning Objective: LGSOPS2003 (IL4)

Question source: Modified LGS Bank (ID: 558362)

Question History: Not used on 2008 or 2010 LGS Written Exam

Cognitive level: Memory/Fundamental knowledge:
Comprehensive/Analysis: X

10CFR Part 55: 41.5

Comments:

QUESTION 18

Unit 1 plant conditions are as follows:

- 100% power
- A RWCU demin resin spill has just occurred during resin transfer
- Reactor Enclosure HVAC Exhaust Rad Monitors A and B indicate 1.4 mR/hr

WHICH ONE of the following describes the resulting status of Standby Gas Treatment System Fan and the location to obtain a valid reading of Reactor Enclosure Effluent radiation levels based on the above conditions?

	SGTS Fan Status	Effluent Rad Reading
A.	SGTS fan 0AV163 running	North Stack Monitor
B.	SGTS fan 0AV163 running	South Stack Monitor
C.	SGTS fan 0AV163 not running	North Stack Monitor
D.	SGTS fan 0AV163 not running	South Stack Monitor

Level: RO
Tier #: 1
Group #: 1

K&A Rating: 295038 AA1.01 (3.9/4.2)

K&A Statement: **Ability to operate and/or monitor the following as they apply to HIGH OFF-SITE RELEASE RATE:** Stack-gas monitoring system

Justification:

A. **Correct:** Zone 1 isolation will occur due to Reactor Enclosure Ventilation Exhaust Duct High Radiation condition above 1.35 mr/hr for rad monitor A and B, causing SGTS fan 0AV163 to start. For the Zone 1 isolation condition, SGTS fan exhaust to North Stack.

B. **Incorrect but plausible:** Plausible due to partially correct Zone 1 isolation will occur due to Reactor Enclosure Ventilation Exhaust Duct High Radiation condition above 1.35 mr/hr for rad monitor A and B, however SGTS fan exhaust to North Stack. Also, normal reactor enclosure ventilation exhausts to south vent stack, if Zone 1 isolation does not occur than the south vent stack would be utilized.

C. **Incorrect but plausible:** Plausible if the applicant does not understand that Zone 1 isolation will occur due to Reactor Enclosure Ventilation Exhaust Duct High Radiation condition above 1.35 mr/hr for rad monitor A and B.

D. **Incorrect but plausible:** Plausible if the applicant does not understand that Zone 1 isolation will occur due to Reactor Enclosure Ventilation Exhaust Duct High Radiation condition above 1.35 mr/hr for rad monitor A and B. Also, normal reactor enclosure ventilation exhausts to south vent stack, if Zone 1 isolation does not occur than the south vent stack would be utilized.

References: LLOT0200 Rev. 018 Applicant Ref: NONE

Learning Objective: LLOT0200 Rev. 018 Obj. #3 and 10b.

Question source: Modified from Limerick Bank (561518)

Question History: Not used in Last 2 NRC exam.

Cognitive level: Memory/Fundamental knowledge: X
Comprehensive/Analysis:

10CFR Part 55: 41.7

Comments:

QUESTION 19

According to SE-8, “Fire,” an Emergency Diesel Generator (EDG) start OR wind direction change with an EDG running, is known to cause fire alarms in the Reactor and Control Structures.

Per SE-8, these “Diesel Induced” fire alarms should be considered ___(1)___ alarms. The Fire Brigade Leader is ___(2)___ to the scene.

A. (1) valid
(2) dispatched

B. (1) valid
(2) not dispatched

C. (1) invalid
(2) dispatched

D. (1) invalid
(2) not dispatched

Proposed Answer: C

Level: RO
Tier #: 1
Group #: 1

K&A Rating: 600000 AK3.04 (2.8/3.4)

K&A Statement: **Knowledge of the reasons for the following responses as they apply to PLANT FIRE ON SITE:** Actions contained in the abnormal procedure for plant fire on site

Justification:

A. **Incorrect but plausible:** Valid fire alarms require the FBL to be dispatched in accordance with SE-8. "Diesel Induced" fire alarms are "invalid."

B. **Incorrect but plausible:** Reasonable to assume that the FBL would not be dispatched for "Diesel Induced" fire alarms that are thought to be "valid," since they are expected and associated with a known condition.

C. **Correct:** SE-8, "Fire," states that "Diesel Induced" fire alarms occur coincident with an Emergency Diesel Generator start **OR** wind direction change with a running EDG. This is a know condition based on Limerick's topography and positioning of ventilation intakes. Since this condition is known to cause false fire alarms in the Reactor and Control Structures, these alarms should be considered an expected response **AND** these alarms should **not** be considered valid fire alarms. Fire alarms in the Diesel Generator Bay for the running diesel should be considered valid **AND** **not** "Diesel Induced." Full response to diesel induced alarms per this procedure **is required**." The Fire Brigade Leader is dispatched as part of the "Full" response per SE-8.

D. **Incorrect but plausible:** Valid fire alarms require the FBL to be dispatched in accordance with SE-8. Therefore, it is reasonable to assume that the FBL would not be dispatched for "invalid" alarms that are expected for a known condition.

References: SE-8, Rev. 043 Applicant Ref: NONE
Lesson Plan LGSOPS2000

Learning Objective: LGSOPS2000 (LLOT1563.01)
LGSOPS2000 (LLOT1563.03)

Question source: New

Question History: None

Cognitive level: Memory/Fundamental knowledge: X
Comprehensive/Analysis:

10CFR Part 55: 41.10

Comments:

QUESTION 20

Unit 1 plant conditions as follows:

- 96% power
- PJM has issued a "MAX EMERGENCY GENERATION ALERT"
- Maximum MVARs have been requested
- Generator H_2 Pressure 68 psig
- Generator Output 1150 MWe
- Reactive Load 350 MVAR
- Field Amps 6394 Amps
- Terminal Voltage 21.3 kV

Which one of the following identifies the single action that will restore <u>all</u> main generator parameters within required limits?

A. Raise Main Generator H_2 pressure

B. Lower Main Generator Excitation

C. Raise Reactor Power

D. Raise Main Generator Excitation

GENERATOR HYDROGEN MACHINE GAS PRESSURE (PSIG)		75	74	73	72	71	70	69	68	67	66	65	64	63	62	61	60	59	58	57	56	55	54	53
	1245	224	180	122	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no
	1240	250	212	166	100	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no
	1235	274	239	199	149	70	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no
	1230	296	264	228	186	131	0	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no
	1225	316	286	254	217	172	111	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no
	1220	334	307	277	243	204	157	86	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no
	1215	352	326	298	267	232	192	140	49	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no
	1210	369	344	318	289	257	221	178	121	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no
Main	1205	385	361	336	309	280	247	209	163	96	no	no	no	no	no	no	no	no	no	no	no	no	no	no
Gen	1200	400	378	354	328	300	270	236	197	147	69	no	no	no	no	no	no	no	no	no	no	no	no	no
Load	1195	415	393	370	346	320	291	260	225	183	130	0	no	no	no	no	no	no	no	no	no	no	no	no
(Mwe)	1190	429	408	386	363	338	311	282	250	213	169	109	no	no	no	no	no	no	no	no	no	no	no	no
	1185	443	422	401	379	355	330	302	273	240	201	154	84	no	no	no	no	no	no	no	no	no	no	no
	1180	456	436	415	394	371	347	321	294	263	229	189	138	49	no	no	no	no	no	no	no	no	no	no
	1175	469	449	429	409	387	364	339	313	285	253	218	175	119	no	no	no	no	no	no	no	no	no	no
	1170	481	462	443	423	402	379	356	331	305	276	243	206	161	97	no	no	no	no	no	no	no	no	no
	1165	493	475	456	436	416	395	372	348	323	296	266	233	194	145	68	no	no	no	no	no	no	no	no
	1160	505	487	468	449	430	409	387	365	341	315	287	256	222	181	128	0	no	no	no	no	no	no	no
	1155	516	499	481	462	443	423	402	380	357	333	307	278	246	210	167	108	65	no	no	no	no	no	no
	1150	527	510	492	474	456	436	416	395	373	350	325	298	269	236	198	152	115	0	no	no	no	no	no
	1145	538	521	504	486	468	449	430	409	388	366	342	317	289	259	226	186	155	100	no	no	no	no	no
	1140	545	535	510	490	475	460	438	425	395	375	350	320	292	260	230	220	185	150	no	no	no	no	no
	1135	560	555	515	510	485	475	450	430	410	385	358	330	310	275	240	235	212	175	0	no	no	no	no
	1130	570	563	530	520	495	487	468	445	400	405	380	350	320	295	255	265	235	195	150	0	no	no	no
	1125	568	565	550	535	510	496	475	465	437	425	390	368	335	315	272	285	265	225	175	105	no	no	no
	1120	572	570	555	540	530	510	485	468	455	430	410	380	355	332	300	315	280	255	210	135	0	no	no

K&A # 700000 AA 1.03
Importance Rating 3.8

QUESTION 20

K&A Statement: Ability to operate and/or monitor voltage regulator controls as it applies to GENERATOR VOLTAGE AND ELECTRIC GRID DISTURBANCES

Justification:

A. Incorrect but plausible if the candidate does not recognize that raising main generator H_2 pressure will raise the allowable amount of MVAR at this MWE rating, but will not correct field current

B. Correct – Currently Main Generator Field Current limits are being exceeded (>6382 Amps) and can only be corrected by lowering main generator excitation.

C. Incorrect but plausible if candidate does not recognize that main generator field current limits are being exceeded, and raises reactor power to support the MAXIMUM EMERGENCY GENERATION ALERT. While this will raise main generator MWe output, it will not correct main generator field current, which is currently above its limit.

D. Incorrect but plausible if the candidate does not recognize that main generator field current limits are being exceeded, and chooses to raise main generator excitation to support maximum MVAR generation. While this will raise MVAR output and raise main generator terminal voltage, it will also raise main generator field current, which is already above its limit.

References: S32.3.A, Rev. 008
E-5, Rev. 020

Student Ref: None

Learning Objective: N/A

Question source: Modified LGS bank 833371

Question History: Not used on 2008 or 2010 LGS initial exams

Cognitive level: Memory/Fundamental knowledge:
Comprehensive/Analysis: X

10CFR 41.5/41.10

QUESTION 21

Unit 1 was operating at 100% power for 8 months, when the reactor was manually scrammed due to a loss of condenser vacuum resulting from loss of the in-service SJAE train and inability to place the alternate SJAE train in service.

The following conditions exist 5 minutes after the scram:

- HPCI is unavailable
- RPV level is -38 inches
- RPV pressure is 955 psig
- Condenser vacuum is 8.45" Hg Vac and slowly degrading

Assuming no operator action, RPV pressure is ____(1)____ and RPV level is ____(2)____.

A. (1) rising
(2) rising

B. (1) rising
(2) lowering

C. (1) stable
(2) rising

D. (1) stable
(2) lowering

Proposed Answer: B

Level: RO
Tier #: 1
Group #: 2

K&A Rating: 295002 AK1.03 (3.6/3.8)

K&A Statement: **Knowledge of the operational implications of the following concepts as they apply to LOSS OF MAIN CONDENSER VACUUM:** Loss of heat sink

Justification:

A. **Incorrect but plausible:** RFPTs trip at 15" Hg Vac. HPCI is unavailable. RCIC auto starts at minus 38 inches but has insufficient capacity to make up for boil off that is occurring due to decay heat in the reactor within the first 15 minutes of MSIV closure.

B. **Correct:** Per OT-116, "Loss of Condenser Vacuum," MSIV automatic isolation occurs at 8.54" Hg Vac. Bypass Valves are isolated from the reactor and have lost the ability to control RPV pressure. RFPTs trip at 15" Hg Vac. HPCI is unavailable. RCIC auto starts at minus 38 inches but has insufficient capacity to make up for boil off that is occurring due to decay heat in the reactor within the first 15 minutes of MSIV closure.

C. **Incorrect but plausible:** MSIV automatic isolation occurs at 8.54" Hg Vac. Bypass Valves are isolated from the reactor and have lost the ability to control RPV pressure. Plausible if the applicant does not recall the MSIV isolation setpoint or that that MSIV closure isolates the Bypass Valves, which auto close at 7" Hg Vac. RCIC auto starts at minus 38 inches but has insufficient capacity to make up for boil off that is occurring due to decay heat in the reactor within the first 15 minutes of MSIV closure.

D. **Incorrect but plausible:** MSIV automatic isolation occurs at 8.54" Hg Vac. Bypass Valves are isolated from the reactor and have lost the ability to control RPV pressure. Plausible if the applicant does not recall the MSIV isolation setpoint or that that MSIV closure isolates the Bypass Valves, which auto close at 7" Hg Vac.

References: OT-116, Rev. 35 Applicant Ref: NONE

Learning Objective: LGSOPS0007 (IL6.a)

Question source: Modified from PB 1/11 Exam (Q 59)

Question History: None

Cognitive level: Memory/Fundamental knowledge:
Comprehensive/Analysis: X

10CFR Part 55: 41.8 to 41.10

Comments:

QUESTION 22

Given the following:

- Unit 1 Refueling Outage completed
- Power ascension on hold at 80% RTP to perform power suppression testing to locate a leaking fuel bundle
- ARC-MCR-107, REACTOR, Window D-4, “FWLCS FAILURE,” alarms
- ARC-MCR-107, REACTOR, Window H-2, “REACTOR HI/LO LEVEL,” alarms
- All +54” automatic trips occur as expected
- RPV Pressure is 590 psig and continuing to lower (low decay heat load)

Which one of the following describes the appropriate Operator Actions in accordance with OT-110, “Reactor High Level?”

A. Trip the running Condensate pumps;
Establish RWCU System blowdown to the Equipment Drain Collection Tank

B. Trip the running Condensate pumps;
Establish RWCU System blowdown to the Main Condenser Hotwell

C. Close the RFP discharge valves;
Establish RWCU System blowdown to the Equipment Drain Collection Tank

D. Close the RFP discharge valves;
Establish RWCU System blowdown to the Main Condenser Hotwell

Proposed Answer: A

Level: RO
Tier #: 1
Group #: 2

K&A Rating: 295008 (G2.2.44) (4.2/4.4)

K&A Statement: **Ability to interpret control room indications to verify the status and operation of a system, and understand how operator actions and directives affect plant and system conditions,** as they apply to High Reactor Water Level.

Justification:

A. **Correct:** RPV depressurization to below Condensate pump shutoff head (nominal 600 psig) will result in significant RPV injection without appropriate Operation action to prevent this. Of the two methods prescribed for securing Condensate injection (tripping the pumps or closing RFP discharge valves), closure of the RFP discharge valves is preferred. This is the normal method of isolating Condensate that leaves the system in service, available for RPV make-up and continued Main Condenser vacuum operation (cooling to the SJAE and SPE condensers). However, the RFP discharge valves take time to close (approximately 80 to 100 seconds) and RPV inventory will continue to rise. For the given conditions, a competent Reactor Operator should be able to recognize that rapid termination of Condensate injection is required to prevent flooding the Main Steam Lines, and that tripping the Condensate pumps is the most appropriate action. The adverse consequences of tripping the Condensate pumps is offset by avoiding flooding of the Main Steam lines and possible SRV damage which could result on SRV operation with a water and/or water/steam discharge. In addition, with suspected fuel damage, reactor coolant radioactivity should be taken into consideration prior to blowing down to the Main Condenser. RWCU blowdown to the Equipment Drain Collection Tank is the most appropriate action.

B. **Incorrect but plausible:** With suspected fuel damage, reactor coolant radioactivity should be taken into consideration prior to blowing down to the Main Condenser. RWCU blowdown to the Equipment Drain Collection Tank is the most appropriate action.

C. **Incorrect but plausible:** The RFP discharge valves take time to close (approximately 80 to 100 seconds) and RPV inventory will continue to rise. For the given conditions, rapid termination of Condensate injection is required, and tripping the Condensate pumps is the most appropriate action.

D. **Incorrect but plausible:** The RFP discharge valves take time to close (approximately 80 to 100 seconds) and RPV inventory will continue to rise. For the given conditions, rapid termination of Condensate injection is required, and tripping the Condensate pumps is the most appropriate action. With suspected fuel damage, reactor coolant radioactivity should be taken into consideration prior to blowing down to the Main Condenser. RWCU blowdown to the Equipment Drain Collection Tank is the most appropriate action.

References: Lesson Plan LGSOPS1540, Rev. 000 Applicant Ref: NONE
ARC 107 REACTOR (D-4), Rev. 002

ARC 107 REACTOR (H-2), Rev. 003
OT-110, Rev. 029
OT-110 Bases, Rev. 029
S06.1.H U/1, Rev. 012
S44.4.A, Rev. 028
S44.4.C, Rev. 019

Learning Objective:	LLGSOPS1540 (IL5)	
Question source:	New	
Question History:	None	
Cognitive level:	Memory/Fundamental knowledge:	
	Comprehensive/Analysis:	X
10CFR Part 55:	41.5	
Comments:		

QUESTION 23

Given the following:

- Unit 1 is operating at 100% power
- Drywell Unit Cooler Fans 1A2V212 through 1H2V212 are in service with their associated hand switches placed in the "RUN" position
- Drywell Unit Cooler Fans 1A1V212 through 1H1V212 are in standby with their associated hand switches placed in the "AUTO" position

Then:

- Unit 1 automatically scrams on High Drywell Pressure
- T-101, "RPV Control," has been entered
- The running Drywell Unit Cooler Fans lose power due to load shedding of the associated 480 VAC Load Centers

Which one of the following describes the response of Drywell Unit Cooler Fans 1A2V212 through 1H2V212 once power has been restored to the 480 VAC Load Centers that power these fans?

A. LOCA Unit Fans auto restart after 30 seconds;
Non-LOCA Unit Fans require manual reset and closure of their 1E breakers

B. LOCA Unit Fans auto restart after 55 seconds;
Non-LOCA Unit Fans require manual reset and closure of their 1E breakers

C. Fans 1A2V212 through 1H2V212 auto restart after 30 seconds

D. Fans 1A2V212 through 1H2V212 auto restart immediately

Proposed Answer: C

Level: RO
Tier #: 1
Group #: 2

K&A Rating: 295010 AK2.05 (3.7/3.8)

K&A Statement: **Knowledge of the interrelations between HIGH DRYWELL PRESSURE and the following:** Drywell cooling and ventilation

Justification:

A. **Incorrect but plausible:** For Unit 1 only, Drywell Unit Cooler Fans 1A2V212 through 1H2V212 (LOCA and Non-LOCA) in "RUN" will automatically restart after a 30 second time delay once power has been restored to the associated 480 VAC Load Center. The 1E fan breakers do not require manual reset and closure in order to restart the fans.

B. **Incorrect but plausible:** For Unit 1 only, Drywell Unit Cooler Fans 1A2V212 through 1H2V212 (LOCA and Non-LOCA) in "RUN" will automatically restart after a 30 second time delay once power has been restored to the associated 480 VAC Load Center. The 1E fan breakers do not require manual reset and closure in order to restart the fans. The 55 second time delay is associated with the low flow auto start circuit for fans in standby.

C. **Correct:** For Unit 1 only, Fans A2 through H2 in "RUN" will automatically restart after a 30 second time delay once power has been restored to the associated 480 VAC Load Center. For Unit 1 only, Fans A1 through H1 in "AUTO" will not restart unless a low flow condition is sensed for 55 seconds, followed by an additional 30 second time delay.

D. **Incorrect but plausible:** For Unit 1 only, Drywell Unit Cooler Fans 1A2V212 through 1H2V212 (LOCA and Non-LOCA) in "RUN" will automatically restart after a 30 second time delay once power has been restored to the associated 480 VAC Load Center. For Unit 1 only, there is no time delay for Drywell Unit Cooler Fans 1A1V212 through 1H1V212 (LOCA and Non-LOCA) that are in RUN." For Unit 2, there is no time delay associated with any fan that is in "RUN."

References: Lesson Plan LGSOPS0077, Rev. 000 Applicant Ref: NONE
S77.1.A, Rev. 17

Learning Objective: LGSOPS0077 (IL6)

Question source: New

Question History: None

Cognitive level: Memory/Fundamental knowledge: X
Comprehensive/Analysis:

10CFR Part 55: 41.7

Comments:

QUESTION 24

Given the following:

- A Reactor Startup is in progress on U1
- RWM Sequence 'B' is being utilized
- Reactor power is 8%
- Control Rods 50-27 and 18-19 were hydraulically isolated prior to Startup to support corrective maintenance
- There are no other "Problem Rods"

Then:

- A single rod scram occurs on Control Rod 26-11 from position 16
- Control Rod 26-11 settles at position 00

Which one of the following describes the Banked Position Withdrawal Sequence (BPWS) Deviation and the appropriate Action to be taken?

A. BPWS Deviation Acceptable;
Contact Reactor Engineering for recovery

B. BPWS Deviation Not Allowed;
Demand a P-1 and evaluate thermal limits

C. BPWS Deviation Acceptable;
Hydraulically isolate Control Rod 26-11

D. BPWS Deviation Not Allowed;
Manually scram the reactor

Proposed Answer: D

Level: RO
Tier #: 1
Group #: 2

K&A Rating: 295014 AK3.01 (4.1/4.1)

K&A Statement: **Knowledge of the reasons for the following responses as they apply to INADVERTENT REACTIVITY ADDITION:** Reactor SCRAM

Justification:

A. **Incorrect but plausible:** BPWS Rod Group 3 (Sequence 'B') Control Rods 18-19 and 26-11 are only separated by one control cell. A manual Reactor Scram is required whenever a BPWS Deviation is not allowed ≤ 10% RTP. Contacting Reactor Engineering for recovery guidance below 10% RTP is performed when there is only one error rod or the rod pattern complies with BPWS Allowed Deviations. Three error rods exist.

B. **Incorrect but plausible:** Per ON-104 guidance, "Demanding" a P-1 edit for thermal limit evaluations is performed at reactor power levels above the RWM LPSP (< 15.9% reactor power as sensed by the Total Steam Flow signal from the Digital Feedwater Level Control System).

C. **Incorrect but plausible:** Per ON-104 guidance, the appropriate Action is to manually scram the reactor when the rod pattern does not comply with BPWS Allowed Deviation ≤ 10% RTP. Hydraulically isolating Control Rod 26-11 is plausible considering that (1) two other control rods in the same BPWS Rod Group have already been fully inserted and their HCUs hydraulically isolated, and (2) a maximum of three fully inserted control rods that deviate from the BPWS requirements within the same BPWS Rod Group are allowed, provided control rod separation requirements are met.

D. **Correct:** BPWS Rule Deviations are applicable ≤ 10% RTP. The three fully inserted control rods are all in BPWS Rod Group 3 (Sequence 'B'). A maximum of three fully inserted control rods within the same BPWS Rod Group are allowed to deviate from the BPWS requirements provided the control rods are separated from each other in all directions by at least two control cells. Control Rods 18-19 and 26-11 are only separated by one control cell. A manual Reactor Scram is required.

References: Lesson Plan LGSOPS1550, Rev. 000
ON-104, Rev. 53
ON-104 Bases, Rev. 46

Applicant Ref: ON-104, Attachment 4 (pages 2,3,4)

Learning Objective: LGSOPS1550 (IL3)

Question source: New

Question History: None

Cognitive level: Memory/Fundamental knowledge:
Comprehensive/Analysis: X

10CFR Part 55: 41.5

Comments:

QUESTION 25

Given the following:

- Unit 2 reactor power 100%
- Both loops of Drywell Cooling are in service

A loss of 20Y101 120 VAC Instrument Bus results in the closure of four drywell chilled water isolation valves.

Which one of the following describes the status of drywell chilled water service to the drywell one minute later and the ability to bypass the isolation and restore full drywell cooling, based on the above conditions?

	Drywell Chilled Water Status	Bypass/Restoration Capability
A.	No loops supplying drywell cooling	Can be bypassed and restored
B.	No loops supplying drywell cooling	Cannot be bypassed and restored
C.	'A' Loop Only supplying drywell cooling	Can be bypassed and restored
D.	'A' Loop Only supplying drywell cooling	Cannot be bypassed and restored

Proposed Answer: B

Level: RO
Tier #: 1
Group #: 2

K&A Rating: 295020 AA1.02 (3.2/3.4)

K&A Statement: **Ability to operate and/or monitor the following as they apply to INADVERTENT CONTAINMENT ISOLATION:** Drywell ventilation/cooling system

Justification:

A. **Incorrect but plausible:** Loss of the 20Y101 120 VAC Instrument Bus will *not* allow the isolation to be bypassed. The bypass is energized to operate. The isolation signal is de-energize to operate.

B. **Correct:** Loss of the 20Y101 120 VAC Instrument Bus closes the Drywell Supply and Return Outboard MOVs in both the 'A' and 'B' Chilled Water Loops (Note that Loss of 20Y102 closes the Inboard MOVs in both loops). Loss of power will *not* allow the isolation to be bypassed. The bypass is energized to operate. The isolation signal is de-energize to operate.

C. **Incorrect but plausible:** Loss of the 20Y101 120 VAC Instrument Bus closes the Drywell Supply and Return Outboard MOVs in both the 'A' and 'B' Chilled Water Loops. Loss of power will *not* allow the isolation to be bypassed. The bypass is energized to operate.

D. **Incorrect but plausible:** Loss of the 20Y101 120 VAC Instrument Bus closes the Drywell Supply and Return Outboard MOVs in both the 'A' and 'B' Chilled Water Loops.

References: Lesson Plan LGSOPS0087, Rev. 000 Applicant Ref: NONE
GP-8 (U1), Rev. 016
GP-8.1 (U1), Rev. 016
GP-8.2 (U1), Rev. 008
GP-8.4 (U1), Rev. 008

Learning Objective: LLGSOPS0087 (IL7)

Question source: Modified LGS Bank (ID 561542)

Question History: Not used on 2008 or 2010 LGS Written Exam

Cognitive level: Memory/Fundamental knowledge: X
Comprehensive/Analysis:

10CFR Part 55: 41.7

Comments:

QUESTION 26

Unit 2 plant conditions are as follows:

- Drywell pressure is 1.85 psig
- RPV water level is -25 inches
- HPCI is running and slowly recovering level
- Suppression Pool level is 26'-5"
- '2B' RHR pump has been placed in Suppression Pool Cooling
- A large leak from the Main Condenser Hotwell has been reported

Which one of the following procedures must be used to control Suppression Pool level?

A. T-233, RHR to Radwaste

B. S52.1.D, Alternate Suppression Pool Cleanup

C. T-232, Suppression Pool Cleanup Pump

D. T-230, HPCI/RCIC to CST

Proposed Answer: A

Level: RO
Tier #: 1
Group #: 2

K&A Rating: 295029 EK3.02 (3.6/4.0)

K&A Statement: **Knowledge of the reasons for the following responses as they apply to HIGH SUPPRESSION POOL WATER LEVEL:** Lowering suppression pool water level

Justification:

A. **Correct:** T-233 reduces Suppression Pool water level with the 'A' RHR Pump discharge lined up to the Equipment Drain Collection Tank. The '2A' RHR Pump is available. T-233 includes steps to defeat the High Drywell Pressure Group IIB isolations to the RHR Drain to Radwaste Inboard and Outboard valves.

B. **Incorrect but plausible:** S52.D.1, "Alternate Suppression Pool Cleanup," provides an alternate method of Suppression Pool cleanup using the Condensate Storage Tank and Radwaste. It does not provide a methodology to lower Suppression Pool water level. Use of S52.D.1 is initially plausible in that its title implies that it may be used in lieu of T-232. T-232 is not a viable option given the leak in the Main Condenser Hotwell.

C. **Incorrect but plausible:** T-232 bypasses the High Drywell Pressure Group VIIIB NSSSS Isolations to the Suppression Pool Cleanup Pump Inboard and Outboard suction valves, allowing Suppression Pool Cleanup to be used for removal of Suppression Pool water inventory to the Main Condenser Hotwell. The Hotwell has developed a large leak, making it unavailable for use in accordance with this procedure.

D. **Incorrect but plausible:** T-230 reduces Suppression Pool water level by using HPCI or RCIC to take a suction from the Suppression Pool and discharge to the Condensate Storage Tank. HPCI and RCIC cannot be used because the 1.68 psig High Drywell Pressure initiation signal is present.

References: Lesson Plan, LGSOPS2003, Rev. 001 Applicant Ref: NONE
GP-8 (U2), Rev. 08
GP-8.1 (U2), Rev. 14
T-102, Rev. 24
T-230 (U2), Rev. 12
T-232 (U2), Rev. 15
T-233 (U2), Rev. 10
S52.1.D, Rev. 12

Learning Objective: LGSOPS2003 (IL4)

Question source: Modified LGS Bank (ID 554428)

Question History: Not used on 2008 or 2010 LGS Written Exam

Cognitive level:	Memory/Fundamental knowledge:	
	Comprehensive/Analysis:	X
10CFR Part 55:	41.5	
Comments:		

QUESTION 27

Given the following:

- U1 is at 98% reactor power
- RCIC System Full Flow Functional Test in progress per S49.1.D
- ARC-MCR-116, RCIC, Window A-5, "RCIC PUMP ROOM FLOOD" alarms
- T-103 is entered

Which one of the following is used to determine when RCIC compartment water level exceeds the MSO value specified in T-103, Table SCC-2?

A. RCIC room level indicator LIS-49-1N011 on instrument rack 10C017

B. Reflash of the "RCIC PUMP ROOM FLOOD" annunciator

C. MSO water level markings inside and outside the RCIC Room

D. Simultaneous start of both Reactor Enclosure Floor Drain Sump pumps

Proposed Answer: C

Level: RO
Tier #: 1
Group #: 2

K&A Rating: 295036 EA2.02 (3.1/3.1)

K&A Statement: **Ability to determine and/or interpret the following as they apply to SECONDARY CONTAINMENT HIGH SUMP/AREA WATER LEVEL:** Water level in the affected area

Justification:

A. **Incorrect but plausible:** Plausible if the applicant is unaware that permanently installed plant instrumentation (i.e., RCIC LIS-49-1N011) does not exist for reading specific water levels in the areas listed in Tables SCC-1 and SCC-2 of T-103.

B. **Incorrect but plausible:** The “RCIC PUMP ROOM FLOOD” annunciator only alarms on the MNO value. It does not have reflash capability to alert the operators that the MSO value has been exceeded.

C. **Correct:** While area water levels are known to have exceeded their MNO values via annunciators, determining whether an area water level is approaching or has exceeded its MSO limit may be difficult since remote indication does not exist. MSO water levels for areas listed in Table SCC-2 are marked in the plant both inside and outside the HPCI, RCIC, RHR, and Core Spray rooms. It is acceptable, for the purposes of T-103, to send an operator to the area(s) to locally monitor the parameter of concern. A Caution in section SCC/L of the T-103 Bases states that “Breaching the watertight integrity of a potentially flooded room could endanger personnel safety and affect plant equipment.” Opening a watertight door during this type of event could allow the flood to affect multiple ECCS rooms and therefore place the unit in an unanalyzed condition.

D. **Incorrect but plausible:** The Reactor Enclosure Floor Drain Sump pumps are both verified to be running upon receipt of the “REACTOR ENCL FLOOR DRAIN SUMP PUMP HI-HI WATER LEVEL” annunciator. There is no direct correlation between any of the MSO values in Table SCC-2 and the start of both sump pumps.

References: Lesson Plan LLOT1560, Rev. 014 Applicant Ref: NONE
T-103, Rev. 020
T-103 Bases, Rev. 022
ARC 116 RCIC (A-5), Rev. 001
ARC 127 OFF GAS 1 (H-4), Rev. 004

Learning Objective: LLOT1560 (EO5)

Question source: New

Question History: None

Cognitive level: Memory/Fundamental knowledge: X
Comprehensive/Analysis:

10CFR Part 55: 41.10

Comments:

QUESTION 28

Unit 1 plant conditions are as follows:

- Mode 3
- RPV pressure 500 psig
- '1B' RHR pump in Suppression Pool Cooling
- A DIV 2 LOCA signal occurs

One minute later, the HV51-1F048B (HX Bypass Valve) handswitch is taken to the 'Close' position.

Which one of the following describes the status of '1B' RHR pump system flow and the response of HV51-1F048B?

	'1B' RHR Pump	HV51-1F048B
A.	Injecting	Remains Open
B.	Injecting	Closes and Reopens
C.	Not Injecting	Remains Open
D.	Not Injecting	Closes and Reopens

Proposed Answer: D

Level: RO
Tier #: 2
Group #: 1

K&A Rating: 203000 A1.03 (3.8/3.7)

K&A Statement: **Ability to predict and/or monitor changes in parameters associated with operating the RHR/LPCI: INJECTION MODE (PLANT SPECIFIC) controls including:** System flow

Justification:

A. **Incorrect but plausible:** Plausible if the applicant does not recall the LPCI Injection Valve Low ΔP requirement (< 74 PSI) and the fact that RPV pressure is above the '1B' RHR pump shutoff head (approximately 330 psig). Also plausible if the applicant does not understand the valve logic associated with the RHR HX Bypass Valves upon receipt of a LOCA initiation signal.

B. **Incorrect but plausible:** Plausible if the applicant does not recall the LPCI Injection Valve Low ΔP requirement (< 74 PSI) and the fact that RPV pressure is above the '1B' RHR pump shutoff head (approximately 330 psig).

C. **Incorrect but plausible:** Plausible if the applicant does not understand the valve logic associated with the RHR HX Bypass Valves upon receipt of a LOCA initiation signal.

D. **Correct:** '1B' RHR pump flow will be through its Minimum Flow Bypass Valve (HV51-1F007B). Associated LPCI Injection Valve HV51-1F017B will not "Auto" open because differential pressure across the valve is greater than 74 PSI (Reactor pressure is 500 psig). In addition, the 500 psig reactor pressure is greater than the shutoff head of the '1B' RHR pump (approximately 330 psig). RHR HX Bypass Valve HV51-1F048B receives an "Open" signal for the first three minutes following the DIV 2 LPCI initiation signal. If the handswitch is taken to close during that time, the valve will cycle closed and then immediately reopen per design to ensure maximum flow for LPCI injection.

References: Lesson Plan LLOT0051, Rev. 000 Applicant Ref: NONE

Learning Objective: LLOT0051 (IL7, IL8)

Question source: Modified LGS Bank (ID: 560651)

Question History: Not used on 2008 or 2010 LGS Written Exam

Cognitive level: Memory/Fundamental knowledge: X
Comprehensive/Analysis:

10CFR Part 55: 41.5

Comments:

QUESTION 29

Given the following plant conditions:

- Unit 1 is in cold shutdown
- 'A' RHR Pump is running in RHR-ADHR in accordance with S51.6.C, "Swapping An Operating RHR Pump Between RHR-SDC and RHR-ADHR
- Reactor water level lowers to -142" on wide range level

Given the following valves:

- HV-51-1F008 RHR S/D Clg. Suction (OUTBOARD)
- HV-51-1F009 RHR S/D Clg. Suction (INBOARD)
- HV-51-1F015A RHR S/D/ Clng. Rtn. (OUTBOARD)
- HV-51-1F004A, PUMP SUCTION

WHICH ONE of the following describes the expected plant status five minutes after the LPCI system initiation signal was generated? (Assume no operator actions).

A. F008, F009, and F015A are open. 'A' RHR pump tripped due to F004 closed in LPCI mode

B. F008, F009, and F015A are open. 'A' RHR pump is running

C. F008, F009, and F015A are closed. 'A' RHR pump has tripped due to loss of suction path

D. F008, F009, and F015A are closed. 'A' RHR pump is running

K&A #	205000 K4.03
Importance Rating	3.8

QUESTION 29

K&A Statement: Knowledge of SHUTDOWN COOLING SYSTEM (RHR SHUTDOWN COOLING MODE) design feature(s) and/or interlocks which provide for low reactor water level

Justification:

A. Incorrect but plausible if the candidate does not recognize that the interlocks jumpered during performance of S51.6.C do not bypass the NSSS isolation, only the loss of pump suction path trip, and the RHR pump will continue running because it does have a pump suction path, just not through 1F004A.

B. Incorrect but plausible if the candidate does not recognize that the interlocks jumpered during performance of S51.6.C do not bypass the NSSS isolation, only the loss of pump suction path trip

C. Incorrect but plausible if candidate believes that the 'A' RHR pump has tripped on loss of suction path. While the loss of suction trip is disabled for F008 and F009 position during performance of S51.6.C, F008 is already closed in the ADHR alignment. F009 will close if it is open, but will not cause a pump trip. In this alignment, 'A' RHR pump will only trip on loss of suction path if BOTH F006 and F004 are closed. F004 is closed, but F006 is open and will remain open throughout this transient.

D. Correct – In the current ADHR alignment, the loss of suction trip is disabled for F008 and F009 position during performance of S51.6.C; F008 is already closed in the ADHR alignment. F009 will close if it is open, but will not cause a pump trip. In this alignment, 'A' RHR pump will only trip on loss of suction path if BOTH F006 and F004 are closed. F004 is closed, but F006 is open and will remain open throughout this transient and 'A' RHR pump will continue to run, although providing little to no flow due to the low water level and 'A' RHR pump suction currently from the skimmer surge tank

References: S51.6.C, Rev. 13
LLOT0051, Rev. 000 — Student Ref: None

Learning Objective: LLOT0051: IL7, IL8 b/c

Question source: Modified LGS bank 555993

Question History: None

Cognitive level: Memory/Fundamental knowledge:
Comprehensive/Analysis: X

10CFR 41.7

Comment: This question meets subject K/A as in this case it is testing design features/interlocks which are bypassed in this specific plant condition

QUESTION 30

Given the following:

- U1 HPCI System is in a normal standby lineup
- HPCI Bus D Logic Power Failure alarm light is lit
- ARC-MCR-117, HPCI, Window A-1, "HPCI OUT OF SERVICE," is in alarm

Which one of the following describes the HPCI system response?

A. Vacuum Breaker Isolation Valve HV55-1F095 control is inoperative

B. Suppression Pool Suction Valve HV55-1F042 valve position monitoring is inoperative

C. Turbine Stop Valve FV56-112 valve position monitoring is inoperative

D. Turbine Steam Supply Isolation Valve HV55-1F001 valve position monitoring is inoperative

Proposed Answer: A

Level: RO
Tier #: 2
Group #: 1

K&A Rating: 206000 K2.01 (3.2/3.3)

K&A Statement: **Knowledge of the electrical power supplies to the following:** System valves: BWR-2,3,4

Justification:

A. **Correct:** The loss of DIV 4 125 VDC power will prevent automatic closure of HV55-1F095 upon receipt of High Drywell pressure **AND** Low HPCI steam supply pressure signals. Individual valve control may be used to isolate the valve since it is powered by AC.

B. **Incorrect but plausible:** Plausible if the applicant does not recall that DIV 2 125 VDC provides power to HV55-1F042 valve position monitoring. With HV55-1F041 and HV55-1F042 valve position monitoring inoperative, the HV55-1F004, HV55-1F008, HV55-1F011 and the HV55-1F041/F042 valves could be opened simultaneously.

C. **Incorrect but plausible:** Plausible if the applicant does not recall that DIV 2 125 VDC provides power to FV56-112 valve position monitoring. FV56-112 and HV55-1F001 valve position monitoring interlocks allow pump discharge valves HV55-1F006 (HPCI Pump Discharge to Core Spray) and HV55-1F105 (HPCI Pump Discharge to Feedwater) to open.

D. **Incorrect but plausible:** Plausible if the applicant does not recall that DIV 2 125 VDC provides power to HV55-1F001 valve position monitoring. FV56-112 and HV55-1F001 valve position monitoring interlocks allow pump discharge valves HV55-1F006 (HPCI Pump Discharge to Core Spray) and HV55-1F105 (HPCI Pump Discharge to Feedwater) to open.

References: Lesson Plan LLOT0055, Rev. 000 Applicant Ref: NONE
ARC 117 HPCI (A-1), Rev. 002

Learning Objective: LLOT0055 (Obj.14.a, 14.b)

Question source: New

Question History: None

Cognitive level: Memory/Fundamental knowledge: X
Comprehensive/Analysis:

10CFR Part 55: 41.7

Comments:

QUESTION 31

Given the following:

- U2 automatically scrammed on High Drywell Pressure
- RPV level rose to +65 inches post scram
- RPV level is presently 0.0 inches and slowly lowering
- Drywell Pressure is 2.5 psig and continuing to rise

Which one of the following actions is required to initiate and inject into the RPV with HPCI?

A. "Arm and Depress" the HPCI INITIATION pushbutton per OP-LG-108-101-1001, "Simple Quick Acts / Transient Acts"

B. Depress the HPCI RX LEVEL HIGH RESET pushbutton per S55.1.C, "Recovery From HPCI Turbine Trip"

C. Depress the HPCI SEAL-IN RESET pushbutton per S55.1.C, "Recovery From HPCI Turbine Trip"

D. Defeat isolation logic per S55.1.E APPENDIX 1, "Recovery From HPCI Steam Line Isolation and Resultant Turbine Trip With a Valid Non-Resetable Initiation Signal Present Hard Card"

Proposed Answer: B

Level: RO
Tier #: 2
Group #: 1

K&A Rating: 206000 A2.01 (4.0/4.0)

K&A Statement: **Ability to (a) predict the impacts of the following on the HIGH PRESSURE COOLANT INJECTION SYSTEM; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations:** Turbine trips: BWR-2,3,4

Justification:

A. **Incorrect but plausible:** Plausible if the applicant is unable to recall the logic and does not realize that (1) the high level trip must be manually reset once level is below the +54 inch setpoint, and/or (2) the High Drywell Pressure initiation signal is still present. OP-LG-108-101-1001 includes Manual Initiation of HPCI using the "Arm and Depress" pushbuttons, as a Transient Act that can be performed without immediate procedure reference.

B. **Correct:** The HPCI System was automatically initiated on High Drywell Pressure and was subsequently shutdown on High RPV Level (setpoint +54 inches). With no operator action, HPCI will automatically restart when RPV Level lowers to -38 inches. For the given plant conditions, (Drywell Pressure 2.5 psig, RPV Level 0.0 inches and slowly lowering), the HPCI System has an initiation signal on High Drywell Pressure, and will therefore inject into the RPV once the high level trip has been reset. The high level trip is reset in accordance with S55.1.C.

C. **Incorrect but plausible:** Plausible if the applicant is unable to recall the logic and does not realize that depressing the SEAL-IN RESET pushbutton will not reset the initiation signal because the High Drywell Pressure signal is still present. Also, with the High RPV Level trip signal not having been manually reset, injection into the RPV will not occur until RPV Level drops to -38 inches. Guidance to clear a "sealed-in" initiation signal by depressing the SEAL-IN RESET pushbutton is provided in S55.1.C.

D. **Incorrect but plausible:** Plausible if the applicant confuses the logic and believes that HPCI isolates on +54 inches as opposed to just tripping. S55.1.E APPENDIX 1, provides Hard Card guidance for defeating HPCI isolation logic and returning HPCI to service.

References: Lesson Plan LLOT0055, Rev. 000 Applicant Ref: NONE
S55.1.C, Rev. 016
S55.1.E APPENDIX 1, Rev. 004
OP-LG-108-101-1001, Rev. 007

Learning Objective: LLOT0055 (Obj #8a & #8c)

Question source: LGS Bank (ID: 664301)

Question History:	Not used on 2008 or 2010 LGS Written Exam	
Cognitive level:	Memory/Fundamental knowledge:	
	Comprehensive/Analysis:	X
10CFR Part 55:	41.5	

Comments:

- Enhanced the stem conditions provided in the original LGS Bank Question.
- Changed Answer "A" in the original question (now Answer D) to enhance the overall plausibility of the distractor.
- Enhanced the distracters by adding applicable procedure references to each in order to more closely align with the K/A statement.

QUESTION 32

Unit 1 plant conditions are as follows:

- Reactor Power 100%
- "1C" Core Spray Pump operating in Full Flow Test

A loss of coolant accident occurs and plant conditions are as follows:

- Reactor level drops to -120" and lowering slowly
- Reactor pressure 550 psig and lowering slowly
- Drywell pressure 1.72 and rising slowly

With the given conditions, which one of the following describes the response of the "1C" Core Spray Pump and the status of HV-052-1F015A, CORE SPRAY LOOP A TEST BYPASS PCIV?

	"1C" Core Spray Pump	HV-052-1F015A
A.	Tripped then restarted	Closed and CANNOT be reopened
B.	Continued Running	Closed and CANNOT be reopened
C.	Tripped	Closed and CANNOT be reopened
D.	Continued Running	Remained Open

Level: RO
Tier #: 2
Group #: 1

K&A Rating: 209001 K4.08 (3.8/4.0)

K&A Statement: **Knowledge of LOW PRESSURE CORE SPRAY SYSTEM design feature(s) and/or interlocks which provide for the following:** Automatic system initiation

Justification:

A. **Incorrect but plausible:** Plausible if the applicant does not recognize that core spray system initiation set points have not been reached [(High Drywell Pressure (> 1.68 psig) AND Low RPV Pressure (< 455 psig); OR Low RPV Level (≤ -129 inches)], and also auto closure signal for test bypass valve has not been initiated (CS initiation signal). If CS system A initiation set points have been reached then this answer would be correct.

B. **Incorrect but plausible:** Plausible if the applicant determines that set points for automatic CS initiation has not been reached; however determines that due to the transient condition full flow test valve will auto close.

C. **Incorrect but plausible:** Plausible if the applicant determines that set points for automatic CS initiation has been reached; however due to the sequencing time "C" CS pumps should sequence on at t= 15 sec; therefore 'C' CS pump should remained tripped until t=15 sec. Also, due to the set points reached auto closure signal would be initiated for test bypass valve.

D. **Correct:** Core spray system initiation set points have not been reached [(High Drywell Pressure (> 1.68 psig) AND Low RPV Pressure (< 455 psig); OR Low RPV Level (≤ -129 inches)], and also auto closure signal for test bypass valve has NOT been initiated (NO CS initiation signal).

References: LLOT0350 Rev. 016 Applicant Ref: NONE

Learning Objective: LLOT0350 Rev. 016 Obj. #2d and 7.

Question source: Modified from Limerick Bank (846364)

Question History: Not used in Last 2 NRC exam.

Cognitive level: Memory/Fundamental knowledge:
Comprehensive/Analysis: X

10CFR Part 55: 41.7

Comments:

QUESTION 33

Unit 2 initial plant conditions are as follows:

- Reactor power 100%
- DIV II of RRCS is de-energized
- Instrument air to the SLC Tank level bubbler has been isolated to repair a tubing leak

Then:

- Inboard MSIV HV41-2F022A fails closed
- Reactor pressure reaches 1190 psig
- No rod motion occurs

Which one of the following describes the status of the SLC pumps 120 seconds later?

A. Only '2C' SLC pump running

B. Only '2A' SLC pump running

C. '2A' and '2B' SLC pumps running

D. No SLC pumps running

Proposed Answer: B

Level: RO
Tier #: 2
Group #: 1

K&A Rating: 211000 K5.06 (3.0/3.2)

K&A Statement: **Knowledge of the operational implications of the following concepts as they apply to STANDBY LIQUID CONTROL SYSTEM:** Tank level measurement

Justification:

A. **Incorrect but plausible:** Due to design issues, only two SLC pumps ('2A' and '2B') are aligned for auto start on SLC initiation (discharge pressure with three running pumps exceeds pressure relief valve lift settings). The '2C' pump is maintained in the STOP position and will not auto start.

B. **Correct:** The SLC Tank level bubbler provides indication only and has no impact on SLC pump operation. There are two dedicated level transmitters for each pump that provide a control function. If both transmitters sense low level (2 out of 2 once), the associated pump is prevented from starting or will trip if running. With DIV II of RRCS de-energized, the two level transmitters associated with SLC pump '2B' both sense a low level, preventing automatic pump start upon receipt of the valid SLC initiation signal. Due to design issues, only two SLC pumps ('2A' and '2B') are aligned for auto start on SLC initiation (discharge pressure with three running pumps exceeds pressure relief valve lift settings). The '2C' pump is maintained in the STOP position and will not auto start. The '2A' SLC pump is unaffected. SLC initiates on High Reactor Pressure (setpoint is 1149 psig and seals in) and APRMs > 3.2% power, after a 118 second time delay.

C. **Incorrect but plausible:** The '2B' SLC pump will not auto start upon receipt of the valid SLC initiation signal due to de-energization of DIV II RRCS as described above.

D. **Incorrect but plausible:** The '2B' SLC pump will not auto start upon receipt of the valid SLC initiation signal due to de-energization of DIV II RRCS as described above. The SLC Tank level bubbler provides indication only and has no impact on SLC pump operation. The '2A' pump will auto start. The '2C' pump is maintained in the STOP position and will not auto start.

References: Lesson Plan LLOT0048, Rev. 000
ARC 108 REACTOR (I-2), Rev. 000

Applicant Ref: NONE

Learning Objective: LLOT0048 (IL11, IL12)

Question source: Modified from LGS Bank (ID: 562247)

Question History: Not used on 2008 or 2010 LGS Written Exam

Cognitive level:	Memory/Fundamental knowledge:	
	Comprehensive/Analysis:	X
10CFR Part 55:	41.5	
Comments:		

QUESTION 34

Unit 1 plant conditions are as follows:

- GP-2, Normal Plant Startup, is in progress
- Reactor Power is approximately 30%
- House loads have been transferred to the 11 Unit Aux Transformer
- TURBINE CONTROL VALVE/STOP VALVE SCRAM BYPASSED (ARC-MCR-107, A-2) alarm is in and will not clear

The Equipment Operator reports the following status of Main Turbine First Stage Pressure trip units from the Auxiliary Equipment Room:

- PIS-001-1N652A is illuminated
- PIS-001-1N652B is extinguished
- PIS-001-1N652C is extinguished
- PIS-001-1N652D is extinguished

A Main Turbine trip occurs due to low Main Shaft Oil Pump discharge pressure.

WHICH ONE of the following identifies the status of the MG Set Drive Motor Breakers and Control Rods following the Main Turbine trip?

	MG Set Drive Motor Breakers	Control Rods
A.	Closed	Position Unchanged
B.	Closed	All Fully Inserted
C.	Tripped	Position Unchanged
D.	Tripped	All Fully Inserted

K&A # 212000 K5.02
Importance Rating 3.3

QUESTION 34

K&A Statement: Knowledge of the operational implications of specific logic arrangements as they apply to REACTOR PROTECTION SYSTEM

Justification:

A. Incorrect but plausible if the candidate does not recognize that due to the main turbine being synchronized to the grid, a turbine trip will also cause a generator lockout and resulting fast transfer. This will cause the recirc pump drive motor breakers to trip.

B. Incorrect but plausible if the candidate does not recognize that due to the main turbine being synchronized to the grid, a turbine trip will also cause a generator lockout and resulting fast transfer. This will cause the recirc pump drive motor breakers to trip. Additionally, a full scram will not result from the given conditions, only a ½ scram from RPS 'A' due to PIS-001-1N652A, as candidates may misconstrue the three extinguished lights to be trip signals.

C. Correct – For the given plant conditions (plant startup in progress, Reactor Power approximately 30%, three of four Main Turbine First Stage Pressure trip units indicating RPV pressure is less than 180 psig), Main Turbine Stop and Control Valve Closure Scram signals are <u>not</u> active, and a trip of the Main Turbine will <u>not</u> result in a full reactor scram signal when either (or both): (1) MSVs are less than 95% open, or (2) TCV RETS pressure drops to less than 500 psig. A half-scram signal, however, will be generated in RPS Trip Logic Channel "A1" via PIS-001-1N652A. Also, based on the given plant conditions, the Main Generator would be online and house loads would be on the Aux Buses. A Turbine trip would initiate a Generator Lockout, resulting in a Fast Transfer to the Startup Sources and a trip of both of the MG Set Drive Motor Breakers.

D. Incorrect but plausible if the candidate misconstrues the three extinguished trip unit lights to be trip signals, resulting in three RPS inputs (one 'A', two 'B') and full scram

References: LGSOPS0032, Rev. 003
LLOT0071, Rev. 000

Student Ref: None

Learning Objective: LGSOPS0032: IL4
LLOT0071: 4, 5

Question source: LGS bank 833595

Question History: None used on 2008 or 2010 LGS exams

Cognitive level: Memory/Fundamental knowledge:
Comprehensive/Analysis: X

10CFR 41.10

QUESTION 35

Unit 1 was operating at 100% power when

- An inadvertent feedwater runback occurs
- HPCI and RCIC automatically initiated restoring vessel level

Current plant conditions are as follows:

- All scram actions are complete
- Reactor level 58 inches, down slow
- Reactor pressure 940 psig, up slow
- No recirculation pumps are in operation

The Reactor Operator is directed to reset the scram. Only the following actions are performed:

- Scram Discharge Volume Hi level bypass switch is placed in BYPASS
- RPS RESET switch is placed in Group 1/4 and Group 2/3 positions

WHICH ONE of the following identifies the status of the RPS trip systems and SDV Vent and Drain Valves?

	RPS Logic	SDV Vent and Drain Valves
A.	Not Reset	Open
B.	Reset	Closed
C.	Reset	Open
D.	Not Reset	Closed

K&A #	212000 A4.04
Importance Rating	3.9

QUESTION 35

K&A Statement: Ability to manually operate and/or monitor in the control room: Bypass SCRAM instrument volume high level SCRAM signal

Justification:

A. Incorrect but plausible if the candidate does not recognize that current conditions are met for RPS logic reset, and proper integrated operation of scram reset/scram air header/SDV vent and drain valve operations

B. Correct – Under the given conditions, both RPS trip systems will reset, but the scram air header will not re-pressurize as ARI has not yet been reset. Although not explicitly stated, ARI initiates at Level 2 (-38"); the stem of the question states that HPCI and RCIC initiated and that no recirculation pumps are in operation. All of these automatic actions occur at Level 2

C. Incorrect but plausible if the candidate does not recall ARI has also initiated, which redundantly de-pressurizes the scram air header and must be reset separately from the scram.

D. Incorrect but plausible if the candidate does not recognize that current conditions are met for RPS logic reset

References:	LLOT0071, Rev. 000 LGSOPS0036A, Rev. 002a	Student Ref:	None

Learning Objective:	LGSOPS0036A: IL6a LLOT0071: 6	
Question source:	LGS bank 710376	
Question History:	None	
Cognitive level:	Memory/Fundamental knowledge: Comprehensive/Analysis:	 X
10CFR55	41.10	

QUESTION 36

Given the following:

- A plant startup is in progress on U2
- IRM 'H' is inoperable and bypassed
- All other IRMs are indicating on Range 8
- RPS shorting links are installed

Then:

- The output of the High Voltage Power Supply (HVPS) for IRM 'G' drops to 89 VDC.

Which one of the following describes the effect of the HVPS voltage drop?

A. Rod Block only

B. Rod Block and Full Scram signal

C. Rod Block and Half Scram signal

D. No Rod Block or Scram signal

Proposed Answer: C

Level: RO
Tier #: 2
Group #: 1

K&A Rating: 215003 K6.04 (3.0/3.0)

K&A Statement: **Knowledge of the effect that a loss or malfunction of the following will have on the INTERMEDIATE RANGE MONITOR (IRM) SYSTEM:** Detectors

Justification:

A. **Incorrect but plausible:** Plausible if the applicant does not recall that the IRM INOP trip results in both a Rod Block and a Scram signal.

B. **Incorrect but plausible:** Plausible if the applicant does not recall that the RPS trip logic is one-out-of two taken twice with the shorting links installed.

C. **Correct:** With the RPS shorting links installed, all IRM trips are in the coincident mode ('A' and 'B' RPS Trip System logic one-out-of two taken twice). With IRM'G' HVPS output voltage less than the Low Detector Voltage setpoint of 90 VDC, an RPS INOP Trip is generated, resulting in a Rod Block and Half Scram signal (shorting links installed).

D. **Incorrect but plausible:** Plausible if the applicant does not recall the IRM Detector HVPS Low Voltage setpoint of 90 VDC.

References: Lesson Plan LGSOPS0074, Rev. 002 Applicant Ref: NONE

Learning Objective: LGSOPS0074 (IL22.a)

Question source: Modified from HC 2009 Exam (Q 12)

Question History: None

Cognitive level: Memory/Fundamental knowledge: X
Comprehensive/Analysis:

10CFR Part 55: 41.7

Comments:

QUESTION 37

During a refueling outage on Unit 2, the RPS Shorting Links have been removed.

Which ONE of the following will result if the “A” Source Range Monitor (SRM) drawer mode switch is taken out of the OPERATE position?

	Alarm Status	Block/RPS Status
A.	A SRM downscale alarm	Rod Block and Reactor Scram will occur
B.	A SRM downscale alarm	A Rod Block will occur
C.	A SRM Upscale/Inop alarm	A Rod Block will occur
D.	A SRM Upscale/Inop alarm	Rod Block and Reactor Scram will occur

Level: RO
Tier #: 2
Group #: 1

K&A Rating: 215004 (Source Range Monitor System) AA1.05 (3.6/3.8)

K&A Statement: **Ability to predict and/or monitor changes in parameters associated with operating the SOURCE RANGE MONITOR (SRM) SYSTEM controls including:** SCRAM, rod block, and period alarm trip setpoints

Justification:

A. **Incorrect but plausible:** Plausible if the applicant determines that placing the drawer mode switch out of Operate creates a SRM downscale trip, and determines that full scram will occur due to shorting links removed..

B. **Incorrect but plausible:** Plausible if the applicant determines that placing the drawer mode switch out of Operate creates a SRM downscale trip, and determines that rod block will occur.

C. **Correct:** Placing the drawer mode switch out of Operate creates a SRM Inoperative trip causing Upscale/Inop alarm, and due to the upscale/inop alarm a rod block will also occur.

D. **Incorrect but plausible:** Plausible due to partially correct that Placing the drawer mode switch out of Operate creates a SRM Inoperative trip causing Upscale/Inop alarm, however SRM channels generate a scram signal on an INOP condition for loss of power only condition.

References: LGSOPS0074 Rev. 002 Applicant Ref: NONE

Learning Objective: LGSOPS0074 Rev. 002 Obj. EO4b, EO5, and IL6

Question source: New

Question History: Not used in Last 2 NRC exam.

Cognitive level: Memory/Fundamental knowledge: X
Comprehensive/Analysis:

10CFR Part 55: 41.7

Comments:

QUESTION 38

Unit 1 plant conditions are as follows:

- Reactor power is 35%
- ARC-MCR-108, REACTOR, Window A-5, "OPRM/APRM TROUBLE," alarms
- APRM 1 counts two LPRM input signals at Axial Level 'C'

Which one of the following describes the expected response for APRM 1 and RBM Channel 'A'?

APRM 1 ___(1)___ a rod withdrawal block signal to RMCS.
RBM Channel 'A' ___(2)___ an alternate Simulated Thermal Power Reference value.

A. (1) does not send
(2) substitutes

B. (1) does not send
(2) does not substitute

C. (1) sends
(2) substitutes

D. (1) sends
(2) does not substitute

Proposed Answer: D

Level: RO
Tier #: 2
Group #: 1

K&A Rating: 215005 K4.01 (3.7/3.7)

K&A Statement: **Knowledge of AVERAGE POWER RANGE MONITOR/LOCAL POWER RANGE MONITOR SYSTEM design feature(s) and/or interlocks which provide for the following:** Rod withdrawal blocks

Justification:

A. **Incorrect but plausible:** Plausible if the applicant is unable to recall that (1) a rod withdrawal block is generated for < 3 LPRM detector input signals per Axial Level, (2) an APRM Inoperative Trip ("vote") is **not** generated when the channel becomes Inoperable due to too few LPRM detector input signals, and (3) an APRM Inoperative Trip ("vote") must be generated for the affected RBM channel to automatically substitute an alternate STP Reference value.

B. **Incorrect but plausible:** Plausible if the applicant is unable to recall that a rod withdrawal block is generated for < 3 LPRM detector input signals per Axial Level.

C. **Incorrect but plausible:** Plausible if the applicant is unable to recall that (1) an APRM Inoperative Trip ("vote") is **not** generated when the channel becomes Inoperable due to too few LPRM detector input signals, and (2) an APRM Inoperative Trip ("vote") must be generated for the affected RBM channel to automatically substitute an alternate STP Reference value.

D. **Correct:** Too few LPRM input signals per Axial Level to an APRM channel automatically generates a rod withdrawal block. Although the associated APRM channel is Inoperable, an APRM Channel Inoperative Trip ("vote") is **not** generated when the inoperability is the result of too few LPRM detector input signals. RBM channels automatically substitute an alternate Simulated Thermal Power (STP) Reference value when the primary reference APRM channel is bypassed **or** inoperative. *(i.e., when an Inoperative Trip ("vote") has been generated)*. Because an Inoperative Trip ("vote") is **not** generated for the given condition, the alternate STP Reference value is not automatically substituted.

References: Lesson Plan LEOT0074A, Rev. 003 Applicant Ref: NONE
ARC 108 REACTOR (A-5), Rev. 002

Learning Objective: LEOT0074A (EO10.b. EO10.c)

Question source: New

Question History: None

Cognitive level: Memory/Fundamental knowledge:
Comprehensive/Analysis: X

10CFR Part 55: 41.7

Comments:

QUESTION 39

Unit 1 plant conditions as follows:

- A transient has resulted in feedwater unavailability and lowering RPV water level
- A loss of 125 VDC Bus A has been confirmed
- RPV water level is currently -30", down slow

Which one of the following describes the availability of RCIC for level control?

	Automatic Initiation	Manual Pushbutton Initiation
A.	Unavailable	Unavailable
B.	Unavailable	Available
C.	Available	Unavailable
D.	Available	Available

K&A #	217000 K6.01
Importance Rating	3.4

QUESTION 39

K&A Statement: Knowledge of the effect that a loss or malfunction of electrical power will have on the REACTOR CORE ISOLATION COOLING SYSTEM (RCIC)

Justification:

A. Correct – Loss of Div 1 DC (125 VDC Bus A) disables both automatic and manual pushbutton initiation of RCIC.

B. Incorrect but plausible if candidate does not recognize loss of both automatic and manual pushbutton initiation of RCIC due to loss of Div 1 DC

C. Incorrect but plausible if candidate does not recognize loss of both automatic and manual pushbutton initiation of RCIC due to loss of Div 1 DC

D. Incorrect but plausible if candidate does not recognize loss of both automatic and manual pushbutton initiation of RCIC due to loss of Div 1 DC

References: LLOT0380, Rev. 025 Student Ref: None

Learning Objective: LLOT0380: 12a

Question source: New

Question History: Not used on 2008 or 2010 LGS exams

Cognitive level: Memory/Fundamental knowledge: X
Comprehensive/Analysis:

10CFR 41.7

QUESTION 40

Plant conditions as follows:

- The main control room has become uninhabitable
- SE-1, "Remote Shutdown" has been entered and the control room has been evacuated
- HV-49-1F160, "RCIC Turbine Exhaust" was being stroked for troubleshooting and left closed during the control room evacuation
- No other RCIC valves have been altered from their required automatic initiation position
- RCIC was not initiated prior to control room evacuation
- Control has been transferred to the Remote Shutdown Panel
- The Reactor Operator has been directed to perform section 4.3 of SE-1 to maintain reactor water level using RCIC

No other operator action is taken

Which one of the following describes:

(a) RCIC availability if initiation is attempted AND
(b) What actions must be performed?

A. (a) RCIC will NOT run due to interlocked Steam Supply (1F045) and Turbine Exhaust (1F060) valves
(b) Manually startup RCIC using SE-1

B. (a) RCIC will run with reduced steam flow through vacuum breakers
(b) Continue RCIC operation using SE-1

C. (a) RCIC will run following burst of the rupture disc and will automatically isolate
(b) Verify RCIC isolation using GP-8.1, "Automatic Actions by Isolation Signals"

D. (a) RCIC will run following burst of the rupture disc and will NOT automatically isolate
(b) Perform manual RCIC isolation using GP-8.2, "Manual Isolations"

K&A # 217000 A2.03
Importance Rating 3.4

QUESTION 40

K&A Statement: Ability to (a) predict the impacts of valve closures on the REACTOR CORE ISOLATION COOLING SYSTEM (RCIC); and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations

Justification:

A. Incorrect but plausible if the candidate does not recognize that with control transferred to the RSP during SE-1, this interlock is bypassed. Continuing RCIC startup will result in admitting steam to the RCIC turbine and rupture of the turbine exhaust piping rupture discs; this will cause steam to be vented directly into the RCIC turbine room.

B. Incorrect but plausible if candidate does not understand function/operation of the turbine exhaust vacuum breakers. Continuing RCIC operations IAW SE-1 will result in admitting steam to the RCIC turbine and rupture of the turbine exhaust piping rupture discs; this will cause steam to be vented directly into the RCIC turbine room.

C. Incorrect but plausible if candidate does not recognize that with control transferred to RSP in SE-1, RCIC will not automatically isolate. Continuing RCIC operations IAW SE-1 will result in admitting steam to the RCIC turbine and rupture of the turbine exhaust piping rupture discs; this will cause steam to be vented directly into the RCIC turbine room.

D. Correct –Normally the RCIC turbine steam inlet valve is prevented from opening if the RCIC turbine exhaust valve is closed. This prevents overpressurizing the turbine exhaust piping. The piping is also protected by series rupture discs that actuate at 150 psig. Once pressure downstream of the first rupture disc reaches 10 psig, a system isolation signal is actuated. Due to control room evacuation and transfer to RSP, RCIC: (a) will NOT auto start, (b) will NOT automatically isolate, (c) will NOT trip on reactor high water level, (d) min flow valve operation is NOT automatic, (d) turbine steam inlet valve is NOT interlocked to prevent opening with turbine exhaust valve closed, and (e) condensate pump will NOT cycle automatically on high level.

References:	LLOT0380, Rev. 025 SE-1, Rev. 064 LLOT0735, Rev. 013	Student Ref:	None

Learning Objective: LLOT0735: 3

Question source: New

Question History: Not used on 2008/2010 LGS written exams

Cognitive level: Memory/Fundamental knowledge:
Comprehensive/Analysis: X

10CFR 41.5

QUESTION 41

Given:

- Unit 2 reactor scrams on High Drywell Pressure coincident with a Main Turbine Trip and failure of the Bypass valves to open.
- ADS SRVs PSV-2F013E and PSV-2F013K were cycled once to stabilize RPV pressure below 1096 psig.
- Drywell Pressure subsequently rises to a maximum value of 38.0 psig

By design, which one of the following describes the effect of these conditions on the ability of SRVs PSV-2F013E and PSV-2F013K to perform their ADS function?

SRVs PSV-2F013E and PSV-2F013K ...

A. will NOT operate.

B. will operate to ensure at least ONE opening.

C. will operate to ensure at least TWO openings.

D. will operate to ensure at least THREE openings.

Proposed Answer: B

Level: RO
Tier #: 2
Group #: 1

K&A Rating: 218000 K3.02 (4.5/4.6)

K&A Statement: **Knowledge of the effect that a loss or malfunction of the AUTOMATIC DEPRESSURIZATION SYSTEM will have on the following:** Ability to rapidly depressurize the reactor

Justification:

A. **Incorrect but plausible:** The two ADS SRVs are capable of being actuated one more time after having been initially opened to stabilize RPV pressure following the loss of instrument gas. Applicant needs to recall the minimum number of valve actuations supported by the ADS accumulators (two by design) at 38.5 psig in the DW, and understand that PCIG to the DW isolates on 1.68 psig DW pressure.

B. **Correct:** The ADS SRVs each have an accumulator sized for two valve actuations at 38.5 psig drywell pressure (70% of the 55 psig design pressure). Therefore, the capability exists to open the SRV at least one more time with PCIG isolated to the drywell.

C. **Incorrect but plausible:** The two ADS SRVs are capable of being actuated one more time after having been initially opened to stabilize RPV pressure following the loss of instrument gas. Applicant needs to recall the minimum number of valve actuations supported by the ADS accumulators (two by design) at 38.5 psig in the DW, and understand that PCIG to the DW isolates on 1.68 psig DW pressure.

D. **Incorrect but plausible:** The two ADS SRVs are capable of being actuated one more time after having been initially opened to stabilize RPV pressure following the loss of instrument gas. Applicant needs to recall the minimum number of valve actuations supported by the ADS accumulators (two by design) at 38.5 psig in the DW, and understand that PCIG to the DW isolates on 1.68 psig DW pressure.

References: Lesson Plan LGSOPS0050, Rev. 000; Unit 2 TS Bases 3.5.1 ECCS – Operating (Page 3/4 5-2, Amendment No. 147) Applicant Ref: NONE

Learning Objective: LGSOPS0050 (IL2.a)

Question source: Modified from HC 8/10 Exam (Q 5)

Question History: None

Cognitive level: Memory/Fundamental knowledge: X
Comprehensive/Analysis:

10CFR Part 55: 41.7

Comments:

QUESTION 42

Unit 1 conditions are as follows:

- Annunciator A-1, "DIV I ADS OUT OF SERVICE," in alarm on panel 10C826
- An unisolable primary coolant leak is discharging into the RWCU Nonregenerative Heat Exchanger Room
- RPV pressure is 725 psig and slowly lowering
- RPV water level has been -140 inches and stable for the last seven minutes (420 seconds)
- At 530 seconds, the Div 3 ADS logic reset pushbutton was inadvertently depressed (assume annunciator reset pushbutton depressed immediately thereafter)

Which one of the following describes the status of Annunciator C-3, "DIV 3 ADS RELAYS ENERGIZED," <u>and</u> Annunciator C-4, "DIV 3 ADS TIMER INITIATED," on panel 10C826, 100 seconds later?

	ANNUNCIATOR C-3	ANNUNCIATOR C-4
A.	In alarm	In alarm
B.	In alarm	Clear
C.	Clear	In alarm
D.	Clear	Clear

Proposed Answer: D

Level: RO
Tier #: 2
Group #: 1

K&A Rating: 218000 A3.09 (4.2/4.3)

K&A Statement: **Ability to monitor automatic operations of the AUTOMATIC DEPRESSURIZATION SYSTEM including:** Reactor vessel water level

Justification:

A. **Incorrect but plausible:** Applicant needs to understand the ADS Initiation logic and recall that both the 420 second ADS High Drywell Bypass Timer and the 105 second DIV 3 ADS Initiation Timer will be reset after the DIV 3 ADS logic reset pushbutton is depressed. Also plausible if the applicant confuses ADS system response with respect to operation of the Manual Inhibit Switches (valves remain open) versus operation of the Logic Reset Pushbutton (valves close), once ADS has initiated.

B. **Incorrect but plausible:** Applicant needs to understand the ADS Initiation logic and recall that both the 420 second ADS High Drywell Bypass Timer and the 105 second DIV 3 ADS Initiation Timer will be reset after the DIV 3 ADS logic reset pushbutton is depressed. Also plausible if the applicant confuses ADS system response with respect to operation of the Manual Inhibit Switches (valves remain open) versus operation of the Logic Reset Pushbutton (valves close), once ADS has initiated.

C. **Incorrect but plausible:** Applicant needs to understand the ADS Initiation logic and recall that both the 420 second ADS High Drywell Bypass Timer and the 105 second DIV 3 ADS Initiation Timer will be reset after the DIV 3 ADS logic reset pushbutton is depressed. Also plausible if the applicant confuses ADS system response with respect to operation of the Manual Inhibit Switches (valves remain open) versus operation of the Logic Reset Pushbutton (valves close), once ADS has initiated.

D. **Correct:** The DIV 3 ADS logic reset pushbutton is depressed 5 seconds after ADS has been initiated (initiation occurs at 525 seconds). ADS valves will close. Both the 420 second ADS High Drywell Bypass Timer and the DIV 3 ADS Initiation Timer will be reset. Annunciator C-4, “DIV 3 ADS TIMER INITIATED,” will not alarm until 420 seconds later (950 seconds), and Annunciator C-3, “DIV 3 ADS RELAYS ENERGIZED,” will not alarm until 105 seconds after receipt of Annunciator C-4 (1055 seconds), indicating that ADS has re-initiated. Therefore, Annunciators C-3 and C-4 will both be CLEAR at 630 seconds (100 seconds after the DIV 3 ADS reset pushbutton was depressed).

References: Lesson Plan LGSOPS0050, Rev. 000; Applicant Ref: NONE

Learning Objective: LGSOPS0050 (IL5)

Question source: New

Question History: None

Cognitive level:	Memory/Fundamental knowledge:	
	Comprehensive/Analysis:	X
10CFR Part 55:	41.7	
Comments:		

QUESTION 43

Unit 1 plant conditions are as follows:

- GP-2, Normal Plant Startup, is in-progress
- S32.1.A, Synchronizing the Main Generator to Grid, is in-progress
- DIV 3 STEAM LEAK DET SYS HI TEMP/TROUBLE annunciator alarmed

An EO reports the following from the AER:

- TIS-25-101C indicates:
  TE25-115C, TURB ENCL MSLT AMB, indicates 193°F up slow

- TIS-25-101D indicates:
  TE25-115D, TURB ENCL MSLT AMB, indicates 165°F up slow

IAW ARC-MCR-107 H5, which ONE of the following identifies MSIV response and the appropriate required action?

	MSIV Response	Required Action
A.	Remain Open	Verify Automatic Actions per GP-8
B.	Close	Enter T-101, RPV Control
C.	Remain Open	Enter T-103, Secondary Containment Control
D.	Close	Verify Automatic Actions per GP-8

Level: RO
Tier #: 2
Group #: 1

K&A Rating: 223002 A2.09 (3.6/3.9)

K&A Statement: **Ability to (a) predict the impacts of the following on the PRIMARY CONTAINMENT ISOLATION SYSTEM/NUCLEAR STEAM SUPPLY SHUT-OFF ; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations:** System initiation

Justification:

A. **Incorrect but plausible:** Plausible if the applicant does not understand that Group 1 isolation occurs if A or C AND B or D channels are tripped, and the trip set points are reached when Div 3 Steam Leak Detection System High temp/Trouble annunciator is alarmed. Also, verification of automatic actions per GP-8 is plausible because ARC directs that action, if the steam leak isolates RCIC.

B. **Correct:** Group 1 isolation occurs if A or C AND B or D channels are tripped, and the trip set points are reached when Div 3 Steam Leak Detection System High temp/Trouble annunciator is alarmed. ARC directs entry into T-101, RPV control when Group 1 isolation occurs.

C. **Incorrect but plausible:** Plausible if the applicant does not understand that Group 1 isolation occurs if A or C AND B or D channels are tripped, and the trip set points are reached when Div 3 Steam Leak Detection System High temp/Trouble annunciator is alarmed. Also, entry into T-103 is plausible, since steam tunnel high temperature ARC, requires entry into T-103 when there is high temperature condition in steam chase.

D. **Incorrect but plausible:** Plausible, partially correct that Group 1 isolation occurs if A or C AND B or D channels are tripped, and the trip set points are reached when Div 3 Steam Leak Detection System High temp/Trouble annunciator is alarmed. However, verification of automatic actions per GP-8 is directed if steam leak isolates RCIC.

References: LLOT0180 Rev. 015 Applicant Ref: NONE

Learning Objective: LLOT0180 Rev. 015 Obj. #2, 7 & 8.

Question source: Modified from Limerick Bank (833614)

Question History: Not used in Last 2 NRC exam.

Cognitive level: Memory/Fundamental knowledge:
Comprehensive/Analysis: X

10CFR Part 55: 41.7

Comments:

QUESTION 44

Given the following:

- Unit 1 automatically scrams on a Group 1A Isolation from 100% power
- All MSIVs are closed
- ARC-MCR-110, STEAM, Window B-2, “SAFETY RELIEF VALVE OPEN,” is in alarm
- White “unlabeled” status lights on SRV control panel 10C626 are extinguished

Which one of the following identifies the instrumentation that brings in the “SAFETY RELIEF VALVE OPEN” alarm <u>and</u> what is the status of the SRVs?

	Instrumentation	SRV Status
A.	Acoustic Monitor	Open on the Safety Function
B.	SRV Tailpipe Temperatures	Open on the Safety Function
C.	Acoustic Monitor	Open on the Relief Function
D.	SRV Tailpipe Temperatures	Open on the Relief Function

Proposed Answer: A

Level: RO
Tier #: 2
Group #: 1

K&A Rating: 239002 A3.08 (3.6/3.6)

K&A Statement: **Ability to monitor automatic operations of the RELIEF/SAFETY VALVES including:** Lights and alarms

Justification:

A. **Correct:** The Acoustic Monitor senses flow noise at the SRV discharge and provides an input to the "SAFETY RELIEF VALVE OPEN" annunciator in the MCR. SRV tailpipe temperature thermocouples monitor pipe temperature downstream of each SRV and only provide inputs to DAS Monitor XI-36-102 and the "SRV/HEAD VENT VALVE LEAKING" annunciator. The white "unlabeled" status lights on SRV control panel 10C626 are the individual SRV solenoid status lights adjacent to each of the SRV control switches. The light illuminates when its associated SRV control switch is placed in the "OPEN" position, energizing the solenoid and allowing instrument gas pressure to open the valve. This manually initiated Pneumatic Operation is known as the SRV "Relief Function." The SRV "Safety Function" is the opening of the valves at RPV pressures above the respective mechanical lift setpoints. The fact that the SRVs are open with all of the white "unlabeled" status lights extinguished, indicates that the SRVs have opened as a result of RPV pressure exceeding the mechanical lift setponts. Control switches were not repositioned to energize the SRV solenoids.

B. **Incorrect but plausible:** Plausible if the applicant is unable to recall that the "SAFETY RELIEF VALVE OPEN" annunciator alarms on flow noise sensed by the acoustic monitor and not SRV tailpipe temperatures.

C. **Incorrect but plausible:** Plausible if the applicant (1) is unable to recall that the white "unlabeled" status lights on SRV control panel 10C626 provide indication of individual SRV solenoid status (energized vs. de-energized) after operation of the respective control switch, and (2) does not understand or recall the difference between the SRV Safety Function and the SRV Relief Function.

D. **Incorrect but plausible:** Plausible if the applicant (1) is unable to recall that the "SAFETY RELIEF VALVE OPEN" annunciator alarms on flow noise sensed by the acoustic monitor and not SRV tailpipe temperatures, (2) is unable to recall that the white "unlabeled" status lights on SRV control panel 10C626 provide indication of individual SRV solenoid status (energized vs. de-energized) after operation of the respective control switch, and (3) does not understand or recall the difference between the SRV Safety Function and the SRV Relief Function.

References: Lesson Plan LGSOPS0001B, Rev. 000 Applicant Ref: NONE
Lesson Plan LGSOPS0050, Rev. 000
ARC 110 STEAM (B-2), Rev. 000

Learning Objective: LGSOPS0001B (IL9.a)

Question source:	Susquehanna 5/08 Exam (Q 13)
Question History:	None
Cognitive level:	Memory/Fundamental knowledge: X Comprehensive/Analysis:
10CFR Part 55:	41.7

Comments:

- Revised the stem conditions to (1) reflect LGS alarms and indications, and (2) enhance the operational plausibility of the question.
- Reformatted the answer section.

QUESTION 45

At T=0, with Unit 1 startup is in progress

Reactor pressure is 350 psig
Reactor water level is 35"
Reactor Feed Pumps Bypass (LIC-006-120) is in AUTO, and is 60% open
Reactor Feed Pump Bypass (LIC-006-138) is in AUTO and is closed

At T=15 minutes, the following plant conditions exist:

Reactor pressure has been raised with EHC pressure set to 425 psig
Reactor water level has dropped to 15" and steady for approximately 2 minutes due to a leak in containment

Which one of the following describes the automatic DFWLC response at T=15 minutes?

A. LIC-006-120 will remain open, LIC-006-138 will open

B. LIC-006-120 will remain open, LIC-006-138 will remain closed

C. LIC-006-120 will close, LIC-006-138 will open

D. LIC-006-120 will close, LIC-006-138 will close

K&A # 259002 G2.1.28
Importance Rating 4.1

QUESTION 45

K&A Statement: Reactor Water Level Control: Knowledge of the purpose and function of major system components and controls

Justification:

A. Incorrect but plausible if the candidate does not understand the transition between the HV-006-120 and HV-006-138A. With the conditions met for transfer (>400 psig reactor pressure and HV-006-120 >80% open), the HV-006-120 will close and the HV-006-138A will open

B. Incorrect but plausible if the candidate does not understand the transition between the HV-006-120 and HV-006-138A. With the conditions met for transfer (>400 psig reactor pressure and HV-006-120 >80% open), the HV-006-120 will close and the HV-006-138A will open

C. Correct – in order to transfer from the 120 to the 138A valve, reactor pressure must be greater than 400 psig and HV-006-120, "Reactor Feed Pump Bypass Valve" must be greater than 80% open. With RPV water level below the normal control level of 35" for approximately 2 minutes, HV-006-120 will have traveled to full open in an attempt to raise RPV water level. Once the HV-006-120 is approximately 80% open, the HV-006-120 will close and the HV-006-138A will open to allow a higher capacity valve to begin feeding the reactor

D. Incorrect but plausible if the candidate does not understand the functions of the HV-006-120 and HV-006-138A valves and their transition operations.

References: LLOT0550, Rev. 019 Student Ref: None

Learning Objective: LLOT0550: 3

Question source: Modified LGS bank 599716

Question History: None

Cognitive level: Memory/Fundamental knowledge:
Comprehensive/Analysis: X

10CFR55 41.7

QUESTION 46

Unit 2 plant conditions are as follows:

- Reactor power is 85%
- Normal Reactor Enclosure ventilation is in service
- Both Standby Gas Treatment System (SGTS) Fans are in AUTO

A loss of 2BY160 occurs.

Which one of the following identifies the status of the SGTS Refuel Floor and Unit 2 Reactor Enclosure Parallel Connecting Dampers?

	U2 Reactor Enclosure Dampers	Refuel Floor Dampers
A.	One Open	Two Open
B.	Two Open	One Open
C.	One Open	One Open
D.	Two Open	Two Open

Proposed Answer: C

Level: RO
Tier #: 2
Group #: 1

K&A Rating: 261000 K6.05 (3.1/3.2)

K&A Statement: **Knowledge of the effect that a loss or malfunction of the following will have on the STANDBY GAS TREATMENT SYSTEM:** Reactor protection system: Plant-Specific

Justification:

A. **Incorrect but plausible:** Plausible if the applicant does not recall that AC logic power for the Secondary Containment Isolations comes from RPS, and that a loss of RPS *AY160 or *BY160 UPS power will only result in a partial isolation (i.e. single division trip). Only one damper in the Refuel Floor Parallel Connecting Damper Pair will reposition from 'Close' to 'Open.' Also plausible if the applicant does not recall or understand that the Refuel Floor Parallel Connecting Damper U1 and U2 divisional solenoids specific to each damper are both de-energized by the same divisional isolation signal (i.e., a single divisional isolation signal does <u>not</u> de-energize a solenoid in each of the two dampers).

B. **Incorrect but plausible:** Plausible if the applicant does not recall that AC logic power for the Secondary Containment Isolations comes from RPS, and that a loss of RPS *AY160 or *BY160 UPS power will only result in a partial isolation (i.e. single division trip). Only one damper in both the Reactor Enclosure and Refuel Floor Parallel Connecting Damper Pairs will reposition from 'Close' to 'Open.'

C. **Correct:** Each Parallel Damper Set consists of a Division 1 and Division 2 damper that fails open upon receipt of the <u>associated</u> divisional isolation signal. AC logic power for the Secondary Containment Isolations comes from RPS. Loss of RPS *AY160 or *BY160 UPS power will only result in a partial isolation (i.e. single division trip). Only one damper in each SGTS Parallel Connecting Damper Pair will reposition from 'Close' to 'Open.' Note that the loss of a single RPS Bus on either Unit affects the SGTS Parallel Connecting Dampers in both the affected Unit and the Common Refuel Floor. While each Reactor Enclosure Connecting Damper has only one solenoid (de-energizes allowing damper to fail open), each Refuel Floor Connecting Damper has two solenoids (a U1 and U2 divisional solenoid), **<u>both</u>** of which must de-energize to fail the damper open. For these dampers only, the Unit 1 and Unit 2 logic systems are interconnected such that a trip of either division also trips the same division on the other Units logic.

D. **Incorrect but plausible:** Plausible if the applicant does not recall that AC logic power for the Secondary Containment Isolations comes from RPS, and that a loss of RPS *AY160 or *BY160 UPS power will only result in a partial isolation (i.e. single division trip). Only one damper in both the Reactor Enclosure and Refuel Floor Parallel Connecting Damper Pairs will reposition from 'Close' to 'Open.' Also plausible if the applicant does not recall or understand that the Refuel Floor Parallel Connecting Damper U1 and U2 divisional solenoids specific to each damper are both de-energized by the same divisional isolation signal (i.e., a single divisional isolation signal does <u>not</u> de-energize a solenoid in each of the two dampers).

References: Lesson Plan LLOT0200, Rev. 018 Applicant Ref: NONE

Learning Objective: LLOT0200 (Obj. 7.i, 10.b)

Question source: New

Question History: None

Cognitive level: Memory/Fundamental knowledge: X
Comprehensive/Analysis:

10CFR Part 55: 41.7

Comments:

QUESTION 47

Unit 1 plant conditions are as follows:

- 100% power
- Normal electrical lineup

201 Safeguard Bus voltage drops to 65% for 10 seconds.

WHICH ONE of the following identifies the closed D12 Bus supply breaker and the D12 D/G status following the degraded voltage condition?

	D12 Bus Supply Breaker	D12 Diesel Status
A.	201-D12	Shutdown in standby
B.	101-D12	Shutdown in standby
C.	101-D12	Running in emergency mode
D.	D/G 12 Breaker	Running in emergency mode

Level: RO
Tier #: 2
Group #: 1

K&A Rating: 262001 K1.01 (3.8/4.3)

K&A Statement: **Knowledge of the physical connections and/or cause effect relationships between A.C. ELECTRICAL DISTRIBUTION and the following:** Emergency generators

Justification:

A. **Incorrect but plausible:** Plausible if the applicant does not understand the set point for auto trip of the normal supply breaker for the D12 bus. This answer would be correct if the voltage remained >70%, for that condition 201-D12 remains close, and EDG would be in shutdown and standby status.

B. **Incorrect but plausible:** Plausible if that applicant correctly determines that due to voltage <70%, alternate feeder breaker would close after 1 sec, if feeder supply voltage > 70%. However, EDG will auto start due to EDG ready to load relay has a time delay of 0.5 sec, where if alternate breaker is not closed within 0.5 sec, then the EDG will auto start.

C. **Correct:** If the 201 Transformer voltage drops to <70% the 201 feed breaker to its respective bus (D-12) will trip. Upon tripping of the D-12 201 breaker the D-12 101 feed breaker will close in if the following conditions are met: 101 D-11 breaker is connected, 201 D-11 breaker control switch is RED flagged, D-12 Bus voltage<40%, 1 sec T/D, 101 feed voltage >70%, All lockout relays reset, along with the feeder breaker swap (1 sec) the EDG will start in 0.5 sec and remain running in its emergency mode.

D. **Incorrect but plausible:** Plausible the applicant does not understand the set point for auto trip of the normal supply breaker and closure of the alternate feeder breaker. If the applicant determines that alternate feeder breaker to its respective bus (D-12) fails to close, then this answer would be correct.

References: LGSOPS0092A Rev001 Applicant Ref: NONE

Learning Objective: LGSOPS0092A Rev001– IL4a, EOobj 2a

Question source: Bank Modified (560527)

Question History: Not used in Last 2 NRC exam.

Cognitive level: Memory/Fundamental knowledge: X
Comprehensive/Analysis:

10CFR Part 55: 41.7

Comments:

QUESTION 48

Unit 1 plant conditions are as follows:

- Reactor power 100%
- 1BY160 being powered from its Primary Alternate Source due to corrective maintenance on the '1B' RPS Static Inverter 250 VDC supply breaker
- '1A' RPS UPS Inverter being powered by 250 VDC with 1AY160 Alternate Source power aligned to 'Primary Alternate'

Then:

- '1B' RPS UPS Inverter "series" breakers trip on Undervoltage due to loss of Primary Alternate Source power
- Shortly thereafter, an Overtemperature condition occurs on the '1A' RPS UPS Inverter

Which one of the following describes the plant response?

A. Full Scram signal resulting from '1A' RPS UPS Inverter shutdown on high temperature

B. Full Scram signal resulting from '1A' RPS UPS Inverter static switch transfer to Alternate Source power

C. Half Scram signal only;
1AY160 powered from its Primary Alternate Source

D. Half Scram signal only;
1AY160 powered from its Secondary Alternate Source

Proposed Answer: A

Level: RO
Tier #: 2
Group #: 1

K&A Rating: 262002 K4.01 (3.1/3.4)

K&A Statement: **Knowledge of UNINTERRUPTABLE POWER SUPPLY (A.C./D.C.) design feature(s) and/or interlocks which provide for the following:** Transfer from preferred power to alternate power supplies

Justification:

A. **Correct:** The RPS UPS Inverters are normally powered from Safeguard 250 VDC. On a loss of 250 VDC, the inverter output is lost. Normally, the static switch will automatically transfer to Alternate Source power. This Alternate Source is selectable between the normally aligned 'Primary Alternate' and the 'Secondary Alternate,' which requires manual local operator action to select. Note that the 'Primary Alternate' Source for both the '1A' and '1B' RPS Buses (1AY160 & 1BY160) is the TSC UPS. A loss of RPS Bus 1BY160 occurs due to loss of the 'Primary Alternate' source, which is powering the bus as indicated in the initial conditions. This results in a 'B' side Half Scram signal. RPS Bus 1AY160 (Alternate Source aligned to 'Primary Alternate'), is initially unaffected because it is being powered by the '1A' RPS UPS Inverter. The High Temperature condition on the'1A' RPS UPS Inverter would normally initiate an automatic transfer of 1AY160 Bus power to the selected Alternate Source if available (in this case, the 'Primary Alternate'), and shut down the inverter as a protective measure. The '1A' RPS UPS Inverter static switch will not AUTO transfer to 'Primary Alternate' because it is unavailable. RPS Bus 1AY160 will lose power due to the '1A" RPS UPS Inverter shutdown on High Temperature. With both 1AY160 and 1BY160 de-energized, a Full Scram occurs.

B. **Incorrect but plausible:** Plausible if (1) the applicant recalls that 'Primary Alternate' Source power is the same for both 1AY160 and 1BY160, and that 1AY160 'Primary Alternate' Source power is therefore unavailable as well, and (2) the applicant is unable to recall that the AUTO transfer to Alternate Source power on inverter High Temperature will not occur if the Alternate Source (i.e., the Primary Alternate in this case) is unavailable. Note that the there is no automatic transfer capability between Alternate Sources if the selected Alternate Source becomes unavailable. Manual local operator action is necessary to select between Alternate Sources.

C. **Incorrect but plausible:** Plausible if the applicant does not recall that 'Primary Alternate' Source power is the same for both 1AY160 and 1BY160, and that 1AY160 'Primary Alternate' Source power is therefore unavailable as well.

D. **Incorrect but plausible:** Secondary Alternate Source power is available. Plausible if the applicant (1) does not recall that manual local operator action is necessary to select between 'Primary Alternate' and 'Secondary Alternate' Source power, and (2) believes that 'Secondary Alternate' will be automatically selected if the 'Primary Alternate' is unavailable.

References: Lesson Plan LLOT0071, Rev. 000 Applicant Ref: NONE
Lesson Plan LLOT0093, Rev. 000

ARC 120 D11 (A-5), Rev. 000
ARC 122 D12 (A-5), Rev. 000

Learning Objective:	LLOT0071 (Obj. 2.f)
Question source:	Modified LGS Bank (ID: 746035)
Question History:	Not used on 2008 or 2010 LGS Written Exam
Cognitive level:	Memory/Fundamental knowledge: Comprehensive/Analysis: X
10CFR Part 55:	41.7
Comments:	

QUESTION 49

With Unit 2 initially at 90% power, plant conditions as follows:

- Division III DC is de-energized
- Drywell Pressure is 1.85 psig and rising slowly
- No other operator actions are taken
- The CRS directs the PRO to maintain reactor pressure 990-1096 psig

Which one of the following describes an available SRV for pressure control?

A. '2N' SRV from the MCR

B. '2S' SRV from the AER

C. '2M' SRV from the RSP

D. '2D' SRV from the MCR

K&A # 263000 K3.03
Importance Rating 3.4

QUESTION 49

K&A Statement: Knowledge of the effect that a loss or malfunction of the D.C. ELECTRICAL DISTRIBUTION will have on systems with D.C. components

Justification:

A. Correct –With a loss of Div III DC and a loss of offsite power causing PCIG and other isolations, the only available SRVs are those with accumulators from either the MCR or RSP. ADS SRV controls in the AER are powered by Div III DC. SRVs operated from RSP are C, A, N. '2M' SRV is not controllable from RSP

B. Incorrect but plausible if candidate does not recognize that AER control of ADS SRVs is disabled with a loss of Div III DC

C. Incorrect but plausible if candidate does not recall the SRVs that are controlled from the RSP. Only 'C', 'A', and 'N' SRV are controlled from the RSP

D. Incorrect but plausible if the candidate does not recall that for a loss of offsite power, this results in PCIG and other isolations. While the 2D SRV can be operated from the MCR electrically, it has no pneumatic source because it has no accumulator.

References: LGSOPS0001B, Rev. 0 Student Ref: None

Learning Objective: LGSOPS0001B: IL12a, IL12h

Question source: Modified LGS bank 562223

Question History: None

Cognitive level: Memory/Fundamental knowledge: X
Comprehensive/Analysis:

10CFR55 41.7

QUESTION 50

Unit 2 is operating at 100% RTP.

Given the following sequence:

- t = 0 seconds, DIV 3 LOCA signal is received
- t = 5 seconds, D23 EDG Speed 200 RPM and increasing
- t = 10 seconds, D23 EDG at rated speed and 95% rated voltage

Which one of the following identifies when the '0C' ESW pump will auto start?

A. t = 45 seconds

B. t = 50 seconds

C. t = 53 seconds

D. t = 58 seconds

Proposed Answer: D

Level: RO
Tier #: 2
Group #: 1

K&A Rating: 264000 K1.04 (3.2/3.3)

K&A Statement: **Knowledge of the physical connections and/or cause-effect relationships between EMERGENCY GENERATORS (DIESEL/JET) and the following:** Emergency generator cooling water system

Justification:

A. **Incorrect but plausible:** Plausible if the applicant (1) confuses the 45-second "Dead Bus" Start time delay with the 53-second LOCA time delay for the ESW pump start, and (2) does not take into account the 5 seconds for the EDG to come up to speed and energize the "Low Speed Relay."

B. **Incorrect but plausible:** Plausible if the applicant confuses the 45-second "Dead Bus" Start time delay with the 53-second LOCA time delay for the ESW pump start.

C. **Incorrect but plausible:** Plausible if the applicant does not take into account the 5 seconds for the EDG to come up to speed and energize the "Low Speed Relay."

D. **Correct:** On a LOCA, the affected Diesel's ESW pump ('0C') will auto start 53 seconds after engine speed increases to 200 RPM, energizing the "Low Speed Relay." Energizing the "Low Speed Relay" initiates the 53-second ESW Pump Start time delay. Per the initial conditions, the "Low Speed Relay" is energized at t = 5 seconds, resulting in an ESW pump start at t = 58 seconds.

References: Lesson Plan LLOT0011, Rev. 000 Applicant Ref: NONE
Lesson Plan LLOT0092B, Rev. 000

Learning Objective: LLOT0011 (Obj. 5)

Question source: Modified LGS Bank (ID: 562674)

Question History: Not used on 2008 or 2010 LGS Written Exam

Cognitive level: Memory/Fundamental knowledge: X
Comprehensive/Analysis:

10CFR Part 55: 41.2 to 41.9

Comments:

QUESTION 51

Unit 1 plant conditions are as follows:

- Reactor power lowered to 65% to perform a rod pattern adjustment
- D12 Diesel is tagged for scheduled maintenance
- D13 Diesel is unavailable due to a Lube Oil line rupture that occurred during performance of ST-6-092-313-1, "Slow Start Operability Test Run"
- Equipment Operator reports that smoke is coming from the Static Inverter Compartment on Elevation 254'0"

Then:

- A Loss of Offsite Power occurs
- D11 Diesel starts and immediately trips on Differential Overcurrent

Which one of the following describes the "Prompt Actions" required to be performed for safe shutdown in accordance with 1FSSG-3020 (U1), "Fire Area 020 Fire Guide?"

A. Place "DIFF/GROUND TRIP BYPASS" switch on 10C661 to "FIRE";
Restart D11 Diesel from the Local Control panel

B. Place "DIFF/GROUND TRIP BYPASS" switch on 1AC514 to "FIRE";
Restart D11 Diesel from the Local Control panel

C. Place "DIFF/GROUND TRIP BYPASS" switch on 10C661 to "FIRE";
Restart D11 Diesel from the Main Control Room

D. Place "DIFF/GROUND TRIP BYPASS" switch on 1AC514 to "FIRE";
Restart D11 Diesel from the Main Control Room

Proposed Answer: B

Level: RO
Tier #: 2
Group #: 1

K&A Rating: 264000 (G2.1.30) (4.4/4.0)

K&A Statement: **Ability to locate and operate components, including local controls,** as they apply to Emergency Generators (Diesel/Jet).

Justification:

A. **Incorrect but plausible:** Plausible if the applicant believes that the switch is located in the MCR or is unable to recall its location.

B. **Correct:** HS-092-186A, "DIFF/GROUND TRIP BYPASS" switch is located on Local Control Panel 1AC514. Placing the D11 Diesel switch to "FIRE" (1) bypasses the D/G Differential Overcurrent Lockout input to the Emergency Stop Relay, (2) disables MCR speed governor and auto voltage controls, and (3) provides a means of isolating a fire-induced circuit fault to allow the Diesel Generator to be restarted and controlled locally.

C. **Incorrect but plausible:** Plausible if the applicant (1) believes that the switch is located in the MCR or is unable to recall its location, and (2) does not understand the effects of operating the switch.

D. **Incorrect but plausible:** Plausible if the applicant does not understand the effects of operating the switch.

References: Lesson Plan LLOT0092B, Rev. 000 Applicant Ref: NONE
1FSSG-3020, Rev. 013
BOP ARC 1AC514 (F-6), Rev. 000

Learning Objective: LLOT0092B (Obj. 5 & 11)

Question source: New

Question History: None

Cognitive level: Memory/Fundamental knowledge: X
Comprehensive/Analysis:

10CFR Part 55: 41.7

Comments:

QUESTION 52

Unit 1 is operating at rated power when an air leak occurs on BOTH instrument air headers. Both compressors are in AUTO.

- Due to the air leak, air pressure on both instrument headers lowered to 98 psig over twenty minutes
- Air pressure on both headers is then recovered to 105 psig

Which one of the following statements describes the expected status of the lag side of the instrument air compressors at this time?

	1A Lag Side Compressor Status	1B Lag Side Compressor Status
A.	Loaded	Loaded
B.	Loaded	Unloaded
C.	Unloaded	Loaded
D.	Unloaded	Unloaded

Level: RO
Tier #: 2
Group #: 1

K&A Rating: 300000 K5.01 (2.5)

K&A Statement: **Knowledge of the operational implications of the following concepts as they apply to the INSTRUMENT AIR SYSTEM:** Air compressors

Justification:

A. **Incorrect but plausible:** Plausible if the applicant does not understand that the lag side loading set points are different for the B air compressor. For B air compressor, the lag side will load at 96 psig, compared to A air compressor lag side loading of 98 psig.

B. **Correct:** For the A(B) compressor in AUTO, the compressor will start and load when receiver pressure drops to 100 psig. If pressure continues to drop, the lag side will load at 98 psig (96 psig). With receiver pressure rising, the lag side will unload at 108 psig (106 psig). The lead side unloads when receiver pressure rises to 110 psig.

C. **Incorrect but plausible:** Plausible if the applicant does not understand that the lag side loading set points for B air compressor are different. Plausible if the applicant confuses the B side lag load set points with A side.

D. **Incorrect but plausible:** Plausible if the applicant does not recall the lag side unloading set points are different for the B air compressor. For B air compressor, the lag side will unload at 106 psig, and the A air compressor lag side does not unload until pressure rises above 108 psig.

References: LGSOPS0015 Rev001 Applicant Ref: NONE

Learning Objective: LGSOPS0015 Rev001 – IL10a, 10d, EO 9a, and 9d

Question source: New

Question History: Not used in Last 2 NRC exam.

Cognitive level: Memory/Fundamental knowledge:
Comprehensive/Analysis: X

10CFR Part 55: 41.5 / 45.3

Comments:

QUESTION 53

Given the following:

- U1 operating at 100% reactor power
- '1A' RECW Pump in "AUTO" and running
- '1B' RECW Pump in "AUTO" and standby

Then:

- I&C field errors result in simultaneous receipt of a DIV III LOCA signal and DIV IV LOOP signal
- DIV III and DIV IV EDGs respond as expected
- RECW Heat Exchanger outlet pressure is 118.0 psig

Which one of the following describes the status of the U1 RECW Pumps 60 seconds later (Assume NO operator actions)?

	'1A' RECW Pump	'1B' RECW Pump
A.	Running	Running
B.	Running	Stopped
C.	Stopped	Running
D.	Stopped	Stopped

Proposed Answer: C

Level: RO
Tier #: 2
Group #: 1

K&A Rating: 400000 A3.01 (3.0/3.0)

K&A Statement: **Ability to monitor automatic operations of the CCWS including:** Setpoints on instrument signal levels for normal operations, warnings, and trips that are applicable to the CCWS

Justification:

A. **Incorrect but plausible:** Regarding the '1A' RECW Pump: Plausible if the applicant (1) is unable to recall that a RECW Pump will not automatically restart upon receipt of a LOCA signal after power has been restored to its MCC following LOCA load shed, or (2) believes that the RECW Pumps do not lose power on a LOCA.

B. **Incorrect but plausible:** Regarding the '1A' RECW Pump: Plausible if the applicant (1) is unable to recall that a RECW Pump will not automatically restart upon receipt of a LOCA signal after power has been restored to its MCC following LOCA load shed, or (2) believes that the RECW Pumps do not lose power on a LOCA. Regarding the '1B' RECW Pump: Plausible if the applicant believes that manual actions are required to start a RECW Pump following restoration of power to the pump's MCC after receipt of a LOOP signal (not unlike the manual actions required to restore a RECW Pump following a LOCA signal).

C. **Correct:** Regarding the '1A' RECW Pump: DIV III LOCA load shed results in a loss of power to the '1A' RECW Pump. Three seconds after the LOCA signal is sealed in, the D134 load center 4 KV supply breakers reshut, powering MCC D134-R-H, which feeds '1A' RECW Pump. The pump will not restart however, because a contact in the pump's control circuit opens on the DIV III LOCA signal. To restart the '1A' RECW Pump, the control room operator must either (1) start the pump manually from 10C655, or (2) reset the DIV III Core Spray System logic by depressing the reset pushbutton (provided the LOCA signal is no longer present). Once the LOCA signal has been reset, the pump will auto start on RECW Heat Exchanger low outlet pressure (<118.6 psig). Regarding the '1B' RECW Pump: The '1B' RECW Pump will automatically restart on low RECW Heat Exchanger outlet pressure (<118.6 psig), approximately 20 seconds after the DIV IV EDG has restored power to MCC D144-R-H.

D. **Incorrect but plausible:** Regarding the '1B' RECW Pump: Plausible if the applicant believes (1) that manual actions are required to start a RECW Pump following restoration of power to the pump's MCC after receipt of a LOOP signal (not unlike the manual actions required to restore of a RECW Pump following a LOCA signal), or (2) that RECW Heat Exchanger outlet pressure has not dropped below the setpoint for auto pump start (118.6 psig).

References: Lesson Plan LLOT0013, Rev. 000 Applicant Ref: NONE

Learning Objective: LLOT0013 (IL6, IL7)

Question source:	New	
Question History:	None	
Cognitive level:	Memory/Fundamental knowledge:	
	Comprehensive/Analysis:	X
10CFR Part 55:	41.7	
Comments:		

QUESTION 54

Unit 2 plant conditions as follows:

At T=0:

- OPCON 4
- D22 bus out of service for maintenance
- A Loss of Offsite Power has occurred
- All automatic actions and equipment functions as designed

At T=30 seconds:

- D24 bus trips on overcurrent lockout
- No other operator action is taken

Which one of the following describes the availability of power to the 2A and 2B CRD pumps at T=30 seconds?

	2A	2B
A.	Available	Available
B.	Available	Unavailable
C.	Unavailable	Available
D.	Unavailable	Unavailable

K&A #	201001 K2.01
Importance Rating	2.9

QUESTION 54

K&A Statement: Knowledge of electrical power supplies to: Pumps

Justification:

A. Incorrect but plausible if the candidate does not recall power supplies of 2A and 2B CRD pumps, effects of bus lockouts, and effects of bus maintenance

B. Correct – 2A CRD pump power supply is D23, 2B CRD pump power supply is D24. D22 bus being out of service is a distracter if candidates believe D22 is a power supply to one of the pumps. With a loss of offsite power, the EDG will start and provide power to the buses, with exception of the D22 bus and the D24 bus which suffers an overcurrent lockout, leaving only 2A CRD pump with power available

C. Incorrect but plausible if candidate does not properly recall power supplies of 2A and 2B CRD pumps, effects of bus lockouts, and effects of bus maintenance

D. Incorrect but plausible if candidate does not properly recall power supplies of 2A and 2B CRD pumps, effects of bus lockouts, and effects of bus maintenance

References: LLOT0070, Rev. 000 Student Ref: None

Learning Objective: LLOT0070: 4c/10d

Question source: New

Question History: Not used on 2008 or 2010 LGS exams

Cognitive level:	Memory/Fundamental knowledge:	X
	Comprehensive/Analysis:	

10CFR55 41.7

QUESTION 55

Unit 2 plant conditions are as follows:

- SHUTDOWN is in progress with Reactor Power at 16%
- Rod Group 10 is being inserted
- Group 10 has an insert limit of 12 and a withdraw limit of 48
- The next rod in Group 10 is selected and continuously inserted from notch 48

WHICH ONE of the following describes the RWM system response?

A. The rod will be pre-blocked and stop at position 12.

B. When the rod reaches position 8, a rod insert block will be initiated

C. The rod will fully insert and show up as an insert error

D. When the rod reaches position 10, a rod insert block will be initiated

Level: RO
Tier #: 2
Group #: 1

K&A Rating: 201006 K4.01 (3.4/3.5)

K&A Statement: **Knowledge of ROD WORTH MINIMIZER SYSTEM (RWM) (PLANT SPECIFIC) design feature(s) and/or interlocks which provide for the following:** Insert blocks/errors

Justification:

A. **Correct:** The rod will be pre-blocked at position 12 when continuously inserted from position 48. Within 150 milliseconds after reaching position 12, the motion signal is removed and a control rod block is applied. This allows the control rod to settle back at 12.

B. **Incorrect but plausible:** Plausible if the applicant does not recall or understand the pre-blocked circuit, which inserts rod block within 150 millisecond of reaching the insert set point. Applicant may determine that the rod will settle at position 8 due to mismatch between programmed and actual, with insert block.

C. **Incorrect but plausible:** Plausible if the applicant does not recall the pre-blocked rod stop, and determines that the rod will be allowed to be fully inserted and would show up as an inset error.

D. **Incorrect but plausible:** Plausible if the applicant does not recall or understand the pre-blocked circuit, which inserts rod block within 150 millisecond of reaching the insert set point. Applicant may determine that the rod will settle at position 10 due to mismatch between programmed and actual, with insert block.

References: LLOT-0073B Rev. 000 Applicant Ref: NONE

Learning Objective: LLOT-0073B Learning Objective 3

Question source: Bank (555816)

Question History: Not used in Last 2 NRC exam.

Cognitive level: Memory/Fundamental knowledge: X
Comprehensive/Analysis:

10CFR Part 55: 41.7

Comments:

QUESTION 56

Unit 2 plant conditions as follows:

- A Unit 2 scram condition occurred due to a loss of feedwater transient
- RPV water level reached -44 inches and was recovered by both HPCI and RCIC
- All control rods inserted
- RPV pressure is 825 psig
- A cooldown was commenced using ST-6-107-641-2, “Rx Vessel Temperature and Pressure Monitoring”

For these conditions, which of the following describes the accuracy of the RPV bottom head drain temperature?

A. Bottom head drain temperature is not accurate due to lack of forced circulation ONLY

B. Bottom head drain temperature is not accurate due to lack of forced circulation and RWCU out of service

C. Bottom head drain temperature is accurate due to recirculation pumps being at minimum speed

D. Bottom head drain temperature is accurate due to RWCU system remaining in service

K&A #	202001 K3.07
Importance Rating	2.9

QUESTION 56

K&A Statement: Knowledge of the effect that a loss or malfunction of the RECIRCULATION SYSTEM will have on vessel bottom head drain temperature

Justification:

A. Incorrect but plausible if the candidate does not recall that the RWCU system has been isolated by NSSSS at -38" and is not the only cause of the lack of accuracy due to reactor Recirc pumps being tripped at -38" via ATWS-RPT

B. Correct –due to both an NSSSS isolation of RWCU at -38" and an ATWS-RPT trip of the Recirc pumps, there is no core forced circulation or RWCU system flow through the bottom head drain line. Due to this, bottom head drain line temperature is not accurate

C. Incorrect but plausible if candidate does not recall that Recirc pumps trip at -38"

D. Incorrect but plausible if the candidate does not recall that the RWCU receives a NSSSS isolation signal at -38", resulting in no system flow

References: LGSOPS0044, Rev. 0 Student Ref: None

Learning Objective: LGSOPS0044: IL5

Question source: Bank PB 2/07 Q65

Question History: Not used on 2008 or 2010 LGS exams

Cognitive level: Memory/Fundamental knowledge:
Comprehensive/Analysis: X

10CFR55 41.7

QUESTION 57

Unit 2 plant conditions are as follows:

- Unit 2 Reactor Power is 30%
- Reactor Level is 35" and steady
- 2A and 2B RFPs are in service
- 2C RFP is shutdown

The "2B" RFP Pump trips and the following conditions are observed:

- Reactor Level drops to 28" then returns to normal
- Total Feedflow drops to 15% for 20 sec, then rises to new steady state valve

WHICH ONE of the following statements describes the plant's response to this trip and its associated setpoint parameter that caused the plant response?

A. Recirculation Pumps runback to 28% due to total feedwater flow conditions

B. Reactor Recirculation Pumps runback to 42% due to RPV level conditions

C. Reactor Recirculation Pumps runback to 28% due to RPV level conditions

D. Recirculation Pumps runback to 42% due to total feedwater flow conditions

Level: RO
Tier #: 2
Group #: 2

K&A Rating: 202002 (Recirculation Flow Control) K4.02 (3.0)

K&A Statement: **Knowledge of RECIRCULATION FLOW CONTROL SYSTEM design feature(s) and/or interlocks which provide for the following:** Recirculation pump speed control

Justification:

A. **Correct:** Low limiter causes Recirc pump speed to be limited to 28% if total feedwater flow < 18.8% for greater than 15 seconds, OR RPV level < 12.5 inches OR Recirc pump discharge valve not fully open.

B. **Incorrect but plausible:** Plausible if the applicant does not correctly recall the 42% speed limiter setpoint, 42% speed limiter would be plausible if the RPV water level got below 27.5 inches, however RPV water level did not go below 27.5 inches.

C. **Incorrect but plausible:** Plausible if the applicant does not correctly recall the setpoint for 28% speed limiter based on RPV water level condition. RPV water level must go below 12.5 inches to actuate on RPV water level.

D. **Incorrect but plausible:** Plausible if the applicant does not correctly recall the 42% speed limiter setpoint, 42% speed limiter would be plausible if the RPV water level got below 27.5 inches, and any individual reactor feed pump flow < 18.8%

References: LGSOPS0043B Rev. 3 Applicant Ref: NONE

Learning Objective: LGSOPS0043B Learning Objective IL2a, 2b, 3 and 4

Question source: Modified Bank (562508)

Question History: Not used in Last 2 NRC exam.

Cognitive level: Memory/Fundamental knowledge: X
Comprehensive/Analysis:

10CFR Part 55: 41.7

Comments:

QUESTION 58

Given the following:

- Unit 1 operating at 100% reactor power
- I&C Technician inadvertently opens the “Equalizing” valve for LT-042-1N004B during performance of a Quarterly I&C surveillance for LT-042-1N080B

Then:

- LT-042-1N004C fails “UPSCALE” two (2) minutes later

Which one of the following describes the impact to the plant given the above conditions?

A. FWLCS continues to control RPV water level automatically using the remaining 2 valid input signals

B. FWLCS lowers RFP speed until the +12.5 inch RPV water level scram setpoint is reached

C. Main Turbine and RFP Turbines trip;
Turbine trips initiated via the FWLCS AC70-I/O modules

D. Main Turbine and RFP Turbines trip;
Turbine trips initiated via the FWLCS AC450 Controller

Proposed Answer: C

Level: RO
Tier #: 2
Group #: 2

K&A Rating: 216000 A1.02 (2.9/3.1)

K&A Statement: **Ability to predict and/or monitor changes in parameters associated with operating the NUCLEAR BOILER INSTRUMENTATION controls including:** Removing or returning a sensor (transmitter) to service

Justification:

A. **Incorrect but plausible:** Plausible if the applicant does not recall or understand (1) the effects of equalizing the level transmitter, (2) the "*one-out-of-two twice*" high level trip logic, and/or (3) that the +54 inch RPV high level trip logic is implemented in the four AC70-I/O modules only, separate and independent of the FWLCS AC450 Controller, which functions to control RPV water level by averaging only "valid" level signals from the N004 transmitters. The Main/RFP Turbines will trip regardless of actual water level. It should also be noted that the upscale failure of LT-042-1N004C two minutes after inadvertently equalizing across LT-042-1N004B, enhances the plausibility of this distracor in that the conditions specified do not constitute a simultaneous failure of the two RPV level transmitters as described in S06.1.H U/1. A simultaneous failure would automatically transfer the FWLC M/A stations to "Manual" which would preclude automatic level control.

B. **Incorrect but plausible:** Plausible if the applicant does not recall or understand that the +54 inch RPV high water level trip logic is implemented in the four AC70-I/O modules only (separate and independent of the FWLCS AC450 Controller), and that the Main/RFP Turbines will trip regardless of actual water level. The reactor will scram as a result of the Main Turbine trip. It should also be noted that the upscale failure of LT-042-1N004C two minutes after inadvertently equalizing across LT-042-1N004B, enhances the plausibility of this distracor in that the conditions specified do not constitute a simultaneous failure of the two RPV level transmitters as described in S06.1.H U/1. A simultaneous failure would automatically transfer the FWLC M/A stations to "Manual" which would preclude automatically lowering level to the +12.5 inch scram setpoint.

C. **Correct:** Equalizing the pressure across Narrow Range RPV level transmitter LT-042-1N004B causes indicated RPV water level to be pegged upscale. The 'B' and 'C' N004 level transmitter combination satisfies the "*one-out-of-two twice*" high level trip logic for the +54 inch Main/RFP Turbine trips, which is implemented in four separate and independent AC70-I/O modules. The Main/RFP Turbines will trip regardless of actual water level. The trips are <u>NOT</u> dependent on the FWLCS AC450 Controller, which functions to automatically control RPV water level by averaging only "valid" level signals.

D. **Incorrect but plausible:** Plausible if the applicant believes that the +54 inch RPV high level trip logic is implemented in the FWLCS AC450 Controller, and <u>not</u> the four separate and independent AC70-I/O modules.

References: Lesson Plan LLOT0550, Rev. 019 Applicant Ref: NONE

Lesson Plan LGSOPS0042, Rev. 000
S06.1.H U/1, Rev. 012

Learning Objective:	LLOT0550 (Obj. 7.c & 10.e) LGSOPS0042 (IL7.c, IL9.f, IL9.g)	
Question source:	New	
Question History:	None	
Cognitive level:	Memory/Fundamental knowledge: Comprehensive/Analysis:	 X
10CFR Part 55:	41.5	
Comments:		

QUESTION 59

Unit 1 is in OPCON 4.

- The "B" Loop of RHR is lined up in Suppression Pool Cooling using the 1D RHR pump.
- The "A" Loop of RHR is lined up in Shutdown Cooling using the 1A RHR pump.
- Equipment Operator reports 101-D11 breaker is opened and the D11 Bus Differential/Overcurrent relay is flagged.

Given the above plant conditions, which one of the following correctly describes the expected plant response?

The D11 Diesel Generator auto starts and …

A. 201-D11 breaker closes. Shutdown Cooling using the 1A RHR pump remains in service.

B. 201-D11 breaker closes. 1A RHR pump requires a manual restart following 201-D11 breaker closure.

C. D-11 Diesel output breaker closes. 1A RHR pump restarts automatically, following a trip, upon D-11 Diesel output breaker closure

D. Bus D11 remains de-energized and Shutdown Cooling using the 'A' RHR loop is lost.

Level: RO
Tier #: 2
Group #: 1

K&A Rating: 219000 (RHR/LPCI: Torus/Suppression Pool Cooling Mode)
K2.02 (3.1/3.3)

K&A Statement: **Knowledge of electrical power supplies to the following:**
Pumps

Justification:

A. **Incorrect but plausible:** Plausible if the applicant does not understand that the differential/overcurrent results in bus D11 lockout, which prevents auto closure of the 201-D11 breaker. If the bus lockout had not occurred, then this would be the correct choice.

B. **Incorrect but plausible:** Plausible if the applicant does not understand that the differential/overcurrent results in bus D11 lockout, which prevents auto closure of the 201-D11 breaker.

C. **Incorrect but plausible:** Plausible if the applicant determines that EDG auto starts and loads the D-11 bus based on loss of power.

D. **Correct:** Due to the differential/overcurrent, bus D11 will be in lockout. RHR pump 'A' is powered from Bus D11, and as a result, shutdown cooling using 'A' RHR pump will be lost.

References: LGSOPS0092A Rev001 Applicant Ref: NONE
LLOT0051 Rev000

Learning Objective: LLOT0051 Rev000 obj. IL2

Question source: New

Question History: Not used in Last 2 NRC exam.

Cognitive level: Memory/Fundamental knowledge: X
Comprehensive/Analysis:

10CFR Part 55: 41.7

Comments:

QUESTION 60

Unit 2 plant conditions as follows:

- Drywell pressure is 1.4 psig rising very slowly
- Drywell temperature is 220°F rising very slowly
- Reactor level dropped to -135" and has been restored to +17"
- RPV pressure is 420 psig and steady
- '2B' RHR is in Suppression Pool Spray
- '2A' RHR is in Drywell Spray

Which one of the following identifies the status of the '2B' RHR Loop LOCA signal, and the HV-51-2F017B, '2B' RHR LPCI Injection PCIV, white 'Override' light?

	'2B' RHR Loop LOCA Signal	HV-51-2F017B 'Override Light
A.	Present	Not lit
B.	Not Present	Lit
C.	Present	Lit
D.	Not Present	Not lit

K&A # 226001 A3.04
Importance Rating 3.1

QUESTION 60

K&A Statement: Ability to monitor automatic operations of the RHR/LPCI: CONTAINMENT SPRAY SYSTEM MODE including: lights and alarms

Justification:

A. Correct –with RPV level reaching -135", a LOCA signal exists. The following conditions must be met for 2F017B to open: LOCA signal, power available, and D/P across valve less than 74 psid (approximately 404 psig due to shutoff head of RHR at ~330 psig). During performance of T-225 for Suppression Pool sprays, 2F017B is directed to be closed or verified closed. 2F017A(B) have a white indicating light indicating if valve had been repositioned following LOCA signal and valve open signal. Because 2F017B never received an open signal, the white indicating light will not be lit.

B. Incorrect but plausible if candidate does not recall LOCA initiation signal of -129" RPV water level or conditions required to energize the 'override' light (valve receive OPEN signal and overridden closed). Valve did not receive open signal due to RPV pressure >74 psid above RHR pump shutoff head.

C. Incorrect but plausible if candidate does not recall conditions required to energize the 'override' light (valve receive OPEN signal and overridden closed). Valve did not receive open signal due to RPV pressure >74 psid above RHR pump shutoff head.

D. Incorrect but plausible if the candidate does not recall LOCA initiation signal of 129" RPV water level

References: LLOT0051, Rev. 0 Student Ref: None

Learning Objective: LLOT0051: IL6/IL8g/IL9b

Question source: Modified LGS bank 560901

Question History: Not used on 2008 or 2010 LGS exams

Cognitive level: Memory/Fundamental knowledge:
Comprehensive/Analysis: X

10CFR55 41.7

QUESTION 61

During a routine plant startup with the main generator synchronized to the grid, you observe that the difference between reactor pressure and turbine inlet pressure is becoming larger as power ascends.

This observation is...

A. not expected because EHC senses and regulates turbine inlet pressure to maintain it within 30 psig of reactor pressure.

B. expected because EHC senses reactor pressure to maintain it in a 30 psig regulation band, and the lower turbine inlet pressure results from headloss in the main steam lines.

C. not expected because EHC senses reactor pressure to maintain it and turbine inlet pressure in a 30 psig regulation band up to full power.

D. expected because EHC senses turbine inlet pressure to maintain it in a 30 psig regulation band, and reactor pressure rises with regulation band and main steam line headloss.

Proposed Answer: D

Level: RO
Tier #: 2
Group #: 2

K&A Rating: 241000 K5.04 (3.3/3.3)

K&A Statement: **Knowledge of the operational Implications of the following concepts as they apply to REACTOR/TURBINE PRESSURE REGULATING SYSTEM:** Turbine inlet pressure vs. reactor pressure

Justification:

A. **Incorrect but plausible:** Plausible if the applicant does not understand or confuses the turbine inlet pressure versus reactor pressure relationship. The 30 psig regulation band is associated with the change in turbine inlet pressure as steam line flow increases. Turbine inlet pressure is not maintained within 30 psig of reactor pressure as is evidenced by the values of turbine inlet pressure (990 psig) and reactor pressure (1045 psig) at 100% steam flow.

B. **Incorrect but plausible:** Plausible if the applicant does not understand or confuses the turbine inlet pressure versus reactor pressure relationship. EHC senses turbine inlet pressure to maintain it in a 30 psig regulation band, not reactor pressure.

C. **Incorrect but plausible:** Plausible if the applicant does not understand or confuses the turbine inlet pressure versus reactor pressure relationship. EHC senses turbine inlet pressure to maintain it in a 30 psig regulation band up to full power. The 30 psig regulation band is not associated with reactor pressure.

D. **Correct:** The 30 psig regulation band is associated with the change in turbine inlet pressure as steam line flow increases. Turbine inlet pressure rises from 960 to 990 psig at a 3.33% steam flow per 1 psi rise. In other words, a 1 psi pressure error increase causes the control valves to open enough to pass 3.33% more steam flow. Reactor pressure rises from 960 to 1045 psig. Reactor pressure rises non-linearly to a higher value due to increased differential pressure caused by MSL headloss as steam line flow increases.

References: Lesson Plan LLOT0590, Rev. 000 Applicant Ref: NONE

Learning Objective: LLOT0590 (Obj. 2.a)

Question source: New

Question History: None

Cognitive level: Memory/Fundamental knowledge: X
Comprehensive/Analysis:

10CFR Part 55: 41.7

Comments:

QUESTION 62

Unit 2 is operating at 70% power when a fault on the grid causes a 50% mismatch between the main generator electrical output and turbine power to occur.

Assume **NO** operator actions

What are the turbine and reactor responses to this condition?

A. Main turbine control valves close at normal rate. Reactor trips on high RPV pressure

B. Main turbine control valves close at rapid rate. Reactor trips on control valve fast closure

C. Main turbine control valves close at normal rate. Reactor remains on line

D. Main turbine control valves close at rapid rate. Reactor trips on high RPV pressure

K&A #	245000 G2.1.27
Importance Rating	3.9

QUESTION 62

K&A Statement: Knowledge of system purpose and/or function as it applies to Main Turbine Generator and Auxiliary Systems

Justification:

A. Incorrect but plausible if the candidate does not know turbine fast closure load reject circuitry. Reactor would trip on high pressure if control valves closed to reduce load by 50%

B. Correct: turbine control valves trip closed by fast acting solenoid due to load imbalance >40%, reactor will trip on the fast closure interlock

C. Incorrect but plausible: if applicant does not know turbine fast closure load reject circuitry and final load is within turbine bypass valve capability

D. Incorrect but plausible: control valves do close rapidly from load reject circuitry. However, reactor will trip on the fast closure interlock before actuation of the high pressure trip

References: LGSOPS0032, Rev. 3
LLOT0580, Rev. 0

Student Ref: None

Learning Objective: LGSOPS0032: IL4
LLOT0580: 5

Question source: Bank, Fitzpatrick 5/10

Question History: Not used on 2008 or 2010 LGS initial exams

Cognitive level: Memory/Fundamental knowledge: X
Comprehensive/Analysis:

10CFR55: 41.7

QUESTION 63

Given the following conditions for Unit 2:

- RPV water level +35 inches, steady
- Total Feedwater Flow 11.8 Mlbs/hr, steady
- '2A' RFP speed 4607 rpm, steady
- '2B' RFP speed 4609 rpm, steady
- '2C' RFP speed 4601 rpm, steady

Then:

- '2B' Condensate Pump breaker 252-10204 trips on overcurrent

Operators reduce core flow to restore RPV water level

Which one of the following describes the INITIAL plant response and appropriate Operator Follow-up Action in accordance with OT-100, "Reactor Low Level?"

A. RFP speed reduction initiated;
Lower RFP speed as needed to maintain RFP suction pressure above 300 psig

B. RFP speed reduction initiated;
Lower power as needed to maintain RFP suction pressure above 300 psig

C. RFP speed reduction NOT initiated;
Lower RFP speed as needed to maintain RFP suction pressure above 300 psig

D. RFP speed reduction NOT initiated;
Lower power as needed to maintain RFP suction pressure above 300 psig

Proposed Answer: D

Level: RO
Tier #: 2
Group #: 2

K&A Rating: 259001 A2.03 (3.6/3.6)

K&A Statement: **Ability to (a) predict the impacts of the following on the REACTOR FEEDWATER SYSTEM; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations:** Loss of condensate pump(s)

Justification:

A. **Incorrect but plausible:** Plausible if the applicant is unable to recall that a Reactor Feed Pump speed reduction is only initiated above 4611 rpm on a Condensate Pump trip. Also plausible in that lowering RFP speed will raise pump suction pressure (not an option because this results in an RPV level reduction). OT-100 guidance is to lower reactor power as needed to maintain RFP suction pressure above 300 psig <u>AND</u> Total FW Flow less than or equal to 11.3 Mlbs/hr. Manually controlling the RFPs is only permitted if RPV level is outside of the 30 to 40 inch band and a RFP controller/FWLCS malfunction exists.

B. **Incorrect but plausible:** Plausible if the applicant is unable to recall that a Reactor Feed Pump speed reduction is only initiated above 4611 rpm on a Condensate Pump trip.

C. **Incorrect but plausible:** Plausible in that lowering RFP speed will raise pump suction pressure (not an option because this results in an RPV level reduction). OT-100 guidance is to lower reactor power as needed to maintain RFP suction pressure above 300 psig <u>AND</u> Total FW Flow less than or equal to 11.3 Mlbs/hr. Manually controlling the RFPs is only permitted if RPV level is outside of the 30 to 40 inch band and a RFP controller/FWLCS malfunction exists.

D. **Correct:** The loss of a Condensate Pump ONLY results in a Reactor Feed Pump speed reduction if speed is above 4611 rpm. RFP speed is limited to 4611 rpm to minimize the potential for tripping on low suction pressure at 233 psig. With all three RFPs running below 4611 rpm, the automatic speed reduction is not initiated. Note that Recirc Pumps do not runback because Total Feedwater is less than 80.9%. In accordance with OT-100, "Reactor Low Level," if a third Condensate Pump is unavailable, actions must be taken to lower reactor power as needed to maintain RFP suction pressure above 300 psig (conservatively chosen to account for possible calibration shifts). Lowering RFP speed is not an option because it results in an RPV level reduction.

References: Lesson Plan LLOT0540, Rev. 000 Applicant Ref: NONE
Lesson Plan LLOT0550, Rev. 019
OT-100, Rev. 032
OT-100 Bases, Rev. 034

Learning Objective: LLOT0540 (Obj. 14.b)

Question source:	New
Question History:	None
Cognitive level:	Memory/Fundamental knowledge: Comprehensive/Analysis: X
10CFR Part 55:	41.5
Comments:	

QUESTION 64

Unit 1 Plant conditions are as follows:

- Unit is in OPCON 2
- Reactor pressure is 50 psig
- Offgas recombiner has been preheated to 330° F
- 1st stage Steam Jet Air Ejector being placed in service using Aux steam

Due to high air inleakage, PIC-007-141A, Recirc to Condenser is set to 80%

Annunciator 127 C-1 "1 UNIT RECOMBINER TRAIN AFTERCOND OUTLET HI TEMP" received and will not clear

Which one of the following is the required action to take?

A. Lower the setpoint of PIC-07-141A to 70%

B. PLACE alternate Aftercondenser Level Controller in service

C. Raise service water flow using service water inlet valve 10-1022

D. Ensure CV-69-156, Offgas Drain Select pushbutton, is positioned to Clean Rad Waste (CRW)

Level: RO
Tier #: 2
Group #: 1

K&A Rating: 271000 (Offgas System) A4.09 (3.3/3.2)

K&A Statement: **Ability to manually operate and/or monitor in the control room:** Offgas system controls/components

Justification:

A. **Incorrect but plausible:** Plausible if the applicant determines that lowering PIC-007-141 will decrease the outlet temperature. Lowering PIC-007-141 actually makes the problem worse by increasing the flow to offgas.

B. **Incorrect but plausible:** Plausible if the applicant does not understand that placing an alternate level controller in service would be correct if the problem was due to high level.

C. **Correct:** ARC-MCR-127 Directs raising service water flow using 10-1022 to the aftercondenser. M69.0.A Section 4.3 also directs service water flow be maximized.

D. **Incorrect but plausible:** Plausible if the applicant determines that swapping Drains to CRW would be the correct answer, however, this would be correct if level was the issue.

References: ARC-MCR-127 C-1
LGSOPS0069 Rev 002

Applicant Ref: NONE

Learning Objective: Objective IL2c, E03c

Question source: Bank (777255)

Question History: Not used in Last 2 NRC exam.

Cognitive level: Memory/Fundamental knowledge: X
Comprehensive/Analysis:

10CFR Part 55: 41.7

Comments:

QUESTION 65

Both Units are operating at 100 percent power when an electrical fire causes the loss of the Motor Driven Fire Pump.

Which one of the following describes the Fire Protection System response to the loss of the Motor Driven Fire Pump?

A. The Diesel-Driven Fire Pump will cycle to maintain system pressure between 100 psig to 125 psig.

B. The Diesel-Driven Fire Pump will auto start when system pressure drops to 100 psig and must be stopped by the operator.

C. The Diesel-Driven Fire Pump will cycle to maintain system pressure between 95 psig to 125 psig

D. The Diesel-Driven Fire Pump will auto start when system pressure drops to 95 psig and must be stopped by the operator.

Level: RO
Tier #: 2
Group #: 2

K&A Rating: 286000 (Fire Protection) K6.01 (3.1/3.1)

K&A Statement: **Knowledge of the effect that a loss or malfunction of the following will have on the FIRE PROTECTION SYSTEM:** A.C. electrical distribution: Plant-Specific

Justification:

A. **Incorrect but plausible:** Plausible if the applicant confuses auto start set point for diesel fire pump with motor driven pump and determines that the pump will maintain pressure between 100 – 125 psig. Motor driven pump auto starts at 100 psig and requires manual shutdown.

B. **Incorrect but plausible:** Plausible if the applicant confuses auto start set point for diesel fire pump with motor driven pump. Motor driven pump auto starts at 100 psig and requires manual shutdown.

C. **Incorrect but plausible:** Plausible if the applicant does not recall that diesel driven pump auto starts at 95 psig and requires manual shutdown.

D. **Correct:** The diesel-driven fire pump does not auto cycle and auto starts at 95 psig.

References: LLOT0733, Rev. 000 Applicant Ref: NONE

Learning Objective: LLOT0733: LO-5

Question source: New

Question History: Not used in Last 2 NRC exam.

Cognitive level: Memory/Fundamental knowledge: X
Comprehensive/Analysis:

10CFR Part 55: 41.7

Comments:

QUESTION 66

Given the following:

- Unit 1 is in OPCON 4
- Preparations for reactor startup are in progress following a Refueling Outage
- While performing a HPCI system valve lineup, the Equipment Operator identifies that the locking device installed on the handwheel of a "Locked Throttled Valve" is unlocked
- Operations confirms that the valve was not worked or tagged during the outage

Which one of the following is the appropriate method for determining the position of the "Locked Throttled Valve" during performance of the HPCI system valve lineup?

A. Obtain position from the "Locked Valve Logs"

B. Use appropriate process parameter as a check of component position

C. Remove locking device, throttle valve in accordance with applicable HPCI system operating procedure, perform Independent Verification

D. Remove locking device, throttle valve in accordance with applicable HPCI system operating procedure, perform Concurrent Verification

Proposed Answer: D

Level: RO
Tier #: 3

K&A Rating: G2.1.29 (4.1/4.0)

K&A Statement: **Knowledge of how to conduct system lineups, such as valves, breakers, switches, etc.**

Justification:

A. **Incorrect but plausible:** Plausible if the applicant is unaware that OP-AA-108-101-1001, "Component Position Determination," and OP-AA-108-103, "Locked Equipment Program," are both silent regarding use of the "Locked Valve Logs to satisfy valve position determination requirements. Also plausible if the applicant believes that obtaining position from the "Locked Valve Logs" is sufficient on the basis of stem information stating that "the valve was not worked or tagged during the outage." Valve position status must be treated as an unknown.

B. **Incorrect but plausible:** Plausible if the applicant is unaware or does not understand that using process parameters (flow, pressure, etc.) as a means of verifying/determining valve position can be unreliable. Step 4.1.6 of OP-AA-108-101-1001, "Component Position Determination," states "**CARE** must be exercised when using process parameters as a check of component position due to possible alternate flow paths or other conditions that could make this method unreliable." For the given conditions, the HPCI System is out of service. Using process parameters to verify/determine valve position for an out-of-service system is inappropriate and conflicts with the guidance in Step 4.2.2 of OP-AA-108-103 for restoration of locked throttled valves. Step 4.2.2 reads "Positions of locked throttled valves (number of turns open/closed) are governed by the applicable system operating procedures. These procedures shall be referenced when locked throttled valves are verified. Restoring locked throttled valves requires CV."

C. **Incorrect but plausible:** Plausible if the applicant is unaware that HU-AA-101, "Human Performance Tools And Verification Practices," specifically states (1) that Independent Verification does not apply to "Throttled Valves," and (2) that Concurrent Verification applies to "Throttled Valves."

D. **Correct:** OP-AA-108-103, "Locked Equipment Program," Section 4.2, "Restoration," Step 4.2.2, states "Positions of locked throttled valves (number of turns open/closed) are governed by the applicable system operating procedures. These procedures shall be referenced when locked throttled valves are verified. Restoring locked throttled valves requires CV." Although OP-AA-108-103 does not specifically address the situation described in the stem (i.e., locked throttled valve found to be unlocked), valve position status must be treated as an unknown.

References: Lesson Plan LGSOPS2010, Rev. 001 Applicant Ref: NONE
OP-AA-108-103, Rev. 002
OP-AA-108-101-1001, Rev. 004
HU-AA-101, Rev. 006

Learning Objective: LGSOPS2010 (Obj. 20.c)

Question source:	New	
Question History:	None	
Cognitive level:	Memory/Fundamental knowledge:	X
	Comprehensive/Analysis:	
10CFR Part 55:	41.10	
Comments:		

QUESTION 67

At 2300, Unit 2 will undergo a load drop from 1200 MWe to 900 MWe to support a rod pattern adjustment.

No other activities are planned for Unit 2 within the next 24 hours.

In accordance with OP-AA-101-111, “Roles and Responsibilities of On-Shift Personnel” which SRO fulfills the minimum requirement for reactivity change oversight?

A. Unit 2 CRS can provide direct oversight of the reactivity change, provided that Unit 1 CRS monitors all other duties related to both units.

B. Unit 2 CRS can provide direct oversight of the reactivity change, while Shift Manager monitors all other duties related both units.

C. Shift Manager is required for direct oversight of the reactivity change activity

D. Reactivity Management SRO (RMSRO) required for direct oversight of the reactivity change activity

Level: RO
Tier #: 2
Group #: 2

K&A Rating: G2.1.1 (3.7/3.8)

K&A Statement: **Knowledge of conduct of operations requirements.**

Justification:

A. **Incorrect but plausible:** Plausible if the applicant does not recall that IAW OP-AA-101-111, RMSRO is required for planned reactivity changes in excess of approximately 50 MWe and 1% RPT per hour. Applicant may determine that prior Limerick reactivity management procedure allowed combined unit CRS oversight.

B. **Incorrect but plausible:** Plausible if the applicant does not recall that IAW OP-AA-101-111, RMSRO is required for planned reactivity changes in excess of approximately 50 MWe and 1% RPT per hour. Applicant may determine that prior Limerick reactivity management procedure allowed combined unit CRS oversight and determine that Shift manager oversight is sufficient to fill the role.

C. **Incorrect but plausible:** Plausible if the applicant does not recall that IAW OP-AA-101-111, RMSRO is required for planned reactivity changes in excess of approximately 50 MWe and 1% RPT per hour. Applicant may determine that Shift manager oversight is sufficient for planned reactivity manipulation, however, IAW OP-AA-101-111, RMRSRO is required.

D. **Correct:** IAW OP-AA-101-111, RMSRO is required for planned reactivity changes in excess of approximately 50 MWe and 1% RPT per hour. Also, RMSRO must be active SRO that is responsible for direct oversight of the manipulation of reactivity controls and is separate from the Unit Supervisor.

References: OP-AA-101-111, Rev. 5 Applicant Ref: NONE

Learning Objective: LGSOPS2010 LLOT-1574, Learning Objective 1 and 14A

Question source: New

Question History: Not used in Last 2 NRC exam.

Cognitive level: Memory/Fundamental knowledge: X
Comprehensive/Analysis:

10CFR Part 55: 41.10/45.13

Comments:

QUESTION 68

Unit 1 shutdown is in progress in accordance with GP-3, "Normal Plant Shutdown". Given the following times and pressures, which statement describes the cooldown in accordance with GP-3?

Time	Pressure
0315	490.1
0330	442.9
0345	399.3
0400	336.2
0415	280.9
0430	232.5

A. Both the Technical Specification and the GP-3 targeted cooldown limits are satisfied

B. The Technical Specification cooldown limit is satisfied but GP-3 targeted cooldown limit has been exceeded and RWCU cavitation may result

C. Both Technical Specification and GP-3 targeted cooldown limits have been exceeded

D. The Technical Specification limit is satisfied but GP-3 targeted cooldown limit has been exceeded

K&A # 2.1.25
Importance Rating 3.9

QUESTION 68

K&A Statement: Ability to interpret reference materials, such as graphs, curves, tables, etc.

Justification:

A. Incorrect but plausible if the candidate does not recognize that the GP-3 targeted cooldown rate of 42 degrees per hour has been exceeded; additionally, 60 degrees per hour has been exceeded which may result in RWCU cavitation

B. Correct –from 0315 to 0345, cooldown rate is in compliance with GP-3 targeted cooldown rate of 42 degrees per hour (40 degrees per hour during this time), but from 0345 to 0430, the cooldown rate accelerates to 64 degrees per hour, which violates the 42 degree per hour cooldown rate **AND** exceeds the 60 degree per hour limit, at which RWCU cavitation may result

C. Incorrect but plausible if candidate incorrectly applies usage of steam tables and determines that a cooldown rate of 100 degrees per hour has been exceeded

D. Incorrect but plausible if the candidate does not recognize that not only has the targeted cooldown rate of 42 degrees per hour been exceeded, but also 60 degrees per hour, which may result in RWCU cavitation

References: LGSOPS2001, Rev. 0 Student Ref: Steam Tables

Learning Objective: LGSOPS2001: IL3a

Question source: New

Question History: Not used on 2008 or 2010 LGS initial exams

Cognitive level: Memory/Fundamental knowledge:
Comprehensive/Analysis: X

10CFR55: 41.10

QUESTION 69

Which of the following describes the conditions requiring the Mode Switch to be placed in SHUTDOWN for a sustained loss of control rod charging water header pressure (0 psig) with reactor pressure at 920 psig?

A. Immediately upon determining more than one CRD accumulator is Inoperable, and all the Inoperable accumulators are associated with fully inserted control rods

B. Immediately upon determining any CRD accumulator is Inoperable, and the Inoperable accumulator is associated with a withdrawn control rod

C. Within 20 minutes of determining more than one CRD accumulator is Inoperable, and at least one of those Inoperable accumulators is associated with a withdrawn control rod

D. Within 20 minutes of determining any CRD accumulator is Inoperable, and the Inoperable accumulator is associated with a withdrawn control rod

K&A # 2.2.39
Importance Rating 3.9

QUESTION 69

K&A Statement: Knowledge of less than or equal to one hour Technical Specification action statements for systems

Justification:

A. Incorrect but plausible if the candidate does not recall that if a control rod is inoperable and inserted, no action is required for this spec immediately; only isolation of the rod or be in hot shutdown in 12 hours

B. Incorrect but plausible if candidate does not recognize that RPV pressure is ≥900 psig and action is not required immediately, as reactor pressure is sufficient to drive the rod in if a scram signal did exist

C. Correct – more than one control rod scram accumulator inoperable, the rod is required to be declared inoperable. Additionally, charging header pressure must be verified ≥1400 psig, and restart one control drive pump (not possible due to sustained loss described in stem) within 20 minutes or place the reactor mode switch in the shutdown position

D. Incorrect but plausible if the candidate does not recall that with only one accumulator inoperable, the 8 hour portion of the TS is entered. The 20 minute timeframe is only applicable with *more than* one accumulator inoperable

References: TS 3.1.3.5 Amendment 143 Student Ref: None

Learning Objective: LLOT0070: 9b

Question source: Modified SSES bank 1883

Question History: Not use on 2008 or 2010 LGS initial exams

Cognitive level: Memory/Fundamental knowledge:
Comprehensive/Analysis: X

10CFR55: 41.7

QUESTION 70

Given the following:

- Unit 2 is in OPCON 4
- RCS temperature is 173°F
- GP-2, "Normal Plant Startup," is in progress
- Operators are preparing to start the '2A' Recirc Pump in accordance with S43.1.A, "Startup of Recirculation System"
- 2A-V101 Turbine Enclosure Supply Fan and 2C-V105 Turbine Enclosure Exhaust Fan are tagged for emergent maintenance

Then:

- ARC-MCR-219, VENT, Window H-1, "TURB ENCL HVAC PANEL 20C126 TROUBLE," alarms

Initial attempt to start the '2A' Recirc Pump is unsuccessful

Which one of the following explains why the '2A' Recirc Pump failed to start?

A. Turbine Enclosure Supply Fan malfunction;
Results in failure to satisfy a start permissive to close the Recirc MG Set Drive Motor Breaker

B. Turbine Enclosure Supply Fan malfunction;
Results in failure to satisfy a start permissive to close the Recirc MG Set Generator Field Breaker

C. Turbine Enclosure Exhaust Fan malfunction;
Results in failure to satisfy a start permissive to close the Recirc MG Set Drive Motor Breaker

D. Turbine Enclosure Exhaust Fan malfunction;
Results in failure to satisfy a start permissive to close the Recirc MG Set Generator Field Breaker

Proposed Answer: C

Level: RO
Tier #: 3

K&A Rating: G2.2.1 (4.5/4.4)

K&A Statement: **Ability to perform pre-startup procedures for the facility, including operating those controls associated with plant equipment that could affect reactivity.**

Justification:

A. **Incorrect but plausible:** Plausible if the applicant is unable to recall which Turbine Enclosure HVAC Fan (Supply or Exhaust) provides an input to the start permissive logic for closing the Recirc MG Set Drive Motor Breaker.

B. **Incorrect but plausible:** Plausible because Recirc MG Set Generator Field Breaker position is one of the Recirc MG Set Starting Interlocks. Also plausible if the applicant is unable to recall (1) which Turbine Enclosure HVAC Fan (Supply or Exhaust) provides an input to the start permissive logic for closing the Recirc MG Set Drive Motor Breaker, and (2) which Recirc MG Set Breaker is affected by the operating status of the exhaust fans.

C. **Correct:** Two Turbine Enclosure Ventilation Exhaust Fans must be running in order to satisfy a start permissive to close the Recirc MG Set Drive Motor Breaker when starting a Recirc MG Set. There are three 50% capacity Turbine Enclosure Exhaust Fans. The standby fan will auto start on a failure of one of the two operating fans. The given conditions specify that 2C-V105 Turbine Enclosure Exhaust Fan is tagged for emergent maintenance, leaving only two available exhaust fans. A malfunction of one of the two remaining exhaust fans results in a failure to satisfy a start permissive to close the Recirc MG Set Drive Motor Breaker. The Generator Field Breaker is not affected by the operating status of the Turbine Enclosure Exhaust Fans.

D. **Incorrect but plausible:** Plausible because Recirc MG Set Generator Field Breaker position is one of the Recirc MG Set Starting Interlocks. Also plausible if the applicant is unable to recall which Recirc MG Set Breaker is affected by the operating status of the Turbine Enclosure Exhaust Fans.

References: Lesson Plan LGSOPS0043A, Rev. 003 Applicant Ref: NONE
S43.1.A U/2, Rev. 000
GP-2, Rev. 145
ARC 219 VENT (H-1), Rev. 001

Learning Objective: LGSOPS0043A (IL7)

Question source: New

Question History: None

Cognitive level: Memory/Fundamental knowledge:
Comprehensive/Analysis: X

10CFR Part 55: 41.5

Comments:

QUESTION 71

A Steam Leak occurs in the Outboard MSIV room which results in actuation of the Outboard MSIV room Blowout Panels. The following conditions are now present:

- Reactor is scrammed
- RPV pressure is 800 psig and dropping
- The Shift Manager has declared an Alert
- Turbine Building Ventilation is shutdown

WHICH ONE of the following describes the reason for Turbine Building Ventilation to be restarted?

A. Maintain negative pressure in the Turbine Building

B. Provide a filtered release path to the environment

C. Assure max safe temperature limits are NOT reached

D. Prevent unmonitored radiation release to the environment

Level: RO
Tier #: 2
Group #: 2

K&A Rating: G2.3.11 (3.8)

K&A Statement: **Ability to control radiation releases**

Justification:

A. **Incorrect but plausible:** Plausible, if the applicant determines that turbine building ventilation needs to be restarted to maintain negative pressure to prevent release to the environment

B. **Incorrect but plausible:** Plausible, if the applicant determines that bases behind starting the turbine building ventilation is to provide a filtered path to the environment via north stack, since turbine building ventilation exhaust to the north stack, however the basis is to provide a monitored release path not filtered release path.

C. **Incorrect but plausible:** Plausible, if the applicant determines that due to the steam leak and blowout panel actuation, temperature in the turbine building is a concern and as a result turbine building is restarted to decrease temperature

D. **Correct:** T-104 Bases states that the continued personnel access to the Turbine Enclosure and/or Radwaste Enclosure may be essential for responding to emergencies or transients which may degrade into emergencies. These areas are not always airtight structures, and a radioactivity release inside the structure would not only limit personnel access, but could eventually lead to an unmonitored ground level release. Operation of the respective HVAC system preserves accessibility and ensures radioactive discharges will be released through elevated, monitored release points.

References: T-104, Radioactivity Release Control, Rev. 12 Applicant Ref: NONE
T-104 Basis, Rev. 13

Learning Objective: LLOT 1560, Rev. 14 Learning Objective 5

Question source: New

Question History: Not used in Last 2 NRC exam.

Cognitive level: Memory/Fundamental knowledge: X
Comprehensive/Analysis:

10CFR Part 55: 45.9/45.10

Comments:

QUESTION 72

In accordance with RP-AA-403, "Administration of the Radiation Work Permit Program," which one of the following describes the RWP requirements for allowing Operations personnel access into Locked High Radiation Areas for tours and inspections?

A. General RWP with electronic dosimeter Dose Rate Alarms set at 300 mrem/hr

B. General RWP with electronic dosimeter Dose Rate Alarms set at 400 mrem/hr

C. Specific RWP with electronic dosimeter Dose Rate Alarms set at 300 mrem/hr

D. Specific RWP with electronic dosimeter Dose Rate Alarms set at 400 mrem/hr

Proposed Answer: B

Level: RO
Tier #: 3

K&A Rating: G2.3.7 (3.5/3.6)

K&A Statement: **Ability to comply with radiation work permit requirements during normal or abnormal conditions.**

Justification:

A. **Incorrect but plausible:** Plausible if the applicant is unable to recall the 400 mrem/hr electronic dosimeter alarm setpoint for Operations personnel.

B. **Correct:** Section 4.4 (Step 4.4.2) of RP-AA-403, states "General RWPs should not allow access into a high radiation or locked high radiation area except Operations and Radiation Protection." Step 4.4.3 states that that General or Standing RWP Dose Rate Alarms for Operations and Radiation Protection should be set at 400 mrem/hr.

C. **Incorrect but plausible:** Plausible if the applicant (1) believes that a dedicated or "Specific" RWP is required for entry into a Locked High Radiation Area to perform tours and inspections, and (2) is unable to recall the 400 mrem/hr electronic dosimeter alarm setpoint for Operations personnel.

D. **Incorrect but plausible:** Plausible if the applicant believes that a dedicated or "Specific" RWP is required for entry into a Locked High Radiation Area to perform tours and inspections.

References: RP-AA-403, Rev. 003
RP-AA-460, Rev. 021
Lesson Plan LLOT1760, Rev. 011

Applicant Ref: NONE

Learning Objective: LLOT1760 (Obj.8)

Question source: New

Question History: None

Cognitive level: Memory/Fundamental knowledge: X
Comprehensive/Analysis:

10CFR Part 55: 41.12

Comments:

QUESTION 73

Given the following:

- U1 is in a Station Blackout
- HPCI and RCIC both initiated on -38 inches RPV water level
- RPV water level is recovering
- E-1, "Loss of All AC Power (Station Blackout)," and T-101 are being executed concurrently

In accordance with E-1, which one of the following describes the required Operator Actions during a Station Blackout Event?

A. Shutdown HPCI within 10 minutes of Station Blackout;
Transfer and maintain RCIC Pump suction to the Suppression Pool

B. Shutdown RCIC within 10 minutes of Station Blackout;
Transfer and maintain HPCI Pump suction to the Suppression Pool

C. Shutdown HPCI within 10 minutes of Station Blackout;
Maintain RCIC Pump suction aligned to the CST

D. Shutdown RCIC within 10 minutes of Station Blackout;
Maintain HPCI Pump suction aligned to the CST

Proposed Answer: A

Level: RO
Tier #: 3

K&A Rating: G2.4.8 (3.8/4.5)

K&A Statement: **Knowledge of how abnormal operating procedures are used in conjunction with EOPs.**

Justification:

A. **Correct:** Event Procedure E-1, "Loss of all AC Power (Station Blackout)," Step 2.1, directs entry into T-100/T-101 as applicable, and concurrent execution. In accordance with Step 3.1 of E-1, if HPCI is automatically initiated, then HPCI shutdown per S55.2.A is to be completed within 10 minutes of Station Blackout. The Limerick design basis for RPV water level control following a Station Blackout credits only the RCIC system for RPV level control since RCIC has sufficient capacity to maintain RPV inventory and HPCI capacity would result in exceeding the High RPV water level trip of +54 inches. Performance of S55.2.A returns the HPCI system to the auto/standby condition if the system has automatically initiated. Step 3.2 of E-1 provides direction to transfer and maintain RCIC suction to the Suppression Pool. The Limerick design basis for RPV level control for the four hour coping period following a Station Blackout credits the RCIC system in operation with suction from the Suppression Pool only. No credit is taken for the CST as a suction source for RCIC.

B. **Incorrect but plausible:** Plausible if the applicant is unable to recall or is unfamiliar with (1) E-1 requirements for RPV water level control following a Station Blackout when E-1 and T-100/T-101 are being executed concurrently, and/or (2) the Limerick design basis requirements for RPV water level control following a Station Blackout. Also plausible in that HPCI and RCIC share the same suction sources.

C. **Incorrect but plausible:** Plausible if the applicant is unable to recall or is unfamiliar with (1) E-1 requirements for RPV water level control following a Station Blackout when E-1 and T-100/T-101 are being executed concurrently, and/or (2) the Limerick design basis requirements for RPV water level control following a Station Blackout. Also plausible in that HPCI and RCIC share the same suction sources.

D. **Incorrect but plausible:** Plausible if the applicant is unable to recall or is unfamiliar with (1) E-1 requirements for RPV water level control following a Station Blackout when E-1 and T-100/T-101 are being executed concurrently, and/or (2) the Limerick design basis requirements for RPV water level control following a Station Blackout. Also plausible in that HPCI and RCIC share the same suction sources.

References: Lesson Plan LGSOPS2000, Rev. 000 Applicant Ref: NONE
E-1, Rev. 040
E-1 Bases, Rev. 004

Learning Objective: LGSOPS2000 (Obj. LLOT1566.02)

Question source: New

Question History:	None	
Cognitive level:	Memory/Fundamental knowledge:	X
	Comprehensive/Analysis:	
10CFR Part 55:	41.10	
Comments:		

QUESTION 74

Unit 1 was operating at rated power when a scram occurs:

Then:

- The Mode Switch was locked in SHUTDOWN.
- All rods inserted EXCEPT one rod, which is stuck @ notch 48.
- SRMs AND IRMs have been inserted.

Additionally:

- RPV level lowered to 14.5" and has since recovered to 35".
- RPV pressure peaked @ 1040 psig and is now 950 psig and lowering
- RE FLOOR DRAIN SUMP PUMP HI HI LVL alarm is annunciated
- RB Equipment operator is dispatched to report RE floor drain sump level

What procedure entries are required?

I. T-100, Scram/Scram Recovery
II. T-101, RPV Control
III. T-103, Secondary Containment Control

A. (I) Only.

B. (II) Only.

C. (I) and (III) Only.

D. (II) and (III) Only.

Level: RO
Tier #: 2
Group #: 2

K&A Rating: G2.4.4 (4.5/4.7)

K&A Statement: **Ability to recognize abnormal indications for system operating parameters which are entry-level conditions for emergency and abnormal operating procedures.**

Justification:

A. **Correct:** T-100, Scram/Scram Recovery conditions are met. Entry criteria for T-101, RPV Control does not exist and can be determined by evaluating initial conditions. RPV pressure did not increase above 1096 psig, Scram condition with power above 4% does not exist with one rod stuck out, RPV level did not go below +12.5 inches, and Drywell pressure did not go above 1.68 psig. Also, entry condition for T-103, Secondary Containment Control does not exist. Although RE FLOOR DRAIN SUMP PUMP HI HI LVL alarm is annunciated and this condition is an entry criteria for T-103, basis for T-103 indicates that the entry conditions into T-103 are "conditions", not alarms. Stem condition states that RB Equipment operator is dispatched to report RE floor drain sump level, and the RE floor drain sump level has not been verified.

B. **Incorrect but plausible:** Plausible if the applicant does not correctly recall the entry criteria for T-101 RPV Control and determines that T-101, RPV Control entry is appropriate due to one rod stuck out at notch 48. T-100, Scram/Scram Recovery procedure states that if T-101 is entered then exit this procedure and enter T-101 at step RC-1.

C. **Incorrect but plausible:** Plausible if the applicant does not correctly recall the entry criteria for T-103, Secondary Containment Control and determines that due to the RE FLOOR DRAIN SUMP PUMP HI HI LVL alarm, T-103, Secondary Containment entry is required. Basis for T-103 indicates that the entry conditions into T-103 are "conditions", not alarms. Stem condition states that RB Equipment operator is dispatched to report RE floor drain sump level, and the RE floor drain sump level has not been verified.

D. **Incorrect but plausible:** Plausible if the applicant does not correctly recall the entry criteria for T-101 RPV Control and determines that T-101, RPV Control entry is appropriate due to one rod stuck out at notch 48. Also, applicant does not correctly recall the entry criteria for T-103, Secondary Containment Control and determines that due to the RE FLOOR DRAIN SUMP PUMP HI HI LVL alarm, T-103, Secondary Containment entry is required. Basis for T-103 indicates that the entry conditions into T-103 are "conditions", not alarms. Stem condition states that RB Equipment operator is dispatched to report RE floor drain sump level, and the RE floor drain sump level has not been verified.

References:	T-100, Scram/Scram Recovery, Rev. 17 T-101, RPV Control, Rev. 21 T-103, Secondary Containment, Rev. 20	Applicant Ref: NONE

Learning Objective:	LLOT 1560, Rev. 14 Learning Objective 5
Question source:	New
Question History:	Not used in Last 2 NRC exam.
Cognitive level:	Memory/Fundamental knowledge: Comprehensive/Analysis: X
10CFR Part 55:	41.10/43.2
Comments:	

QUESTION 75

Given the following conditions for Unit 2:

- Main Control Room (MCR) has been abandoned
- SE-1, "Remote Shutdown," has been entered
- RCIC was manually initiated prior to leaving the MCR
- All 17 Remote Shutdown Transfer Switches have been placed in the "Emergency" position
- RCIC TRIP BYPASS Switch has been taken to the "BYPASS" position
- Cooldown has been initiated from the Remote Shutdown Panel using SRVs
- HPCI auto initiated at -38 inches and is assisting RCIC in maintaining RPV water level
- No additional Operation actions are taken

RPV pressure subsequently lowers to 63 psig during the Cooldown

Which one of the following describes the status of the HPCI and RCIC Systems?

	<u>HPCI</u>	<u>RCIC</u>
A.	Running	Running
B.	Running	Isolated
C.	Isolated	Isolated
D.	Isolated	Running

Proposed Answer: D

Level: RO
Tier #: 3

K&A Rating: G2.4.34 (4.2/4.1)

K&A Statement: **Knowledge of RO tasks performed outside the main control room during an emergency and the resultant operational effects.**

Justification:

A. **Incorrect but plausible:** Plausible if the applicant is unable to recall or does not understand HPCI System response and control capabilities during RSP operations. See Answer 'D' discussion below.

B. **Incorrect but plausible:** Plausible if the applicant is unable to recall or does not understand HPCI/RCIC System response and control capabilities during RSP operations. See Answer 'D' discussion below.

C. **Incorrect but plausible:** Plausible if the applicant is unable to recall or does not understand RCIC System response and control capabilities during RSP operations. See Answer 'D' discussion below.

D. **Correct:** During Remote Shutdown Panel (RSP) operation, the HPCI System will start and stop as designed on RPV level, and will isolate on Low Steam Supply Pressure (100 psig), provided the HPCI Emergency Shutdown Keyswitch at the RSP remains in the "NORMAL" position. During Cooldown operations from the RSP, flow out of the SRV (800,000 lbm/hr) will far exceed the capacity of the RCIC System. The HPCI System will initiate on -38 inches and assist in maintaining RPV level. With the Remote Shutdown Transfer Switches in the "EMERGENCY" position and the RCIC Trip Bypass Switch taken to "BYPASS," RCIC auto start capability is lost and the RCIC System will not automatically isolate. All trips except for mechanical overspeed are bypassed. As such, RCIC will not isolate on Low Steam Supply Pressure (64.5 psig); it will remain aligned and running as steam line pressure drops, even to very low values.

References: Lesson Plan LLOT0735, Rev. 013 Applicant Ref: NONE
Lesson Plan LLOT0380, Rev. 025
SE-1, Rev. 064

Learning Objective: LLOT0735 (Obj. 5)

Question source: New

Question History: None

Cognitive level: Memory/Fundamental knowledge:
Comprehensive/Analysis: X

10CFR Part 55: 41.10

Comments:

QUESTION 76

Unit 1 operating at 100% reactor power

Conditions at time t = 0200 on 8/10:

- 125 VDC Battery 1CD101 declared Inoperable due to failure to meet Surveillance Requirement (SR) 4.8.2.1.a.1 acceptance criteria (Float Current reported to be 1.5 amps)

Conditions at time t = 0300 on 8/10:

- 1CD101 failed to meet SR 4.8.2.1.a.2 acceptance criteria (Battery Terminal Voltage reported to be less than the Minimum Established Float Voltage)

WHICH ONE of the following describes the Technical Specification required actions for Battery 1CD101?

A. Restore Terminal Voltage by 0400 on 8/10;
Restore Float Current by 2000 on 8/10

B. Restore Terminal Voltage by 0500 on 8/10;
Restore Float Current by 2100 on 8/10

C. Restore Terminal Voltage by 0400 on 8/10;
Restore Float Current by 0400 on 8/10

D. Restore Terminal Voltage by 0500 on 8/10;
Restore Float Current by 0500 on 8/10

Level: SRO
Tier #: 1
Group #: 1

K&A Rating: 295004 AA2.03 (2.8/2.9)

K&A Statement: **Ability to determine and/or interpret the following as they apply to PARTIAL OR COMPLETE LOSS OF D.C. POWER:** Battery voltage

Justification:

A. **Incorrect but plausible:** Plausible if the applicant, during implementation of Actions a.1 and a.2, does not account for the 1-hour "from time of discovery" when the failure to meet SR 4.8.2.1.a.2 acceptance criteria in Action b.2 was identified.

B. **Correct:** LCO 3.8.2.1, "DC Sources Operating," ACTION b.2, specifies performance of SR 4.8.2.1.a.2 to determine the value of Battery Terminal Voltage within 2 hours of discovering that Float Current has exceeded TS limits (> 1 amp for 1CD101). In accordance with the D.C. Sources Section of associated Bases 3/4.8, "Electrical Power Systems," since Action b.2 only specifies "perform" 4.8.2.1.a.2, a failure to meet 4.8.2.1.a.2 acceptance criteria "does not result in this Action not being met." The Bases goes on to state "When this float voltage is not maintained, the Actions of 3.8.2.1 Action 'a' provide the necessary and appropriate verifications of the battery condition." Action a.1 requires restoration of battery terminal voltage within 2 hours, and Action a.2 verifies float current ≤ 1 amp within 18 hours. The 2 hour and 18 hour Action Times imposed by Actions a.1 and a.2 respectively, commence at the time Battery Terminal Voltage is found to be low out of spec, which is 1 hour after 1CD101 is initially declared Inoperable (i.e., Action 'a' TS clock starts at 0300). Note that TS 3.8.2.1 and associated Bases will be provided for the exam.

C. **Incorrect but plausible:** Plausible if the applicant (1) believes that Action b.2 is not met due to failure to meet SR 4.8.2.1.a.2 acceptance criteria, (2) reasons that Action b.6.(ii) is therefore applicable, and (3) starts the Action b.6.(ii) 2-hour restoration time clock from the time when 1CD101 was initially declared Inoperable (0200), instead of when the Battery Terminal Voltage was found to be low out of spec (0300). Action b.6.(ii) states that for "Any battery not meeting any Action b.1 through b.5, Restore the battery parameters to within limits within 2 hours." Note that this 2-hour restoration time, as it pertains to Action b.2, only applies after failure to meet the associated 18-hour action time.

D. **Incorrect but plausible:** Plausible if the applicant (1) believes that Action b.2 is not met due to failure to meet SR 4.8.2.1.a.2 acceptance criteria, and (2) reasons that Action b.6.(ii) is therefore applicable. Action b.6.(ii) states that for "Any battery not meeting any Action b.1 through b.5, Restore the battery parameters to within limits within 2 hours." Note that this 2-hour restoration time, as it pertains to Action b.2, only applies after failure to meet the associated 18-hour action time.

References: Lesson Plan LGSOPS0095, Rev. 000
LGS TS 3.8.2.1
LGS TS Bases 3/4.8.2

Applicant Ref: LGS TS 3.8.2.1 & associated Bases 3/4.8.2 (DC Sources Section only)

Learning Objective:	LGSOPS0095 (IL9)
Question source:	New
Question History:	None
Cognitive level:	Memory/Fundamental knowledge: Comprehensive/Analysis: X
10CFR Part 55:	43(b)(2)
Comments:	

QUESTION 77

Unit 1 is operating at rated power

THEN, a manual scram was inserted due to a sudden degradation in condenser vacuum

The Mode Switch was LOCKED in SHUTDOWN

- Two rods remain FULL OUT
- SRV "1E" inadvertently opened and operators manually closed the SRV using the hand switch
- RPV Level is +10 inches and rising slowly
- Suppression Pool Temperature is 112°F and up slowly
- ALL APRM DOWNSCALE lights are illuminated

Based on the above, the MAXIMUM allowed level band is....

A. -186" to +10" IAW T-117, Level Power Control

B. -186" to +54" IAW T-117, Level Power Control

C. +12.5" to +54" IAW T-101, RPV Control

D. +12.5" to -161" IAW T-101, RPV Control

K&A Rating: 295006 SCRAM AA2.03(4.2)

K&A Statement: **Ability to determine and/or interpret the following as they apply to SCRAM:** Reactor water level

Justification:

A. **Incorrect but plausible:** Plausible if the applicant determines that ATWS conditions exist based indications of 2 rods remaining full out, and Rx power unknown. Based on that, applicant also determines that RPV level needs be deliberately be lowered to -50" and as a result step LQ-15 states that if RPV level was deliberately lowered then RPV level needs to be maintained between -186" to level to which it was lowered from (+10").

B. **Incorrect but plausible:** Plausible if the applicant determines that ATWS conditions exist based indications of 2 rods remaining full out, and Rx power unknown. Applicant also determines that RPV level does not need to be deliberately be lowered to -50" and as a result of RPV level needs to be maintained between -186" to +54".

C. **Correct:** Based on RPV level below +12.5", T-101, RPV Control is entered, and ATWS condition exists but reactor power is less than 4% power due to indications that APRM downscale lights are illuminated. T-101, step RC/L-2 ATWS bases states that if operators have positive confirmation that the reactor is, and will remain, shutdown under all conditions without boron, an ATWS is NOT in progress. This determination is best obtained by determining that no control rod is withdrawn beyond the maximum subcritical banked withdrawal position (MSBWP, position 02). However, other criteria can also be used to demonstrate that the reactor will remain shutdown under all conditions, without boron. Also, caution for RC/Q states that APRM downscale may be used to ensure reactor power is less than 4%. Therefore, RC/L-4 directs operators to restore & maintain RPV level between +12.5" and +54" when there is an ATWS condition with reactor power less than 4%.

D. **Incorrect but plausible:** Plausible if the applicant correctly determines that no ATWS conditions exist based on APRM downscale lights, however, applicant may determine that due to the RPV level below +12.5" step RC/L-5 applies, which states that if RPV level cannot be restored and maintained above +12.5" then maintain RPV level above -161". Based on that the maximum level band changes to +12.5" to -161".

References: T-101, Rev. 21
T-117, Rev. 17
LLOT1560, Rev. 14

Student Ref: None

Learning Objective: LLOT1560, Learning objective 2 & 6.

Question source: New

Question History: Not used on 2008 or 2010 LGS initial exams

Cognitive level:	Memory/Fundamental knowledge:	
	Comprehensive/Analysis:	X
10CFR55:	41.10, 43.5, 45.13	
Comment:		

QUESTION 78

Given the following conditions:

- Unit 2 is operating at 100% power when an Instrument Air header in the Turbine Building ruptures, resulting in a Complete Loss of Instrument Air
- The reactor was manually scrammed
- All control rods are fully inserted
- MSIVs are closed
- HPCI / RCIC are maintaining RPV level between +12.5" and +54"
- SRVs are controlling RPV pressure 800-1000 psig
- Drywell pressure is 0.58 psig and slowly rising
- Recirc pumps have tripped
- T-100, "Scram /Scram Recovery," and ON-119, "Loss of Instrument Air," are being executed concurrently

WHICH ONE of the following describes the appropriate Operator response based on the above conditions?

A. Vent the Drywell per OT-101, "High Drywell Pressure"

B. Maximize RPV bottom head drain flow per S44.1.J, "RWCU Hot Shutdown Operation"

C. Place RECW in service to cool the Drywell per S13.6.D, "RECW Operation With Loss Of Drywell Chilled Water"

D. Secure CRD flow to the RPV per S46.7.A, "Control Rod Drive Hydraulic System Operation Following Reactor Scram"

Level: SRO
Tier #: 1
Group #: 1

K&A Rating: 295019 AA2.02 (3.6/3.7)

K&A Statement: **Ability to determine and/or interpret the following as they apply to PARTIAL OR COMPLETE LOSS OF INSTRUMENT AIR:** Status of safety-related instrument air system loads (see AK2.1 – AK2.19)

Justification:

A. **Incorrect but plausible:** Loss of Instrument Air results in a loss of the Drywell Chilled Water System (causes Drywell temperature and pressure to rise). Plausible if the applicant does not recall or is unfamiliar with the procedural guidance provided in the "ON-119 Attachment," which states that Containment cannot be vented with a Loss of Instrument Air. OT-101, "High Drywell Pressure," directs the use of HV-57-*17, "Drywell Purge To Equipment Compt Exh Outbd PCIV," to vent containment. This is an air-operated valve, the normal position of which is closed. On a Loss of Instrument Air, HV-57-*17 will remain in the closed "Fail Safe" position.

B. **Incorrect but plausible:** Plausible if the applicant does not recall that on a Complete Loss of Instrument Air, RWCU will trip on low flow when the Filter Demin flow control valves fail closed. Step RC/P-12 of T-100, directs maximization of RPV bottom head drain flow (per S44.1.J) assuming a "YES" response to RC/P-9 (RWCU System in service).

C. **Incorrect but plausible:** Loss of Instrument Air results in a loss of the Drywell Chilled Water System (causes Drywell temperature and pressure to rise). Plausible if the applicant does not understand that "RECW to Drywell Cooling Primary Containment Isolation Valves" HV87-*24a, *24B, *25A, and *25B are no longer automatic PCIVs that can be opened in OPCONs 1, 2, or 3 without violating primary containment integrity (TS 3.6.1.1). The RECW System provides backup cooling to the Drywell portion of the Drywell Chilled Water System (DCWS) during a LOOP or failure of the DCWS. Placing RECW in service to cool the Drywell per S13.6.D would be a viable option in OPCONs 4 and 5 only (stem conditions indicate that the Unit is in OPCON 3).

D. **Correct:** Step RC/P-10 of T-100, directs alternative actions to prevent thermal stratification of coolant in the RPV on the basis of "NO" responses to RC/P-8 and RC/P-9 (no Recirc pumps running and the RWCU System not in service). On a Complete Loss of Instrument Air, RWCU will trip on low flow when the Filter Demin flow control valves fail closed. With both Recirc pumps tripped and RWCU unavailable, the required action, in accordance with Step RC/P-10, is to secure CRD pump flow to the RPV using S46.7.A. The CRD pumps are a source of cold water that could cause thermal stratification of coolant in the RPV. Since the CRD pumps are not needed for control rod insertion or RPV level control, CRD pump flow is secured. This action is also important from the standpoint that CRD charging water will continue to flow into the RPV through the "Inlet Scram Valves," even after the Scram is reset, because there is no air to close the valves.

References: Lesson Plan LGSOPS0015, Rev. 001 Applicant Ref: None
Lesson Plan LGSOPS1550, Rev. 000
Lesson Plan LGSOPS1540, Rev. 000
Lesson Plan LLOT1560, Rev. 014
Lesson Plan LGSOPS0087, Rev. 000
Lesson Plan LGSOPS0044, Rev. 000
Lesson Plan LLOT0013, Rev. 000
T-100, Rev. 017
T-100 Bases, Rev. 014
ON-119, Rev. 025
ON-119 Attachment, Rev. 010
ON-119 Bases, Rev. 026
OT-101, Rev 031
OT-101, Bases, Rev 033
S13.6.D, Rev 015
S44.1.J, Rev. 010
S46.7.A, Rev. 003

Learning Objective: LGSOPS0015 (EO10)
LGSOPS1550 (IL2)
LGSOPS1540 (IL5)
LLOT1560 (EO5,6)
LGSOPS0087 (IL4)
LGSOPS0044 (IL10)
LLOT0013 (IL3)

Question source: New

Question History: None

Cognitive level: Memory/Fundamental knowledge:
Comprehensive/Analysis: X

10CFR Part 55: 43(b)(5)

Comments:

QUESTION 79

The following annunciators are received in the MCR:

Units 1 & 2 South Stack HI-HI Radiation (003 F-1)
Units 1 & 2 South Stack HI Radiation (003 F-2)

RRMS shows rising radiation levels on the South Stack

WHICH ONE of the following identifies the source of the radiation and what action is required to mitigate the release?

A. Standby Gas Treatment Exhaust
Enter and execute T-104, Radioactivity Release Control

B. Standby Gas Treatment Exhaust
Perform ST-6-104-880-0, Gaseous Effluent Dose Rate Determination

C. Reactor Enclosure Equipment Compartment Exhaust
Enter and execute T-104, Radioactivity Release Control

D. Reactor Enclosure Equipment Compartment Exhaust
Perform ST-6-104-880-0, Gaseous Effluent Dose Rate Determination

K&A # 295038 G2.4.31
Importance Rating 4.1

QUESTION 79

K&A Statement: Knowledge of annunciator alarms, indications, or response procedures. (High Off-site Release Rate)

Justification:

A. Incorrect but plausible: conditions are not yet met for entry into T-104. Plausible if candidate believes HI-HI rad alarm with rising rad is sufficient to enter T-104 without first performing ST-6-104-880-0. Also plausible if candidate does not properly recall discharge location of Standby Gas (North Stack)

B. Incorrect but plausible if the candidate does not properly recall discharge location of Standby Gas (North Stack)

C. Incorrect but plausible: Reactor Enclosure Equipment Compartment Exhaust discharges to the South Stack, but conditions are not yet met for entry into T-104. Plausible if candidate believes HI-HI rad alarm with rising rad is sufficient to enter T-104 without first performing ST-6-104-880-0.

D. Correct: Reactor Enclosure Equipment Exhaust discharges to the South Stack. Performance of ST-6-104-880-0 is required by ARC 003 F-1, and is also discussed in T-104 bases. The ARCs for North and South Stack HI-HI Radiation direct operators to perform ST-6-104-880-0, Gaseous Effluent Dose Rate Determination, which evaluates whether further dose assessment per EM-MA-110-200, Dose Assessment, is required. If the results of ST-6-104-880-0 indicate further dose assessment is required, dose assessment personnel will conduct the required assessment and inform the operating crew of the results. If the results of the assessment indicate an offsite radioactivity release above the ALERT action level, entry into T-104 is required.

References: T-104 Bases, Rev. 13
LLOT1790, Rev. 7

Student Ref: None

Learning Objective: LLOT1790: 2
LLOT1560: 5

Question source: New

Question History: Not used on 2008 or 2010 LGS initial exams

Cognitive level: Memory/Fundamental knowledge: X
Comprehensive/Analysis:

10CFR55: 43(b)(5)

Comment: This question is SRO only as it requires assessing plant conditions and directing the correct mitigating action. It requires knowledge of TRIP Bases and what methods are used to arrive at entry conditions for T-104.

QUESTION 80

Given the following conditions for Unit 1:

- A Design Basis LOCA has occurred
- Containment Sprays are Unavailable
- Drywell Pressure is 70 psig, up slow
- Suppression Pool Pressure is 65 psig, up slow
- Primary Containment Water Level is 70 feet, steady

In accordance with T-102, "Primary Containment Control," WHICH ONE of the following describes (1) the status of Primary Containment Pressure with respect to Primary Containment Pressure Limit (PCPL) Curve PC/P-1, and (2) the required Operator Actions?

A. UNSAFE region of PCPL Curve;
Do NOT vent Primary Containment

B. UNSAFE region of PCPL Curve;
Vent Primary Containment, exceed Tech Spec/ODCM Offsite Release Rate Limits

C. SAFE region of PCPL Curve;
Vent Primary Containment, exceed Tech Spec/ODCM Offsite Release Rate Limits

D. SAFE region of PCPL Curve;
Vent Primary Containment, Do NOT exceed Tech Spec/ODCM Offsite Release Rate Limits

Level: SRO
Tier #: 1
Group #: 1

K&A Rating: 295024 G2.4.18 (3.3/4.0)

K&A Statement: **Knowledge of specific bases for EOPs** as they apply to High Drywell Pressure

Justification:

A. **Incorrect but plausible:** Plausible if the applicant (1) does not recall that Primary Containment Water Level is the X-axis label for the PCPL Curve, OR believes that Drywell Pressure is the Y-axis label instead of Suppression Pool Pressure, and (2) does not recall or is unfamiliar with the basis discussion pertaining to Step PC/P-13 of T-102, which states that if the combination of Primary Containment Water Level and Suppression Pool Pressure has already gone outside the limits of the PCPL Curve when Step PC/P-13 is reached, the specified actions should still be performed.

B. **Incorrect but plausible:** Plausible if the applicant does not recall that Primary Containment Water Level is the X-axis label for the PCPL Curve, OR believes that Drywell Pressure is the Y-axis label instead of Suppression Pool Pressure.

C. **Correct:** Suppression Pool Pressure (65 psig up slow) has <u>not</u> yet crossed into the UNSAFE region of the PCPL Curve for the specified value of Primary Containment Water Level (will occur at approximately 69 psig). LGS TRIP Step PC/P-13 directs actions to vent per T-200, "Primary Containment Emergency Vent Procedure," regardless of offsite radioactivity release. The reference to LGS TRIP NOTE #17 reminds operators that exceeding offsite release rate limits in the Tech Spec/ODCM is authorized if necessary. Note that the logic term "BEFORE" in Step PC/P-13 means that primary containment venting <u>should</u> be initiated before the UNSAFE region of the PCPL Curve is entered. If the combination of Primary Containment Water Level and Suppression Pool Pressure has already gone outside the limits of the PCPL Curve when Step PC/P-13 is reached, the specified actions should still be performed.

D. **Incorrect but plausible:** Plausible if the applicant does not recall that LGS TRIP Step PC/P-13 directs actions to vent the Primary Containment regardless of offsite radioactivity release. The reference to LGS TRIP NOTE #17 reminds operators that exceeding offsite release rate limits in the Tech Spec/ODCM is authorized if necessary.

References: Lesson Plan LLOT1560, Rev. 014
T-102, Rev. 024
T-102 Bases, Rev. 024

Applicant Ref: <u>T-102 PCPL Curve with X/Y axis labels and unit references (e.g., feet, psig) removed</u>

Learning Objective: LLOT1560 (EO5,6)

Question source:	New	
Question History:	None	
Cognitive level:	Memory/Fundamental knowledge:	X
	Comprehensive/Analysis:	
10CFR Part 55:	43(b)(5)	
Comments:		

QUESTION 81

A plant transient has resulted in the following:

- Reactor pressure is 150 psig and steady
- Steam Cooling portion of T-111, Level Restoration/Steam Cooling is being used to maintain core cooling
- 3 SRVs are open
- RPV water is -200" and steady
- Suppression pool level is 15 feet and steady
- Suppression pool temperature is 135°F and rising

IAW T-111, Level Restoration/Steam Cooling, WHICH ONE of the following describes the required operator action and the basis behind the action?

A. Immediately open additional SRVs as necessary to increase RPV level.
The opening of additional SRVs will result in swell and provide temporary adequate core cooling.

B. Enter T-112, Emergency Blowdown, to rapidly depressurize and continue in T-111 level restoration to maintain RPV level above -186".
Steam cooling is no longer sufficient, emergency RPV depressurization is performed to quench the uncovered portion of the fuel and reduce peak clad temperature for adequate core cooling.

C. Enter T-112, Emergency Blowdown, to rapidly depressurize RPV and exit T-111, Level Restoration/Steam Cooling.
Steam cooling is no longer sufficient, emergency RPV depressurization is performed to quench the uncovered portion of the fuel and reduce peak clad temperature for adequate core cooling.

D. Enter SAMP-1 and SAMP-2
Adequate core cooling does not exist, and primary containment flooding is required.

K&A Rating: 295031 Reactor Low Water Level EA2.04 (4.8)

K&A Statement: **Ability to determine and/or interpret the following as they apply to REACTOR LOW WATER LEVEL:** Adequate Core Cooling

Justification:

A. **Incorrect but plausible:** Plausible, if the applicant determines RPV level has dropped below -198" (minimum zero-injection RPV water level), and this is the lowest RPV level at which the covered portion of the reactor core will generate sufficient steam to preclude any clad temperature in the uncovered portion of the core from exceeding 1800°F. Therefore, applicant determines that opening additional SRVs will result in level swell and provide temporary adequate core cooling.

B. **Correct:** IAW T-111, Level Restoration/Steam Cooling, Step LR-17, if the RPV level drops below -198"(minimum zero-injection RPV water level), steam cooling may no longer be sufficient to preclude the peak clad temperature from exceeding 1800°F. Therefore, entry into T-112, emergency blowdown, is required when these conditions exist. Unless the RPV is already depressurized, it is expected that the resulting swell will be sufficient to quench the uncovered portion of the fuel and reduce peak clad temperature almost to the value that would exist if the core were submerged. Also, T-111, Step LR-17, states to enter T-112 and execute concurrently with T-111.

C. **Incorrect but plausible:** Plausible, if the applicant determines that based on RPV level below -198" (minimum zero-injection RPV water level), steam cooling may no longer be sufficient to preclude the peak clad temperature from exceeding 1800°F. Therefore, entry into T-112, emergency blowdown, is required and applicant does not recall that T-111 allows concurrent entry in to T-112.

D. **Incorrect but plausible:** Plausible, if the applicant does not recall that when RPV level drops below -211", and design core spray loop flow requirement of 6250 gpm is not sufficient to maintain RPV water level above -211" then entry into SAMP-1 and SAMP-2 is required.

References: T-111, Rev. 15
T-111 Basis, Rev. 14
LLOT1560 Rev. 14

Student Ref: None

Learning Objective: LLOT1560 Learning Objective 3 and 6.

Question source: New

Question History: Not used on 2008 or 2010 LGS initial exams

Cognitive level: Memory/Fundamental knowledge:
Comprehensive/Analysis: X

10CFR55: 43(b)(5)

Comment:

QUESTION 82

Given the following conditions for Unit 2:

- A reactor scram has occurred
- A Full Core ATWS is in progress
- T-101, "RPV Control," has been entered
- SLC is injecting
- The RWM has been bypassed; rods are being manually inserted

WHICH ONE of the following Operator Actions is in accordance with T-101 ATWS mitigation strategies, when SLC tank level reaches 0 gallons during concurrent execution of the "RC/Q Rods" Leg, and all control rods have NOT been inserted to OR beyond position 02?

A. Depressurize the RPV to < 75 psig, initiate shutdown cooling

B. Depressurize the RPV to < 75 psig, DO NOT initiate shutdown cooling

C. DO NOT commence RPV depressurization until all rods are inserted to OR beyond position 02

D. Depressurize the RPV, DO NOT go below 75 psig until all rods are inserted to OR beyond position 02

Level: SRO
Tier #: 1
Group #: 1

K&A Rating: 295037 G2.4.6 (3.7/4.7)

K&A Statement: **Knowledge of EOP mitigation strategies** as they apply to SCRAM Condition Present and Reactor Power Above APRM Downscale or Unknown.

Justification:

A. **Incorrect but plausible:** Plausible if the applicant does not recall or understand that shutdown cooling cannot be initiated during ATWS conditions (as defined by Note 14 of T-101). See Answer B discussion.

B. **Correct:** Step RC/P-15 of the RC/P Leg of T-101, is a Hold/Wait step that is not exited until one of three conditions specified in the associated "WHEN" statement exist. SLC tank level reaching 0 gallons is one of the specified conditions. Therefore, subsequent step RC/P-16, which directs RPV depressurization, may be performed. Step RC/P-18 of T-101, is another Hold/Wait step that is not exited until both of the conditions specified in its associated "WHEN" statement exist (i.e., No ATWS AND RPV pressure < 75 psig). When these two conditions are met, subsequent steps in the RC/P flowpath direct the establishment of shutdown cooling and placement of the plant in Cold Shutdown. The shutdown cooling lineup cannot be established until RPV pressure is below the high RPV pressure shutdown cooling interlock setpoint of 75 psig. RPV pressure may be reduced below 75 psig, but Step RC/P-18 cannot be exited and shutdown cooling established, until ATWS conditions no longer exist. Per Note 14 of T-101, an ATWS is defined as (1) All rods NOT inserted to OR beyond 02, AND (2) The reactor has NOT been determined to be shutdown under all conditions without boron. Because steps in RC/Q RODS are still being executed and all control rods have not been inserted to OR beyond position 02, the "WHEN" statement in RC/P-18 is unable to be satisfied. Therefore, shutdown cooling cannot be initiated per Step RC/P-20, even with RPV pressure < 75 psig.

C. **Incorrect but plausible:** Plausible if the applicant believes that RPV depressurization cannot commence under any circumstances (e.g., SLC tank level at 0 gallons) as long as ATWS conditions (as defined by Note 14 of T-101) exist. See Answer B discussion.

D. **Incorrect but plausible:** Plausible if the applicant believes that depressurizing the RPV below 75 psig to establish shutdown cooling is not allowable under any circumstances (e.g., SLC tank level at 0 gallons), as long as ATWS conditions (as defined by Note 14 of T-101) exist. Step RC/P-18 of T-101, is a Hold/Wait step that is not exited until both of the conditions specified in the associated "WHEN" statement are met (i.e., No ATWS AND RPV pressure < 75 psig). When these two conditions are met, subsequent steps in the RC/P flowpath direct the establishment of shutdown cooling and placement of the plant in Cold Shutdown. See Answer B discussion.

References:	Lesson Plan LLOT1560, Rev. 014 T-101, Rev. 021 T-101 Bases, Rev. 020	Applicant Ref: NONE

Learning Objective: LLOT1560 (EO5,6)

Question source: New

Question History: None

Cognitive level: Memory/Fundamental knowledge: X
Comprehensive/Analysis:

10CFR Part 55: 43(b)(5)

Comments:

QUESTION 83

Given the following conditions:

- Unit 1 ATWS in progress
- Rx power 19%
- RPV Pressure is 885 psig down slowly
- Suppression Pool level is 25 feet up slowly
- Suppression Pool temperature is 165°F up slowly

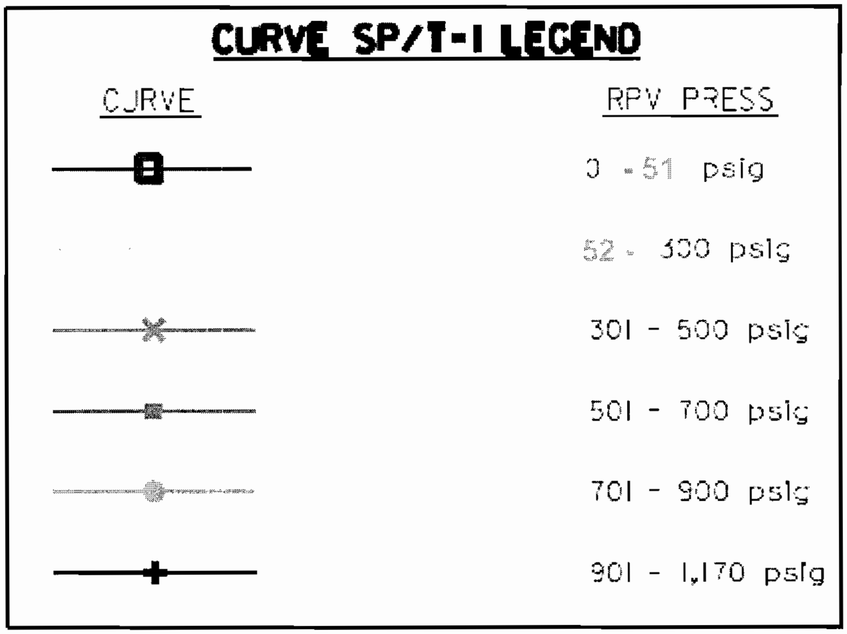
Given the Heat Capacity Temperature Limit (HCTL) curve from T-102, PRIMARY CONTAINMENT CONTROL, select the necessary corrective action:

A. Enter T-112, and perform Emergency Blowdown

B. Rapidly depressurize using turbine Bypass Valves

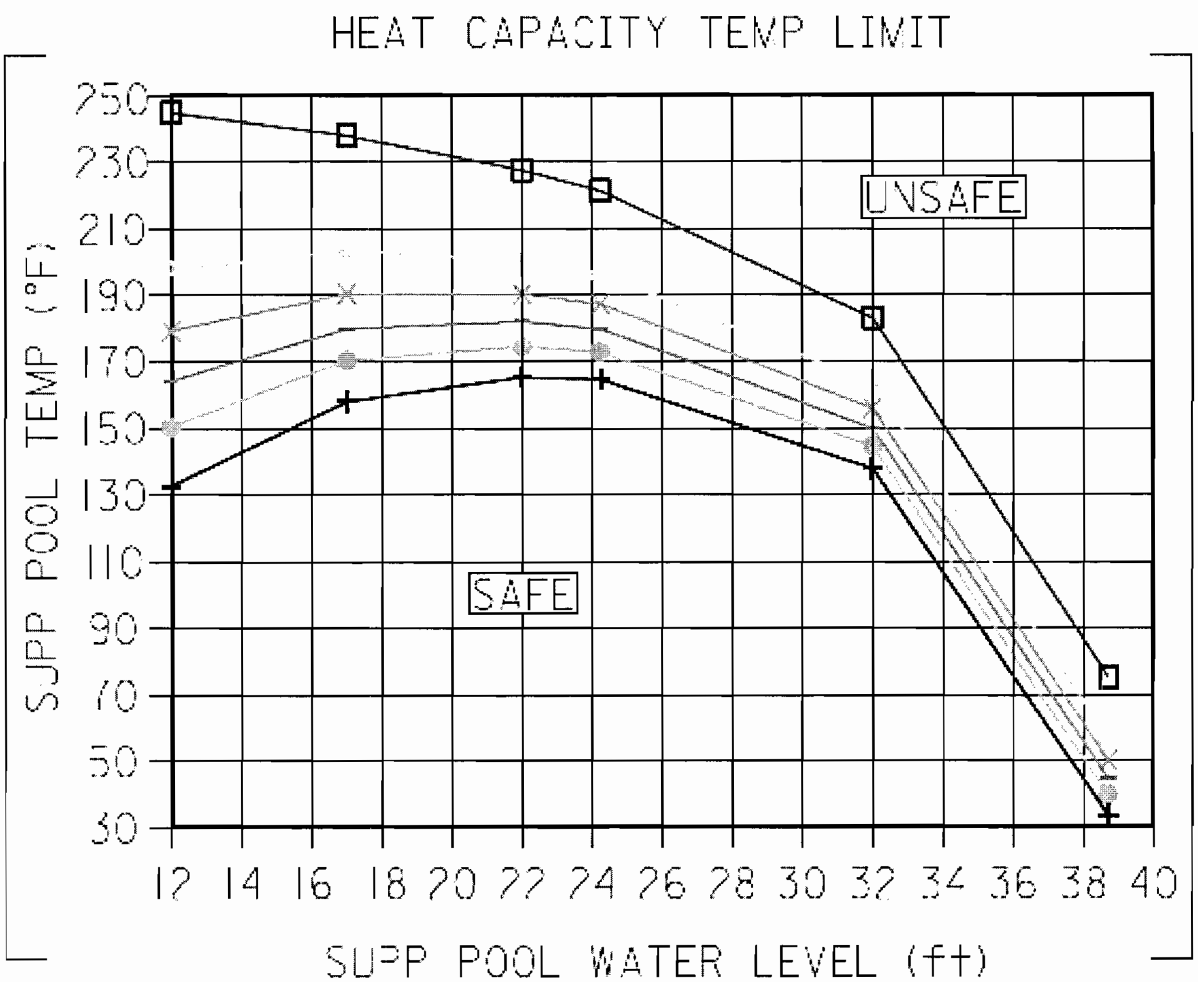
C. Use SRV/BPV to maintain RPV pressure below HCTL, not to exceed 100°F/hr

D. Use SRV/BPV to maintain RPV pressure below HCTL, exceeding 100°F/hr if necessary



CURVE SP/T-I LEGEND
CURVE
RPV PRESS
0 - 51 psig
52 - 300 psig
301 - 500 psig
501 - 700 psig
701 - 900 psig
901 - 1,170 psig

CURVE SP/T-I



HEAT CAPACITY TEMP LIMIT
UNSAFE
SAFE
SUPP POOL TEMP (°F)
250
230
210
190
170
150
130
110
90
70
50
30
12 14 16 18 20 22 24 26 28 30 32 34 36 38 40
SUPP POOL WATER LEVEL (ft)

K&A # 295013 A2.01
Importance Rating 4.0

QUESTION 83

K&A Statement: Ability to determine and/or interpret the following as they apply to HIGH SUPPRESSION POOL TEMPERATURE: Suppression Pool Temperature

Justification:

A. Incorrect but plausible if the candidate does not properly plot position on HCTL curve, plotting a position that is above the HCTL curve, necessitating a T-112 Emergency Blowdown

B. Incorrect but plausible if the candidate does not recall the requirements of step RC/P-6 of T-101, RPV Control. In order to be able to use turbine BPV to rapidly depressurize: (1) blowdown must be imminent, (2) condenser available, AND (3) No ATWS. Use of BPV to perform rapid depressurization during ATWS is NOT permitted

C. Incorrect but plausible if the candidate does not recall that exceeding of 100°F/hr is permitted to protect Primary containment. The plant conditions are on the border of exceeding HCTL, which constitutes a primary containment challenge

D. Correct –With current plant conditions, HCTL is not currently exceeded but the margin is small. Violation of HCTL would require entry into T-112 and performance of an emergency blowdown. T-102, step SP/T-8 directs maintaining RPV pressure on the safe side of the HCTL curve, exceeding 100°F/hr if necessary

References: T-101, Rev. 21
T-102, Rev. 24

Student Ref: None

Learning Objective: LLOT1560: 5/6

Question source: SSES 1/12 exam Q79

Question History: Not used on 2008 or 2010 LGS initial exams

Cognitive level: Memory/Fundamental knowledge:
Comprehensive/Analysis: X

10CFR55: 43.5

Comment: This question is SRO only as it cannot be answered *solely* by knowing systems knowledge, immediate operator actions, AOP/EOP entry conditions, or purpose/overall mitigative strategy of a procedure

QUESTION 84

Unit 2 was operating at 100% when an existing drywell leak degraded and, as the result, operators initiated a manual scram when drywell pressure was at its peak of 1.65 psig.

The following conditions now exist:

- Multiple control rods are at position 48
- Reactor Power is 12%, steady
- Rods are manually being inserted with the RWM bypassed
- Drywell Pressure is 1.80 psig and slowly rising
- RPV level is -130 inches and slowly rising

Which one of the following describes the HIGHEST notification required?

A. Unusual Event

B. Alert

C. Site Area

D. General Emergency

K&A Rating: 295015 Incomplete SCRAM G.2.4.41 (3.6)

K&A Statement: **Knowledge of the emergency action level thresholds and classifications.**

Justification:

A. **Incorrect but plausible:** Plausible if applicant determines based on the initial conditions that criteria for Alert or higher declaration does not exist due to the automatic scram set point was not reached and manual actions to scram was initiated prior to automatic scram setpoint. As indicated in the question stem, that manual scram actions were taken prior to exceeding automatic scram setpoint. EAL basis for Alert of higher states that "this condition indicates failure of the automatic protection system to scram the reactor in response to exceeding reactor protective system setpoints during a plant transient".

B. **Incorrect but plausible:** Plausible, if applicant determines that based on the initial conditions that criteria for Alert or higher declaration does not exist due to the automatic scram set point was not reached and manual actions to scram was initiated prior to automatic scram setpoint. However, applicant may determine that based on drywell pressure > 1.68 psig and drywell pressure rise due to RCS leakage, alert conditions exist.

C. **Correct:** Even thought manual scram was initiated prior to reaching the automatic scram setpoint, automatic scram set points were exceeded. When the mode switch was taken out of the run position, nuclear instrumentation scram setpoint is lowered, and automatic scram setpoint is exceeded based on the power level. Also, based on the information that rods are manually being inserted is an indication that ARI was not successful with reactor power above 4%.

D. **Incorrect but plausible:** Plausible if applicant does not understand that based on the RPV level and the trend, the general emergency criteria does not exist. RPV level can be restored and maintained over -186 inches.

References: EP-AA-1008, Rev. 23
LS-AA-1400, Rev. 4
LLOT1572, Rev. 8
LLOT1566.02, Rev. 0

Student Ref: EAL Table LGS 3-1 (RPS failure and primary containment conditions pages ONLY)

Learning Objective: LLOT0071, Learning objective 5. LLOT1572, LO # 3, LLOT1566 Objective 02

Question source: New

Question History: Not used on 2008 or 2010 LGS initial exams

Cognitive level: Memory/Fundamental knowledge:
Comprehensive/Analysis: X

10CFR55: 43.5, 45.11

Comment:

QUESTION 85

Given the following conditions for Unit 1:

- An unisolable steam leak has occurred in the Turbine Building
- Turbine Enclosure HVAC is operating
- ARC-MCR-003, RAD, Window E-2, "NORTH STACK HI RADIATION," in alarm
- ARC-MCR-003, RAD, Window E-1, "NORTH STACK HI-HI RADIATION," in alarm
- North Stack WR Monitor RIX-26-076-4 reads 2.00 E+07 μCi/sec (> 15 minutes)
- Meteorology based Dose Assessment at Site Boundary indicates doses are 85 mRem TEDE
- T-104, "Reactivity Release Control," has been entered

WHICH ONE of the following describes the appropriate event declaration in accordance with EP-AA-1008, "Radiological Emergency Plan Annex For Limerick Generating Station," and the reason for Dose Assessment performance?

A. Declare an ALERT;
Dose Assessment required based upon receipt of MCR "NORTH STACK HI-HI RADIATION" alarm

B. Declare an ALERT;
Dose Assessment required based upon results of ST-6-104-880-0, "Gaseous Effluent Dose Rate Determination"

C. Declare a SITE AREA EMERGENCY;
Dose Assessment required based upon receipt of MCR "NORTH STACK HI-HI RADIATION" alarm

D. Declare a SITE AREA EMERGENCY;
Dose Assessment required based upon results of ST-6-104-880-0, "Gaseous Effluent Dose Rate Determination"

Level: SRO
Tier #: 1
Group #: 2

K&A Rating: 295017 AA2.05 (2.5/3.8)

K&A Statement: **Ability to determine and/or interpret the following as they apply to HIGH OFF-SITE RELEASE RATE:** Meteorological data

Justification:

A. **Incorrect but plausible:** Plausible if the applicant believes that a Dose Assessment is required when either the North or South Stack Hi-Hi Radiation alarm is received, AND/OR is unfamiliar with the requirement for Operators to perform ST-6-104-880-0 upon receipt of either alarm. See Answer B discussion.

B. **Correct:** Dose Assessment results, if available when the classification is made, override Stack Effluent Monitor readings. Dose Assessments are based on actual meteorology, whereas monitor reading thresholds are not. Accordingly, Dose Assessment results may indicate that a classification is not warranted or that a higher classification is warranted. For this reason, emergency implementing procedures call for the timely performance of Dose Assessments using actual meteorology and release information. The Dose Assessment value of 85 mRem TEDE is below the EAL Matrix value for Site Area Emergency classification. Therefore, an Alert is the proper declaration, even with North Stack Effluent Monitor indication above the Site Area Emergency Threshold value. ST-6-104-880-0 is an Operations Surveillance Test (ST) used to determine whether or not a Dose Assessment per EP-MA-110-200, "Dose Assessment," is required after receiving either the North or South Stack Hi-Hi Radiation alarm. The annunciator response card for each alarm directs Operations to perform the ST. Note that a Dose Assessment would be required upon receipt of both the North and South Stack Hi-Hi Radiation alarms, irrespective of Ops ST performance. Dose Assessments are performed by Radiation Protection. Direction for performing the Dose Assessment comes from Operations. ST-6-104-880-0 is an essential link in the process of classifying the event. If the ST is performed incorrectly or missed, then EP-MA-110-200 may not be performed (potential for either a mis-classification or delay in classification).

C. **Incorrect but plausible** Plausible if the applicant (1) believes that Stack Effluent Monitor readings override meteorology based Dose Assessment results, and (2) believes that a Dose Assessment is required when either the North or South Stack Hi-Hi Radiation alarm is received, AND/OR is unfamiliar with the requirement for Operators to perform ST-6-104-880-0 upon receipt of either alarm. See Answer B discussion.

D. **Incorrect but plausible:** Plausible if the applicant believes that Stack Effluent Monitor readings override meteorology based Dose Assessment results. See Answer B discussion.

References: Lesson Plan LLOT1560, Rev. 014; Lesson Plan LLOT1790, Rev. 007

Applicant Ref: Table LGS 3-1 Emergency

EP-AA-1008, Rev. 023
T-104, Rev. 012
T-104 Bases, Rev. 013
ST-6-104-880-0, Rev. 029
ARC 003 RAD (E-1), Rev. 002
ARC 003 RAD (E-2), Rev. 002

Action Level (EAL) Matrix: Radiological Effluents Hot Matrix only, w/EAL Threshold Value Notes removed

Learning Objective: LLOT1560 (EO7)
LLOT1790 (OBJ. 5)

Question source: New

Question History: None

Cognitive level: Memory/Fundamental knowledge:
Comprehensive/Analysis: X

10CFR Part 55: 43(b)(5)

Comments:

QUESTION 86

Given the following:

- A feedwater line break in the drywell has occurred
- Reactor Power is 3.5% and steady
- Reactor Pressure is being controlled between 800 and 1000 psig
- RPV water level is -127" and lowering at 2" per minute
- HPCI is in service
- Drywell Pressure is 7.8 psig and rising at 0.1 psig per minute
- Drywell Temperature is 228 °F and rising at 3° per minute
- Suppression Pool Temperature is 101 °F and rising at 3° per minute

Assuming the trends continue as above and all systems are operable, which one of the following is/will be required?

A. Immediately terminate and prevent injection to lower RPV Level until it reaches -161" IAW T-117, Level/Power Control

B. Inject SLC before three minutes have elapsed IAW T-101, RPV Control

C. Open all 5 ADS valves in four minutes IAW T-112, Emergency Blowdown

D. Terminate and prevent injection in six minutes IAW T-117, Level/Power control. Once complete, open all 5 ADS valves IAW T-112, Emergency Blowdown

K&A # 211000 G2.4.47
Importance Rating 4.2

QUESTION 86

K&A Statement: Ability to diagnose and recognize trends in an accurate and timely manner utilizing the appropriate control room reference material

Justification:

A. Incorrect but plausible if the candidate does not recognize that power is less than 4%, therefore level is not lowered

B. Correct: with the current trend, Suppression Pool temperature will exceed 110°F in three minutes. Step RC/Q-16 of T-101, RPV Control, directs injecting SLC before Suppression Pool temperature exceeds 110°F.

C. Incorrect but plausible if candidate believes one of the parameters has exceeded a blowdown requirement

D. Incorrect but plausible if the candidate believes that level cannot be restored and maintained above -186". This is not true, as injecting SLC and level lowering further will further suppress power, allowing HPCI to raise/recover level.

References: LLOT1560, Rev. 14
T-101 Bases, Rev. 20

Student Ref: None

Learning Objective: LLOT1560: 6

Question source: Bank, Hope Creek 2/2009

Question History: Not used on 2008 or 2010 LGS written exams

Cognitive level: Memory/Fundamental knowledge:
Comprehensive/Analysis: X

10CFR55: 43(b)(5)

Comment: This question is SRO only as it requires assessing of plant conditions and then selecting a procedure or section of a procedure to mitigate, recover, or with which to proceed.

QUESTION 87

Unit 1 plant conditions are as follows:

- Core Alterations are in progress in Quadrant ‘A’
- ‘1C’ SRM count rate is 1.4 cps with a signal-to-noise ratio of 4.0
- ‘At 1415 on 4/23, the SRO was notified that the ‘1A’ SRM Channel Functional Test was NOT performed in its entirety and is now 72 hours past its grace period (31 day Surveillance Frequency)
- No special moveable detectors are connected
- A risk assessment is unable to be performed

WHICH ONE of the following identifies the actions required by Technical Specifications for the above conditions?

Complete the Channel Functional Test NO later than _____(1)_____; otherwise, suspend Core Alterations in _____(2)_____.

A. (1) time 0215 on 4/24
(2) the ‘A’ Quadrant only

B. (1) time 0215 on 4/24
(2) all Quadrants

C. (1) time 1415 on 4/24
(2) the ‘A’ Quadrant only

D. (1) time 1415 on 4/24
(2) all Quadrants

Level: SRO
Tier #: 2
Group #: 1

K&A Rating: 215004 (G2.2.40) (3.4/4.7)

K&A Statement: **Ability to apply Technical Specifications for a system** as they apply to the Source Range Monitor (SRM) System.

Justification:

A. **Incorrect but plausible:** Plausible if the applicant (1) is unable to recall or is unfamiliar with the provisions of SR 4.0.3 that establish the flexibility to defer declaring affected equipment Inoperable when a Surveillance has not been completed within the specified Surveillance time interval and allowed extension, and (2) misinterprets the "SRM Count Rate Versus Signal To Noise Ratio" curve, believing that '1C' SRM is Operable. Also plausible in that there is a 12-hour TS Action time associated with SRMs in other LCOs (e.g., Instrumentation LCOs 3.3.6 and 3.3.7.6). See Answer 'D' discussion.

B. **Incorrect but plausible:** Plausible if the applicant is unable to recall or is unfamiliar with the provisions of SR 4.0.3 that establish the flexibility to defer declaring affected equipment Inoperable when a Surveillance has not been completed within the specified Surveillance time interval and allowed extension. Also plausible in that there is a 12-hour TS Action time associated with SRMs in other LCOs (e.g., Instrumentation LCOs 3.3.6 and 3.3.7.6). See Answer 'D' discussion.

C. **Incorrect but plausible:** Plausible if the applicant misinterprets the "SRM Count Rate Versus Signal To Noise Ratio" curve, believing that '1C' SRM is Operable. See Answer 'D' discussion.

D. **Correct:** '1C' SRM is Inoperable as determined by evaluation of TS Figure 3.3.6-1, "SRM Count Rate Versus Signal To Noise Ratio," for the given conditions. Surveillance Requirement 4.0.3 provides the necessary provisions for determining compliance with LCO 3.9.2.c, given that (1) the Channel Function Test for '1A' SRM is 72 hours beyond its grace period, and (2) the '1C' SRM is inoperable. SR 4.0.3 states "If it is discovered that a Surveillance was not performed within its specified Surveillance time interval and allowed extension per Specification 4.0.2, then compliance with the requirement to declare the Limiting Condition for Operation not met may be delayed, from the time of discovery, up to 24 hours or up to the limit of the specified Surveillance time interval, whichever is greater. This delay period is permitted to allow performance of the Surveillance. A risk evaluation shall be performed for any Surveillance delayed greater than 24 hours and the risk impact shall be managed." Although the SRM Channel Functional Test Surveillance interval of 31 days is greater than the 24 hours, LCO 3.9.2.c is considered not met if the Functional Test is unable to be completed within the 24 hours "from time of discovery." This is due to failure to comply with the SR 4.0.3 requirement that a risk evaluation shall be performed for any Surveillance delayed greater than 24 hours (Note that the stem states "A risk assessment is unable to be performed"). With both the '1A' and '1C' SRMs Inoperable, Core Alterations are suspended since this combination fails to satisfy the LCO 3.9.2.c requirement for performing Core Alterations in Quadrants B and D (i.e., No Operable SRM detectors in adjacent Quadrants A and C).

References:	Lesson Plan LGSOPS0074, Rev. 002 LGS TS 3.9.2 & associated Bases LGS TS 3/4.0 (Surveillance Requirements 4.0.2 & 4.0.3 & associated Bases)	Applicant Ref: LGS TS 3.9.2 and TS Figure 3.3.6-1

Learning Objective:	LGSOPS0074 (Obj. 10)	
Question source:	Modified LGS Bank (ID: 715727)	
Question History:	Not used on 2008 or 2010 LGS Written Exam	
Cognitive level:	Memory/Fundamental knowledge:	
	Comprehensive/Analysis:	X
10CFR Part 55:	43(b)(2)	
Comments:		

QUESTION 88

Unit 1 plant conditions are as follows:

- A LOCA occurs
- Reactor is shutdown
- Reactor pressure is 850 psig and lowering slowly
- HPCI is unavailable due to failure of the Aux Oil Pump
- Reactor level is -131" and lowering
- Drywell pressure is 2 psig and slowly rising
- RHR pumps are NOT running

Twenty seconds following the LOCA conditions:

- All Core Spray Pumps are running with discharge pressure of 140 psig
- ADS has NOT been Inhibited
- All NSSSS isolations are verified complete

WHICH ONE of the following identifies how the ADS valves will respond as reactor level continues to drop, and what actions must be directed?

A. NOT open
Bypass PCIG Isolation logic per GP-8 and Depressurize RPV within 100°F/hr using SRVs.

B. OPEN
Bypass PCIG Isolation logic per GP-8 to ensure availability of ADS valves.

C. NOT open
Rapidly Depressurize RPV IAW T-112, Emergency Blowdown.

D. OPEN
When RPV pressure < 75 psig, Initiate shutdown cooling per S51.8.B or S51.8.H using pumps that are NOT required to maintain RPV level.

K&A Rating: 218000 ADS 2.4.6(4.7)

K&A Statement: **Knowledge of EOP mitigation strategies.**

Justification:

A. **Correct:** Based on the initial conditions ADS will NOT automatically initiate due to core spray pump discharge pressure not above 145 psig. ADS will automatically initiate due to high drywell pressure, low reactor water level (-129"), and running of RHR or Core Spray pump (CS discharge pressure > 145 psig). Initial conditions identify that a LOCA has occurred with drywell pressure 2 psig, RPV Control step RC/P-16 states to depressurize RPV using SRVs, and due to the 2 psig drywell pressure, bypassing PCIG isolation logic per GP-8 is necessary to ensure long term operations of SRVs.

B. **Incorrect but plausible:** Plausible if the applicant determines ADS will automatically initiate based on core spray pumps running, high drywell pressure, and low reactor water level (-129"). If ADS had automatically initiated, then the correct step would be to bypass PCIG isolation logic per GP-8 to ensure long term ADS availability

C. **Incorrect but plausible:** Plausible, partially correct that ADS will NOT automatically initiate due to core spray pump discharge pressure not above 145 psig. ADS will automatically initiate due to high drywell pressure, low reactor water level (-129"), and running of RHR or Core Spray pump (CS discharge pressure > 145 psig). However, RPV rapid depressurization is performed when RPV level cannot be maintained above -161". Based on initial conditions, RPV level did not go below -161", therefore, rapid depressurization is not appropriate.

D. **Incorrect but plausible:** Plausible, if the applicant determines ADS will automatically initiate based on core spray pumps running, high drywell pressure, and low reactor water level (-129"). If ADS had automatically initiated, and applicant determined that bypassing PCIG logic is not necessary, then the correct step would be to allow ADS to depressurize RPV below 75 psig, and initiate shutdown cooling per S51.8.B or S51.8H using only those pumps not required to maintain RPV level.

References: T-101, Rev. 21
LGSOPS0050 Rev. 0
LGSOPS0059, Rev. 1
LLOT0350 Rev. 16

Student Ref: None

Learning Objective: LGSOPS0050 Objectives EO3.a, IL3.a
LGSOPS0059 IL Objective #8
LLOT0350 Objective #7

Question source: Modified Bank (562516)

Question History: Not used on 2008 or 2010 LGS initial exams

Cognitive level: Memory/Fundamental knowledge:

	Comprehensive/Analysis:	X
10CFR55:	43(b)(5)	

Comment:

QUESTION 89

Given the following conditions for Unit 2:

- OPCON 5
- '2B' RHR Pump is in Shutdown Cooling per S51.8.B, "Shutdown Cooling/Reactor Coolant Circulation Operation Start-Up And Shutdown"
- '0B' RHRSW Pump is in service
- RCS temperature is 120 °F
- The Safeguard Buses are in a "Normal" Electrical Lineup

Then:

- An electrical fault causes a loss of the 20 Station Aux Bus
- The associated 4.16 KV Divisional Safeguard Buses remain de-energized (i.e., Dead Bus transfers do not occur and associated D/Gs do not start)
- A leak is identified between Shutdown Cooling Valves 2F008 and 2F009

The SRO enters ON-121, "Loss of Shutdown Cooling." WHICH ONE of the following describes the appropriate Operator Actions for this event in accordance with ON-121 guidance?

A. Start '0D' RHRSW Pump per S12.1.A, "RHR Service Water System Startup."
Establish Alternate Shutdown Cooling using S41.7.B, "Use of SRV's And Suppression Pool Cooling As An Alternate Shutdown Cooling Method."

B. Start '0D' RHRSW Pump per S12.1.A, "RHR Service Water System Startup."
Establish Alternate Decay Heat Removal per GP-6.2, "Shutdown Operations – Shutdown Condition Tech Spec Actions."

C. Start '0A' RHRSW Pump per S12.1.A, "RHR Service Water System Startup."
Establish Alternate Shutdown Cooling using S41.7.B, "Use of SRV's And Suppression Pool Cooling As An Alternate Shutdown Cooling Method."

D. Start '0A' RHRSW Pump per S12.1.A, "RHR Service Water System Startup."
Establish Alternate Decay Heat Removal per GP-6.2, "Shutdown Operations – Shutdown Condition Tech Spec Actions."

Level: SRO
Tier #: 2
Group #: 1

K&A Rating: 205000 A2.03 (3.2/3.2)

K&A Statement: **Ability to (a) predict the impacts of A.C. failures on the SHUTDOWN COOLING SYSTEM (RHR SHUTDOWN COOLING MODE); and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations.**

Justification:

A. **Incorrect but plausible:** Plausible if the applicant believes that Alternate Shutdown Cooling using RHR, SRVs and Suppression Pool Cooling can be used in OPCON 5. Also plausible in that RHRSW flow is required for Suppression Pool Cooling operations. See Answer B discussion.

B. **Correct:** A loss of 20 Station Aux Bus would normally cause a loss of the associated 4.16 KV Divisional Buses (D12, D14, D21, D23) only until a Dead Bus Transfer to the 101 Safeguard Bus occurs. Because the 4.16 KV Divisional Buses remain de-energized (specified in the stem conditions), the in service '0B' RHRSW Pump remains de-energized after initially tripping due to loss of the D12 Bus, resulting in no cooling to the Unit 2 'B' RHR Heat Exchanger. The '2B' RHR Pump remains in service since it is powered from the D22 Bus. The RHRSW System is comprised of two loops with two pumps per loop. The '0A' and '0C' pumps make up the A Loop, while the '0B' and '0D' pumps make up the 'B' Loop. Each loop provides cooling to <u>one</u> RHR Heat Exchanger in <u>each</u> unit for a total of two Heat Exchangers. 'A' Loop provides cooling to the '1A and '2A' RHRHXs, while the 'B' Loop provides cooling to the '1B' and '2B' RHRHXs. The '0D' RHRSW Pump (powered from the D22 Bus) is available to provide cooling to the '2B' RHR Heat Exchanger during Alternate Decay Heat Removal (ADHR) operation aligned to the 'B' Loop of ADHR. ADHR is established using S51.8.L, "Alternate Decay Heat Removal Startup And Shutdown," per GP-6.2 guidance, which is directed out of ON-121, Attachment 7. Note that the Unit 2 'A' Loop of ADHR cannot be used for decay heat removal due to de-energization of Divisional Buses D21 and D23, which power '2A' and '2C' RHR Pumps respectively. Starting the '0A' RHRSW Pump to provide cooling to the '2A' RHRHX (Answers C and D), is therefore incorrect. ADHR must be established as the means for decay heat removal because (1) stem conditions state that a leak has been identified between the 2F008 and 2F009 Valves, and (2) it can only be used in OPCON 5 since the reactor cavity and fuel pool need to be tied together. Alternate Shutdown Cooling using RHR, SRVs and Suppression Pool Cooling cannot be used in OPCON 5 (specifically stated in ON-121, Attachment 6).

C. **Incorrect but plausible:** Plausible if the applicant believes (1) that Alternate Shutdown Cooling using RHR, SRVs and Suppression Pool Cooling can be used in OPCON 5, and (2) that the 'A' Loop of Suppression Pool Cooling is available for Unit 2. Also plausible in that RHRSW flow is required for Suppression Pool Cooling operations. See Answer B discussion.

D. **Incorrect but plausible:** Plausible if the applicant believes that the Unit 2 'A' Loop of ADHR is available for decay heat removal. See Answer B discussion.

References:	Lesson Plan LLOT0051, Rev. 000 Lesson Plan LGSOPS1550, Rev. 000 Lesson Plan LGSOPS0092A, Rev. 001 Lesson Plan LLOT0012, Rev. 000 ON-121, Rev. 029 S12.1.A, Rev. 050 S41.7.B, 007 S51.8.B, Rev. 071 S51.8.L, Rev. 016 GP-6.2, Rev. 048	Applicant Ref: NONE

Learning Objective:	LLOT0051 (IL14) LGSOPS1550 (IL2) LGSOPS0092A, (IL2.a, IL2.b, IL3)	
Question source:	Modified LGS Bank (ID: 562361)	
Question History:	Not used on 2008 or 2010 LGS Written Exam	
Cognitive level:	Memory/Fundamental knowledge:	
	Comprehensive/Analysis:	X
10CFR Part 55:	43(b)(5)	
Comments:		

QUESTION 90

Unit 1 has just completed a power reduction from 100% to 55% power required by entry into OT-116, "Loss of Condenser Vacuum". The cause has been found and corrected when an electrical transient results in the following annunciators:

- 126 B-4, "12 BUS BKR TRIP"
- 125 F-4, "12 UNIT AUX BUS UNDERVOLTAGE"

Predict the impact of this event to determine (1) what condition has priority and (2) what action must be directed by the CRS

A. (1) Lowering RPV water level
(2) Scram and enter T-101, "RPV Control" per OT-100, "Reactor Low Level"

B. (1) Lowering RPV water level
(2) Reduce reactor power using RMSI per OT-100, "Reactor Low Level" until normal RPV level is restored

C. (1) Thermal hydraulic instability (THI)
(2) Insert control rods or raise core flow per OT-112, "Recirculation Pump Trip"

D. (1) Thermal hydraulic instability (THI)
(2) Scram and enter T-100, "Scram/Scram Recovery" per OT-112, "Recirculation Pump Trip"

K&A #	262001 A2.04
Importance Rating	4.2

QUESTION 90

K&A Statement: Ability to (a) predict the impacts of types of loads that, if deenergized, would degrade or hinder plant operation on the A.C. ELECTRICAL DISTRIBUTION; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of the abnormal conditions or operations

Justification:

A. Incorrect but plausible if the candidate believes that this will cause an appreciable lowering of reactor water level due to tripping of a condensate pump or confuses this bus with the 11 bus, which would cause trip of two condensate pumps. Level control is not a concern with three RFP and two condensate pumps in service at this power level.

B. Incorrect but plausible if the candidate believes that this will cause an appreciable lowering of reactor water level due to tripping of a condensate pump. Level control is not a concern with three RFP and two condensate pumps in service at this power level.

C. Correct – while the loss of the 12 bus has caused a loss of condensate pump, the three RFP and two condensate pumps in service at this power provide adequate level control. The loss of 12 bus has also caused a trip of the 1B reactor recirc pump, potentially placing the plant in the restricted region of the power to flow map. Per OT-112, the restricted region must be exited by either inserting control rods to reduce reactor power or raising core flow. Restarting a recirc pump is not an acceptable means of raising flow.

D. Incorrect but plausible, as loss of the 12 aux bus only results in a trip of the 1B recirc pump. Although OT-112 entry is required, it directs Scram and entry into T-100 only if there are no recirc pumps running. Currently the 1A recirc pump is still running.

References: LGSOPS1540, Rev. 0
LGSOPS0043A, Rev. 3

Student Ref: None

Learning Objective: LGSOPS1540: 5; LGSOPS0043A: IL7/IL14

Question source: Modified PB 12/2009

Question History: Not used on 2008 or 2010 LGS initial exams

Cognitive level: Memory/Fundamental knowledge:
Comprehensive/Analysis: X

10CFR55: 43(b)(5)

Comment: This question is SRO only as it cannot be answered solely by knowing systems knowledge, immediate operator actions, AOP/EOP entry conditions, or purpose/mitigative strategy of a procedure.

QUESTION 91

The following conditions exist on Unit 1:

- Reactor is shutdown with all control rods fully inserted
- Reactor water level is -200 inches rising slowly
- Reactor pressure is 100 psig
- RHR Loop ‘A’ is unavailable
- RHR Loop ‘B’ is injecting at 18,000 gpm
- Core Spray Loops ‘A’ and ‘B’ have failed to inject
- Drywell temperature is 356 °F
- Drywell pressure is 10 psig
- Suppression Pool pressure is 7 psig
- Suppression Pool level is 29 feet
- Containment H2 and O2 concentrations require performing step DW/G-3 of T-102, “Primary Containment Control”

Containment Spray must _____(1)_____ based on _____(2)_____.

Drywell Spray Initiation Limit curve is provided on the next page

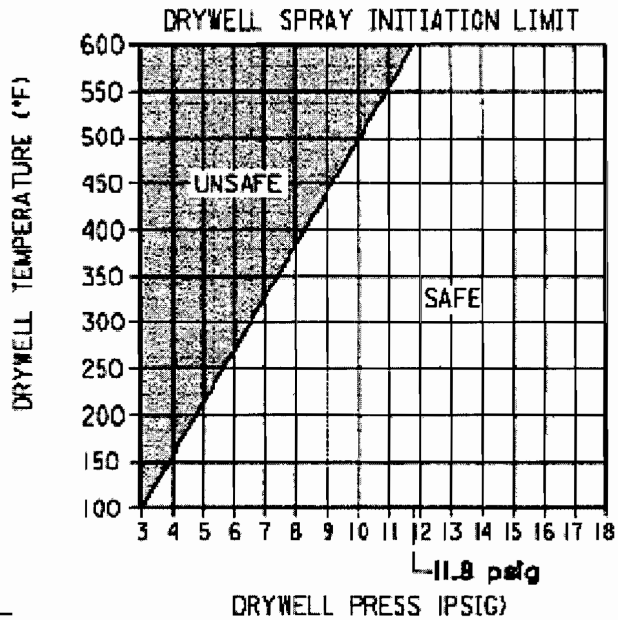
A. (1) NOT be initiated
(2) lack of adequate core cooling

B. (1) NOT be initiated
(2) Drywell Spray Initiation Limit curve

C. (1) be initiated
(2) drywell temperature exceeding design limit

D. (1) be initiated
(2) potential for loss of Primary Containment integrity

CURVE PC/P-2
CURVE DW/T-3



K&A # 226001: G2.1.7
Importance Rating 4.7

QUESTION 91

K&A Statement: Ability to evaluate plant performance and make operational judgments based on operating characteristics, reactor behavior, and instrument interpretation (RHR/LPCI: CTMT Spray Mode)

Justification:

A. Incorrect but plausible: although T-102 DW/T-8 directs spraying only with those pumps not continuously required to assure ACC, and using the only available loop of RHR would jeopardize ACC, T-102 step DW/G-3.8 directs spraying regardless of ACC.

B. Incorrect but plausible: Drywell Spray Initiation Limit (DSIL) curve is NOT exceeded. Plausible if candidate uses Suppression Pool pressure to plot the DSIL curve.

C. Incorrect but plausible: although drywell temperature has exceeded the design limit of 340 °F, this is not the reason containment spray is required since this guidance comes from the DW/T leg of T-102; the reason containment spray is required is based on the guidance in the DW/G leg of T-102.

D. Correct – based on the given conditions, and the guidance of T-102 step DW/G-3.8, containment sprays are required regardless of ACC. Per T-102 step DW/G-3.8 bases, spraying the drywell is performed regardless of ACC because of the potential for deflagration, which could result in a loss of primary containment integrity leading, in turn, to a loss of core cooling capability.

References: T-102, Rev. 24 Student Ref: None

Learning Objective: LLOT1560: 6

Question source: PB 1/2011

Question History: Not used on 2008 or 2010 LGS initial exams

Cognitive level: Memory/Fundamental knowledge:
Comprehensive/Analysis: X

10CFR55: 43(b)(5)

Comment: This question is SRO only as it cannot be answered solely by knowing systems knowledge, immediate operator actions, AOP/EOP entry conditions, or purpose/sequence/mitigative strategy of a procedure. This question also tests the one exception in T-102 that directs spray regardless of ACC to protect the primary containment vice the core. A competent SRO with adequate TRIP bases knowledge should be able to answer this question correctly

QUESTION 92

Given the following conditions for Unit 1:

- Total Feedwater Flow is 6.5 Mlbm/hr
- Main Generator Load is 15,005 amps

A Stator Water Cooling Runback has occurred and the crew is performing actions contained in ON-114, "Loss of Stator Water Cooling Runback." The following plant conditions currently exist:

- Stator Water Cooling Runback signal has cleared
- Main Generator Load is 10,470 amps
- Stator Water Conductivity determined to be 9.0 μS/cm prior to loss of flow

WHICH ONE of the following describes the required Operator Actions for this event in accordance with ON-114 guidance?

A. Immediately:
Initiate a plant shutdown per GP-4, "Rapid Plant Shutdown to Hot Shutdown," Remove load from the Main Generator, and Trip the Main Turbine

B. Immediately:
Remove load from the Main Generator and Trip the Main Turbine

C. Within 3 minutes:
Initiate a plant shutdown per GP-4, "Rapid Plant Shutdown to Hot Shutdown," Remove load from the Main Generator, and Trip the Main Turbine

D. Within 3 minutes:
Remove load from the Main Generator and Trip the Main Turbine

Level: SRO
Tier #: 2
Group #: 2

K&A Rating: 245000 G2.4.11 (4.0/4.2)

K&A Statement: **Knowledge of abnormal condition procedures** as they relate to Main Turbine Generator and Auxiliary Systems

Justification:

A. **Incorrect but plausible:** Plausible if the applicant is unable to recall that the indicated actions are only performed "immediately" for conductivity levels > 9.9 μS/cm. See Answer C discussion.

B. **Incorrect but plausible:** Plausible if the applicant (1) is unable to recall that the indicated actions are only performed "immediately" for conductivity levels > 9.9 μS/cm, and (2) believes that reactor power is ≤ 25%. See Answer C discussion.

C. **Correct:** With Total Feedwater Flow ≤ 6.7 Mlbm/hr, the Recirc Pumps will not trip during the SWC runback. Reactor power is approximately 43% (6.5 Mlbm/hr) prior to receipt of the runback initiating signal. The partial runback reduces Main Generator load from 43% to 30%. Reactor power remains at 43% as Bypass valves open to control reactor pressure in response to the TCV closure to approximately 30% equivalent power. A reactor power of 43% is within the 46.4% combined equivalent power capability of the Bypass valves and the TCVs. ON-114 guidance for reactor power > 25%, and conductivity levels > 0.5 μS/cm and ≤ 9.9 μS/cm prior to the loss of flow, is to initiate a plant shutdown per GP-4, remove load from the Main Generator, and trip the Main Turbine; all "within 3 minutes time". For reactor power ≤ 25%, ON-114 guidance is the same except for initiation of plant shutdown, since Bypass valve equivalent power capability is 25%. Note that these same actions would be performed "immediately" (instead of within 3 minutes) in the event conductivity levels prior to loss of flow were determined to be > 9.9 μS/cm.

D. **Incorrect but plausible:** Plausible if the applicant believes that reactor power is ≤ 25%. See Answer C discussion.

References: Lesson Plan LGSOPS0033, Rev. 002 Applicant Ref: NONE
ON-114, Rev. 028

Learning Objective: LGSOPS0033 (IL5)

Question source: New

Question History: None

Cognitive level: Memory/Fundamental knowledge:
Comprehensive/Analysis: X

10CFR Part 55: 43(b)(5)

Comments:

QUESTION 93

Unit 1 plant conditions are as follows:

- Reactor Power is 100%
- RPV level is +35 inches
- Signal Identity “1XX-FW300.ILEA” causes the “FWLCS TROUBLE” annunciator to alarm
- The "A" Narrow Range level indicator on MCR Panel 10C603 indicates downscale

WHICH ONE of the following describes the MOST LIMITING required Technical Specification action for the above plant conditions?

A. Restore the “A” Narrow Range RPV level channel to OPERABLE status within 7 days or be in at least STARTUP within the next 6 hours.

B. Place the “A” Narrow Range RPV level channel in the tripped condition within one hour or declare the associated trip system inoperable.

C. Restore the “A” Narrow Range RPV level channel to OPERABLE status within 6 hours or be in at least HOT SHUTDOWN within 12 hours and in COLD SHUTDOWN within the next 24 hours.

D. Place the “A” Narrow Range RPV level channel in trip condition within 12 hours.

K&A Rating: 259001 Reactor Feedwater System A2.07 (3.8)

K&A Statement: **Ability to (a) predict the impacts of the following on the REACTOR FEEDWATER SYSTEM ; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations:** Reactor water level control system malfunctions

Justification:

A. **Correct:** TS 3/4.3.9 for Feedwater/main turbine trip instrumentation list Reactor Vessel water Level-High, Level 8 trip function list minimum required channels as 4, and with 1 channel failed downscale, action b states that with the number of OPERABLE channels one less than required by the minimum OPERABLE channels requirement, restore the inoperable channel to OPERABLE status within 7 days or be at least startup within the next 6 hours.

B. **Incorrect but plausible:** Plausible, if the applicant does not recognize that action a, to place the channel in trip condition does not specify an one hour time, and fails to determine that action b applies.

C. **Incorrect but plausible:** Plausible, if the applicant determines that other instrumentation TS are involved and that RPS and NS4 narrow range level instrumentation are applicable, however, RPS and NS4 both share same narrow range level instrumentation, but these narrow range instrumentations are different than the feedwater level control. Applicant may determine that most limit TS of restoring "A" Narrow Range RPV level channel to OPERABLE status within 6 hours applies based on Isolation instrumentation TS 3/4.3.2 and RPS instrumentation TS 3/4.3.1.

D. **Incorrect but plausible:** if the applicant determines that other instrumentation TS are involved and that RPS and NS4 narrow range level instrumentation are applicable, however, RPS and NS4 both share same narrow range level instrumentation, but these narrow range instrumentations are different than the feedwater level control. Applicant may determine that most limit TS of placing the "A" Narrow Range RPV level channel in trip condition within 12 hours based on Isolation instrumentation TS 3/4.3.2.

References: TS 3/4.3 Instrumentation
LGSOPS0042, Rev. 0

Student Ref: TS 3/4.3.1, 3/4.3.2 & 3/4.3.9 Instrumentation TS Sections ONLY

Learning Objective: LGSOPS0042: 3, 9f/g

Question source: Modified Bank (585855)

Question History: Not used on 2008 or 2010 LGS initial exams

Cognitive level: Memory/Fundamental knowledge:
Comprehensive/Analysis: X

10CFR55: 43(b)(2)

Comment:

QUESTION 94

In accordance with FH-105, "Core Component Movement – Core Transfers," WHICH ONE of the following describes a responsibility of the Fuel Handling Director (LSRO/SRO)?

A. Be qualified to operate the refueling bridge

B. Perform observations of refuel platform crew performance

C. Determine the proper prerequisites for performing core component movements

D. Authorize the release and return of refueling bridge equipment to an Operable status

Level: SRO
Tier #: 3

K&A Rating: G2.1.35 (2.2/3.9)

K&A Statement: **Knowledge of the fuel-handling responsibilities of SROs**

Justification:

A. **Incorrect but plausible:** Plausible if the applicant believes, reasons, or assumes that being qualified to operate the refueling bridge is a requirement to direct and supervise the actions of a refuel platform crew. Being qualified to operate the refueling bridge is a responsibility of the Refueling Platform Operator (RPO) per Step 3.5.4 of FH-105.

B. **Incorrect but plausible:** Plausible if the applicant believes, reasons, or assumes that the Fuel Handling Director, in addition to directing and supervising refuel platform crew actions, will be performing observations of crew performance as well. Performing observations of refuel platform crew performance is the responsibility of the Maintenance Supervisor per Step 3.3.5 of FH-105.

C. **Incorrect but plausible:** Plausible if the applicant believes that the Fuel Handling Director is responsible for determining the proper prerequisites for performing core component movements. IAW with Step 3.4.3 of FH-105, the Fuel Handling Director is responsible for ensuring compliance with the appropriate prerequisites. Determining the proper prerequisites is the responsibility of the Reactor Engineer per Step 3.2.7 of FH-105.

D. **Correct:** In accordance with FH-105, "Core Component Movement – Core Transfers," Step 3.4.13, a responsibility of the Fuel Handling Director is to authorize the release and return of refueling bridge equipment to an Operable status.

References: Lesson Plan LLOT0760, Rev. 015 Applicant Ref: NONE
FH-105, Rev. 045

Learning Objective: Lesson Plan LLOT0760 (Terminal Objective; See Introduction I.A)

Question source: New

Question History: None

Cognitive level: Memory/Fundamental knowledge: X
Comprehensive/Analysis:

10CFR Part 55: 43.(b)(7)

Comments:

QUESTION 95

Unit 1 is in Mode 3 with preparations in progress to start the ‘1B’ Reactor Recirculation Pump (RRP) in accordance with S43.1.A, “Startup of Recirculation System”. The following conditions exist:

- RRP ‘1A’ running at minimum speed
- ‘A’ Recirc Loop temperature is 334 °F
- ‘B’ Recirc Loop temperature is 282 °F
- Bottom head drain temperature is 196 °F
- RPV Steam Dome pressure is 97 psig

Based on these conditions, which one of the following is correct regarding the start of the ‘1B’ RRP?

A. Permitted since all differential temperatures are within allowable limits

B. NOT permitted because thermal stresses could exceed design allowances on ‘A’ Loop components

C. NOT permitted because thermal stresses could exceed design allowances on ‘B’ Loop components

D. NOT permitted because thermal stresses could exceed design allowances on bottom head components

K&A # G2.1.32
Importance Rating 4.0

QUESTION 95
K&A Statement: Ability to explain and apply system limits and precautions
Justification:

A. Incorrect but plausible: if candidates do not recall maximum loop differential temperatures or improperly apply steam tables.

B. Incorrect but plausible: ≤50 °F differential between recirc loops 'A' and 'B' is not met (334-282= 52°F). Starting the 'B' RRP under these conditions would cause a thermal shock to the 'B' RRP and recirculation nozzles, not the 'A' recirculation loop as the water must first be returned to the reactor and mixed before reaching the 'A' recirculation loop.

C. Correct: ≤50 °F differential between recirc loops 'A' and 'B' is not met (334-282= 52°F). Starting the 'B' RRP under these conditions would cause a thermal shock to the 'B' RRP and recirculation nozzles. Tech Spec Bases 3/4.4.1 states "In order to prevent undue stress on the vessel nozzles and bottom head region, the recirculation loop temperatures shall be within 50°F of each other prior to startup of an idle loop." Tech Spec 3.4.1.4, "Idle Recirculation Loop Startup," specifies the differential temperature and operating loop flow requirements that must be met within 15 minutes prior to startup of an idle recirculation loop. ST-6-043-390-1, "Reactor Recirculation Pump Idle Loop Startup Temperature and Flow Check," verifies that proper temperature and flow conditions exist in accordance with Surveillance Requirement (SR) 4.4.1.1.5.

D. Incorrect but plausible: if candidates do not recall maximum steam dome to bottom head temperature differential, or incorrectly apply steam tables. Actual differential is 336-196=140°F.

References: LGSOPS0043A, Rev. 003 Student Ref: Steam Tables

Learning Objective: LGSOPS0043A: IL10/IL14

Question source: Modified PB 12/2009

Question History: Not used on 2008 or 2010 LGS initial exams

Cognitive level: Memory/Fundamental knowledge:
Comprehensive/Analysis: X

10CFR55: 43(b)(2)

Comment: This question is SRO only as cannot be answered solely by knowing ≤1 hour TS/TRM actions, 'above the line' information, or TS safety limits. This question requires knowledge of SR and TS bases.

QUESTION 96

Conditions are as follows:

- Units 1 and 2 are operating at 100%
- The PJM has issued a Maximum Emergency Generation Alert
- Emergency 220 KV Switching was performed due to a switchyard equipment failure requiring immediate action
- Multiple clearances are required to support emergent off-hour work that cannot wait until morning
- The Station Switchyard Coordinator is unavailable

In accordance with OP-AA-108-107-1002, "Interface Procedure Between ComEd / PECO and Exelon Generation (Nuclear / Power) For Transmission Operations:"

The _____(1)_____ shall perform the functions of the Station Switchyard Coordinator.

Station Operations and the PECO _____(2)_____ group may work together in developing and reviewing clearance points to expedite clearance preparation.

A. (1) Shift Manager
(2) Transmission and Substations (T&S)

B. (1) Shift Manager
(2) Transmission System Operations (TSO)

C. (1) Work Execution Center Supervisor
(2) Transmission and Substations (T&S)

D. (1) Work Execution Center Supervisor
(2) Transmission System Operations (TSO)

Level: SRO
Tier #: 3

K&A Rating: G2.2.17 (2.6/3.8)

K&A Statement: **Knowledge of the process for managing maintenance activities during power operations, such as risk assessments, work prioritization, and coordination with the transmission system operator.**

Justification:

A. **Incorrect but plausible:** Plausible if the applicant believes that PECO T&S is the responsible work group for preparing clearances for substation transmission equipment in the switchyard. T&S is responsible for performing the installation, maintenance, operation, and testing of substation / switchyard transmission equipment. See Answer 'B' discussion.

B. **Correct:** IAW with OP-AA-108-107-1002, "Interface Procedure Between ComEd / PECO and Exelon Generation (Nuclear / Power) For Transmission Operations," the Shift Manager shall function in the role of Switchyard Coordinator in the event the Switchyard Coordinator is unavailable (Step 2.40). Per Step 4.6.5, an emergency does not release PECO TSO or Station Operations from any required clearance review steps; however, the requesting work group (TSO in this case) and station personnel may work together in developing and reviewing clearance points to expedite clearance preparation. PECO TSO is the responsible work group for preparing clearances for substation transmission equipment in the switchyard.

C. **Incorrect but plausible:** Plausible if the applicant (1) does not believe or recall that the Shift Manager is required to fulfill the role of Switchyard Coordinator if the Switchyard Coordinator is unavailable, and (2) believes that PECO T&S is the responsible work group for preparing clearances for substation transmission equipment in the switchyard. T&S is responsible for performing the installation, maintenance, operation, and testing of substation / switchyard transmission equipment. See Answer 'B' discussion.

D. **Incorrect but plausible:** Plausible if the applicant does not believe or recall that the Shift Manager is required to fulfill the role of Switchyard Coordinator if the Switchyard Coordinator is unavailable. See Answer 'B' discussion.

References: Lesson Plan LGSOPS2010, Rev. 001 Applicant Ref: None
OP-AA-108-107-1002, Rev. 006

Learning Objective: LGSOPS2010 (Obj. 30.a.3)

Question source: New

Question History: None

Cognitive level: Memory/Fundamental knowledge: X
Comprehensive/Analysis:

10CFR Part 55: 43(b)(5)

Comments:

QUESTION 97

In accordance with LS-AA-104, Exelon 50.59 review process, which of the following proposed changes would REQUIRE a 10 CFR 50.59 Screen?

I. Replace the existing RHR service water sump pump discharge check valves, as described by the UFSAR, with mission DUO-CHECK check valves.

II. Replace motor operator on a safety-related valve which is part of the RCS pressure boundary integrity. The position of the valve is not credited for any accident or safety analysis as described in the UFSAR.

III. Relocating the TSC emergency response facility to a new building within protected area.

A. I ONLY.

B. II ONLY.

C. I & II.

D. I, II, & III.

K&A Rating: 2.2.5 (2.7)

K&A Statement: **Knowledge of the process for making changes in the facility as described in the safety analysis report.**

Justification:

A. **Incorrect but plausible:** Plausible, if the applicant determines that IAW LS-AA-104-1000, 50.59 resource manual, activity involving replacement of the RHR service water sump pump discharge check valve with mission duo check valve is an adverse affect on the design function of an SSC as described in the UFSA, and therefore determine that this activity ONLY would involve 50.59 screening. The applicant determines that the replacement of motor operator on a safety related valve which is not credited for any accident analysis as described by the UFSAR would not involve 50.59 screening, and also relocating TSC, as described in the UFSAR, would not involve 50.59 screening.

B. **Incorrect but plausible:** Plausible if the applicant determines that based on information that the motor operator valve has a design function of part of the primary system boundary as described in the UFSAR, 50.59 screening would be applicable, however based on the information that motor operator has not design function credited for any accident or safety analysis described in the UFSAR this activity would screen out. The applicant determines that replacement of the RHR service water sump pump check valve would not involve 50.59 screening, and also relocating TSC, as described in the UFSAR, would not involve 50.59 screening.

C. **Correct:** IAW LS-AA-104-1000, 50.59 resource manual, activity involving replacement of the RHR service water sump pump discharge check valve with mission duo check valve is an adverse affect on the design function of an SSC as described in the UFSAR, therefore, this activity would involve 50.59 screening. Also, replacement of motor operator on a safety related valve which is not credited for any accident analysis as described by the UFSAR would involved 50.59 screening due to the valve being part of RCS Boundary, however, the motor operator valve would screen out as described by the example 1 listed in LS-AA-104-1000 on page 5-2.

D. **Incorrect but plausible:** Plausible if the applicant determines that relocating TSC involves a change as described in the UFSAR, however, TSC relocation is covered under emergency plan regulation 10CFR50.54(q), and any change in EP is will be handled under 50.54 change process, which will involve NRC review and approval. Also, LS-AA-104, states that if any proposed change is governed by other more specific regulatory requirements then 50.59 review is not applicable.

References: LS-AA-104, Rev. 6
LS-AA-104-1002, Rev. 4
LS-AA-104-1000, Rev. 6

Student Ref: None

Learning Objective: LLOT2001 Learning Objective IL4

Question source: New

Question History:	Not used on 2008 or 2010 LGS initial exams	
Cognitive level:	Memory/Fundamental knowledge: Comprehensive/Analysis:	X
10CFR55:	43(b)(3)	
Comment:		

QUESTION 98

Given the following:

- A loss of coolant accident has occurred
- T-101, RPV Control, and T-102, Primary Containment Control, have been entered
- SE-10, LOCA, has been entered
- 3 hours have elapsed since the LOCA signal
- Plant operators have arrived at step 4.24 of SE-10 which states:

4.24 **WHEN** greater than three hours have elapsed following the LOCA signal, **THEN INJECT** SLC per S48.1.B, Standby Liquid Control System Manual Initiation. **(CM-4)**

WHICH ONE of the following describes the basis for performance of this step?

A. Provide an additional source of injection to the reactor to help recover RPV water level

B. Minimizes radioactive release by making the Suppression Pool pH higher (less acidic)

C. Minimizes radioactive release by making the Suppression Pool pH lower (more acidic)

D. Minimizes radioactive release by borating the reactor coolant inside the reactor vessel

K&A Rating: G2.3.14 (3.8)

K&A Statement: **Knowledge of radiation or contamination hazards that may arise during normal, abnormal or emergency conditions or activities**

Justification:

A. Incorrect but plausible: Establishing SLC injection in 4.24 is not as a means for level control but as a means to control radiological dose following a loss of coolant accident involving core damage. Since SLC is identified as an Alternate Injection System it would likely be started to augment RPV injection in an earlier step of the Level branch, before RPV water level reaches the top of the active fuel. This is a plausible distracter for those candidates that do not recognize the radiological impact from SLC injection once TAF has been reached and also plausible for level control as injection requirements 3 hours after shutdown are much lower and closer to the capacity of the SLC pumps

B. Correct: Design basis analyses credit SLC injection for limiting the radiological dose following loss of coolant accidents involving core damage. Radiation induced reactions are predicted to convert large fractions of dissolved ionic iodine into elemental iodine and organic iodides which can escape into the containment atmosphere. The rate of these reactions is strongly dependent on suppression pool pH. If the pH is maintained greater than 7, very little of the dissolved iodine will be converted to volatile forms and most of the iodine fission products will be retained in the suppression pool. Over time, the pH in the Suppression Pool will tend to lower due to the addition of acidic chemicals. The sodium pentaborate solution used in the SLC system is derived from a strong base and therefore raises suppression pool pH

C. Incorrect but plausible: As described above, SLC is injected to control and raise Suppression Pool pH following the onset of a LOCA. This is a plausible distracter for those candidates who are unsure of the addition of SLC raises or lowers pH in the Suppression Pool

D. Incorrect but plausible: Boration of the reactor coolant is performed to reduce power levels in the core by neutron moderation. This is plausible distracter for those candidates who believe that dose mitigation is achieved with boration of the coolant in the vessel versus the Suppression Pool volume

References: SE-10, Rev. 56
UFSAR Section 9.3.5, Rev. 15
S48.1.B, Rev. 13
LLOT0048, Rev. 0

Applicant Ref: None

Learning Objective: LLOT0048: IL1, IL10
LLOT1563: 03

Question source: Bank NMP 8/2009

Question History: Not used on 2008 or 2010 LGS initial exams

Cognitive level:	Memory/Fundamental knowledge:	X
	Comprehensive/Analysis:	

10CFR Part 55:	43(b)(4), 43(b)(1)

Comments: This question is SRO only as it requires knowledge of administrative procedures that specify implementation and coordination of plant emergency procedures regarding radiation hazards that may arise during abnormal plant conditions and knowledge of conditions and limitations in the facility license.

QUESTION 99

Given the following conditions for Unit 1:

- A reactor scram has occurred
- Reactor power is 7%
- Reactor level is unknown
- T-116, "RPV Flooding," has been entered
- 3 SRVs are open
- RPV pressure <u>cannot</u> be maintained above the Minimum Steam Cooling Pressure
- RPV pressure is 290 psig
- Suppression Pool pressure is 8.5 psig
- Primary Containment radiation levels are rising
- Primary Containment Hydrogen levels are rising

WHICH ONE of the following specifies the procedure(s) that must be executed based on the above conditions?

A. T-116 only

B. SAMP-1 only

C. T-116 and SAMP-1

D. SAMP-1 and SAMP-2

Level: SRO
Tier #: 3

K&A Rating: G2.4.16 (3.5/4.4)

K&A Statement: **Knowledge of EOP implementation hierarchy and coordination with other support procedures or guidelines such as, operating procedures, abnormal operating procedures, and severe accident management guidelines.**

Justification:

A. **Incorrect but plausible:** Plausible if the applicant is unfamiliar with or unable to recall the requirements for SAMP entry from T-116. See Answer 'D' discussion.

B. **Incorrect but plausible:** Plausible if the applicant is unable to recall that SAMP-1 and SAMP-2 are always entered and executed concurrently when SAMP conditions exist. See Answer 'D' discussion.

C. **Incorrect but plausible:** Plausible if the applicant is unable to recall (1) that SAMP-1 and SAMP-2 are always entered and executed concurrently when SAMP conditions exist, and (2) that <u>all</u> TRIP Procedures are exited when SAMP Procedures are entered. See Answer 'D' discussion.

D. **Correct:** Entry into the SAMP Procedures is only directed from T-111, T-116, or T-117. When SAMP Procedures are entered, <u>all</u> TRIP Procedures are exited. When SAMP conditions exist, SAMP-1 and SAMP-2 are always entered and executed concurrently. The requirement to enter SAMP from T-116 is the occurrence of core damage due to loss of adequate core cooling (T-116, Step RF-3). T-116, Note 19, states:

> "Core damage is occurring" refers to ongoing fuel degradation caused by loss of Adequate Core Cooling. Indications include:
>
> - Rising Pri Cnt radiation levels
> - Rising Pri Cnt H2 levels
> - Rising MSL, SJAE, offgas OR Rx bldg. radiation levels
> - RPV level/pressure history prior to loss of RPV level indication

Per T-116 Bases, as long as pressure is above Minimum Steam Cooling Pressure (MSCP) in Table RF-1, the core will be adequately cooled by a combination of submergence and Steam Cooling, regardless of whether water is being injected into the RPV or the reactor is shutdown. If RPV pressure is 51 psig or more above Suppression Pool pressure, it indicates that the RPV is still pressurized. If the RPV remains pressurized but RPV pressure cannot be restored and maintained above the MSCP values in Table RF-1 with less than 5 SRVs open, the core is no longer being adequately cooled. The inability to establish and maintain the required flooding conditions when RPV level is unknown, together with rising radiation and Hydrogen levels, are indications that "core damage is occurring." Therefore, entry into SAMP-1 and SAMP-2 is required based on the stem conditions provided.

References:	Lesson Plan LLOT1562, Rev. 009 T-116, Rev. 017 T-116 Bases, Rev. 012 SAMP-1, Sheet 1, Rev. 006 SAMP-1 Bases, Rev. 002 SAMP-2, Sheet 1, Rev. 009 SAMP-2 Bases, Rev. 008	Applicant Ref: NONE

Learning Objective: LLOT1562 (Obj. 1)

Question source: Modified LGS Bank Question (ID: 561388)

Question History: Not used on LGS 2008 or 2010 Exams

Cognitive level: Memory/Fundamental knowledge:
Comprehensive/Analysis: X

10CFR Part 55: 43(b)(5)

Comments:

QUESTION 100

Unit 1 is operating at 100% power with the following:

Time (hh:mm)	Event
00:00	LOCA occurs
00:08	Based on plant conditions classification of an UNUSUAL EVENT threshold has been reached and determined
00:10	State/Local Notification form completed for UNUSUAL EVENT conditions
00:14	Based on plant conditions classification of an ALERT threshold has been reached and determined

Emergency event notification has not yet been made.

State/Local Notification form for ALERT conditions can be available at 00:16.

At 00:15, IAW EP-AA-111, what are the appropriate actions that should be followed for declaring and reporting emergency to State/Local authorities, and when is the latest time that a declaration to the State/Local authorities must be reported?

	Latest Time For Declaration to State/Local	Level of Emergency Declaration and Report to State/Local Authorities
A.	00:29	Declare and report the UNUSUAL EVENT at this time, however report that Alert conditions were reached and a separate notification will be made as soon as possible.
B.	00:29	Declare and report the ALERT when State/Local Notification form for ALERT is available.
C.	00:23	Declare and report the UNUSUAL EVENT at this time, and ensure that ALERT report is made by the latest time of 00:25 ~~however report that Alert conditions were reached and a separate notification will be made as soon as possible~~.
D.	00:23	Declare and report the ALERT when State/Local Notification form for ALERT is available.

K&A Rating: G.2.4.30 (4.0)

K&A Statement: **Knowledge of the emergency plan.**

Justification:

A. **Incorrect but plausible:** Plausible if the applicant determines that based on plant conditions changes 15 minutes to declare clock resets when alert conditions were reached and UE should be declared without waiting for alert notification form to be completed.

B. **Incorrect but plausible:** Plausible, partially correct that IAW EP-AA-111 if a higher classification is made prior to transmitting an event notification, then notification for the higher classification can supersede the previous event notification, provided that it can be performed within the 15-minute timeframe of the previous event. Also plausible, if the applicant determines that based on plant conditions changes 15 minutes to declare clock resets when alert conditions were reached.

C. **Incorrect but plausible:** Plausible, partially correct that 15 minutes to declare clock starts when UE conditions were recognized, however, EP-AA-111 states that if a higher classification is made prior to transmitting an event notification, then notification for the higher classification can supersede the previous event notification, provided that it can be performed within the 15-minute timeframe of the previous event. Based on the plant conditions, it is reasonable for an applicant to determine that sufficient time exist prior to wait for the alert notification form to be completed prior to reporting. Also plausible, if the applicant determines that UE must be reported within 15 minutes and Alert must be reported within 15 minutes of the state/local notification form completion (00:10)[10+15 = 25mins]. The correct latest time for Alert declaration would be by 00:29.

D. **Correct:** Correct, EP-AA-111 states that if a higher classification is made prior to transmitting an event notification, then notification for the higher classification can supersede the previous event notification, provided that it can be performed within the 15-minute timeframe of the previous event. Based on plant conditions changes 15 minutes to declare clock starts when UE conditions were recognized.

References: EP-AA-111, Rev. 16 Student Ref: None

Learning Objective: LLOT-1572, Objective 2 and 3

Question source: New

Question History: Not used on 2008 or 2010 LGS initial exams

Cognitive level: Memory/Fundamental knowledge: X
Comprehensive/Analysis:

10CFR55: 43.5, 45.11

Comment: