KEY
LGS 2012 NRC Written Exam

1	A	35	B	69	C
2	B	36	C	70	C
3	D	37	C	71	D
4	B	38	A	72	D
5	B	39	A	73	A
6	C	40	A	74	A
7	D	41	C	75	D
8	A	42	C	76	C
9	B	43	B	77	B
10	D	44	A	78	D
11	A	45	C	79	D
12	C	46	C	80	C
13	C	47	C	81	B
14	A	48	D	82	B
15	A	49	A	83	D
16	C	50	D	84	C
17	D	51	B	85	B
18	A	52	A	86	B
19	B	53	C	87	D
20	B	54	B	88	A
21	B	55	A	89	B
22	A	56	B	90	C
23	B	57	C	91	D
24	D	58	C	92	A
25	A	59	D	93	A
26	A	60	A	94	C
27	C	61	D	95	C
28	D	62	B	96	C
29	B	63	B	97	C
30	A	64	B	98	B
31	B	65	D	99	D
32	D	66	D	100	D
33	B	67	D		
34	C	68	C		

KEY VERIFY RESCORE

Student ID Number

USE NO. 2 PENCIL ONLY

- EXAMPLE: A B C D E
- MAKE **DARK** MARKS
- ERASE **COMPLETELY** TO CHANGE
- MAKE NO STRAY MARKS

TEST RECORD	
PART 1	
PART 2	
TOTAL	

Firmware Ver. 3.3+

NAME 2012 ILT NRC (Last) RO Key (First)

SUBJECT ____ INSTRUCTOR ____

DATE ____ PERIOD ____

APPERSON EDUCATION PRODUCTS 800.827.9219
A1705 - RR 05/10 US Patent No. 6,079,624

LGS
Limerick Generating Station

Course: 2012 ILT NRC Exam

Exam ID: RO Key

EXAM KEY

(T) (F)

Question	Answer
1	A
2	B
3	D
4	B
5	B
6	C
7	D
8	A
9	B
10	D
11	A
12	C
13	C
14	A
15	A
16	C
17	D
18	A
19	B
20	B
21	B
22	A
23	B
24	D
25	A
26	A
27	C
28	D
29	B
30	A
31	B
32	D
33	B
34	C
35	B
36	C
37	C
38	A
39	A
40	A
41	C
42	C
43	B
44	A
45	C
46	C
47	C
48	D
49	A
50	D

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RESCORE

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KEY

SCORE

KEY VERIFY RESCORE R

USE NO. 2 PENCIL ONLY

- EXAMPLE: A B C D E
- MAKE **DARK** MARKS
- ERASE **COMPLETELY** TO CHANGE
- MAKE NO STRAY MARKS

TEST RECORD	
PART 1	
PART 2	
TOTAL	

Firmware Ver. 3.3+

NAME ____________________ (Last) (First)

SUBJECT ____________ INSTRUCTOR ____________

DATE ____________ PERIOD ____________

Student ID Number

									ESSAY SCORE		
0	0	0	0	0	0	0	0	0	0	0	0
1	1	1	1	1	1	1	1	1	1	1	1
2	2	2	2	2	2	2	2	2	2	2	2
3	3	3	3	3	3	3	3	3		3	3
4	4	4	4	4	4	4	4	4	E S	4	4
5	5	5	5	5	5	5	5	5	S C	5	5
6	6	6	6	6	6	6	6	6	S O	6	6
7	7	7	7	7	7	7	7	7	A R	7	7
8	8	8	8	8	8	8	8	8	Y E	8	8
9	9	9	9	9	9	9	9	9		9	9

Item	(T) A	(F) B	C	D	E	
51	A	■	C	D	E	B
52	■	B	C	D	E	A
53	A	B	■	D	E	C
54	A	■	C	D	E	B
55	■	B	C	D	E	A
56	A	■	C	D	E	B
57	A	B	■	D	E	C
58	A	B	■	D	E	C
59	A	B	C	■	E	D
60	■	B	C	D	E	A
61	A	B	C	■	E	D
62	A	■	C	D	E	B
63	A	■	C	D	E	B
64	A	■	C	D	E	B
65	A	B	C	■	E	D
66	A	B	C	■	E	D
67	A	B	C	■	E	D
68	A	B	■	D	E	C
69	A	B	■	D	E	C
70	A	B	■	D	E	C
71	A	B	C	■	E	D
72	A	B	C	■	E	D
73	■	B	C	D	E	A
74	■	B	C	D	E	A
75	A	B	C	■	E	D
76	A	B	C	D	E	
77	A	B	C	D	E	
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96	A	B	C	D	E	
97	A	B	C	D	E	
98	A	B	C	D	E	
99	A	B	C	D	E	
100	A	B	C	D	E	

KEY VERIFY RESCORE

Student ID Number

ESSAY SCORE

USE NO. 2 PENCIL ONLY

- EXAMPLE: A B C D E
- MAKE **DARK** MARKS
- ERASE **COMPLETELY** TO CHANGE
- MAKE NO STRAY MARKS

TEST RECORD	
PART 1	
PART 2	
TOTAL	

Firmware Ver. 3.3+

NAME 2012 ILT NRC SRO Key
(Last) (First)

SUBJECT ______ INSTRUCTOR ______

DATE ______ PERIOD ______

APPERSON EDUCATION PRODUCTS 800.827.9219
A1705 - RR 05/10 US Patent No. 6,079,624

Course: 2012 ILT NRC Exam

LGS
Limerick Generating Station

Exam ID: SRO Key

EXAM KEY

(T) (F)

Question	Answer
1	A
2	B
3	D
4	B
5	B
6	C
7	D
8	A
9	B
10	D
11	A
12	C
13	C
14	A
15	A
16	C
17	D
18	A
19	B
20	B
21	B
22	A
23	B
24	D
25	A
26	A
27	C
28	D
29	B
30	A
31	B
32	D
33	B
34	C
35	B
36	C
37	C
38	A
39	A
40	A
41	C
42	C
43	B
44	A
45	C
46	C
47	C
48	D
49	A
50	D

KEY VERIFY RESCORE ⊏R⊐

Student ID Number

USE NO. 2 PENCIL ONLY

- EXAMPLE: ⊏A⊐ ⊏B⊐ ⊏C⊐ ⊏D⊐ ⊏E⊐
- MAKE ***DARK*** MARKS
- ERASE ***COMPLETELY*** TO CHANGE
- MAKE NO STRAY MARKS

TEST RECORD	
PART 1	
PART 2	
TOTAL	

Firmware Ver. 3.3+

NAME ______ (Last) ______ (First)

SUBJECT ______ INSTRUCTOR ______

DATE ______ PERIOD ______

ESSAY SCORE

(T) (F)

Question	Marked	Printed
51	B	B
52	A	A
53	C	C
54	B	B
55	A	A
56	B	B
57	C	C
58	C	C
59	D	D
60	A	A
61	D	D
62	B	B
63	B	B
64	B	B
65	D	D
66	D	D
67	D	D
68	C	C
69	C	C
70	C	C
71	D	D
72	D	D
73	A	A
74	A	A
75	D	D
76	C	C
77	B	B
78	D	D
79	D	D
80	C	C
81	B	B
82	B	B
83	D	D
84	C	C
85	B	B
86	B	B
87	D	D
88	A	A
89	B	B
90	C	C
91	D	D
92	A	A
93	A	A
94	C	C
95	C	C
96	C	C
97	C	C
98	B	B
99	D	D
100	D	D

RESCORE

KEY 100

SCORE

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)

WHICH ONE of the following identifies the reason for using Core Plate ΔP indication?

Due to…

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

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 but does not impact Indicated Core Flow, which comes from the Jet Pumps. Core Plate ΔP and Core Flow are both displayed on the same Control Room recorder, XR-042-*R613.

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 is operating at 100% power when a bus lockout occurs on the 11 Unit Auxiliary Bus.

WHICH ONE of the following describes the plant status 5 minutes later? (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

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

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 a trip of the RFPs on low suction pressure and a 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 due to RFPs tripping on low suction pressure. 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

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
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

Applicant Ref: ARC-MCR-122 F4

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 OR 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

The plant is operating at 24% power following a downpower from 100% with the Turbine remaining online. The following alarms are received:

- TURBINE HI VIBRATION
- TURBINE HI HI VIBRATION

Turbine vibrations on VMS rise to 15 mils and stabilize.

WHICH ONE of the following describes the required Operator action?

A. Immediately scram the Reactor

B. Immediately trip the Turbine. A Reactor scram is not required

C. Scram the Reactor if vibrations are not lowered within 15 minutes

D. Trip the Turbine if vibrations are not lowered within 15 minutes. A reactor scram is not required

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 at 28% power, first stage bowl pressure is low enough to bypass Reactor scrams from the Turbine trip

B. Correct – ARC 105 A-2 requires the turbine to be tripped immediately if vibrations exceed 12 mils. With power at 28%, first stage bowl pressure is low enough to bypass Reactor scrams from the Turbine trip, therefore a scram is not required

C. Incorrect but plausible if candidate does not recognize that 13 mils is above the 10-12 mil range where a 15 minute clock applies prior to tripping the Turbine

D. Incorrect but plausible if the candidate does not recognize that 13 mils is above the 10-12 mil range where a 15 minute clock applies prior to tripping the Turbine, and does not recognize that at 28% power, first stage bowl pressure is low enough to bypass Reactor scrams from the Turbine trip

References: LLOT0001A, Rev. 0
ARC 105 A-2, Rev. 7

Student Ref: None

Learning Objective: LLOT0001A: IL6a, IL8i, IL10j

Question source: Bank NMP 8/09

Question History: None

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

10CFR55: 41.10

QUESTION 5

Both units are initially at 35%.

Given the following indications:

Unit 1

- Unit 1 TCV 1 RETS pressure 485 psig (Pressure Switch PS01-102C)
- Unit 1 TCV 2 RETS pressure 490 psig (Pressure Switch PS01-102A)

Unit 2

- Unit 2 TCV 1 RETS pressure 495 psig (Pressure Switch PS01-202C)
- Unit 2 TCV 2 RETS pressure 498 psig (Pressure Switch PS01-202D)

WHICH ONE 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)

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. See Answer 'B' discussion.

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. One TCV's RETS pressure < 500 psig (RPS Trip Setpoint ≥ 500 psig; TS Table 2.2.1-1) will trip one RPS trip system and cause a Half scram. Two TCV's RETS pressures < 500 psig will trip one or both RPS trip systems, causing a Half or Full Scram, <u>if the right 2 valves trip for each unit</u> as indicated below (3 TCV's RETS pressures < 500 psig will always result in a Full Scram):

		Unit 1	Unit 2
TCV 1	RPS channel	B1	B1
TCV 2	RPS channel	A1	B2
TCV 3	RPS channel	B2	A1
TCV 4	RPS channel	A2	A2

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. See Answer 'B' discussion.

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. See Answer 'B' discussion.

References: Lesson Plan LLOT0071, Rev. 000;

Applicant Ref:
RPS Elementary Dwgs:
C71-1020-E-006
C71-1020-E-007
C71-1020-E-020 sh. 6
C71-1020-E-020 sh. 7
(Partial – to include all Scram Logic up to and including MSV logic string):

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 is at 100% reactor power.

- A fire occurs in the main Control Room which requires entry into SE-1, Remote Shutdown
- The Control Room has been evacuated
- RPV water level is +55 inches and rising
- RCIC flow has been minimized

WHICH ONE of the following **prompt** actions is required to be performed per SE-1?

A. Trip HPCI locally

B. Trip RCIC locally

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

D. Shutdown RCIC from the Remote Shutdown Panel using emergency shutdown key

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. Applicant may determine that HPCI needs to be tripped locally prior to establishing RSP control.

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. 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.

C. **Correct:** If Rx level is above +54 inches and continues to rise, then HPCI is shutdown 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 (RSP), and emergency transfer functions are available to RSP to prevent spurious operation during fire.

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 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 ONE 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

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 backup 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 is at 35% Reactor Power.

ON-119 has been entered 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 scram 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 ONE of the following describes the position of PV-015-267, "Service Air Header Press. Control Valve," and the controller demand signal to the LV-C-006-238A, "Startup Level Control Valve"?

	PV-015-267	**LV-C-006-238A Controller Demand Signal**
A.	CLOSED	FULL OPEN
B.	CLOSED	FULL CLOSED
C.	OPEN	FULL OPEN
D.	OPEN	FULL CLOSED

K&A #	295019 AA1.01
Importance Rating	3.5/3.3

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-015-267 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 below setpoint (20"), LV-C-006-238 controller demand signal would be open.

B. Incorrect but plausible – with both Instrument Air headers below 70 psig, PV-015-267 will close to isolate the service air header to allow Service Air to supply the Instrument Air headers via check valves. Failure position of LV-C-006-238 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-015-267.

D. Incorrect but plausible if the candidate does not recall operation or setpoint of PV-015-267; additionally, failure position of LV-C-006-238 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: Comprehensive/Analysis:	X	
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 OPCON 4
- 'A' RHR in Shutdown Cooling (SDC)
- Average RCS temperature is 185 °F and stable
- No Reactor Recirc Pumps are running

An inadvertent SDC isolation occurs.

WHICH ONE of the following identifies the minimum RPV Level that will prevent Thermal Stratification, and whether adequate decay heat removal (DHR) exists at this minimum level?

	RPV Level	Adequate DHR Exists
A.	60 inches on Upset Range Indication	No
B.	60 inches on Shutdown Range Indication	No
C.	78 inches on Upset Range Indication	Yes
D.	78 inches on Shutdown Range Indication	Yes

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:** Plausible if the applicant believes that natural circulation is credited as an alternative method of reactor coolant circulation above 60 inches on Upset Range indication. The 60 inches is only applicable to Shutdown Range indication. The minimum RPV water level for Upset Range indication is 78 inches. 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, additional 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:** Plausible if the applicant believes that establishing natural circulation above 78 inches on Upset Range indication also ensures adequate decay heat removal. 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 60 inches on Shutdown Range indication. Plausible if the applicant believes or reasons that the additional 18 inches is sufficient to ensure adequate decay heat removal. 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
- Core Shuffle Part 2 is in progress
- 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
- 'B' Loop of RHR and 'B' Loop of Core Spray are injecting into the RPV
- Reactor pressure is 45 psig
- Drywell pressure is 17.5 psig
- Drywell temperature is 290 °F
- Suppression Pool pressure is 12.5 psig
- Suppression Pool level is 39.2 feet
- Suppression Pool temperature is 115 °F

WHICH ONE of the following identifies the correct action?

A. Place one loop of RHR in Suppression Pool cooling and one loop of RHR in Suppression Pool Spray

B. Place one loop of RHR in Suppression Pool cooling and one loop of RHR in Drywell spray

C. Place one loop of RHR in Suppression Pool Spray and one loop of RHR in Drywell spray

D. Place two loops of RHR in Drywell spray

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 and all Low Pressure ECCS available for RPV injection), 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 T-102, 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 partially close and then back open
- REACTOR HI PRESS (107 G-2) alarm is received
- Reactor pressure is 1058 psig and slowly rising

WHICH ONE of the following actions is required by OT-102, “Reactor High Pressure”?

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. Control reactor pressure $\leq$1096 psig using bypass valve jack or reducing pressure set

K&A # 295025 EA 2.01
Importance Rating 4.3/4.3

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. Correct: With reactor pressure at 1058 psig and continuing to rise, immediate operator actions is directed from OT-102 to reduce reactor power using GP-5 and RMSI to reduce reactor pressure ≤1053 psig

D. Incorrect but plausible - 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 pressure continues to rise, action must first be taken to reduce reactor power to reduce RPV pressure ≤1053 psig. Once it is reduced, it is then directed to be controlled by the subsequent step using the bypass valve jack and reducing 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 on 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 <u>most likely</u> lead to the symptoms described by the Equipment Operator for the C and D RHR pumps?

	Suppression Pool Temperature	Suppression Pool 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

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." Note 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 Drywell leak on Unit 2 results in the following conditions:

- Reactor Scram
- Drywell Pressure is 2 psig and up slow
- Drywell Temperature is 148°F and up slow

The CRS directs the PRO to maximize drywell cooling.

WHICH ONE of the following describes:

(1) The MINIMUM number of Drywell Fans that must be in service in order to maximize drywell cooling, AND
(2) The MINIMUM required suction pressure to restart Drywell Chilled Water (DWCW)?

	Drywell Fans	DWCW Suction Pressure
A.	One Fan per Cooler	35 psig
B.	One Fan per Cooler	80 psig
C.	Two Fans per Cooler	35 psig
D.	Two Fans per Cooler	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. **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 DWCW system can be determined by DWCW Head Tank High/Low Level Alarm (computer point G532) not being in alarm OR DWCW minimum pump suction pressure greater than 35 psig as read on PI-87-*09A(B).

B. **Incorrect but plausible:** Partially correct as 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. Plausible, if the applicant does not understand the availability requirements of DWCW minimum suction pressure > 35 psig. Minimum suction pressure > 80 psig is a requirement for RECW pump.

C. **Incorrect but plausible:** Partially correct as minimum requirements of DWCW suction pressure > 35 psig. 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 per cooler.

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 per cooler. Also, if the applicant does not understand the availability requirements of DWCW minimum suction pressure > 35 psig. Minimum suction pressure > 80 psig is a requirement for RECW pump.

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

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 (RCIC suction normally aligned to the CST, but can also take 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 'or' to an 'and' 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

Unit 2 plant conditions are as follows:

- Reactor power is 100%
- Division I DC is de-energized

A Digital FWLCS malfunction results in the following:

- RPV water level drops below -38" for five seconds before recovering to +10"
- RPV pressure peaks at 1140 psig
- Reactor Power is 28% steady

WHICH ONE of the following identifies the status of the ARI valves and the Recirc Pumps 30 seconds later?

	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	'B' tripped, 'A' running at 28% speed

K&A #	295031 EK 2.10
Importance Rating	4.0/4.0

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. Correct- ARI initiation setpoints: 1149 psig RPV pressure OR -38" RPV water level. ATWS RPT initiation setpoints: 1149 psig RPV pressure OR -38" RPV water level *after a 9 second time delay* (sealed in). With RPV water level reaching and recovering above -38", ARI and ATWS RPT are initiated. Even though RPV water level recovered prior to 9 seconds, the signal is sealed in and will result in a trip of both recirc pumps

D. Incorrect but plausible if candidate does not recall that that the ATWS RPT trip signal seals in and will result in a recirc pump trip even if level recovers before the 9 second timer expires. Also plausible if candidate believes that a loss of DIV 1 DC will result in a trip of only one recirc pump, when in fact it will still result in a trip of both pumps, except that only *one* RPT breaker will trip for each recirc pump due to the loss of DIV 1 DC

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:

- An 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)

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 "A" Standby Gas Treatment System (SBGT) Fan and the location to obtain a valid reading of Reactor Enclosure Effluent radiation levels?

	"A" SGTS Fan	Effluent Rad Reading
A.	Running	North Stack Monitor
B.	Running	South Stack Monitor
C.	Shutdown	North Stack Monitor
D.	Shutdown	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

"CONT EL 239 SWGR BATT 1" (006, I-2U) Fire Alarm sounds in the Main Control Room. No Fire Pumps are operating.

WHICH ONE of the following identifies the required response per SE-8, "FIRE," and the Fire Protection System that services this area?

	Required Response	Fire Protection System
A.	Dispatch Fire Brigade Leader	Halon
B.	Dispatch Fire Brigade Leader	Wet Pipe Sprinkler System
C.	Dispatch Full Fire Brigade	Halon
D.	Dispatch Full Fire Brigade	Wet Pipe Sprinkler System

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:** Plausible if the applicant is unable to recall that the Halon 1301 System only serves (1) the Unit 1 and Unit 2 Aux Equipment Rooms, (2) the Remote Shutdown Room, and (3) the TSC Building.

B. **Correct:** In accordance with Step 3.3.1 of SE-8, "Fire," if a fire alarm is in with NO automatic Fire Pump start, only the Fire Brigade Leader is dispatched. If confirmatory indications (e.g., confirmed report of fire or smoke, additional alarms in the area, etc) are received that the fire is real, OR the Fire Brigade Leader dispatched to the scene determines that a Full Fire Brigade response is necessary, then the Full Fire Brigade is Activated. The "CONT EL 239 SWGR BATT I" fire alarm is associated with an area that is protected by a Wet Pipe Sprinkler System (reference ARC-MCR-006-I2U).

C. **Incorrect but plausible:** Plausible if the applicant (1) is unable to recall or is unaware that a Full Fire Brigade response is not initially warranted upon receipt of an area fire detection alarm with NO accompanying automatic Fire Pump start, and (2) is unable to recall that the Halon 1301 System only serves (a) the Unit 1 and Unit 2 Aux Equipment Rooms, (b) the Remote Shutdown Room, and (c) the TSC Building.

D. **Incorrect but plausible:** Plausible if the applicant is unable to recall or is unaware that a Full Fire Brigade response is not initially warranted upon receipt of an area fire detection alarm with NO accompanying automatic Fire Pump start.

References: SE-8, Rev. 043
Lesson Plan LGSOPS2000, Rev. 000
Lesson Plan LLOT0733, Rev. 000
ARC-MCR-006-I2U, Rev. 004

Applicant Ref: NONE

Learning Objective: LGSOPS2000 (LLOT1563.01)
LGSOPS2000 (LLOT1563.03)
LLOT0733 (LO3)

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 71 psig
- Generator Output 1150 MWe
- Reactive Load 350 MVAR
- Field Amps 6394 Amps
- Terminal Voltage 21.5 kV

Which one of the following identifies the single action that will restore all 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

K&A # 700000 AA 1.03
Importance Rating 3.8/3.7

QUESTION 20

K&A Statement: Ability to operate and/or monitor voltage regulator controls as they apply 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: S32.3.A, GP-5, Att. 6

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 12 months when the reactor is manually scrammed due to a loss of condenser vacuum.

The following conditions exist 1 minute after the scram:

- HPCI is unavailable
- RCIC is manually initiated
- RPV pressure is 955 psig
- Condenser vacuum is 8.4" Hg Vac and slowly lowering

WHICH ONE of the following identifies the RPV Pressure and Level trend over the next 10 minutes? (Assume no operator action)

	Pressure Trend	Level Trend
A.	Cycling	Rising
B.	Cycling	Lowering
C.	Steady	Rising
D.	Steady	Lowering

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:** Plausible if the applicant believes that RCIC has sufficient capacity to make up for boil off that is occurring due to decay heat in the reactor within the first 15 minutes following the scram.

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. Pressure will be cycling on the SRVs. RFPTs trip at 15" Hg Vac. RCIC is manually initiated 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 following the scram. RCIC Lesson Plan LLOT0380 states that (1) the RCIC system provides adequate core cooling if the reactor is isolated from its primary heat sink (main condenser) with a loss of feedwater flow to the vessel, without requiring actuation of any other emergency core cooling system equipment (i.e., HPCI), (2) RCIC is designed to provide makeup to the vessel as part of the planned operation for periods when the main condenser is unavailable, and (3) within approximately 15 minutes of MSIV closure, RCIC capacity should be enough to make up for boil off that is occurring due to decay heat in the reactor.

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 (i.e., RPV pressure cannot be stabilized by the EHC Control System). Pressure will be cycling on the SRVs. 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. RFPTs trip at 15" Hg Vac. Also plausible if the applicant believes that RCIC has sufficient capacity to make up for boil off that is occurring due to decay heat in the reactor within the first 15 minutes following the scram.

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 (i.e., RPV pressure cannot be stabilized by the EHC Control System). Pressure will be cycling on the SRVs. 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
LGSOPS0007, Rev. 002
LLOT0380, Rev. 025

Applicant Ref: NONE

Learning Objective: LGSOPS0007 (IL6.a)

	LLOT0380 (Obj. 1 Obj. 3.e)
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:

- Reactor Power is 80% during a startup following refueling
- A large fuel leak has been identified

A Feedwater Malfunction results in a High Level Turbine Trip and Reactor Scram with the following conditions:

- RPV Pressure is 540 psig and lowering fast
- RPV Level is 90" and rising rapidly

Both the Hotwell and Equipment Drain Collection Tank have sufficient capacity to receive reactor letdown.

WHICH ONE of the following describes the appropriate action IAW OT-110, "Reactor High Level" and the preferred RWCU Blowdown path?

	Appropriate Action	RWCU Blowdown Path
A.	Trip the running Condensate pumps	Equipment Drain Collection Tank
B.	Trip the running Condensate pumps	Main Condenser Hotwell
C.	Close the RFP discharge valves	Equipment Drain Collection Tank
D.	Close the RFP discharge valves	Main Condenser Hotwell

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). <u>However</u>, 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. This information is provided in the OT-110 Bases document. In addition, with suspected fuel damage, RWCU blowdown to the Equipment Drain Collection Tank is the preferred blowdown path. CAUTION associated with Step 4.9 of S44.4.A, "RWCU System Blowdown Using RWCU Recirc Pumps," states that poor quality water should be sent to the Equipment Drain Collection Tank rather than the Condenser or Condensate Storage Tank. The CAUTION also states that if fuel damage is suspected, RWCU shall only be placed in the blowdown mode with permission of the Shift Manager. OT-110, Step 3.10, contains the same CAUTION regarding blowdown operations with suspected fuel damage. Associated OT-110 Bases document states "Reactor coolant radioactivity should be taken into consideration prior to blowing down to the Main Condenser, especially with failed fuel." Blowdown directed to the Main Condenser Hotwell could result in elevated offsite release rates and offsite dose.

B. **Incorrect but plausible:** With suspected fuel damage, RWCU blowdown to the Equipment Drain Collection Tank is the preferred blowdown path. CAUTION associated with Step 4.9 of S44.4.A, "RWCU System Blowdown Using RWCU Recirc Pumps," states that poor quality water should be sent to the Equipment Drain Collection Tank rather than the Condenser or Condensate Storage Tank. The CAUTION also states that if fuel damage is suspected, RWCU shall only be placed in the blowdown mode with permission of the Shift Manager. OT-110, Step 3.10, contains the same CAUTION regarding blowdown operations with suspected fuel damage. Associated OT-110 Bases document states "Reactor coolant radioactivity should be taken into consideration prior to blowing down to the Main Condenser,

especially with failed fuel." Plausible if the applicant does not recognize that blowdown directed to the Main Condenser Hotwell could result in elevated offsite release rates and offsite dose.

C. **Incorrect but plausible:** Plausible if the applicant does not realize that the RFP discharge valves take time to close (approximately 80 to 100 seconds) and that 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:** Plausible if the applicant does not realize that the RFP discharge valves take time to close (approximately 80 to 100 seconds) and that 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, RWCU blowdown to the Equipment Drain Collection Tank is the preferred blowdown path. CAUTION associated with Step 4.9 of S44.4.A, "RWCU System Blowdown Using RWCU Recirc Pumps," states that poor quality water should be sent to the Equipment Drain Collection Tank rather than the Condenser or Condensate Storage Tank. The CAUTION also states that if fuel damage is suspected, RWCU shall only be placed in the blowdown mode with permission of the Shift Manager. OT-110, Step 3.10, contains the same CAUTION regarding blowdown operations with suspected fuel damage. Associated OT-110 Bases document states "Reactor coolant radioactivity should be taken into consideration prior to blowing down to the Main Condenser, especially with failed fuel." Plausible if the applicant does not recognize that blowdown directed to the Main Condenser Hotwell could result in elevated offsite release rates and offsite dose.

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

Unit 1 is operating at 100% power with the Drywell Unit Cooler Fans aligned as follows:

- Drywell Unit Cooler Fans 1A2V212 through 1H2V212 are in RUN

A large steam leak in the Drywell results in the following conditions:

- Drywell Pressure 15 psig and up fast
- Reactor Pressure 450 psig and down fast

WHICH ONE of the following describes the response of Drywell Unit Cooler Fans 1A2V212 through 1H2V212 to these conditions?

A. Fans remain running

B. Fans trip and auto restart approx. 30 seconds later

C. Fans trip, LOCA Fans A, B, G, H auto restart approx. 30 seconds later;
All other fans require manual restart following reset of shunt trip breakers

D. Fans trip, LOCA Fans A, B, G, H auto restart approx. 55 seconds later;
All other fans trip and require manual restart following reset of shunt trip breakers

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, 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. Plausible if the applicant believes that the fans will not be load shed as a result of the LOCA.

B. **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 standby ("AUTO") will not start unless a low flow condition is sensed for 55 seconds, followed by an additional 30 second time delay.

C. **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 shunt trip breakers are not required to be reset in order to restart the fans. Plausible if the applicant believes that only the LOCA designated fans will auto restart.

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. The shunt trip breakers are not required to be reset in order to restart the fans. The 55 second time delay is associated with the low flow auto start circuit for Fans A2 through H2 in the standby ("AUTO") mode. Plausible if the applicant believes (1) that only the LOCA designated fans will auto restart, and (2) confuses the low flow auto start time delay with the LOCA sequencing time delay.

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 during Startup (RWM sequence has NOT been updated)
- 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

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 only)

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

Unit 1 plant conditions are as follows:

- Reactor Power is 100%
- Outside air temperature is 95° F
- "1B" Drywell Chiller is in service
- "1A" and "1B" Drywell Chilled Water Pumps are in service

A Dead Bus Transfer of the D12 Bus results in a loss of Drywell Chilled Water with the following indications:

- Drywell temperature is 143 ° F and up slow
- Drywell pressure rises to 0.7 psig

WHICH ONE of the following identifies the required action(s) to restore cooling?

A. Reopen the DWCW Containment isolation valves

B. Reset isolation R2 with Blue/Green reset per GP 8.3 and reopen the DWCW Containment isolation valves

C. Bypass the isolation per GP 8.5 and reopen the DWCW Containment isolation valves

D. Re-start "1B" Drywell Chiller

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. **Correct:** The Dead Bus transfer of D12 will de-energize the interposing relays, resulting in isolation/closure of the DWCW Containment Isolation Valves upon re-energization of the bus. The valves can be re-opened when D12 power is restored because no isolation signal is present.

B. **Incorrect but plausible:** Plausible if the applicant believes an isolation signal exists. Performing an R2 with Blue/Green reset would clear an existing isolation signal when the monitored parameter (i.e., High DW Pressure for DWCW Containment Isolation Valves) has returned to a normal value. With no isolation signal present, the DWCW Containment Isolation Valves can be re-opened once power is restored to the D12 bus.

C. **Incorrect but plausible:** Bypassing the isolation per GP-8.5 is plausible if the applicant believes that an isolation signal exists. With no isolation signal present, the DWCW Containment Isolation Valves can be re-opened once power is restored to the D12 bus. In addition, GP-8.5 is not directed until DW temperature rises above 145°F in accordance with T-102, Step DW/T-4.

D. **Incorrect but plausible:** Plausible if the applicant fails to recognize that DW cooling cannot be restored until the DWCW Containment Isolation Valves are re-opened.

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 833382)

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 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

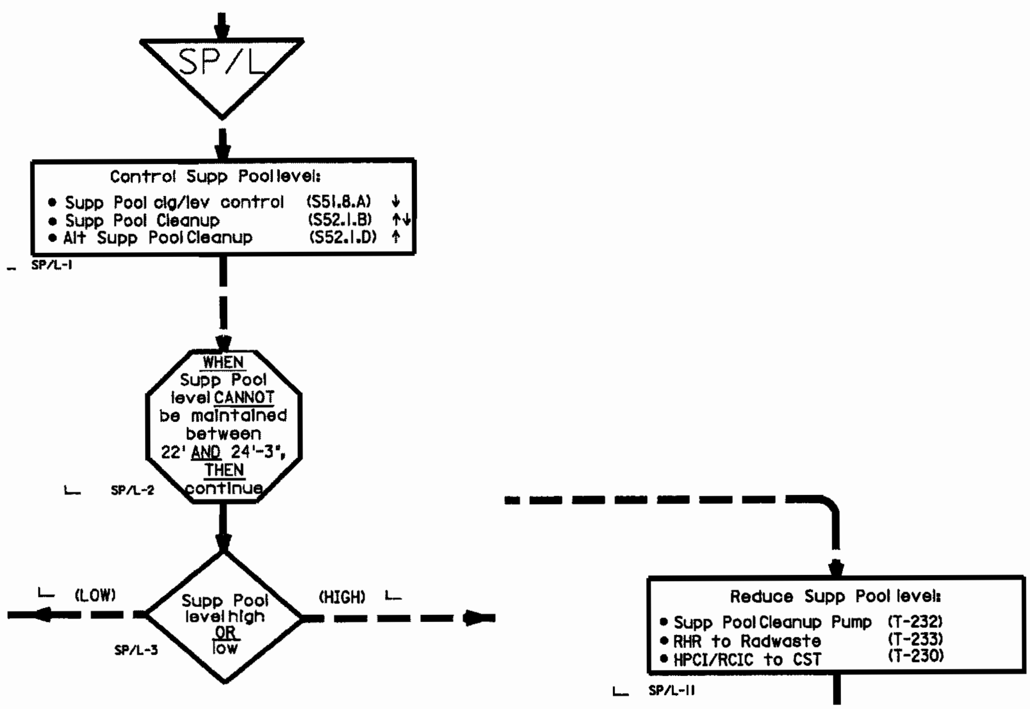
WHICH ONE of the following procedures must be used to control Suppression Pool level?

A. T-233, Dumping Suppression Pool Inventory to Radwaste by way of RHR Loop A

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

C. T-232, Suppression Pool Cleanup Pump Isolation Bypass

D. T-230, Suppression Pool to CST by way of HPCI or RCIC



Level: RO
Tier #: 1
Group #: 2

K&A Rating: 295029 EK2.01 (3.0/3.3)

K&A Statement: **Knowledge of the interrelations between HIGH SUPPRESSION POOL WATER LEVEL and the following:** RHR/LPCI

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:** S52.1.D, "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 S52.1.D 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:	41.7	
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

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:

- OPCON 3
- RPV pressure 500 psig and steady
- '1B' RHR pump in Suppression Pool Cooling

An inadvertent DIV 2 LOCA signal occurs.

One minute later, the HV-C-51-1F048B (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 HV-C-51-1F048B?

	'1B' RHR Pump	HV-C-51-1F048B
A.	Injecting	Remains Open
B.	Injecting	Closes and Reopens
C.	Not Injecting	Remains Open
D.	Not Injecting	Closes and Reopens

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

Unit 1 plant conditions are as follows:

- OPCON 4
- RPV level is 80" on Upset Range
- 'A' RHR Pump running in Shutdown Cooling (SDC)

Reactor water level lowers to -20" on Wide Range.

WHICH ONE of the following describes the status of the "A" RHR Pump and HV-51-1F015A RHR S/D Clng. Rtn. (OUTBOARD) Valve five minutes later? (Assume no operator actions).

	"A" RHR Pump	HV-51-1F015A
A.	Tripped	Open
B.	Tripped	Closed
C.	Running	Open
D.	Running	Closed

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:** Plausible if the applicant believes that Low Reactor Level +12.5 inch Group 2 isolation signal only results in auto closure of the Inboard Suction Isolation Valve (1F009).

B. **Correct:** RHR SDC Inboard (1F009) and Outboard (1F008 & 1F015A) valves close on the Low Reactor Level +12.5 inch Group 2 isolation signal on Channels A through D, due to actual RPV level lowering to -20 inches. The '1A' RHR pump trips on loss of suction path due to auto closure of the 1F008 and 1F009 valves.

C. **Incorrect but plausible:** Plausible if the applicant believes that the RHR SDC Valve isolations are bypassed in OPCON 4 when RPV level reaches 80 inches on the Upset Range. The valve isolations are defeated when the Unit is in OPCON 5 with cavity level > 22 feet, per S51.7.B, "Defeating the RHR Shutdown Cooling Auto Isolation."

D. **Incorrect but plausible:** Plausible if the applicant believes that the RHR SDC loss of suction trip (resulting from 1F008/1F009 auto closure) is disabled when RPV level reaches 80 inches on the Upset Range, and that the '1A' RHR pump is running on Min Flow. Inboard and Outboard SDC valve isolations are defeated when the Unit is in OPCON 5 with cavity level > 22 feet, per S51.7.B, "Defeating the RHR Shutdown Cooling Auto Isolation."

References: S51.7.B, Rev. 009
LLOT0051, Rev. 000

Student Ref: None

Learning Objective: LLOT0051: IL7, IL8, IL11

Question source: Modified LGS bank 555993

Question History: None

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

10CFR 41.7

Comment:

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 effect on the HPCI system?

A. Vacuum Breaker Isolation Valve HV55-1F095 (INBOARD) Auto Isolation is inoperative

B. Suppression Pool Suction Valve HV55-1F042 (INBOARD) Auto Isolation is inoperative

C. Turbine Stop Valve FV56-112 valve logic is inoperative

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

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 isolation of HV55-1F095 upon receipt of High Drywell pressure **AND** Low HPCI steam supply pressure signals. Individual valve control may be used to close 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 for auto isolation capability. The loss of DIV 2 125 VDC power will prevent automatic closure of HV55-1F042 upon receipt of HPCI Isolation signals. Individual valve control may be used to close the valve since it is powered by AC.

C. **Incorrect but plausible:** Plausible if the applicant does not recall that DIV 2 125 VDC provides power to FV56-112 valve position monitoring (valve logic). 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 (valve logic). 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"

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 <u>no</u> 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
S55.1.C, Rev. 016
S55.1.E APPENDIX 1, Rev. 004
OP-LG-108-101-1001, Rev. 007

Applicant Ref: NONE

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 reactor coolant leak occurs which results in the following:

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

WHICH ONE of the following describes the status of the "1C" Core Spray Pump and the HV-052-1F015A, CORE SPRAY LOOP A TEST BYPASS PCIV at this time?

	"1C" Core Spray Pump	HV-052-1F015A
A.	Tripped then restarted	Closed and CANNOT be reopened
B.	Continues running	Closed and CANNOT be reopened
C.	Tripped	Closed and CANNOT be reopened
D.	Continues running	Remains 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 2 DC 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

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 (i.e., DIV2 DC) 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 (i.e., DIV 2 DC) 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 (i.e., DIV 2 DC) 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 Applicant Ref: NONE
ARC 108 REACTOR (I-2), Rev. 000

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 2 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 21 Unit Aux Transformer
- TURBINE CONTROL VALVE/STOP VALVE SCRAM BYPASSED (ARC-MCR-207, A-2) alarm is in and will not clear

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

- PIS-001-2N652A is lit
- PIS-001-2N652B is NOT lit
- PIS-001-2N652C is NOT lit
- PIS-001-2N652D is NOT lit

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-001-2N652A, 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-001-2N652A. 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 perform GP-11, Scram Reset. 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 A4.14
Importance Rating 3.8/3.8

QUESTION 35

K&A Statement: Ability to manually operate and/or monitor in the control room: reset system following system activation

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
- Shorting Links are installed

Then:

- The output of the High Voltage Power Supply (HVPS) for IRM ‘G’ drops to 84 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

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 IRM 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

Unit 2 is in OPCON 5, refueling is in progress.

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	Rod Block occurs, Reactor Scram will NOT occur
C.	A SRM Upscale/Inop alarm	Rod Block occurs, Reactor Scram will NOT 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 based on SRM downscale condition.

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 is at 35% power.

An LPRM failure results in 2 LPRM input signals remaining to ARPM 1 at Axial Level 'C'.

WHICH ONE of the following identifies the Rod Block status and the RBM Channel 'A' Reference APRM if APRM 1 is bypassed?

	Rod Block	RBM 'A' Reference APRM w/ APRM 1 Bypassed
A.	YES	APRM 3
B.	YES	APRM 4
C.	NO	APRM 3
D.	NO	APRM 4

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. **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. The affected APRM must be manually bypassed in this case. 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)*. APRM 3 is the First Alternate APRM for RBM Channel 'A' with APRM 1 bypassed. APRM 4 is the Second Alternate.

B. **Incorrect but plausible:** Plausible if the applicant (1) is unable to recall that APRM 3 is the First Alternate APRM for RBM Channel 'A' with APRM 1 bypassed (APRM 4 is the Second Alternate), or (2) confuses RBM Channel 'A' First and Second Alternate APRMs (3 and 4 respectively) with RBM Channel 'B' First and Second Alternate APRMs (4 and 3 respectively).

C. **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.

D. **Incorrect but plausible:** Plausible if the applicant (1) is unable to recall that a rod withdrawal block is generated for < 3 LPRM detector input signals per Axial Level, (2) is unable to recall that APRM 3 is the First Alternate APRM for RBM Channel 'A' with APRM 1 bypassed (APRM 4 is the Second Alternate), or (3) confuses RBM Channel 'A' First and Second Alternate APRMs (3 and 4 respectively) with RBM Channel 'B' First and Second Alternate APRMs (4 and 3 respectively).

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:	X
	Comprehensive/Analysis:	
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
- Division 1 DC is de-energized
- 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

Unit 1 plant conditions are as follows:

- 100% Reactor Power
- HV-49-1F060, "RCIC Turbine Exhaust" is closed for troubleshooting
- All other RCIC valves are in their normal position

At T=0:
- A transient occurs resulting in RPV water level lowering to -42"

At T=15 minutes:
- MCR has been evacuated and SE-1, "Remote Shutdown" is being performed
- All RSP transfer switches are in EMERG
- Section 4.3 of SE-1 has been directed to maintain RPV level using RCIC

No other operator action is taken.

WHICH ONE of the following describes:

(1) RCIC response to the conditions given at T=0, AND
(2) What actions must be performed at T=15 minutes?

A. (1) RCIC will NOT start due to interlocked Steam Supply (1F045) and Turbine Exhaust (1F060) valves
(2) Manually start RCIC using SE-1; Steam Supply (1F045) will NOT close on RPV High Level

B. (1) RCIC will NOT start due to interlocked Steam Supply (1F045) and Turbine Exhaust (1F060) valves
(2) Manually start RCIC using SE-1; Steam Supply (1F045) will close on RPV High Level

C. (1) RCIC will start which will result in burst of the rupture disc and will automatically isolate
(2) Verify RCIC isolation using GP-8.1, "Automatic Actions by Isolation Signals"

D. (1) RCIC will start which will result in burst of the rupture disc and will NOT automatically isolate
(2) 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. Correct – At T=0, RCIC auto initiation is enabled, and based on low low level (-38") RCIC would auto initiate, however, Steam Supply (1F045) and Turbine Exhaust (1F060) valves interlock prevents RCIC auto initiation. Since MCR has been evacuated, and all of the RSP transfer switches are in EMERG, RCIC will NOT auto start at T=15 min and RCIC RPV high level trip is bypassed.

B. Incorrect but plausible, partially correct, At T=0, RCIC auto initiation is enabled, and based on low low level (-38") RCIC would auto initiate, however, Steam Supply (1F045) and Turbine Exhaust (1F060) valves interlock prevents RCIC auto initiation. Since MCR has been evacuated, and all of the RSP transfer switches are in EMERG, RCIC will NOT auto start at T=15 min and RCIC RPV high level trip is bypassed.

C. Incorrect but plausible if applicant does not recognize that due to Steam Supply (1F045) and Turbine Exhaust (1F060) valves interlock, RCIC will not auto start. If applicant determines that RCIC will start then it 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. Incorrect but plausible if applicant does not recognize that due to Steam Supply (1F045) and Turbine Exhaust (1F060) valves interlock, RCIC will not auto start. If applicant determines that RCIC will start then it 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. Also, RCIC auto isolation is defeated when RCIC controls are transferred to RSP.

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

Unit 2 is at 100% power when a Drywell Leak results in the following:

- Scram on High Drywell Pressure
- Turbine Trip and failure of the Bypass valves to open

Drywell Pressure rises to 15 psig and the PCIG Header is depressurized.

WHICH ONE of the following identifies the ability to operate SRVs?

A. NO SRV's will operate

B. ADS SRVs ONLY will have limited operation

C. C, A, N and ADS SRVs will have limited operation

D. B, J, C and ADS SRVs will have limited operation

Level: RO
Tier #: 2
Group #: 1

K&A Rating: 218000 K4.04 (3.5/3.6)

K&A Statement: **Knowledge of AUTOMATIC DEPRESSURIZATION SYSTEM design feature(s) and/or interlocks which provide for the following:** Insures adequate air supply to ADS valves: Plant-Specific

Justification:

A. **Incorrect but plausible:** Plausible if the applicant believes that depressurization of the PCIG Header renders the ADS and C, A, N SRV accumulators unavailable (i.e., does not recall that there are check valves upstream of the accumulators). See Answer 'C' discussion.

B. **Incorrect but plausible:** Plausible if the applicant does not recall that the C, A, N SRVs have installed accumulators. See Answer 'C' discussion.

C. **Correct:** The ADS and C, A, N SRVs have installed accumulators that provide a storage volume of nitrogen for valve operation should instrument gas be lost. The accumulators are designed for two valve cycles/actuations with drywell pressure at 38.5 psig, assuming design basis leakage. Given the stated conditions, the ADS and C, A, N SRVs can still be operated because of the reserve volume of stored nitrogen that exists in the accumulators. The C, A, N SRVs can be operated from the Remote Shutdown Panel (RSP). The installation of accumulators for these SRVs provides a Fire Safe Shutdown method of depressurizing the RPV from the RSP. Note that because the PCIG Header is depressurized (specified in the stem), the capability does not exist to provide an alternate pneumatic supply to the C, A, N SRVs from D*1, D*2, and D13 Diesel generator starting air receivers. The B, J, C SRVs do not have accumulators. These three SRVs have straight runs in the suppression pool airspace and are to be used if reactor level is high. This is to minimize the possibility of a water-hammer induced tailpipe rupture in the suppression pool airspace.

D. **Incorrect but plausible:** Plausible if the applicant confuses the B, J, C SRVs with the C, A, N SRVS; believing that B, J, and C have the installed accumulators. See Answer 'C' discussion.

References: Lesson Plan LGSOPS0050, Rev. 000; Applicant Ref: NONE
Lesson Plan LGSOPS0001B, Rev. 000
Unit 2 TS Bases 3.5.1 ECCS – Operating (Page 3/4 5-2, Amendment No. 147)

Learning Objective: LGSOPS0050 (IL2.a)
LGSOPS0050 (Obj EO2.c, EO2.g, IL2.d)

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

A T-103 Shutdown has been performed on Unit 1 due to an unisolable primary coolant leak in the RWCU Non-Regenerative Heat Exchanger Room. The following conditions exist:

- RPV pressure is 725 psig and slowly lowering
- RPV water level is -140 inches and has been below Level 1 for 420 seconds
- Drywell Pressure is 0.5 psig and steady
- DIV 1 ADS AUTO INHIBIT Switch is in “INHIB”
- DIV 3 ADS AUTO INHIBIT Switch has failed in “NORM” position
- All low pressure ECCS Pumps are running with normal indications

At 515 seconds after reaching RPV Level 1, the DIV 3 ADS Logic Reset Pushbutton is depressed and released.

WHICH ONE of the following identifies the effect on the ADS valves?

A. Valves will close and re-open 420 seconds later

B. Valves will close and re-open 525 seconds later

C. Valves will remain closed; valves will auto open 525 seconds later

D. Valves will remain closed; valves will NOT auto open on any time delay

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:** Plausible if the applicant does not understand ADS Initiation Logic and System response with respect to (1) operation of the 420 second ADS High Drywell Bypass Timer and the 105 second DIV 3 ADS Initiation Timer, and (2) manipulation of the Manual Inhibit Switches and the Logic Reset Pushbuttons. See Answer 'C' discussion.

B. **Incorrect but plausible:** Plausible if the applicant does not understand ADS Initiation Logic and System response with respect to (1) operation of the 420 second ADS High Drywell Bypass Timer and the 105 second DIV 3 ADS Initiation Timer, and (2) manipulation of the Manual Inhibit Switches and the Logic Reset Pushbuttons. See Answer 'C' discussion.

C. **Correct:** The DIV 3 ADS Logic Reset Pushbutton is depressed 10 seconds prior to ADS initiation (auto initiation occurs at 525 seconds). The 420 second ADS High Drywell Bypass Timer will be reset. The DIV 3 ADS Initiation Timer will also be reset (Note that the DIV 3 ADS Initiation Timer energizes at 420 seconds and does not de-energize when the DIV 3 ADS Inhibit Switch is taken to "INHIB" – *stem condition information states that the DIV 3 ADS Inhibit Switch failed in the "NORM" position*). The ADS valves never opened because the auto initiation at 525 seconds (105 seconds after the 420 second ADS High Drywell Bypass Timer times out) was interrupted when the DIV 3 ADS Logic Reset PB was depressed at time 515 seconds. The ADS valves will open 525 seconds later when both the ADS High Drywell Bypass Timer (420 seconds) and the DIV 3 ADS Initiation Timer (105 seconds) successfully time out (420 + 105 = 525 seconds) after having been reset.

D. **Incorrect but plausible:** Plausible if the applicant does not understand ADS Initiation Logic and System response with respect to (1) operation of the 420 second ADS High Drywell Bypass Timer and the 105 second DIV 3 ADS Initiation Timer, and (2) manipulation of the Manual Inhibit Switches and the Logic Reset Pushbuttons. See Answer 'C' discussion.

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 is at 25% with a startup in progress.

A steam leak results in the following Turbine Enclosure Steam Line Tunnel temperature indications:

- TE25-115C, TURB ENCL MSLT AMB, indicates 193°F up slow
- TE25-115D, TURB ENCL MSLT AMB, indicates 165°F up slow

The following annunciators are in alarm:

- ARC-MCR-107, REACTOR, Window H-5, "DIV 3 STEAM LEAK DET SYS HI TEMP/TROUBLE"
- ARC-MCR-107, REACTOR, Window I-5, "DIV 4 STEAM LEAK DET SYS HI TEMP/TROUBLE"

WHICH ONE of the following identifies MSIV response and the required action?

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

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 and what is the status of the SRVs?

	Instrumentation	SRV Status
A.	Acoustic Monitor	Open Mechanically
B.	SRV Tailpipe Temperatures	Open Mechanically
C.	Acoustic Monitor	Open on Pneumatics
D.	SRV Tailpipe Temperatures	Open on Pneumatics

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 (Pneumatics) to open the valve. 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 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 ("Open on Pneumatics").

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, and (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 ("Open on Pneumatics").

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

Unit 1 startup is in progress with the following conditions:

- Reactor pressure is 350 psig and steady
- Reactor water level is 35” and steady
- Applicable automatic transfer sequences have been enabled in FWLCS
- LIC-006-120, Reactor Feed Pumps Bypass Control Valve, is in AUTO, and is 60% open
- LIC-006-138, “A” Feedwater Start-up Lvl Cntrl, is in AUTO and is closed

15 minutes later, 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 FWLCS response?

A. Both LIC-006-120 and LIC-006-138 are open

B. LIC-006-120 is open, LIC-006-138 is closed

C. LIC-006-120 is closed, LIC-006-138 is open

D. Both LIC-006-120 and LIC-006-138 are closed

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 Unit 2 Reactor Enclosure and SGTS Refuel Floor 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

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 breaker supplying the D12 bus and the D12 D/G status following the degraded voltage condition?

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

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 if 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:

- OPCON 4
- 1A-Y160 power supply is aligned normally
- 1B-Y160 is being powered from its Primary Alternate power supply due to inverter maintenance

Then:

- An electrical fault results in the complete loss of the TSC MCC (144D-C-F)
- Shortly thereafter, a loss of Div 1 DC occurs

WHICH ONE of the following describes the effect on 1A-Y160 and 1B-Y160?

	1A-Y160	1B-Y160
A.	Energized	De-energized
B.	Energized	Energized
C.	De-energized	Energized
D.	De-energized	De-energized

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. **Incorrect but plausible:** Plausible if the applicant (1) does not recall that '1A' RPS UPS Inverter is normally powered by DIV 1 250 VDC, or (2) believes that '1A' RPS UPS Inverter static switch will successfully AUTO transfer to 'Primary Alternate' Source power upon the loss of DIV 1 DC (i.e., inability to recall that 'Primary Alternate' Source power (TSC MCC) is the same for both 1AY160 and 1BY160).

B. **Incorrect but plausible:** For 1A-Y160: Plausible if the applicant (1) does not recall that '1A' RPS UPS Inverter is normally powered by DIV 1 250 VDC, or (2) believes that '1A' RPS UPS Inverter static switch will successfully AUTO transfer to 'Primary Alternate' Source power upon the loss of DIV 1 DC (i.e., inability to recall that 'Primary Alternate' Source power (TSC MCC) is the same for both 1AY160 and 1BY160).

For 1B-Y160: Plausible if the applicant does not recall that the TSC MCC is the 'Primary Alternate' Source for 1BY160, or (2) believes that automatic transfer capabilities exist between Alternate Sources when the selected Alternate Source becomes unavailable (i.e., incorrectly believes that 1BY160 would be automatically powered by its Secondary Alternate Source following loss of the TSC MCC). Manual local operator action is necessary to select between Alternate Sources.

C. **Incorrect but plausible:** Plausible if the applicant does not recall that the TSC MCC is the 'Primary Alternate' Source for 1BY160, or (2) believes that automatic transfer capabilities exist between Alternate Sources when the selected Alternate Source becomes unavailable (i.e., incorrectly believes that 1BY160 would be automatically powered by its Secondary Alternate Source following loss of the TSC MCC). Manual local operator action is necessary to select between Alternate Sources.

D. **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 via the TSC MCC. A loss of RPS Bus 1BY160 occurs due to loss of the 'Primary Alternate' source (TSC MCC), 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 Loss of DIV 1 DC (DIV 1 250 VDC is the normal power supply to the '1A' RPS UPS Inverter) would normally initiate an automatic transfer of 1AY160 Bus power to the selected Alternate Source

if available (the 'Primary Alternate' in this case). However, the '1A' RPS UPS Inverter static switch will not AUTO transfer to 'Primary Alternate' because it is unavailable. The result is a loss of all power to RPS Bus 1AY160. With both 1AY160 and 1BY160 de-energized, a Full Scram occurs.

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

Unit 2 is initially at 90% power when a transient results in the following plant conditions:

- Division 3 DC is de-energized
- Drywell Pressure is 1.85 psig and rising slowly
- The CRS directs the PRO to maintain reactor pressure 990-1096 psig
- No other operator actions are taken

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 drywell pressure >1.68 psig 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 drywell pressure >1.68 psig 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 at 100% power.

A Division 3 LOCA signal occurs.

WHICH ONE of the following identifies when the '0C' ESW pump will auto start?

A. 45 seconds after D23 D/G Output Breaker closes

B. 45 seconds after D23 D/G reaches 800 RPM

C. 53 seconds after D23 reaches 95% speed and voltage

D. 53 seconds after D23 reaches 200 RPM

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 believes that D23 D/G Output Breaker closes on a LOCA signal. If a "Dead Bus" signal was present, this answer would be correct.

B. **Incorrect but plausible:** Plausible if the applicant believes that ESW pump start is associated with the 800 RPM High Speed Relay. The High Speed Relay backs up the Low speed Relay for (1) de-energizing the Start Time and Cranking Time Control Relays, and (2) energizing the Combustion Air Temperature Control Valve.

C. **Incorrect but plausible:** Plausible if the applicant believes that the 53 second ESW timer starts when the D/G is at 95% of rated speed (frequency) and voltage. 95% of rated speed (frequency) and voltage are required to auto close the D/G output breaker.

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.

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

A fire is confirmed in the Unit 1 RPS Static Inverter Room on Elevation 254'.

Subsequent to the fire, a LOOP occurs and D11 D/G auto starts and immediately trips on Differential Overcurrent.

WHICH ONE of the following identifies the location of the "DIFF/GROUND TRIP BYPASS" switch and the location that the D11 D/G must be restarted from once the Bypass switch is placed in "FIRE"?

Given the following panels:

- 1A-C661, MCR D11 Panel
- 1A-C514, Local D11 D/G Panel

	"DIFF/GROUND TRIP BYPASS" Switch Location	Location to re-start D/G
A.	1A-C661	1A-C514
B.	1A-C514	1A-C514
C.	1A-C661	1A-C661
D.	1A-C514	1A-C661

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 plant conditions are as follows:

- Reactor power is 100%
- Plant Air systems are in a normal line-up
- "1A" and "1B" Instrument Air Receiver pressures have lowered to a minimum of 75 psig and 80 psig respectively and are slowly rising
- Unit 1 Service Air Receiver pressure is 100 psig
- No operator action has been taken

After 45 min, "1A" and "1B" Instrument Air Receiver pressure indicates 94 psig and 100 psig respectively with both slowly rising

WHICH ONE of the following describes the status of the Plant Air System?

A. Both Instrument Air compressors are running fully loaded

B. Service Air has automatically aligned to supply the "1B" Instrument Air header

C. The Backup Service Air compressor has automatically aligned to supply the "1A" Instrument Air header

D. The "1A" Instrument Air compressor is running fully loaded and the "1B" Instrument Air compressor is running 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. **Correct:** Both instrument air compressors are responding to a large instrument air load and currently are restoring instrument air pressure. Both compressors auto start when instrument air header pressure drops to 100 psig, and unload when pressure rises to 110 psig.

B. **Incorrect but plausible:** Plausible if the applicant does not recall that BOTH instrument air receivers header needs to drop below 70 psig for service air to be aligned to “1A” instrument air header, and that service air is not normally aligned to “1B” instrument air header.

C. **Incorrect but plausible:** Plausible if the applicant does not understand that backup service air compressor does not automatically align to supply instrument air header. Backup service air compressor requires manual start from the MCR.

D. **Incorrect but plausible:** Plausible if the applicant does not understand the instrument air header compressor unloading setpoints. Instrument air header loads when pressure drops to 100 psig, and unload when pressure rises to 110 psig

References: LGSOPS0015 Rev001 Applicant Ref: NONE

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

Question source: Modified Bank (560811)

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:

- A spurious DIV 3 LOCA signal occurs simultaneous with a trip of the 201-D14 breaker on 201 Safeguard Bus undervoltage

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

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 (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 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).

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 occur and equipment functions as designed

At T=30 seconds:

- D24 bus trips on overcurrent lockout
- No 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 12%
- 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 value

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

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

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

D. Reactor 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. **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.

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. **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.

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
- RPV Level is +35 inches (3-Element Control)
- RPV Level Transmitter LT-042-1N004C has failed "UPSCALE"

An I&C Technician sent to repair the failed transmitter inadvertently opens the "Equalizing" valve for LT-042-1N004B

WHICH ONE of the following describes the impact to the plant given the above conditions?

A. FWLCS continues to automatically control RPV water level at +35 inches 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 only

D. Main, RFP, HPCI and RCIC Turbines trip

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, resulting in a reactor scram. The FWLCS predefined Feedwater Flow SCRAM Profile is activated by RPS relay contacts in panels 609 and 611 on the scram condition. It should also be noted that inadvertent equalization across LT-042-1N004B at some point in time after the upscale failure of LT-042-1N004C, enhances the plausibility of this distractor 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 inadvertent equalization across LT-042-1N004B at some point in time after the upscale failure of LT-042-1N004C, enhances the plausibility of this distractor 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. HPCI and RCIC Turbines remain unaffected since their trips are initiated by Wide Range RPV Level Instrumentation only.

D. **Incorrect but plausible:** Plausible if the applicant believes that the +54 inch RPV high level trip logic implemented in the FWLCS AC70-I/O modules, also trips both the HPCI and RCIC Turbines. HPCI and RCIC Turbines remain unaffected since their trips are initiated by Wide Range RPV Level Instrumentation only.

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 with the following conditions:

- 1A RHR is in Shutdown Cooling
- 1B RHR is in Suppression Pool Cooling

A Differential/Overcurrent occurs on the D12 Bus and all automatic actions occur as designed.

WHICH ONE of the following identifies the plant response?

A. 101-D12 breaker closes. Suppression Pool Cooling using the 1B RHR pump remains in service.

B. 101-D12 breaker closes. 1B RHR pump requires a manual restart following 101-D12 breaker closure.

C. D12 Diesel output breaker closes. 1B RHR pump restarts automatically, following a trip, upon D12 Diesel output breaker closure

D. Bus D12 remains de-energized and Suppression Pool Cooling using the 'B' RHR loop is lost.

Level: RO
Tier #: 2
Group #: 1

K&A Rating:	219000 (RHR/LPCI: Torus/Suppression Pool Cooling Mode) K6.01 (3.2/3.3)
K&A Statement:	**Knowledge of the effect that a loss or malfunction of the following will have on the RHR/LPCI: TORUS/SUPPRESSION POOL COOLING MODE:** A.C. electrical power

Justification:

A. **Incorrect but plausible:** Plausible if the applicant does not understand that the differential/overcurrent results in bus D12 lockout, which prevents auto closure of the 101-D12 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 D12 lockout, which prevents auto closure of the 101-D12 breaker.

C. **Incorrect but plausible:** Plausible if the applicant determines that EDG auto starts and loads the D-12 bus based on loss of power.

D. **Correct:** Due to the differential/overcurrent, bus D12 will be in lockout. RHR pump 'B' is powered from Bus D12, and as a result, suppression pool cooling using 'B' RHR pump will be lost.

References: LGSOPS0092A Rev001
LLOT0051 Rev000

Applicant Ref: NONE

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 6 psig and down slow
- Drywell temperature is 220°F and down slow
- Reactor level dropped to -135" and has been restored to +17"
- RPV pressure is 420 psig and down slow
- '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 Pressure Averaging Manifold (PAM) pressure is becoming larger as power ascends.

WHICH ONE of the following is correct regarding these observations?

This condition is...

A. NOT expected because EHC controls PAM pressure to maintain it within 30 psig of reactor pressure.

B. Expected because EHC controls reactor pressure to maintain it in a 30 psig regulation band and the lower PAM pressure results from main steam line headloss.

C. NOT expected because EHC controls reactor pressure to maintain it and PAM pressure in a 30 psig regulation band.

D. Expected because EHC controls PAM pressure to maintain it in a 30 psig regulation band, and reactor pressure rises with the regulation band and main steam line headloss.

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 PAM pressure versus reactor pressure relationship. The 30 psig regulation band is associated with the change in PAM pressure as steam line flow increases. PAM pressure is not maintained within 30 psig of reactor pressure as is evidenced by the values of PAM 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 PAM pressure versus reactor pressure relationship. EHC senses PAM 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 PAM pressure versus reactor pressure relationship. EHC senses PAM 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 Pressure Averaging Manifold (PAM) pressure as steam line flow increases. PAM 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.

WHICH ONE of the following identifies the Turbine Control Valve (TCV) and reactor response?

	TCV Response	Reactor Response
A.	Close at normal rate	Reactor trips on high RPV pressure
B.	Close at rapid rate	Reactor trips on control valve fast closure
C.	Close at normal rate	Reactor remains on line
D.	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 Student Ref: None
LLOT0580, Rev. 0

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

Unit 2 is at 75% during power reduction for a planned Refueling.

'2B' Condensate Pump breaker trips on overcurrent.

WHICH ONE of the following describes the effect on Reactor Feed Pump (RFP) operation and the required action in accordance with OT-100, "Reactor Low Level?"

A. RFP speed is limited to 78%;
Manually lower RFP speed as needed to maintain RFP suction pressure above 300 psig

B. RFP speed is limited to 78%;
Lower power as needed to maintain RFP suction pressure above 300 psig

C. RFP speed is limited to 80%;
Manually lower RFP speed as needed to maintain RFP suction pressure above 300 psig

D. RFP speed is limited to 80%;
Lower power as needed to maintain RFP suction pressure above 300 psig

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 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. **Correct:** RFP speed is limited to 78% (approximately 4611 RPM) following the loss of a Condensate Pump. The speed limiter results in no more than 90% Feed Flow, minimizing the potential for tripping on low suction pressure at 233 psig. Note that an RFP speed reduction is initiated ONLY if speed is above 4611 rpm. With all three RFPs running below 4611 rpm (as is the case in this question, given that reactor power is 75%), the automatic speed reduction is not initiated. Also 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.

C. **Incorrect but plausible:** Plausible if the applicant confuses the 78% RFP speed limit with the 80% Total Feedwater Flow value above which a Recirc Pump runback would occur given the loss of a Condensate Pump. 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.

D. **Incorrect but plausible:** Plausible if the applicant confuses the 78% RFP speed limit with the 80% Total Feedwater Flow value above which a Recirc Pump runback would occur given the loss of a Condensate Pump.

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:

- 100% power
- "1A" train of SJAEs are in service
- Main Condenser Vacuum is 28.5" Hg Vac.

SJAE discharge flow drops to 9,200 lbm/hr.

WHICH ONE of the following describes the position of the valves listed below 5 minutes later?

	SJAE First Stage Air Valves	SJAE First Stage Steam Valves
A.	Open	Open
B.	Closed	Open
C.	Open	Closed
D.	Closed	Closed

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 does not recall the setpoint for low offgas flow <9400lbm/hr (3480 scfm) prior to preheater, which indicates inadequate steam flow for hydrogen dilution. The 1st stage SJAE gas suction valves will automatically close on low offgas flow <9400lbm/hr, stopping the flow of non-condensable to the Off-Gas System.

B. **Correct:** Low offgas flow <9400lbm/hr (3480 scfm) prior to preheater, which indicates inadequate steam flow for hydrogen dilution. The 1st stage SJAE gas suction valves will automatically close on low offgas flow <9400lbm/hr, stopping the flow of non-condensable to the Off-Gas System.

C. **Incorrect but plausible:** Plausible if the applicant does not recall that based on low offgas flow the 1st stage SJAE gas suction valves will automatically close not the steam supply valve. Low offgas flow <9400lbm/hr (3480 scfm) prior to preheater, which indicates inadequate steam flow for hydrogen dilution. The 1st stage SJAE gas suction valves will automatically close on low offgas flow <9400lbm/hr, stopping the flow of non-condensable to the Off-Gas System

D. **Incorrect but plausible:** Plausible if the applicant determines that based on low offgas flow the 1st stage SJAE offgas suction and steam vales will automatically close. Low offgas flow <9400lbm/hr (3480 scfm) prior to preheater, which indicates inadequate steam flow for hydrogen dilution. The 1st stage SJAE gas suction valves will automatically close on low offgas flow <9400lbm/hr, stopping the flow of non-condensable to the Off-Gas System

References: LGSOPS0069 Rev 002 Applicant Ref: NONE

Learning Objective: Objective IL4, IL8b, E05

Question source: Bank (553506)

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 a LOOP 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

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.

WHICH ONE of the following meets the requirements for Reactivity Change Oversite IAW OP-AA-101-111, "Roles and Responsibilities of On-Shift Personnel"?

A. Unit 2 CRS can provide direct oversight of the reactivity change while monitoring all other activities on Unit 2

B. Unit 2 CRS can provide direct oversight of the reactivity change, while Shift Manager monitors all other activities related to 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 (3.8/4.2)

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 plant conditions are as follows:

- A cooldown is in progress IAW GP-3, "Normal Plant Shutdown"
- "1A" RWCU Pump is in service
- The RPV following pressures have been logged:

Time	**Pressure**
0315	490.1 psig
0330	442.9 psig
0345	399.3 psig
0400	336.2 psig
0415	280.9 psig
0430	232.5 psig

WHICH ONE of the following describes the cooldown in accordance with GP-3?

A. Both the Technical Specification and the GP-3 targeted cooldown limits are satisfied

B. Both the Technical Specification and GP-3 targeted cooldown limits have been exceeded

C. The Technical Specification cooldown limit is satisfied but GP-3 targeted cooldown limit has been exceeded and RWCU cavitation may result

D. The Technical Specification cooldown limit is satisfied but GP-3 targeted cooldown limit has been exceeded and RWCU trip on high vibration may result

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. 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

C. 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

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 ONE 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 could explain 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

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 at the Main Turbine. 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 identifies the reason for restarting Turbine Enclosure Ventilation IAW T-104, "Radioactivity Release Control"?

A. Maintain negative pressure in the Turbine Enclosure

B. Provide a filtered release path to the environment

C. Ensure max safe temperature limits are NOT reached

D. Ensures radioactive release through elevated, monitored release point

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
T-104 Basis, Rev. 13

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: X
Comprehensive/Analysis:

10CFR Part 55: 45.9/45.10

Comments:

QUESTION 72

Unit 2 plant conditions are as follows:

- Reactor power is 100%
- TIPS are in operation per S74.0.A, "Operation of Traversing In-Core Probe System," to support APRM calibrations
- The '2E' TIP is currently inserted in the core

The Reactor Enclosure EO reports that there are workers on the TIP Room roof.

WHICH ONE of the following shall be immediately performed?

A. Direct Security to enter area and evacuate workers

B. Immediately withdraw TIPS into shields, Inform Shift Supervision

C. Direct Equipment Operator to enter posted area and evacuate workers

D. Stop operation of TIP mechanisms, Inform Shift Supervision

Level: RO
Tier #: 3

K&A Rating: G2.3.12 (3.2/3.7)

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

Justification:

A. **Incorrect but plausible:** Plausible if the applicant does not recognize that this action would violate a posted Radiation Boundary and lead to potential uncontrolled dose.

B. **Incorrect but plausible:** Plausible if the applicant believes that moving the irradiated TIP detector from In-Core through the TIP Room to the chamber shields would not raise dose rate in the vicinity of the workers on the TIP Room roof.

C. **Incorrect but plausible:** Plausible if the applicant does not recognize that this action would violate a posted Radiation Boundary and lead to potential uncontrolled dose.

D. **Correct:** Answer is correct because of the WARNING in procedure S74.0.A, "Operation of Traversing In-Core Probe System," which states "TIP detectors shall <u>not</u> be moved from their shields until Health Physics has taken appropriate actions for TIP system operation." The action associated with this WARNING is directly applicable to all in-shield TIP detectors, and can be extended to the in-core TIP detector as well. The intent of the WARNING is to minimize dose rates during TIP system operation by preventing the movement of highly irradiated TIP detectors through normally accessible areas until required radiological postings have been established for personnel protection. With the conditions stated, the required postings and Announcements per S74.0.A, Steps 4.2 and 4.3, have been completed, and personnel have violated a posted radiation boundary. S74.0.A, Step 4.3 PA announcement, is as follows:

   - "Unit 1(2) TIPS will be (are) in operation. Please stay clear of the TIP room, the TIP room roof, and affected areas."

   Action to stop operation of the TIP mechanisms prevents moving the highly irradiated TIP detectors from their in-shield and in-Core locations, through an area that would result in a higher dose to the workers (the TIP Room Roof in this case). Shift Supervision is notified to ensure that TIP operations are stopped and to address violation of the posted radiation boundary.

References: S74.0.A, Rev. 054
RP-AA-460, Rev. 021
Lesson Plan LLOT1760, Rev. 011

Applicant Ref: NONE

Learning Objective: LLOT1760 (Obj.2)

Question source:	LGS 2010 ILOT Exam
Question History:	None
Cognitive level:	Memory/Fundamental knowledge: X Comprehensive/Analysis:
10CFR Part 55:	41.12

Comments: Re-arranged the Answers so that choice 'D' is now correct (Answer 'B' was the correct answer on the 2010 Exam).

QUESTION 73

Given the following:

- U1 is in a Station Blackout
- HPCI and RCIC both initiated on RPV water Level 2
- 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

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 is at 100% Reactor Power.

A manual scram is inserted due to high vibrations on the Main Turbine. All scram actions have been completed. The following conditions exist:

- One rod remains full out
- Digital Feedwater malfunction results in minimum RPV level of 14.5" and the RPV level 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
- The Reactor Enclosure EO has been dispatched to report RE floor drain sump level

WHICH ONE of the following identifies the TRIPs that must be entered?

A. T-100 ONLY

B. T-101 ONLY.

C. T-100 AND T-103

D. T-101 AND T-103

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 Remote Shutdown Panel Transfer Switches have been placed in "EMERG"
- RCIC TRIP BYPASS Switch has been placed in "BYPASS"
- Cooldown has been initiated from the Remote Shutdown Panel using SRVs
- HPCI auto initiated on RPV Level 2 and is assisting RCIC in maintaining RPV water level
- No additional Operator 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?

	HPCI	RCIC
A.	Running	Running
B.	Running	Isolated
C.	Isolated	Isolated
D.	Isolated	Running

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 is in OPCON 1.

At Time 0400 on 8/31, the "Test Evaluation" portion of ST-6-095-905-1, "Unit 1 Safeguard Battery Weekly Inspection," was completed with the following values recorded for 125 VDC Battery 1CD101:

Terminal Voltage - 128 VDC

Float Current - 2.2 Amps

WHICH ONE of the following identifies the required Tech Spec actions?

A. Restore Cell Voltage to ≥ 2.07 volts by 0600 on 8/31;
Restore Float Current to ≤ 1 amp by 0600 on 8/31

B. Restore Cell Voltage to ≥ 2.07 volts by 0400 on 9/01;
Restore Float Current to ≤ 2 amps by 2200 on 8/31

C. Restore Battery Terminal Voltage to ≥ the minimum established float voltage by 0600 on 8/31;
Verify Float Current ≤ 1 amp by 2200 on 8/31;
Restore the battery charger to OPERABLE within 7 days

D. Restore Battery Terminal Voltage to ≥ the minimum established float voltage by 0600 on 8/31;
Verify Float Current to ≤ 2 amps by 2200 on 8/31;
Restore the battery charger to OPERABLE within 7 days

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 believes that (1) the charger is Operable, (2) the battery is inoperable due to one or more bad cells, and (3) the two hour Action time of ACTION 3.8.2.1.6 applies. Although the stem does not discuss individual cell status, the distractor is plausible because high float current and SAT terminal voltage indicate the charger is functioning properly and that one or more cells may be bad. The information provided in the stem indicates a failed battery charger. If the applicant misinterprets this information, he/she may select Answer 'A'.

B. **Incorrect but plausible:** Plausible if the applicant believes that (1) the charger is Operable, (2) the battery is inoperable due to one or more bad cells, (3) ACTIONS 3.8.2.1.b.1 and 3.8.2.1.b.2 apply, and (4) the TS value for float current is 2 amps instead of 1 amp. Although the stem does not discuss individual cell status, the distractor is plausible because high float current and SAT terminal voltage indicate the charger is functioning properly and that one or more cells may be bad. The information provided in the stem indicates a failed battery charger. If the applicant misinterprets this information, he/she may select Answer 'B'.

C. **Correct:** With the conditions provided, the battery terminal voltage is less than the Tech Spec Minimum 132 VDC (minimum established float voltage). With low battery terminal voltage, the battery float current may exceed its Tech Spec minimum which is an indication that the battery charger is malfunctioning. Thus, the battery charger must be declared inoperable which makes Tech Spec 3.8.2.1.a applicable. This requires restoration of battery terminal voltage within 2 hours. Additionally, float current must be restored within 18 hours of the time of discovery (TOD: 0400 on 8/31). As described in Tech Spec Bases 3.8.2.1 " With one division with one or two battery chargers inoperable (e.g., the voltage limit of 4.8.2.1.a.2 is not maintained), the ACTIONS provide a tiered response that focuses on returning the battery to the fully charged state and restoring a fully qualified charger to OPERABLE status in a reasonable time period. Action a.1 requires that the battery terminal voltage be restored to greater than or equal to the minimum established float voltage within 2 hours. This time provides for returning the inoperable charger to OPERABLE status or providing an alternate means of restoring battery terminal voltage to greater than or equal to the minimum established float voltage. <u>Restoring the battery terminal voltage to greater than or equal to the minimum established float voltage provides good assurance that, within 18 hours, the battery will be restored to its fully charged condition (Action a.2) from any discharge that might have occurred due to the charger inoperability." See NOTE on page 4 of S95.1.D, "Installation / Removal of the Spare Battery Charger," for guidance associated with TS 3.8.2.1 ACTION times.</u>

D. **Incorrect but plausible:** Plausible if the applicant concludes that the battery charger is inoperable, and that the TS value for float current is 2 amps instead of 1 amp.

References:	Lesson Plan LGSOPS0095, Rev. 000 LGS TS 3.8.2.1 LGS TS Bases 3/4.8.2 ST-6-095-905-1, Rev. 019 S95.1.D, Rev. 001	Applicant Ref: LGS LCO 3.8.2.1 <u>and</u> Surveillance Requirement 4.8.2.1

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 at 100% power.

A manual scram is inserted due to a sudden degradation in condenser vacuum. Following the scram the following conditions exist:

- Reactor Mode Switch is in SHUTDOWN
- Two rods remain FULL OUT
- SRV "1E" inadvertently opened and reclosed after fuses were pulled
- RPV Level is +10 inches and rising slowly
- Suppression Pool Temperature is 112°F and up slowly
- All "APRM DOWNSCALE" lights are illuminated

WHICH ONE of the following identifies the WIDEST allowable level band?

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. -161" to +12.5" 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. **Correct:** Plausible if the applicant determines that ATWS conditions exist based indications of 2 rods remaining full out. 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. **Incorrect but plausible:** 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

Unit 2 is at 100% power.

An Instrument Air header in the Turbine Building ruptures, resulting in a complete loss of Instrument Air. A GP-4 Rapid Plant Shutdown has been performed and the following conditions now exist:

- All control rods are fully inserted
- MSIVs are closed
- RPV level is being maintained +12.5" to +54" with RCIC
- RPV pressure is being maintained 800-1000 psig with HPCI
- Drywell pressure is 0.58 psig and slowly rising
- Recirc pumps have been tripped

With the plant stabilized and entry conditions for T-101 no longer required, the CRS has transitioned to T-100, "Scram /Scram Recovery."

WHICH ONE of the following actions 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 through the Filter Demins 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 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	Applicant Ref: None

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

Both units are at 100% power when 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)

RMMS shows rising radiation levels on the South Stack

WHICH ONE of the following identifies a potential source of the radiation and what is the required procedural action?

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 46.2 psig, up slow
- Suppression Pool Pressure is 65 psig, up slow

WHICH ONE of the following describes the status of Primary Containment Pressure with respect to Primary Containment Pressure Limit (PCPL) Curve PC/P-1 (provided on next page) and the required action IAW T-102, "Primary Containment Control"?

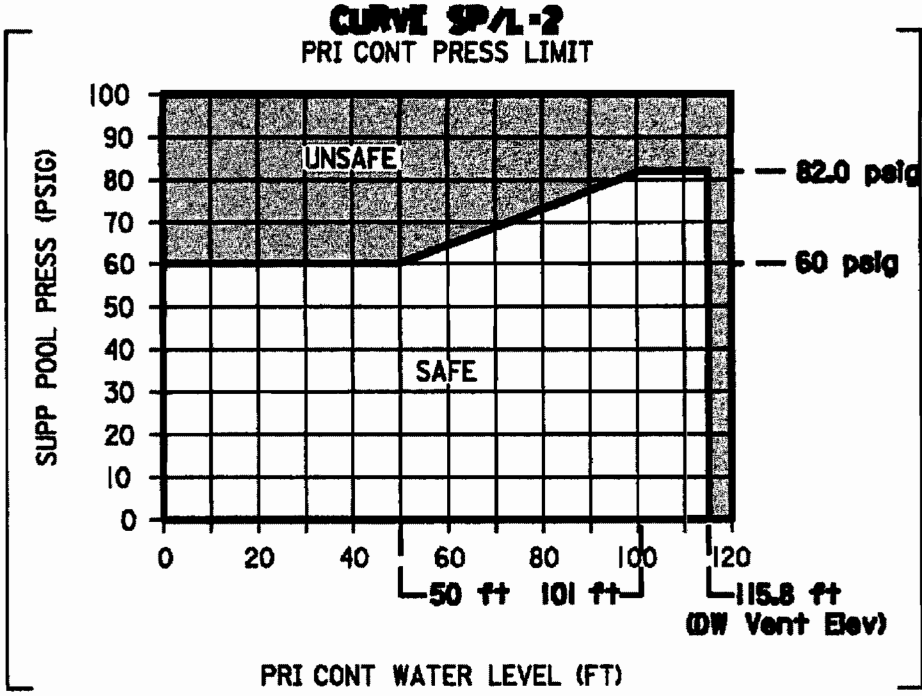
A. UNSAFE region of PC/P-1 Curve;
Do NOT vent Primary Containment

B. UNSAFE region of PC/P-1 Curve;
Vent Primary Containment, exceed Tech Spec/ODCM Offsite Release Rate Limits IF necessary

C. SAFE region of PC/P-1 Curve;
Vent Primary Containment, exceed Tech Spec/ODCM Offsite Release Rate Limits IF necessary

D. SAFE region of PC/P-1 Curve;
Vent Primary Containment, Do NOT exceed Tech Spec/ODCM Offsite Release Rate Limits

CURVE PC/P-1
CURVE SP/L-2



<u>CONTAINMENT LEVEL IN FEET</u>

	______	PSIG SUPP POOL PRESS ON PR57-*01 (BLUE PEN)
MINUS (-)	______	PSIG PRI CONT PRESS ON PR57-*01 (RED PEN)
EQUALS (=)	______	Δ PSIG
TIMES (X)	2.3	FT/PSIG
EQUALS (=)	______	FT
PLUS (+)	26.8	FT
EQUALS (=)	______	FT CONTAINMENT LEVEL

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) miscalculates the value for Primary Containment Water Level (results in a plotting error), 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. See Answer 'C' discussion.

B. **Incorrect but plausible:** Plausible if the applicant miscalculates the value for Primary Containment Water Level, resulting in a plotting error. See Answer 'C' discussion.

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 <u>calculated</u> value of Primary Containment Water Level (70 ft). This will occur at a Suppression Pool Pressure of 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. See Answer 'C' discussion.

References: Lesson Plan LLOT1560, Rev. 014 Applicant Ref: NONE
T-102, Rev. 024
T-102 Bases, Rev. 024

Learning Objective: LLOT1560 (EO5,6)

Question source: New

Question History:	None	
Cognitive level:	Memory/Fundamental knowledge:	
	Comprehensive/Analysis:	X
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

WHICH ONE of the following describes the required operator action and the basis behind the action IAW T-111?

A. Immediately open additional SRVs as necessary to increase RPV level; Opening of additional SRVs will result in swell and provide temporary adequate core cooling

B. Enter T-112, Emergency Blowdown, AND CONTINUE in T-111 to maintain RPV level above -186"; Steam cooling is no longer sufficient

C. Enter T-112, Emergency Blowdown, AND EXIT T-111; Steam cooling is no longer sufficient

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

A full core ATWS is in progress on Unit 2. The following actions have been taken:

- Normal scram actions
- All three SBLC pumps have failed to start
- RWM is bypassed and control rods are being manually inserted

30 minutes later, the following conditions are present:

- ALL IRMs are on Range 5
- 20 Control Rods remain out

(Partial T-101 provided on next page)

WHICH ONE of the following identifies the correct action IAW T-101, RPV Control?

A. Depressurize the RPV to < 75 psig, initiate Shutdown Cooling

B. Depressurize the RPV to < 75 psig, DO NOT initiate shutdown cooling

C. Depressurize the RPV, DO NOT depressurize < 75 psig until all rods are inserted to OR beyond position 02

D. Stabilize RPV pressure below 1096 psig, DO NOT depressurize until all rods are inserted to OR beyond position 02

Stabilize RPV press below 1096 psig:

- Turbine BPV
- ADS SRVs
  - Min Supp Pool level 4.2ft
  - Bypass PCIG isol logic per GP-8 as necessary
  - IF normal AND long term pneumatics unavailable, THEN place ctrl sw to AUTO
- Non ADS SRVs
  - Min Supp Pool level 4.2ft
  - Bypass PCIG isol logic per GP-8 as necessary
  - IF normal pneumatics unavailable, THEN place ctrl sw to CLOSE
- Mn Cond Hotwell Stm Spargers
- HPCI
  - CST preferred
  - Min 2200 RPM
  - Max 170°F suct temp
- RCIC
  - CST preferred
  - Min 2200 RPM
  - Max 170°F suct temp (long term)
    180°F suct temp (≤4 hours)
  - RCIC trips on 50 psig exhaust press
- RFPT
- SJAE
- Offgas Preheater
- MSL Drains
- RWCU (T-226)

#1

RC/P-11

IF NOT required for core cooling,

THEN prevent condensate injection

RC/P-12

Reset PCIG Grp VII isol per GP-8 as necessary

RC/P-13

IF reactor is NOT shutdown,

THEN return to step RC/P-11

#16

RC/P-14

WHEN
no ATWS
OR
SLC tank level reaches 0 gallons
OR
reactor shutdown
AND no boron injected,
THEN
continue

#4
#6
#16

RC/P-15

Depressurize RPV within 100°F/hr using ST-6-107-640-* bypassing PCIG isol logic per GP-8 as necessary

RC/P-16

IF depressurizing with SRVs
AND
normal AND long term pneumatics unavailable,

THEN depressurize with sustained SRV opening

#1

RC/P-17

WHEN
no ATWS
AND
RPV press less than 75 psig,
THEN
continue

#4

RC/P-18

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), even though the reactor is determined to be shutdown with no boron injected. 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. "Reactor shutdown AND no boron injected" is one of the specified conditions. NOTE #16 of T-101 defines "Shutdown" as follows:

> "SHUTDOWN – reactor is subcritical with power below the heating range as defined by IRMs below range 6 OR SRMs below 50,000 CPS."

Because IRMs are on Range 5, subsequent step RC/P-16, which directs RPV depressurization, may be performed as long as control rod insertion is sufficient to shutdown the reactor. Such action is permitted even though the existing margin to criticality may be small. A return to criticality under these conditions is acceptable because termination of the cooldown will stop the reactor power increase. 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. Under ATWS conditions, there is no guarantee that the reactor would remain shutdown and that power would remain below the APRM downscale power level, with shutdown cooling (forced circulation) driving the plant to a Cold Shutdown state.

C. **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., reactor shutdown AND no boron injected), 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.

D. **Incorrect but plausible:** Plausible if the applicant is unable to recall that the reactor is shutdown, by definition, when IRMs are below Range 6, in accordance with NOTE #16 of T-101. NOTE 16 states "SHUTDOWN – reactor is subcritical with power below the heating range as defined by IRMs below range 6 OR SRMs below 50,000 CPS." See Answer B discussion.

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

Learning Objective: LLOT1560 (EO5,6)

Question source: New

Question History: None

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

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

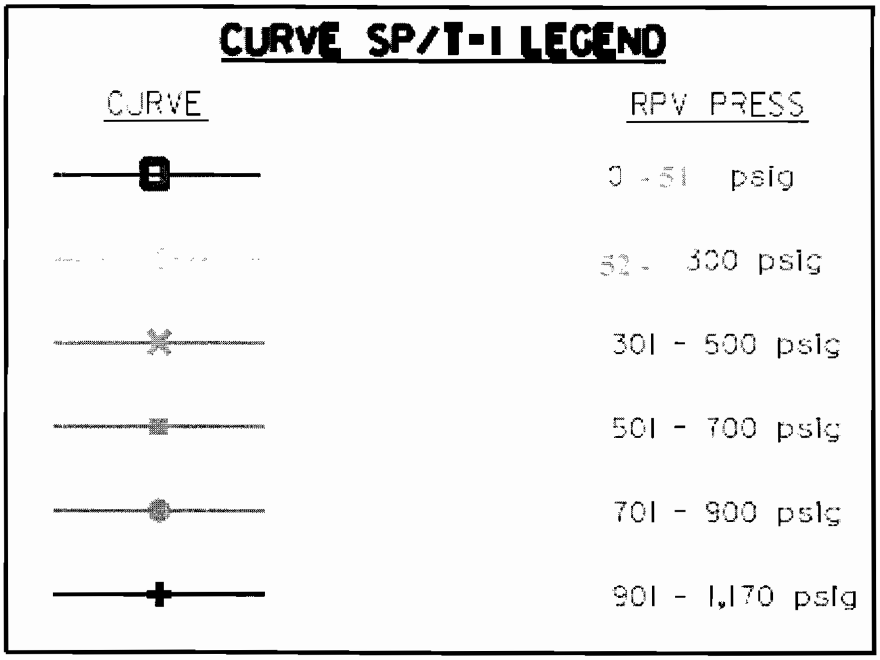
Using the Heat Capacity Temperature Limit (HCTL) curve from T-102 (provided on next page), PRIMARY CONTAINMENT CONTROL, WHICH ONE of the following actions is required?

A. Enter T-112, and perform Emergency Blowdown

B. Rapidly depressurize using turbine Bypass Valves

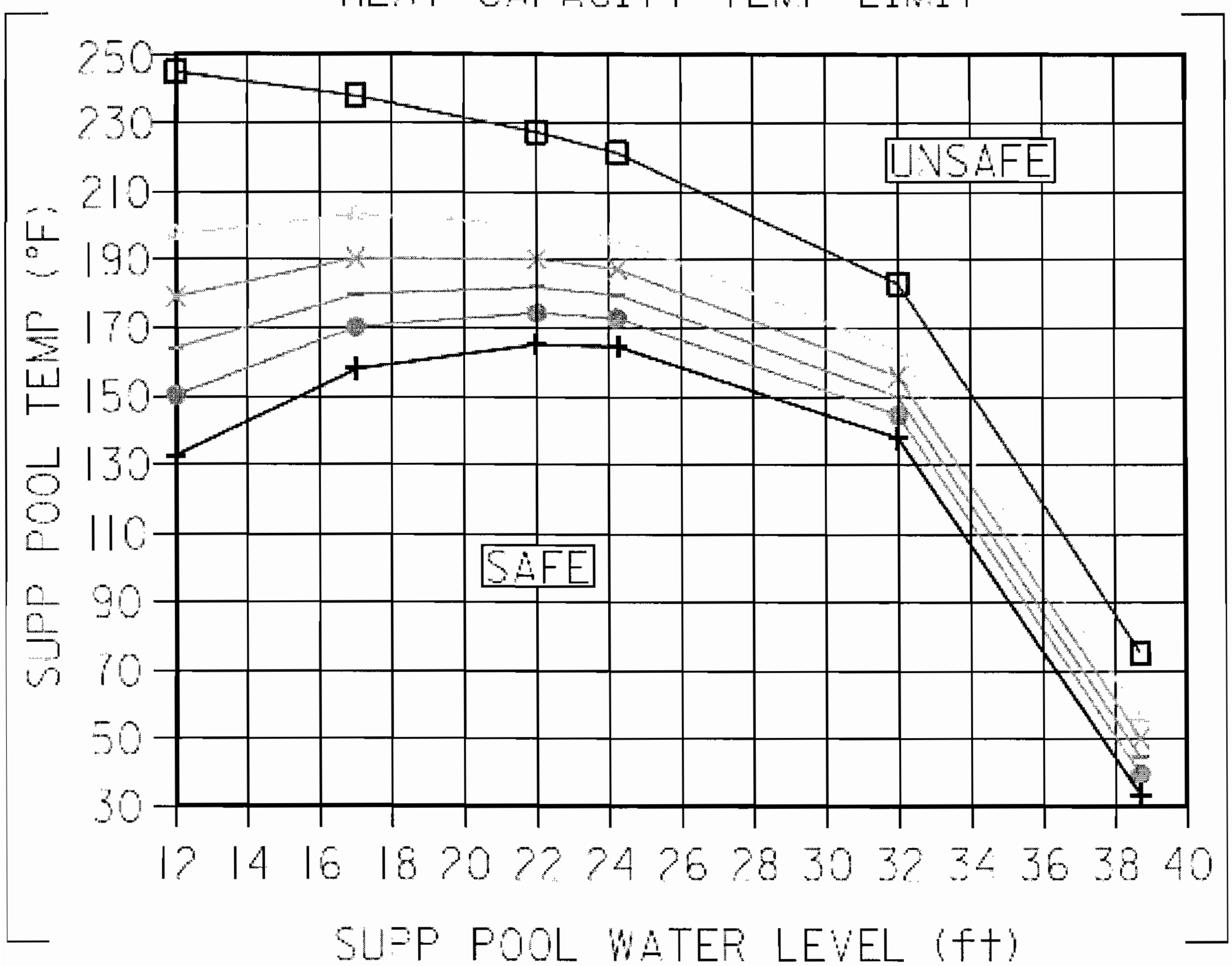
C. Use SRV/BPV to maintain RPV pressure below HCTL, NOT to exceed 100□F/hr

D. Use SRV/BPV to maintain RPV pressure below HCTL, exceeding 100□F/hr if necessary



CURVE SP/T-1

HEAT CAPACITY TEMP LIMIT



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 is at 100% reactor power.

A Drywell leak occurs and the RO scrams the Reactor when Drywell pressure reaches 1.5 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 1.8 psig and slowly rising
- RPV level is -60 inches and steady
- RPV Pressure is 900 psig and slowly lowering
- Suppression Pool Level is 24'
- Suppression Pool Temperature is 92° F

Which one of the following describes the HIGHEST classification required in accordance with EP-AA-1008?

A. Unusual Event

B. Alert

C. Site Area Emergency

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 and HCTL not exceeded.

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:

- 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 2.30 E+08 μCi/sec (> 15 minutes)

The Shift Dose Assessor reports that meteorology based dose assessment results are available and dose at Site Boundary is 101 mRem TEDE.

The referenced procedure titles are provided below:

- ST-6-104-880-0, “Gaseous Effluent Dose Rate Determination”
- ARC-MCR-003, E-1, “NORTH STACK HI-HI RADIATION”

WHICH ONE of the following identifies the procedure that required Dose Assessment performance and the correct EAL Classification?

	Procedure	EAL Classification
A.	ARC-MCR-003, E-1 ONLY	SITE AREA EMERGENCY
B.	ST-6-104-880-0	SITE AREA EMERGENCY
C.	ARC-MCR-003, E-1 ONLY	GENERAL EMERGENCY
D.	ST-6-104-880-0	GENERAL EMERGENCY

Level: SRO
Tier #: 1
Group #: 2

K&A Rating: 295017 AA2.01 (2.9/4.2)

K&A Statement: **Ability to determine and/or interpret the following as they apply to HIGH OFF-SITE RELEASE RATE:** Off-site release rate: Plant-Specific

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 101 mRem TEDE satisfies the EAL Matrix value for Site Area Emergency classification. Therefore, an SAE is the proper declaration, even though North Stack Effluent Monitor readings support a GE level classification. 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. 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 believes (1) 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, and (2) that Stack Effluent Monitor readings override meteorology based Dose Assessment results. 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 EP-AA-1008, Rev. 023	Applicant Ref: Table LGS 3-1 Emergency Action Level (EAL)

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

Matrix: <u>Radiological Effluents Hot Matrix only</u>

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

WHICH ONE of the following is/will be required? (Assume the trends continue as above and all systems are operable)

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 2 plant conditions are as follows:

- Core Alterations are in progress in Quadrant 'A'
- '2C' 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 '2A' 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 '2C' 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 '2C' SRM is Operable. See Answer 'D' discussion.

D. **Correct:** '2C' 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 '2A' SRM is 72 hours beyond its grace period, and (2) the '2C' 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 '2A' and '2C' 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 U2 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:

- Reactor is shutdown
- Reactor pressure is 850 psig and lowering slowly
- Reactor level is -131" and lowering slowly at 1" per minute
- Drywell pressure is 15 psig and slowly rising
- B and D Core Spray Pumps are the ONLY available injection sources and both are running with discharge pressure of 130 psig
- ADS has NOT been inhibited

WHICH ONE of the following identifies the status of ADS valves 2 minutes later and the appropriate action?

A. NOT open
Stabilize RPV pressure to conserve reactor inventory in accordance with OP-LG-103-102-1002, Strategies for Successful Transient Mitigation

B. OPEN
Bypass PCIG Isolation logic per GP-8 as necessary to ensure availability of ADS valves

C. NOT open
Depressurize RPV, exceeding cooldown rate as necessary, to reduce the rate of leakage in accordance with OP-LG-103-102-1002, Strategies for Successful Transient Mitigation

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"), 1 ADS inhibit switch in NORM and running of RHR or Core Spray pump (CS discharge pressure > 145 psig). Initial conditions identify that a LOCA has occurred with drywell pressure 15 psig, and no indicated injection sources available the proper strategy is to conserve reactor inventory in accordance with OP-LG-103-102-1002, Strategies for Successful Transient Mitigation.

B. **Incorrect but plausible:** Plausible if the applicant determines ADS will automatically initiate based on core spray pumps running, high drywell pressure, 1 ADS inhibit switch in NORM 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, 1 ADS inhibit switch in NORM, 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 and level trend, RPV level did not and will 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, 1 ADS inhibit switch in NORM, 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

Unit 2 plant conditions are as follows:

- OPCON 5
- Cavity level is 494"
- '2B' RHR Pump is in Shutdown Cooling
- '0B' RHRSW Pump is in service
- Safeguard Buses are aligned normally

HV-051-2F009, RHR Shutdown Cooling Inboard PCIV, closes on an inadvertent isolation and attempts to re-open the valve have been unsuccessful.

1 minute later, 500 KV switchyard breaker 205 trips resulting in the following:

- Loss of the 20 Station Aux Bus
- The associated 4.16 KV Divisional Safeguard Buses remain de-energized (Dead Bus transfers DO NOT occur and associated D/Gs DO NOT start)

Provided with the following procedure titles:

- S41.7.B, "Use of SRV's And Suppression Pool Cooling As An Alternate Shutdown Cooling Method"
- S51.8.L, "RHR Alternate Decay Heat Removal Startup and Shutdown"

WHICH ONE of the following identifies: (1) the required action driven by ON-121, "Loss of Shutdown Cooling," AND (2) the appropriate RHRSW pump to be placed in service to provide cooling?

A. (1) Establish Alternate Shutdown Cooling using S41.7.B
(2) Start '0D' RHRSW Pump

B. (1) Establish Alternate Decay Heat Removal per S51.8.L
(2) Start '0D' RHRSW Pump

C. (1) Establish Alternate Shutdown Cooling using S41.7.B
(2) Start '0A' RHRSW Pump

D. (1) Establish Alternate Decay Heat Removal per S51.8.L
(2) Start '0A' RHRSW Pump

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 Applicant Ref: NONE
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

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 plant conditions are as follows:

- 55% Reactor Power
- 55% Core Flow
- 3 Condensate Pumps are in service

An electrical transient results in the following annunciators:

- 126 B-4, “12 BUS BKR TRIP”
- 125 F-4, “12 UNIT AUX BUS UNDERVOLTAGE”

WHICH ONE of the following identifies the required action?

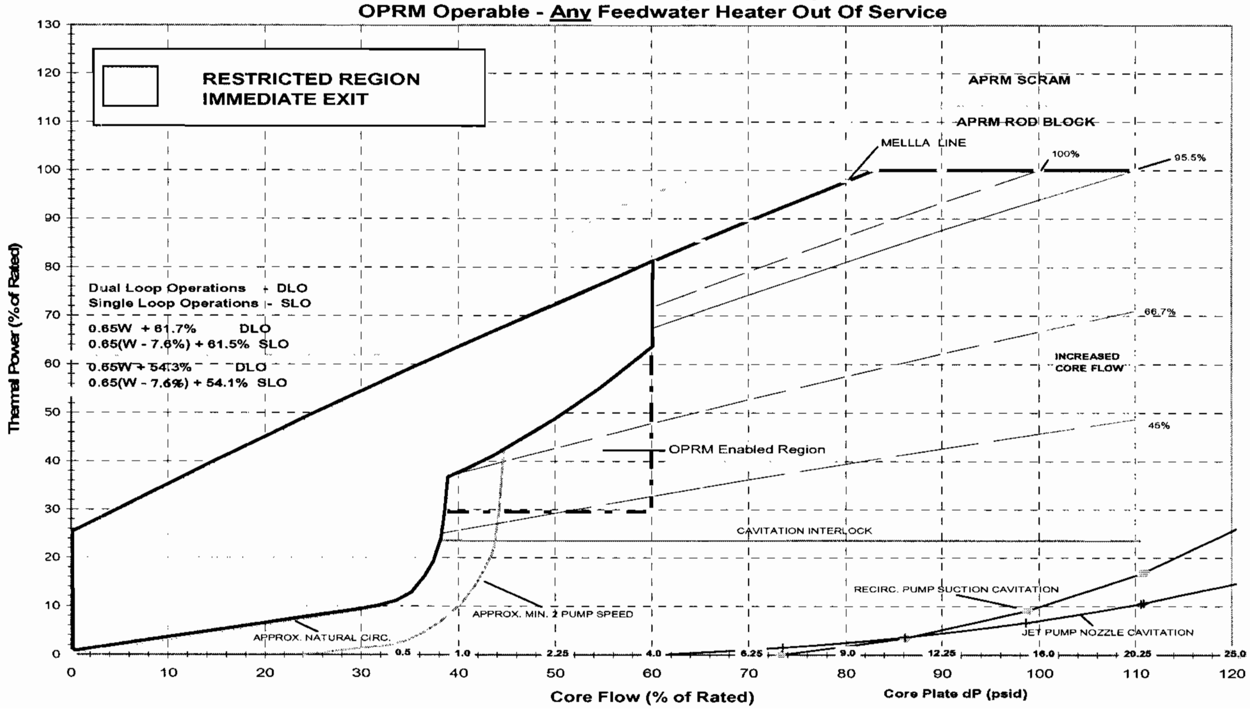
A. Scram and enter T-101, “RPV Control” per OT-100, “Reactor Low Level”

B. Reduce reactor power using RMSI per OT-100, “Reactor Low Level” until normal RPV level is restored

C. Insert control rods or raise core flow per OT-112, “Recirculation Pump Trip”

D. Scram and enter T-101, “RPV Control” per OT-112, “Recirculation Pump Trip”

LGS Power Flow Operation Map
OPRM Operable - Any Feedwater Heater Out Of Service



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 – A loss of the 12 aux bus results in a trip of the 1B recirc pump, which requires entry in to OT-112. Based on initial conditions with reactor power and flow at 55%, and a loss of 12 bus, 1B reactor Recirc pump trip will place plant in the restricted region of Power/Flow map. In this case, OT-112 requires actions to insert control rods or raise core flow.

D. Incorrect but plausible loss of the 12 aux bus only results in a trip of the 1B Recirc pump, if no Recirc pumps are running, then OT-112 entry requires Scram and entry into T-101. Applicant may also determine that due to the loss of 1B Recirc pump, the plant may enter exclusion region of the Power/Flow map, and based on OT-112 actions, scram and entry into T-101 is required.

References: LGSOPS1540, Rev. 0
LGSOPS0043A, Rev. 3

Student Ref:

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
- 'B' RHR is the ONLY available injection source and is injecting at 10,000 gpm
- Drywell temperature is 356 °F and up slow
- Drywell pressure is 20 psig and up slow
- Suppression Pool pressure is 15 psig and up slow
- Suppression Pool level is 29 feet and steady
- Drywell H_2 concentration is currently 6.18%
- Drywell O_2 concentration is currently unknown
- Suppression Pool H_2 concentration is currently 0.5%

WHICH ONE of the following is correct regarding these conditions?

Containment Spray must ______(1)______ based on ______(2)______.

A. (1) <u>NOT</u> be initiated
(2) lack of adequate core cooling

B. (1) <u>NOT</u> 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

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: T-102, sh.2 and T-102, sh. 1 DW/T-7 thru DW/T-11

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

Unit 1 plant conditions are as follows:

- 43% Reactor Power
- Total Feedwater Flow is 6.5 Mlbm/hr
- Main Generator Load is 15,005 amps

The following alarm occurs in the MCR:

- 125, GEN 1, B-4, "1 GEN STATOR COOLANT TROUBLE"

An EO reports the following from local panel 10-C120:

- "CONDUCTIVITY ABOVE 9.9 MICROMHOS (μS)" is in alarm
- Both Stator Cooling Water Pumps are tripped

The following plant conditions exist 4 minutes later:

- No control rods have been inserted
- Main Generator Load is 7,469 amps (21.4% Generator Load)
- Stator Water Conductivity determined to be 11.0 μS/cm just prior to loss of flow

WHICH ONE of the following actions is required in accordance with ON-114, Loss of Stator Water Cooling?

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. **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 runback reduces Main Generator load from 43% to 21.4% ("no cooling setpoint"). With no control rods inserted, **reactor power <u>remains at 43%</u> as Bypass valves open to control reactor pressure in response to the TCV closure to approximately 21.4% 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 direction for reactor power > 25%, and conductivity levels > 9.9 µS/cm prior to the loss of flow, is to <u>immediately</u> initiate a plant shutdown per GP-4, remove load from the Main Generator, and trip the Main Turbine. Note that for reactor power ≤ 25%, ON-114 direction is the same except for initiation of plant shutdown, since Bypass valve equivalent power capability (capacity) is 25%.

B. **Incorrect but plausible:** Plausible if the applicant believes that reactor power is within the capacity of the Bypass valves (≤ 25%). See Answer A discussion.

C. **Incorrect but plausible:** Plausible if the applicant is unable to recall that the actions to initiate a plant shutdown per GP-4, remove load from the Main Generator, and trip the Main Turbine, are to be performed "immediately" for conductivity levels > 9.9 µS/cm. ON-114 direction for reactor power > 25%, and conductivity levels > 0.5 µS/cm and ≤ 9.9 µS/cm prior to the loss of flow, is to perform these same actions "within 3 minutes time". See Answer A discussion.

D. **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 within the capacity of the Bypass valves (≤ 25%). See Answer A 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 is at 100% power.

The following occurs:

- FWLC TROUBLE (107 D-5) alarms
- LI-042-1R606A, "A" Narrow Range level indicator has failed downscale
- All other level indications are normal for 100% and no other alarms are present

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 the tripped 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 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 in 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 a 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 limiting 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

Given the following conditions:

- Unit 1 is in OPCON 5
- Initial core offload / shuffle activities are in progress

WHICH ONE of the following conditions would require stopping Core Alterations IAW FH-105, "Core Component Movement – Core Transfers"?

A. The 'A' Standby Gas Treatment Subsystem is determined to be INOPERABLE

B. The loss of an offsite power supply occurs, but the remaining offsite power is above the Tech Spec minimum requirement and the refuel bridge remains energized

C. Discovery made that the Refuel Platform Spotter did NOT comply with Concurrent Verification requirements for one of the fuel moves observed

D. Refuel Platform Aux Hoist is determined to be out of surveillance

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 that Core Alterations must be suspended/stopped with only one Standby Gas Treatment Subsystem Operable. In accordance with FH-105, "Core Component Movement – Core Transfers," Step 8.4.7, if any system/equipment prescribed as a prerequisite to the procedure becomes inoperable, THEN core component movement/transfer operations should be discontinued until either the system/equipment is returned to operation or alternate action is taken as allowed by Tech Specs. Tech Spec 3.6.5.3, "Standby Gas Treatment System – Common System," allows Core Alterations to continue with one Standby Gas Treatment Subsystem inoperable for a period of seven days.

B. **Incorrect but plausible:** Plausible if the applicant believes that Core Alterations must be suspended/stopped even though the Tech Spec minimum requirement for offsite power per TS 3.8.1.2, "AC Sources Shutdown," is still met and the remaining offsite power source Operable for handling irradiated fuel. Also plausible in that Step 4.15 of FH-105 specifically addresses the Operability of AC/DC Sources and Electrical Distribution.

C. **Correct:** In accordance with FH-105, "Core Component Movement – Core Transfers," Step 8.4.1, if failure of a Concurrent Verification is discovered, THEN (1) Core Alterations must be stopped, (2) Shift Management, RSS Management and Reactor Engineering are to be notified, and (3) an IR initiated.

D. **Incorrect but plausible:** Plausible if the applicant believes that the Refuel Platform Aux Hoists are required to be Operable (i.e., in surveillance) to conduct the removal and installation of fuel and blade guides in the RPV and Spent Fuel Pools. These activities are the primary purpose of the Main Hoist. The Aux Hoists are used for in-vessel servicing tasks such as:

- Separator unlatching
- Tool handling
- LPRM, SRM/IRM dry tube replacements
- Jet pump servicing
- Fuel Support and Control Rod replacement

References: Lesson Plan LLOT0760, Rev. 015 — Applicant Ref: NONE
FH-105, Rev. 045
ST-6-107-591-1, Rev. 095
ST-6-097-630-1, Rev. 019

Learning Objective:	Lesson Plan LLOT0760 (Terminal Objective; See Introduction I.A)
Question source:	Modified from Nine Mile Point 8/09 Exam (Q #95)
Question History:	None
Cognitive level:	Memory/Fundamental knowledge: X Comprehensive/Analysis:
10CFR Part 55:	43.(b)(7)
Comments:	

QUESTION 95

Unit 1 is in OPCON 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. <u>NOT</u> permitted because thermal stresses could exceed design allowances on 'A' Loop components

C. <u>NOT</u> permitted because thermal stresses could exceed design allowances on 'B' Loop components

D. <u>NOT</u> 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 and T.S. 3.4.1.4

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.

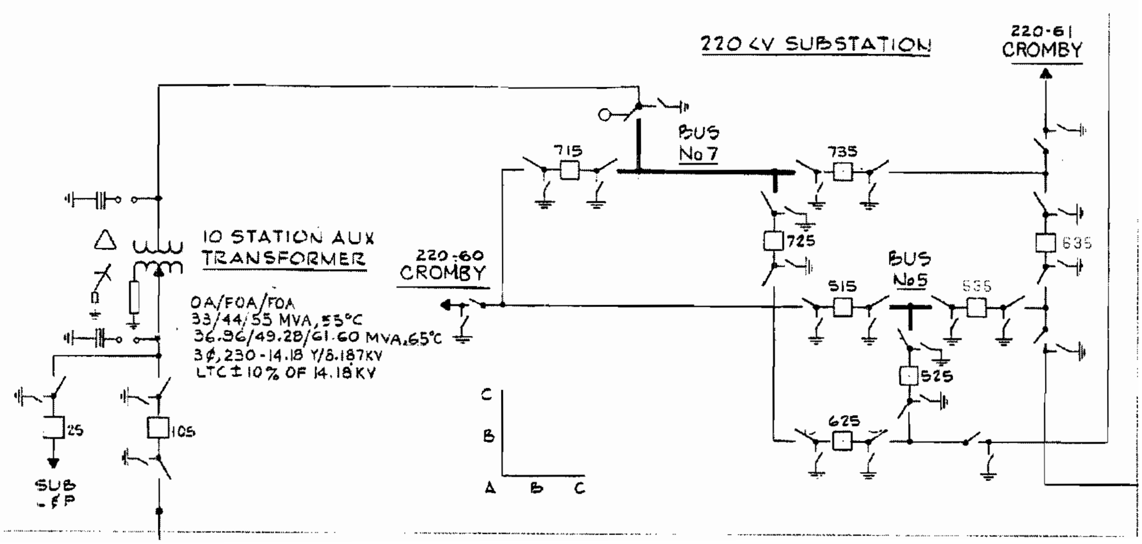
QUESTION 96

Conditions are as follows:

- Unit 1 is at 100% power
- The PJM has issued a Maximum Emergency Generation Alert
- Emergency 220 KV Switching was performed to support Emergent Maintenance on the 515 Breaker

In accordance with OP-AA-108-107-1002, "Interface Procedure Between ComEd / PECO and Exelon Generation (Nuclear / Power) For Transmission Operations," WHICH ONE of the following identifies the required oversight for maintenance on the 515 Breaker and the party responsible for operation of the breaker?

	Maintenance Oversight Required	Responsible Party For Operation
A.	Constant Coverage	PECO
B.	Constant Coverage	LGS OPS
C.	None; MCR notification required	PECO
D.	None; MCR notification required	LGS OPS



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 does not properly apply Attachment 1 of OP-AA-108-107-1002. See Answer 'C' discussion.

B. **Incorrect but plausible:** Plausible if the applicant does not properly apply Attachments 1 and 3 of OP-AA-108-107-1002. See Answer 'C' discussion.

C. **Correct:** Per OP-AA-108-107-1002, Attachment 1, the 515 Breaker would not be categorized as either a Start-Up Source or Generator Breaker. Therefore, it would fall under the "Other Equipment" category. Because this is considered to be Emergent Maintenance, it would be classified as Category C work, which does not require oversight (Note however, that notification of the MCR is still required). Since the 515 Breaker is not listed on Attachment 3 of OP-AA-108-107-1002, responsibility for operating the breaker belongs to PECO. LGS OPS is only responsible for the equipment listed on Attachment 3 of the procedure.

D. **Incorrect but plausible:** Plausible if the applicant does not properly apply Attachment 3 of OP-AA-108-107-1002. See Answer 'C' discussion.

References:	Lesson Plan LGSOPS2010, Rev. 001 OP-AA-108-107-1002, Rev. 006 SIM-E-0001 Op-Aid (preferred) or E-1	Applicant Ref: OP-AA-108-107-1002, Attachments 1 and 3 ONLY

Learning Objective: LGSOPS2010 (Obj. 30.a.3)

Question source: LGS Bank (ID: 846290)

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 97

WHICH ONE of the following proposed changes would REQUIRE a 10 CFR 50.59 Screen IAW LS-AA-104, Exelon 50.59 review process?

I. Replace the existing RHRSW sump pump discharge swing check valves, as described by the UFSAR, with ball check valves

II. Replacement of an existing 10 HP motor operator on a safety-related valve with a 7 HP motor operator

III. Installation of a jumper in a RWCU valve circuit in support of an approved maintenance work order with an expected duration of 40 days

A. I ONLY

B. II ONLY

C. I & II

D. I, II, & III

K&A Rating: 2.2.5 (3.2)

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 SWING check valve with ball 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 existing 10 HP motor operator on a safety-related valve with a 7 HP motor operator would not involve 50.59 screening, and also installation of a jumper in a RWCU valve circuit in support of an approved maintenance work order with an expected duration of 40 days, would not involve 50.59 screening.

B. **Incorrect but plausible:** Plausible if the applicant determines that based on information that the replacement of an existing 10 HP motor operator on a safety-related valve with a 7 HP motor operator would involve 50.59 screening, however based on the information that existing RHRSW sump pump discharge SWING check valves replaced with mission DUO-CHECK check valves, as described by the UFSAR, would screen out due to like for like check valve replacement. Also installation of a jumper in a RWCU valve circuit in support of an approved maintenance work order with an expected duration of 40 days, would not involve 50.59 screening due to temporary mod.

C. **Correct:** IAW LS-AA-104-1000, 50.59 resource manual, activity involving replacement of the RHR service water sump pump discharge SWING check valve with ball 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 existing 10 HP motor operator on a safety-related valve with a 7 HP motor operator would involved 50.59 screening. Also installation of a jumper in a RWCU valve circuit in support of an approved maintenance work order with an expected duration of 40 days, would not involve 50.59 screening due to the activity involving temporary modification and falls under separate process.

D. **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 SWING check valve with ball 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 existing 10 HP motor operator on a safety-related valve with a 7 HP motor operator would involved 50.59 screening. Also installation of a jumper in a RWCU valve circuit in support of an approved maintenance work order with an expected duration of 40 days, would involve 50.59 screening.

References:	LS-AA-104, Rev. 6 LS-AA-104-1002, Rev. 4	Student Ref:	LS-AA- 104-

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. Provides an additional source of injection to the reactor to help recover RPV water level

B. Minimizes radioactive release by maintaining Suppression Pool pH to satisfy the methodology for Alternate Source Term

C. Ensures sufficient negative reactivity is present to ensure reactor remains shutdown due to changes in core geometry

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 bulk Suppression Pool 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, thereby preventing iodine re-evolution. 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 determines that boron ensures sufficient negative reactivity to ensure that reactor remains shutdown with changes in core geometry.

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
TS Bases 3/4.1.5, amendment 186

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 cannot 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

NO Emergency event notifications have been made.

State/Local Notification form for ALERT conditions can be available at 00:16.

At 00:15, IAW EP-AA-111, when is the latest time that a declaration to the State/Local authorities must be reported, and what are the appropriate actions that should be followed for declaring and reporting emergency to State/Local authorities?

	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.
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: