Facility: McGuire 1&2 Date of Exam: September 2020

Tier	Group	RO K/A Category Points											SRO-Only Points		
		K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G*	Total	A2	G*	Total
1. Emergency and Abnormal Plant Evolutions	1	3	3	3	N/A			3	3	N/A		3	18	3	3	6
	2	2	2	1				1	2			1	9	2	2	4
	Tier Totals	5	5	4				4	5			4	27	5	5	10
2. Plant Systems	1	3	2	2	3	2	3	2	3	2	3	3	28	2	3	5
	2	1	0	1	1	1	1	1	1	1	1	1	10	1 1	1	3
	Tier Totals	3	2	3	3	3	4	4	4	3	4	4	38	5	3	8
3. Generic Knowledge and Abilities Categories		1			2			3			4		10	1 2	3 4	7
		2			3			2			3			2 2	1 2	

Note: 1. Ensure that at least two topics from every applicable K/A category are sampled within each tier of the RO and SRO-only outline sections (i.e., except for one category in Tier 3 of the SRO-only section, the "Tier Totals" in each K/A category shall not be less than two). (One Tier 3 radiation control K/A is allowed if it is replaced by a K/A from another Tier 3 category.)

2. The point total for each group and tier in the proposed outline must match that specified in the table. The final point total for each group and tier may deviate by ±1 from that specified in the table based on NRC revisions. The final RO exam must total 75 points, and the SRO-only exam must total 25 points.

3. Systems/evolutions within each group are identified on the outline. Systems or evolutions that do not apply at the facility should be deleted with justification. Operationally important, site-specific systems/evolutions that are not included on the outline should be added. Refer to Section D.1.b of ES-401 for guidance regarding the elimination of inappropriate K/A statements.

4. Select topics from as many systems and evolutions as possible. Sample every system or evolution in the group before selecting a second topic for any system or evolution.

5. Absent a plant-specific priority, only those K/As having an importance rating (IR) of 2.5 or higher shall be selected. Use the RO and SRO ratings for the RO and SRO-only portions, respectively.

6. Select SRO topics for Tiers 1 and 2 from the shaded systems and K/A categories.

7. The generic (G) K/As in Tiers 1 and 2 shall be selected from Section 2 of the K/A catalog, but the topics must be relevant to the applicable evolution or system. Refer to Section D.1.b of ES-401 for the applicable K/As.

8. On the following pages, enter the K/A numbers, a brief description of each topic, the topics' IRs for the applicable license level, and the point totals (#) for each system and category. Enter the group and tier totals for each category in the table above. If fuel-handling equipment is sampled in a category other than Category A2 or G* on the SRO-only exam, enter it on the left side of Column A2 for Tier 2, Group 2. (Note 1 does not apply). Use duplicate pages for RO and SRO-only exams.

9. For Tier 3, select topics from Section 2 of the K/A catalog and enter the K/A numbers, descriptions, IRs, and point totals (#) on Form ES-401-3. Limit SRO selections to K/As that are linked to 10 CFR 55.43.

G* Generic K/As

* These systems/evolutions must be included as part of the sample (as applicable to the facility) when Revision 3 of the K/A catalog is used to develop the sample plan. They are not required to be included when using earlier revisions of the K/A catalog.

** These systems/evolutions may be eliminated from the sample (as applicable to the facility) when Revision 3 of the K/A catalog is used to develop the sample plan.

ES-401	PWR Examination Outline							Form ES-401-2	
Emergency and Abnormal Plant Evolutions—Tier 1/Group 1 (RO/SRO)									
E/APE # / Name / Safety Function	K1	K2	K3	A1	A2	G*	K/A Topic(s)	IR	#
000007 (EPE 7) Reactor Trip, Stabilization, Recovery / 1	X						007EK1.02; Knowledge of the operational implications of the following concepts as they apply to the reactor trip: Shutdown margin	3.4	
						X	007EG2.4.3; Ability to identify post-accident instrumentation.	3.9	SRO
000008 (APE 8) Pressurizer Vapor Space Accident / 3		X					008AK2.03; Knowledge of the interrelations between the Pressurizer Vapor Space Accident and: Controllers and positioners	2.5	
000009 (EPE 9) Small Break LOCA / 3		X					009EK2.03; Knowledge of the interrelations between the small break LOCA and: S/Gs	3.0	
						X	009EG2.2.38; Knowledge of conditions and limitations in the facility license	4.5	SRO
000011 (EPE 11) Large Break LOCA / 3						X	011EG2.4.11; Knowledge of abnormal condition procedures.	4.2	
							011EG2.4.20; Knowledge of the operational implications of EOP warnings, cautions, and notes.	4.3	
000015 (APE 15) Reactor Coolant Pump Malfunctions / 4		X					015AK2.10; Knowledge of the interrelations between the Reactor Coolant Pump Malfunctions (Loss of RC Flow) and: RCP indicators and controls	2.8	
000022 (APE 22) Loss of Reactor Coolant Makeup / 2			X				022AK3.01; Knowledge of the reasons for the following responses as they apply to Emergency Boration: When emergency boration is required	4.1	
000025 (APE 25) Loss of Residual Heat Removal System / 4					X		025AA2.07; Ability to determine and interpret the following as they apply to the Loss of Residual Heat Removal System: Pump cavitation.	3.4	
000026 (APE 26) Loss of Component Cooling Water / 8					X		026AA2.05; Ability to determine and interpret the following as they apply to Loss of CCW: The normal values for CCW header flow rate and the flow rates to the components cooled by CCW	2.5	SRO
000027 (APE 27) Pressurizer Pressure Control System Malfunction / 3				X			027AA1.01; Ability to operate and/or monitor the following as they apply to the Pressurizer Pressure Control Malfunctions: PZR heaters, sprays, PORVs	4.0	
000029 (EPE 29) Anticipated Transient Without Scram / 1				X			029EA1.06; Ability to operate and monitor the following as they apply to an ATWS: Operating switches for normal charging header isolation valves	3.2	
000038 (EPE 38) Steam Generator Tube Rupture / 3	X						038EK1.04; Knowledge of the operational implications of the following concepts as they apply to the SGTR: Reflux boiling	3.1	
000054 (APE 54; CE E06) Loss of Main Feedwater /4					X		054AA2.03; Ability to determine and interpret the following as they apply to Loss of Main Feedwater: Conditions and reasons for AFW pump startup	4.1	RO
000055 (EPE 55) Station Blackout / 6						X	055EG2.2.37; Ability to determine operability and/or availability of safety related equipment.	2.9	RO
000056 (APE 56) Loss of Offsite Power / 6				X			056AA1.18; Ability to operate and / or monitor the following as they apply to the Loss of Offsite Power: Control room normal ventilation supply fan.	3.2	
					X		056AA2.73; Ability to determine and interpret the following as they apply to the Loss of Offsite Power: PZR heater on/off	3.6	SRO
000057 (APE 57) Loss of Vital AC Instrument Bus / 6			X				057AK3.01; Knowledge of the reasons for the following responses as they apply to the Loss of Vital AC Instrument Bus: Actions contained in EOP for loss of vital ac electrical instrument bus .	4.1	
000062 (APE 62) Loss of Nuclear Service Water / 4					X		062AA2.01; Ability to determine and interpret the following as they apply to the Loss of Nuclear Service Water: Location of a leak in the SWS	2.9	RO
					X		062AA2.05; Ability to determine and interpret the following as they apply to the Loss of SW: The normal values for SWS header flow rate and flow rates to the components cooled by the SWS.	2.5	SRO

000065 (APE 65) Loss of Instrument Air / 8			X				065AK3.04; Knowledge of the reasons for the following responses as they apply to the Loss of Instrument Air: Cross-over to backup air supplies	3.0	
(W E05) Loss of Secondary Heat Sink / 4						X	WE05EG2.4.2; Knowledge of system set points, interlocks and automatic actions associated with EOP entry conditions.	4.5	RO
(W E12) Uncontrolled Depressurization of all Steam Generators / 4	X						WE12EK1.2; Knowledge of the operational implications of: Normal, abnormal, and emergency operating procedures associated with Uncontrolled Depressurization of all Steam Generators.	3.5	
K/A Category Totals:	3	3	3	3	3/3	3/3	Group Point Total:		18/6

ES-401	PWR Examination Outline							Form ES-401-2	
	Emergency and Abnormal Plant Evolutions—Tier 1/Group 2 (RO/SRO)								
E/APE # / Name / Safety Function	K1	K2	K3	A1	A2	G*	K/A Topic(s)	IR	#
000003 (APE 3) Dropped Control Rod / 1				X			003AA1.05; Ability to operate and / or monitor the following as they apply to the Dropped Control Rod: Reactor power - turbine power	4.1	
000005 (APE05) Inoperable/stuck Control Rod / 1					X		005AA2.01; Ability to determine and interpret: Stuck or inoperable control rod from in-core and ex-core NIS, in-core, or loop temperature measurements.	3.3	SRO
000024 (APE 24) Emergency Boration / 1			X				024AK3.02; Knowledge of the reasons for the following responses as they apply to Emergency Boration: Actions contained in EOP for emergency boration	4.2	
000036 (APE 36; BW/A08) Fuel-Handling Incidents / 8	X						036AK1.02; Knowledge of the operational implications of the following concepts as they apply to Fuel Handling Incidents: SDM	3.4	
000037 (APE 37) Steam Generator Tube Leak / 3					X		037AA2.2.04; Ability to determine and interpret the following as they apply to the SGTL: Comparison of RCS fluid inputs and outputs, to detect leaks	3.4	RO
000051 (APE 51) Loss of Condenser Vacuum / 4						X	051AG2.2.3; (multi-unit license) Knowledge of the design, procedural, and operational | differences between units.	3.8	RO
000068 (APE 68; BW A06) Control Room Evacuation / 8		X					068AK2.01; Knowledge of the interrelations between the Control Room Evacuation and the following: Auxiliary shutdown panel layout	3.9	
000069 (APE 69) Loss of Containment Integrity / 5					X		069AA2.02; Ability to determine and interpret the following as they apply to the Loss of Containment Integrity: Verification of automatic and manual means of restoring integrity	3.9	SRO
076 (APE 76) High Reactor Coolant Activity / 9						X	076AG2.4.31; Knowledge of annunciator alarms, indications, or response procedures.	4.1	SRO
(W E01 & E02) Rediagnosis & SI Termination / 3						X	WE01&02G2.1.32: Ability to explain and apply system limits and precautions.	4.0	SRO
(W E03) LOCA Cooldown and Depressurization / 3		X					WE03EK2.2; Knowledge of the operational implications of the following concepts as it applies to LOCA C/D and Depressurization: Facility's heat removal systems, including primary coolant, emergency coolant, decay heat removal systems, and relations between the proper operation of these systems to operation of the facility	3.7	
(W E08) Pressurized Thermal Shock / 4					X		WE08EA2.2; Ability to determine and interpret the following as it applies to Pressurized Thermal Shock: Adherence to appropriate procedures and operation within the limitations in the facility's license and amendments.	3.5	RO
(W E15) Containment Flooding / 5	X						WE15EK1.2; Knowledge of the operational implications of the following as it applies to Containment Flooding: Normal, abnormal and emergency operating procedures	2.7	
K/A Category Point Totals:	2	2	1	1	2/2	1/2	Group Point Total:		9/4

ES-401	PWR Examination Outline Plant Systems—Tier 2/Group 1 (RO/SRO)											Form ES-401-2		
System # / Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G*	K/A Topic(s)	IR	#
003 (SF4P) Reactor Coolant Pump	X											003K1.10; Knowledge of the physical connections and/or cause-effect relationships between the RCPS and: RCS	3.0	
004 (SF1; SF2) Chemical and Volume Control	X											004K1.05; Knowledge of the physical connections and/or cause-effect relationships between CVCS and: CRDS operation in automatic mode control	2.7	
					X							004K5.18; Knowledge of the operational implications of the following concepts as they apply to CVCS: Relationship between neutron flux and reactivity	2.8	
005 (SF4P) Residual Heat Removal			X									005K3.06; Knowledge of the effect that a loss or malfunction of the RHRS will have on: CSS	3.1	
								X				005A2.02; Ability to (a) predict the impacts of Pressure transient protection during cold shutdown on RHRS, and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences.	3.7	SRO
006 (SF2; SF3) Emergency Core Cooling							X					006A1.14; Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating the ECCS controls including: Reactor vessel level	3.6	
007 (SF5) Pressurizer Relief/Quench Tank							X					007A1.03; Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating the PRTS controls including: Monitoring quench tank temperature	2.6	
	X											007K1.01; Knowledge of the physical connections and/or cause/effect relationships between the PRTS and: Containment system	2.9	
008 (SF8) Component Cooling Water		X										008K2.02; Knowledge of bus power supplies to: CCW pump, including emergency backup	3.0	
010 (SF3) Pressurizer Pressure Control											X	010G2.4.46; Ability to verify that the alarms are consistent with the plant conditions.	4.2	RO
012 (SF7) Reactor Protection						X						012K6.04; Knowledge of the effect of a loss or malfunction of the following will have on the RPS: Bypass-block circuits	3.3	
											X	012G2.1.25; Ability to interpret reference materials, such as graphs, curves, tables, etc.	4.2	SRO
013 (SF2) Engineered Safety Features Actuation								X				013A2.03; Ability to (a) predict the impacts of Rapid depressurization on ESFAS; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences.	4.4	RO
								X				013A2.04; Ability to (a) predict the impacts of the loss of instrument bus on ESFAS; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences.	4.2	SRO
022 (SF5) Containment Cooling									X			022A3.01; Ability to monitor automatic operation of CCS, including: Initiation of safeguards mode of operation	4.1	
										X		022A4.03; Ability to manually operate and/or monitor in the control room: Dampers in the CCS	3.2	

025 (SF5) Ice Condenser				X								025K4.02; Knowledge of ice condenser system design feature(s) and/ or interlock(s) which provide for: System control	2.8	
						X						025K6.01; Knowledge of the effect that a loss or malfunction of the upper and lower doors will have on the ice condenser system.	3.4	
026 (SF5) Containment Spray				X								026K4.02; Knowledge of CSS design feature(s) and/or interlock(s) which provide for: Neutralized boric acid to reduce corrosion and remove inorganic fission product iodine from steam (NAOH) in containment spray	3.1	
039 (SF4S) Main and Reheat Steam					X							039K5.08; Knowledge of the operational implications of the following concepts as the apply to the MRSS: Effect of steam removal on reactivity	3.6	
059 (SF4S) Main Feedwater			X									059K3.02; Knowledge of the effect that a loss or malfunction of the MFW will have on the following: AFW system	3.6	
											X	059G2.4.20; Knowledge of the operational implications of EOP warnings, cautions, and notes.	4.3	SRO
061 (SF4S AF) Auxiliary/Emergency Feedwater						X						061K6.02; Knowledge of the effect of a loss or malfunction of pumps will have on AFW components.	2.6	
											X	061G2.4.18; Knowledge of specific bases for EOPs.	4.0	SRO
062 (SF6) AC Electrical Distribution											X	062G2.4.45; Ability to prioritize and interpret the significance of each annunciator or alarm.	4.1	RO
063 (SF6) DC Electrical Distribution								X				063A2.02; Ability to (a) predict the impacts of grounds on the DC electrical systems; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions.	2.5	RO
										X		063A4.01; Ability to manually operate and/or monitor in the control room: Major breakers and control power fuses	2.8	
064 (SF6) Emergency Diesel Generator										X		064A4.01; Ability to manually operate and/or monitor in the control room: Local and remote operation of the EDG	4.0	
073 (SF7) Process Radiation Monitoring								X				073A2.02; Ability to (a) predict the impacts of detector failure on the PRM system; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences.	2.5	RO
076 (SF4S) Service Water											X	076G2.4.3; Ability to identify post-accident instrumentation.	3.7	RO
		X										076K2.04; Knowledge of bus power supplies to: Reactor building closed cooling water	2.5	
078 (SF8) Instrument Air				X								078K4.03; Knowledge of IAS design feature(s) and/or interlock(s) which provide for the following: Securing of SAS upon loss of cooling water	3.1	
103 (SF5) Containment									X			103A3.01; Ability to monitor automatic operation of the containment system, including: containment isolation	3.9	
K/A Category Point Totals:	3	2	2	3	2	3	2	3/2	2	3	3/3	Group Point Total:		28/5

ES-401	PWR Examination Outline Plant Systems—Tier 2/Group 2 (RO/SRO)											Form ES-401-2	
System # / Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G*	K/A Topic(s)	IR	#
001 (SF1) Control Rod Drive											X	001G2.1.23; Ability to perform specific system and integrated plant procedures during all modes of plant operation.	4.3	RO
002 (SF2; SF4P) Reactor Coolant											X	002G2.1.25; Ability to interpret reference materials, such as graphs, curves, tables, etc.	3.9	SRO
011 (SF2) Pressurizer Level Control								X				011A2.07; Ability to (a) predict the impacts of isolation of letdown on the PZR LCS; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences.	3.0	RO
015 (SF7) Nuclear Instrumentation						X						015K6.03; Knowledge of the effect of a loss or malfunction on the following will have on the NIS: component interconnections	2.6	
016 (SF7) Nonnuclear Instrumentation				X								016K4.01; Knowledge of NNIS design feature(s) and/or interlock(s) which provide for: Reading of NNIS channel values outside control room	2.8	
028 (SF5) Hydrogen Recombiner and Purge Control							X					028A1.01; Ability to predict and/or monitor changes in parameter (to prevent exceeding design limits) associated with operating HRPS controls including: Hydrogen concentration	3.4	
034 (SF8) Fuel-Handling Equipment				X								034K4.01; Knowledge of design feature(s) and/or interlock(s) which provide for: Fuel protection from binding and dropping	3.4	SRO
035 (SF 4P) Steam Generator					X							035K5.01; Knowledge of operational implications of the following concepts as the apply to the S/GS: Effect of secondary parameters, pressure, and temperature on reactivity	3.4	
041 (SF4S) Steam Dump/ Turbine Bypass Control			X									041K3.01; Knowledge of the effect that a loss or malfunction of the SDS will have on the: S/G	3.2	
045 (SF 4S) Main Turbine Generator									X			045A3.05; Ability to monitor automatic operation of the MT/G system, including: Electrohydraulic control	2.6	
055 (SF4S) Condenser Air Removal	X											055K1.06; Knowledge of the physical connections and/or cause-effect relationships between the CARS and the following systems: PRM system	2.6	
068 (SF9) Liquid Radwaste										X		068A4.03; Ability to manually operate and/or monitor in the control room: Stoppage of release if limits exceeded .	3.9	
071 (SF9) Waste Gas Disposal								X				071A2.03; Ability to (a) predict the impacts of rupture disk failures on the Waste Gas Disposal System ; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences.	2.7	SRO
K/A Category Point Totals:	1	0	1	2	1	1	1	1/1	1	1	1/1	Group Point Total:		10/3

Facility: McGuire Date of Exam: February 2020

Category	K/A #	Topic	RO		SRO-only	
			IR	#	IR	#
1. Conduct of Operations	2.1.5	Ability to use procedures related to shift staffing, such as minimum crew | complement, overtime limitations, etc.	2.9			
	2.1.14	Knowledge of criteria or conditions that require plant-wide announcements, such | as pump starts, reactor trips, mode changes, etc.	3.1			
	2.1.20	Ability to interpret and execute procedure steps.			4.6	
	2.1.23	Ability to perform specific system and integrated plant procedures during all | modes of plant operation.			4.4	
		Subtotal	2		2	
2. Equipment Control	2.2.15	Ability to determine expected plant configuration using design and configuration control documentation, such as drawings, line-ups, tag-outs, etc.			4.3	
	2.2.20	Knowledge of the process for managing troubleshooting activities.			3.8	
	2.2.36	Ability to analyze the effect of maintenance activities, such as degraded power | sources, on the status of limiting conditions for operations.	3.1			
	2.2.42	Ability to recognize system parameters that are entry-level conditions for Technical Specifications.	3.9			
	2.2.44	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.	4.2			
		Subtotal	3		2	
3. Radiation Control	2.3.4	Knowledge of radiation exposure limits under normal or emergency conditions.	3.2			
	2.3.13	Knowledge of radiological safety procedures pertaining to licensed operator duties, such as response to radiation monitor alarms, containment entry requirements, fuel handling responsibilities, access to locked high-radiation areas, aligning filters, etc.	3.4			
	2.3.14	Knowledge of radiation or contamination hazards that may arise during normal, abnormal, or emergency conditions or activities.			3.8	
		Subtotal	2		1	
4. Emergency Procedures/Plans	2.4.5	Knowledge of the organization of the operating procedures network for normal, | abnormal, and emergency evolutions.			4.3	
	2.4.20	Knowledge of the operational implications of EOP warnings, cautions, & notes.	3.8			
	2.4.28	Knowledge of procedures relating to a security event (non-safeguards information).			4.1	
	2.4.35	Knowledge of local auxiliary operator tasks during an emergency and the resultant operational effects.	3.8			
	2.4.39	Knowledge of RO responsibilities in emergency plan implementation.	3.9			
		Subtotal	3		2	
		Tier 3 Point Total	10		7	

Tier / Group	Randomly Selected K/A	Reason for Rejection

MNS ILT 20-1R NRC Written MNS SRO NRC Reta QUESTION 1

B

SYS003 K1.10 - Reactor Coolant Pump System (RCPS)

Knowledge of the physical connections and/or cause-effect relationships between the RCPS and the following systems: (CFR: 41.2 to 41.9 / 45.7 to 45.8)

RCS .....

Given the following conditions:

- Unit 1 is at 12% RTP
- Power ascension in progress

Subsequently:

- 1C NCP trips

An automatic reactor trip will NOT occur because reactor power is below the ____(1)____ setpoint.

Loop C delta-T will stabilize at a ____(2)____ value.

Which ONE of the following completes the statements above?

A. 1. P-7
   2. higher

B. 1. P-8
   2. lower

C. 1. P-8
   2. higher

D. 1. P-7
   2. lower

General Discussion

Reactor Power is below the P-8 setpoint (48%) which would enable the Single Loop Loss of Flow Trip.

Reverse flow in the affected loop will cause Thot to decrease to a value equal to or slightly less than Tcold, thereby decreasing the affected loop delta T.
Steam flow from the Steam Generators and heat removal from the NC system in unaffected loops will increase and Tcold in the unaffected loops will decrease.

Answer A Discussion

INCORRECT:

PLAUSIBLE:
Part 1 is plausible because P-7 is a permissive interlock for the Two Loop Loss of Flow trip but the setpoint is 10%.

Part 2 is plausible because the overall core delta T would increase due to only 3 NC pumps running, but the affected loop delta T would decrease due to reverse flow in that loop.

Answer B Discussion

CORRECT. See explanation above.

Answer C Discussion

INCORRECT:

PLAUSIBLE:
Part 1 is correct.

Part 2 is plausible because the overall core delta T would increase due to only 3 NC pumps running, but the affected loop delta T would decrease due to reverse flow in that loop.

Answer D Discussion

INCORRECT:

PLAUSIBLE:
Part 1 is plausible because P-7 is a permissive interlock for the Two Loop Loss of Flow trip but the setpoint is 10%.

Part 2 is correct.

Basis for meeting the KA

The K/A is matched because the applicant has to evaluate the relationship between the 1C NCP and the effect on RCS after a pump trip.

Basis for Hi Cog

The question is Hi Cog because the applicant has to evaluate the given condition (1C NCP trip) and the effect on the RCS.

Basis for SRO only

Job Level	Cognitive Level	QuestionType	Question Source
RO	Comprehension	MODIFIED	Bank Question 1347

Development References

OP-MC-IC-IPE, Reactor Protection.
OP-MC-PS-NCP, Reactor Coolant Pump.

Student References Provided

SYS003 K1.10 - Reactor Coolant Pump System (RCPS)
Knowledge of the physical connections and/or cause-effect relationships between the RCPS and the following systems: (CFR: 41.2 to 41.9 / 45.7 to 45.8)
RCS .....

Remarks/Status

B

MNS ILT 20-1R NRC Written MNS SRO NRC Reta QUESTION 2

D

SYS004 K1.05 - Chemical and Volume Control System

Knowledge of the physical connections and/or cause-effect relationships between the CVCS and the following systems: (CFR: 41.2 to 41.9 / 45.7 to 45.8)

CRDS operation in automatic mode control .....

Given the following on Unit 1:

- Unit 1 is at 75% RTP
- CRD BANK SELECT – AUTO
- Valve Positions on 1MC10:

Based on the conditions above, the NC SYS M/U CONTROLLER is in the ____(1)____ position.

If operation is continued in this alignment, automatic control rod INSERTION ____(2)____ occur.

Which ONE of the following completes the statements above?

A. 1. ALT DILUTE
2. will NOT

B. 1. DILUTE
2. will NOT

C. 1. ALT DILUTE
2. will

D. 1. DILUTE
2. will

General Discussion

With the M/U Controller switch set to "DILUTE", the "Reactor Makeup Water Flow Control" (NV-252A) setpoint is adjusted on the SLIMs station or the DCS Graphic "NVMU- Boric Acid Blender" graphic page. After selecting the page and clicking on the NV-252A Icon, the popup of "Rx M/U Water Control" will come up on the screen. The setpoint is then adjusted to the desired flow rate and the Total Makeup Flow Counter is set to the desired quantity. Actuation of the makeup start switch will then initiate the dilute mode. A selected RMWP starts, the makeup stop valve NV-171A and Rx M/U Water Control valve NV-252A open.

Increasing the boron concentration (borate) will add negative reactivity and thus power should decrease. Decreasing the boron concentration (dilute) will add positive reactivity and thus power should increase. Rods will insert to add negative reactivity.

Answer A Discussion

INCORRECT:

PLAUSIBLE:
Part 1 is plausible because ALT DILUTE uses 1NV-171A as a flowpath just as DILUTE but 1NV-175A would be open as well in ALT DILUTE.

Part 2 is plausible if the applicant does not understand the reactivity effects of a dilution.

Answer B Discussion

INCORRECT:

PLAUSIBLE:
Part 1 is correct.

Part 2 is plausible if the applicant does not understand the reactivity effects of a dilution.

Answer C Discussion

INCORRECT:

PLAUSIBLE:
Part 1 is plausible because ALT DILUTE uses 1NV-171A as a flowpath just as DILUTE but 1NV-175A would be open as well in ALT DILUTE.

Part 2 is correct.

Answer D Discussion

CORRECT. See explanation above.

Basis for meeting the KA

The K/A is matched because the applicant has to determine the current charging lineup and it's effect on control rods in auto.

Basis for Hi Cog

The question is Hi Cog because the applicant has to evaluate the current lineup with the picture given and determine it's effect on rod movement.

Basis for SRO only

Job Level	Cognitive Level	QuestionType	Question Source
RO	Comprehension	NEW	

Development References	Student References Provided
OP-MC-PS-NV, Chemical and Volume Control Lesson OP-MC-ADM-RM, Reactivity Management Lesson	

SYS004 K1.05 - Chemical and Volume Control System

Knowledge of the physical connections and/or cause-effect relationships between the CVCS and the following systems: (CFR: 41.2 to 41.9 / 45.7 to 45.8)

CRDS operation in automatic mode control .....

Remarks/Status

MNS ILT 20-1R NRC Written MNS SRO NRC Reta QUESTION 3

B

SYS004 K5.18 - Chemical and Volume Control System
Knowledge of the operational implications of the following concepts as they apply to the CVCS: (CFR: 41.5/45.7)
Relationship between neutron flux and reactivity .....

Given the following on Unit 2:

- Unit is at 100% RTP
- A malfunction of 2KC-132 (L/D HX OUTLET TEMP CONTROL) has occurred
- 2AD-7, H2 (LETDN HX OUTLET HI TEMP) is in alarm

Based on the conditions above:

1) This event will result in the addition of _____ reactivity.

2) If letdown temperature continues to rise to 138 °F, letdown flow will be automatically aligned to the _____.

Which ONE of the following best completes the statements above?

A. 1. positive
2. VCT

B. 1. negative
2. VCT

C. 1. positive
2. RHT

D. 1. negative
2. RHT

General Discussion

As letdown temperature increases, boron will be released from the demineralizers and cause NC boron concentration to increase. This adds negative reactivity.

At 138 F, 2NV-127A (L/D HX Outlet Temp Control), will divert letdown to the VCT to protect the demineralizer resin.

Answer A Discussion

INCORRECT:

PLAUSIBLE:
Part 1is plausible if the applicant does not understand that boron will be released from demins when temperature rises.

Part 2 is correct.

Answer B Discussion

CORRECT. See explanation above.

Answer C Discussion

INCORRECT:

PLAUSIBLE:
Part 1is plausible if the applicant does not understand that boron will be released from demins when temperature rises.

Part 2 is plausible because the RHT is used for reliefs as well as the VCT High Level divert valve in the NV System.

Answer D Discussion

INCORRECT:

PLAUSIBLE:
Part is correct.

Part 2 is plausible because the RHT is used for reliefs as well as the VCT High Level divert valve in the NV System.

Basis for meeting the KA

The K/A is matched because the applicant has to show knowledge of the operational implications on reactivity for a NV system malfunction.

Basis for Hi Cog

The question is Hi Cog because the applicant has to evaluate the given NV system malfunction and the effects on reactivity.

Basis for SRO only

Job Level	Cognitive Level	QuestionType	Question Source
RO	Comprehension	MODIFIED	2019 CNS NRC (BANK 7384)

Development References	Student References Provided
OP-MC-PS-NV, Chemical and Volume Control Lesson.	

SYS004 K5.18 - Chemical and Volume Control System
Knowledge of the operational implications of the following concepts as they apply to the CVCS: (CFR: 41.5/45.7)
Relationship between neutron flux and reactivity .....

Remarks/Status

SYS005 K3.06 - Residual Heat Removal System (RHRS)
Knowledge of the effect that a loss or malfunction of the RHRS will have on the following: (CFR: 41.7 / 45.6)
CSS .....

Given the following on Unit 1:

- A large break LOCA has occurred
- The CRS has implemented FR-Z.1 (RESPONSE TO HIGH CONTAINMENT PRESSURE)

Subsequently:

- The crew attempts to align the 1A Train of ND to supply Containment Spray
- 1NS-43A (1A ND HX OUTLET TO NS CONT OUTSIDE ISOL) failed to open

Which ONE of the following describes the interlock that prevented 1NS-43A from opening?

A. 1NI-185A (RB SUMP TO TRAIN A ND & NS) was not OPEN

B. CPCS signal was not present

C. 1NI-173A (1A ND TO A & B COLD LEGS CONT OUTSIDE ISOL) was not CLOSED

D. 1ND-58A (TRAIN A ND TO NV & NI PUMPS) was not CLOSED

General Discussion

The ND spray header isolation valves (NS38 & 43) are manually aligned by the operator (if required) after establishing cold-leg recirculation. An interlock prevents opening the header supply valves unless the containment sump valves (NI184 & 185) are open.

Answer A Discussion

CORRECT: See explanation above.

Answer B Discussion

INCORRECT:

PLAUSIBLE:
Plausible because NS-38 and 43 are 8 inch containment isolation valves just like NS-12, 15, 29 and 32. These four valves do require input from CPCS to operate.

Answer C Discussion

INCORRECT:

PLAUSIBLE:
Plausible because the procedure, FR-Z.1, directs closing NI-173A to ensure sufficient head to establish spray flow. However, this is not an interlock preventing operation of NS-43A.

Answer D Discussion

INCORRECT:

PLAUSIBLE:
Plausible if the applicant concludes the piggy back alignment is isolated to allow alignment to Aux Spray. Additionally, ND-58A and NS-43A are both interlocked with various other valves in the ND system. The applicant may incorrectly associate ND-58A with NS-43A.

Basis for meeting the KA

The K/A is matched because the applicant demonstrates knowledge of the affect a malfunction (NI-185A failed to OPEN as required) in the ECCS system will have on aligning ND to the NS system (ND aux spray is the only tie to NS for the ND system).

Basis for Hi Cog

Basis for SRO only

Job Level	Cognitive Level	QuestionType	Question Source
RO	Memory	BANK	Bank Question 4602

Development References

OP-MC-ECC-NS, Containment Spray

Student References Provided

SYS005 K3.06 - Residual Heat Removal System (RHRS)
Knowledge of the effect that a loss or malfunction of the RHRS will have on the following: (CFR: 41.7 / 45.6)
CSS .....

Remarks/Status

SYS006 A1.14 - Emergency Core Cooling System (ECCS)

Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating the ECCS controls including: (CFR: 41.5 / 45.5)

Reactor vessel level .....

Given the following on Unit 1:

- A LOCA has occurred
- Initial depressurization to S/G pressures of 190 PSIG has been completed
- All T-Hot temperatures are less than 388°F

The crew is currently performing the following:

- S/G depressurization to atmospheric pressure per FR-C.1 (RESPONSE TO INADEQUATE CORE COOLING)

Per FR-C.1:

1) A RVLIS reading of less than a MAXIMUM of _____ indicates an inadequate core cooling condition.

2) The subsequent S/G depressurization to atmospheric pressure is performed in order to allow injection from the _____.

Which ONE of the following completes the statements above?

A. 1. 39%
   2. ND system

B. 1. 60%
   2. ND system

C. 1. 39%
   2. Cold Leg accumulators

D. 1. 60%
   2. Cold Leg accumulators

General Discussion

If RVLIS lower range is less than 39%, then the core is uncovered and an inadequate core cooling condition has been reached.

Depressurization to atmospheric pressure will lower pressure less than the shutoff head of the ND pumps and allow the core to re-cover.

Answer A Discussion

CORRECT: See explanation above.

Answer B Discussion

INCORRECT:

PLAUSIBLE;
Part 1 is plausible because 60% is used for RVLIS level when determining exit criteria from FR-C.1

Part 2 is correct.

Answer C Discussion

INCORRECT:

PLAUSIBLE;
Part 1 is correct.

Part 2 plausible because CLAs would inject at lower pressures but would be isolated to prevent nitrogen injection with temperature less than 388F.

Answer D Discussion

INCORRECT:

PLAUSIBLE;
Part 1 is plausible because 60% is used for RVLIS level when determining exit criteria from FR-C.1

Part 2 plausible because CLAs would inject at lower pressures but would be isolated to prevent nitrogen injection with temperature less than 388F.

Basis for meeting the KA

The K/A is matched because the applicant demonstrates the ability to predict the reactor vessel level below which the core would become uncovered (39%) during a LOCA.

Basis for Hi Cog

The question is higher cognitive because the applicant has to apply the condtions given and determine how they affect the mitigative strategy for recovering reactor water level.

Basis for SRO only

Job Level	Cognitive Level	QuestionType	Question Source
RO	Comprehension	MODIFIED	Bank Question 530

Development References

OP-MC-EP-F0, Critical Safety Function Status Trees
OP-MC-EP-FRC, Core Cooling Functional Restoration Procedures

Student References Provided

SYS006 A1.14 - Emergency Core Cooling System (ECCS)
Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating the ECCS controls including: (CFR: 41.5 / 45.5)
Reactor vessel level .....

Remarks/Status

MNS ILT 20-1R NRC Written MNS SRO NRC Reta QUESTION 6

B

SYS007 A1.03 - Pressurizer Relief Tank/Quench Tank System (PRTS)

Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating the PRTS controls including: (CFR: 41.5 / 45.5)

Monitoring quench tank temperature .....

Given the following on Unit 1:

- Unit is at 100% RTP
- There is leak-by on ONE PZR PORV
- PRT Temperature on 1NCP-5350 is currently 90°F and rising 2°/minute

At the current rate, the PRT temperature will reach the PRT high temperature alarm on 1AD-6 within _____ minutes.

Which ONE of the following completes the statements above?

A. 5

B. 12

C. 25

D. 40

General Discussion

Per OP/1/A/6150/004 (Pzr Relief Tank) Limit and Precautions PRT Temperature should remain less than 114 degress F.

With initial temperature at 90 degrees F and rising 2 degrees/min, 114 degree F will be reached in 12 minutes.

Answer A Discussion

INCORRECT:

PLAUSIBLE:
Plausible because at 5 minutes temperature will reach 100 degrees F. 100 degrees F is the containment upper compartment temperature limit in TS 3.6.5.

Answer B Discussion

CORRECT: See explanation above.

Answer C Discussion

INCORRECT:

PLAUSIBLE:
Plausible because at 25 minutes temperature will reach 140 degrees F. 140 degrees F is the alarm setpoint for PZR Safety Discharge Hi Temp for 1NC-2 and 3.

Answer D Discussion

INCORRECT:

PLAUSIBLE:
Plausible because at 40 minutes temperature will reach 170 degrees F. 170 degrees F is the alarm setpoint for PZR Safety Discharge Hi Temp for 1NC-1.

Basis for meeting the KA

The K/A is matched because the applicant demonstrates the ability to predict (by calculating) PRT temperature using the value given on 1NCP-5350 and determine when a limit will be reached.

Basis for Hi Cog

This question is higher cognitive because the applicant is required to perform a calculation of PRT temperature using the value given on 1NCP-5350 and the rate at which temperature is rising.

Basis for SRO only

Job Level	Cognitive Level	QuestionType	Question Source
RO	Comprehension	NEW	

Development References

OP-MC-PSS-NCD Lesson Plan
OP/1/A/6100/010 G (Annunciator Response for 1AD-6)
OP/1/A/6150/004 (PRT Operation)
TS 3.6.5

Student References Provided

SYS007 A1.03 - Pressurizer Relief Tank/Quench Tank System (PRTS)
Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating the PRTS controls including: (CFR: 41.5 / 45.5)
Monitoring quench tank temperature .....

Remarks/Status

SYS007 K1.01 - Pressurizer Relief Tank/Quench Tank System (PRTS)

Knowledge of the physical connections and/or cause-effect relationships between the PRTS and the following systems: (CFR: 41.2 to 41.9 / 45.7 to 45.8)

Containment system .....

Given the following on Unit 2:

- A reactor trip has occurred
- The CRS has implemented E-0 (REACTOR TRIP OR SAFETY INJECTION)
- Containment pressure is 0.1 PSIG and stable

Subsequently,

- ONE (1) PZR PORV fails partially open
- PRT pressure rises and then drops and stabilizes at 2 PSIG

Based on the conditions above,

1) the PRT _____ operated to reduce pressure.

2) as Containment pressure rises, the LCO for TS 3.6.4 (CONTAINMENT PRESSURE) will be exceeded when Containment pressure exceeds a MINIMUM of _____ PSIG.

Which ONE of the following completes the statements above?

A. 1. vent valve
   2. 0.3

B. 1. rupture disc
   2. 0.3

C. 1. vent valve
   2. 0.2

D. 1. rupture disc
   2. 0.2

General Discussion

Per OP-MC-PS-NC, the PRT Rupture Discs will lift at 100 PSIG to protect the PRT. There is a manual vent valve but is not usually used due to ALARA concerns. It is used during an outage to vent the PRT.

According to Technical Specification LCO 3.6.4, the Technical Specification Containment Pressure upper limit is 0.3 PSIG.

Answer A Discussion

INCORRECT:

PLAUSIBLE:
Part 1 plausible because there is a vent valve that can be used to vent to containment but it is not used at power.

Part 2 is correct.

Answer B Discussion

CORRECT: See explanation above.

Answer C Discussion

INCORRECT:

PLAUSIBLE:
Part 1 plausible because there is a vent valve that can be used to vent to containment but it is not used at power.

Part 2 is plausible because 0.2 PSIG is the setpoint for the Containment Hi Pressure Alert annunciator alarm.

Answer D Discussion

INCORRECT:

PLAUSIBLE:
Part 1 is correct.

Part 2 is plausible because 0.2 PSIG is the setpoint for the Containment Hi Pressure Alert annunciator alarm.

Basis for meeting the KA

K/A is matched because the applicant must have knowledge of the cause-effect relationship between PRT rupture disc operation and containment pressure.

Basis for Hi Cog

Basis for SRO only

Job Level	Cognitive Level	QuestionType	Question Source
RO	Memory	MODIFIED	2018 MNS NRC (BANK 7416)

Development References

Lesson Plan OP-MC-PS-NC
TS 3.6.4 (Containment Pressure)

Student References Provided

SYS007 K1.01 - Pressurizer Relief Tank/Quench Tank System (PRTS)
Knowledge of the physical connections and/or cause-effect relationships between the PRTS and the following systems: (CFR: 41.2 to 41.9 / 45.7 to 45.8)
Containment system .....

Remarks/Status

MNS ILT 20-1R NRC Written MNS SRO NRC Reta QUESTION 8

B

SYS008 K2.02 - Component Cooling Water System (CCWS)
Knowledge of bus power supplies to the following: (CFR: 41.7)
CCW pump, including emergency backup .....

Given the following on Unit 2:

- Unit is at 100% RTP
- 2A1 KC Pump is in service
- 2A2 KC Pump is secured
- The 2B sequencer is in TEST

Subsequently:

- An inadvertent SI signal is received on Unit 2 “B” Train ONLY

Which ONE of the following describes the Unit 2 KC pumps that are in service?
(Assume no operator action)

A. 2A1 KC pump ONLY

B. 2A1, 2B1, and 2B2 KC pumps ONLY

C. 2A1 and 2A2 KC pumps ONLY

D. 2A1, 2A2, 2B1 and 2B2 KC pumps

General Discussion

The sequencer is designed to automatically override the test mode should an actual safety injection or blackout occur during testing. If an actual initiating signal occurs during testing, the sequencer will be RESET and removed from TEST.

Answer A Discussion

INCORRECT:

PLAUSIBLE:
Plausible if the applicant is not aware that an SI signal will remove the B Train sequencer from test.

Answer B Discussion

CORRECT. See explanation above.

Answer C Discussion

INCORRECT:

PLAUSIBLE:
Plausible if the applicant is not aware that an SI signal will remove the B Train sequencer from test and reasons that all KC pumps get a start signal from either train SI.

Answer D Discussion

INCORRECT:

PLAUSIBLE:
Plausible if the applicant assumes either train SI will initiate a start signal for all KC pumps.

Basis for meeting the KA

The K/A is matched because the applicant has to know that KC pumps are powered from 2ETA and 2ETB and will get a sequencer start signal.

Basis for Hi Cog

The applicant has to evaluate the conditions given (pumps running, sequencer in Test) to determine the effect an SI signal will have on system status.

Basis for SRO only

Job Level	Cognitive Level	QuestionType	Question Source
RO	Comprehension	BANK	2017 CNS Audit (BANK 7206)

Development References

OP-MC-DG-EQB
OP-MC-PSS-KC

Student References Provided

SYS008 K2.02 - Component Cooling Water System (CCWS)
Knowledge of bus power supplies to the following: (CFR: 41.7)
CCW pump, including emergency backup .....

Remarks/Status

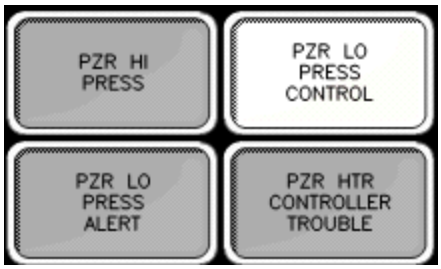
MNS ILT 20-1R NRC Written MNS SRO NRC Reta QUESTION 9

A

SYS010 2.4.46 - Pressurizer Pressure Control System (PZR PCS)
SYS010 GENERIC
Ability to verify that the alarms are consistent with the plant conditions. (CFR: 41.10 / 43.5 / 45.3 / 45.12)

Given the following on Unit 1:

- The unit is at 100%
- Pressurizer Pressure is 2220 PSIG and slowly lowering
- Pressurizer Pressure Master Controller Error is -15 PSIG
- Backup Heaters are in AUTO
- The following is observed on 1AD6:



At the current error signal, all backup heaters are ____(1)____.

1AD6 Annunciators ____(2)____ consistent with the given plant conditions.

Which ONE of the following best completes the statements above?

A 1. OFF
2. are NOT

B 1. ON
2. are NOT

C 1. OFF
2. are

D 1. ON
2. are

General Discussion

When the Pressurizer Pressure Master error is -17 psig the following conditions should exist:
1. 'C' Heaters should be full ON at an error of -15 psig.
2. B.U Heaters will NOT be ON until -25 psig so for the given conditions they would remain OFF.
3. 1AD6 C-6 PZR LO PRESS CONTROL should not alarm until -25 psig. Therefore the annunciators are NOT consistent with pressure at 2218 psig and a -17 psig error.

Answer A Discussion

CORRECT: See explanation above.

Answer B Discussion

INCORRECT:

PLAUSIBLE:
Part 1 is plausible because the C Heaters are full ON at -15 psig.

Part 2 is correct.

Answer C Discussion

INCORRECT:

PLAUSIBLE:
Part 1 is correct.

Part 2 is plausible because the "C" Pzr heaters are full on and the applicant may conclude the low pressure control annunciator setpoint is associated with the setpoint for "C" heaters being full on.

Answer D Discussion

INCORRECT:

PLAUSIBLE:
Part 1 is plausible because the C Heaters are full ON at -15 psig

Part 2 is plausible because the "C" Pzr heaters are full on and the applicant may conclude the low pressure control annunciator setpoint is associated with the setpoint for "C" heaters being full on.

.

Basis for meeting the KA

The K/A is matched because the applicant has to verify given annunciators are consistent with the given PZR Pressure and Error signals.

Basis for Hi Cog

The question is higher cognitive because the applicant has to evaluate the 1AD6 annunciator windows against current conditions and then apply that to system operation.

Basis for SRO only

Job Level	Cognitive Level	QuestionType	Question Source
RO	Comprehension	NEW	

Development References

OP-MC-PS-IPE, Pressurizer Pressure Control
OP/1/A/6100/010 G, Annunicator Response for Panel 1AD-6

Student References Provided

SYS010 2.4.46 - Pressurizer Pressure Control System (PZR PCS)
SYS010 GENERIC
Ability to verify that the alarms are consistent with the plant conditions. (CFR: 41.10 / 43.5 / 45.3 / 45.12)

Remarks/Status

MNS ILT 20-1R NRC Written MNS SRO NRC Reta QUESTION 10

C

SYS012 K6.04 - Reactor Protection System (RPS)
Knowledge of the effect of a loss or malfunction of the following will have on the RPS: (CFR: 41.7 / 45/7)
Bypass-block circuits .....

Given the following on Unit 2:

- The Unit is conducting a startup at 6% RTP
- The N-35 channel “LEVEL TRIP” switch is in “BYPASS”

Subsequently:

- Intermediate Range channel N-35 begins to operate erratically

Removal of 2N-35 Instrument Power fuses ____(1)____ result in a reactor trip.

Removal of 2N-35 Control Power fuses ____(2)____ result in a reactor trip.

Which ONE of the following completes the statements above?

A. 1. will
2. will

B. 1. will
2. will NOT

C. 1. will NOT
2. will

D. 1. will NOT
2. will NOT

General Discussion

The instrument fuse trip is prevented from occurring when the NI is in BYPASS OR blocked. Stem conditions clearly indicate that N-35 channel has been placed in BYPASS, therefore only the instrument power fuses can be removed without causing a reactor trip.
The control power fuse removal trip is still in place.

Answer A Discussion

INCORRECT:

PLAUSIBLE:
Part 1 is plausible because this would be a true statement if the Level Trip switch is not in bypass.

Part 2 is correct.

Answer B Discussion

INCORRECT:

PLAUSIBLE:
Part 1 is plausible because this would be a true statement if the Level Trip switch is not in bypass.

Part 2 is plausible if the applicant concludes BYPASS blocks trips from either sets of fuses.

Answer C Discussion

CORRECT. See explanation above.

Answer D Discussion

INCORRECT:

PLAUSIBLE:
Part 1 is correct.

Part 2 is plausible if the applicant concludes BYPASS blocks trips from either sets of fuses.

Basis for meeting the KA

The K/A is matched because the applicant has to understand the effect of taking the "LEVEL TRIP" switch for N-35 to bypass.

Basis for Hi Cog

Basis for SRO only

Job Level	Cognitive Level	QuestionType	Question Source
RO	Memory	BANK	2012 CNS Audit (BANK 7335)

Development References

OP-MC-IC-ENB, Excore Nuclear Instrumentation

Student References Provided

SYS012 K6.04 - Reactor Protection System (RPS)
Knowledge of the effect of a loss or malfunction of the following will have on the RPS: (CFR: 41.7 / 45/7)
Bypass-block circuits .....

Remarks/Status

SYS013 A2.03 - Engineered Safety Features Actuation System (ESFAS)

Ability to (a) predict the impacts of the following malfunctions or operations on the ESFAS; and (b) based Ability on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations; (CFR: 41.5 / 43.5 / 45.3 / 45.13)

Rapid depressurization .....

Given the following on Unit 2:

- A startup is in progress and reactor power is currently 1% RTP

Subsequently:

- 2NC-27C (PRESSURIZER SPRAY CONTROL) fails OPEN
- The crew enters AP-11 (PRESSURIZER PRESSURE ANOMALIES)
- The valve will not close from the SLIM on 2MC-10.

Based on the conditions above,

1) The BOP will attempt to stop spray flow by _____.

2) The actions the BOP takes to stop spray flow are an attempt to prevent a _____ reactor trip from occurring.

Which ONE of the following completes the statements above?

A. 1. securing NCP A and B
   2. OTΔT

B. 1. securing NCP A and B
   2. OPΔT

C. 1. placing emergency close switch to “CLOSE”.
   2. OTΔT

D. 1. placing emergency close switch to “CLOSE”.
   2. OPΔT

General Discussion

When a spray valve is open the operator will attempt to close the valve from the SLIM or via the emergency close switch. In this case the emergency close will be used since the SLIM did not work.

If reactor pressure was allowed to drop then an OTDT reactor trip setpoint would be reached.

Answer A Discussion

INCORRECT:

PLAUSIBLE;
Part 1 is plausible because if the spray valves would not close via the SLIM or the emergency close switch, then the NCPs would be tripped. With the reactor in Mode 1 or 2 the reactor would need to be tripped first.

Part 2 is correct.

Answer B Discussion

INCORRECT:

PLAUSIBLE;
Part 1 is plausible because if the spray valves would not close via the SLIM or the emergency close switch, then the NCPs would be tripped. With the reactor in Mode 1 or 2 the reactor would need to be tripped first.

Part 2 is plausible if the applicant confuses the effects pressure will have on the OPDT and OTDT setpoints.

Answer C Discussion

CORRECT: See explanation above.

Answer D Discussion

INCORRECT:

PLAUSIBLE;
Part 1 is correct.

Part 2 is plausible if the applicant confuses the effects pressure will have on the OPDT and OTDT setpoints.

Basis for meeting the KA

The K/A is matched because the applicant demonstrates the ability to use the correct procedure guidance in AP-11 to prevent the reactor from tripping on OTDT (predict the impact) from a stuck spray valve.

Basis for Hi Cog

Basis for SRO only

Job Level	Cognitive Level	QuestionType	Question Source
RO	Memory	MODIFIED	South Texas 2016

Development References

AP/1/A/5500/11, Pressurizer Pressure Anomalies
AP-11 Basis Document

Student References Provided

SYS013 A2.03 - Engineered Safety Features Actuation System (ESFAS)
Ability to (a) predict the impacts of the following malfunctions or operations on the ESFAS; and (b) based Ability on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations; (CFR: 41.5 / 43.5 / 45.3 / 45.13)
Rapid depressurization .....

Remarks/Status

SYS022 A3.01 - Containment Cooling System (CCS)
Ability to monitor automatic operation of the CCS, including: (CFR: 41.7 / 45.5)
Initiation of safeguards mode of operation .....

Given the following on Unit 1:

- A SBLOCA has occurred
- Containment pressure peaked at 1.3 PSIG and now is 0.9 PSIG and stable
- The Pressurizer Booster and Pipe Tunnel Booster Fans shunt trip OFF

Based on the conditions above,

1) The Pressurizer Booster fans _____ swapped to emergency power.

2) Pipe Tunnel Booster fans _____ remain OFF.

Which ONE of the following completes the statements above?

A. 1. have
2. will

B. 1. have
2. will NOT

C. 1. have NOT
2. will

D. 1. have NOT
2. will NOT

General Discussion

A safety injection occurs at 1.0 psig. On a SI the following occurs:
PZR Booster Fans will shunt trip off, swap to emergency power and the selected fan restarts.
Pipe tunnel booster fans will be shunt tripped off and remain off.

Answer A Discussion

CORRECT. See explanation above.

Answer B Discussion

INCORRECT:

PLAUSIBLE:
Part 1 is correct.

Part 2 is plausible because for a blackout they will restart.

Answer C Discussion

INCORRECT:

PLAUSIBLE:
Part 1 is plausible because VU and pipe tunnel fans will shunt trip off and not swap to emergency power to restart.

Part 2 is correct.

Answer D Discussion

INCORRECT:

PLAUSIBLE:
Part 1 is plausible because VU and pipe tunnel fans will shunt trip off and not swap to emergency power to restart.

Part 2 is plausible because for a blackout they will restart.

Basis for meeting the KA

K/A is matched because the applicant is required to demonstrate the ability to monitor automatic operation of the Containment Cooling system by determining the status of the VL fans and the PTBFs after initiation of a safety injection.

Basis for Hi Cog

This question is a higher cognitive question because the applicant must analyze the conditions in the stem to determine which safeguards actuations have occurred due to containment pressure and then determine the status of the containment cooling system fans.

Basis for SRO only

Job Level	Cognitive Level	QuestionType	Question Source
RO	Comprehension	MODIFIED	2018 MNS NRC (BANK 7401)

Development References

OP-MC-CNT-VUL, Upper and Lower Containment Ventilation System

Student References Provided

SYS022 A3.01 - Containment Cooling System (CCS)
Ability to monitor automatic operation of the CCS, including: (CFR: 41.7 / 45.5)
Initiation of safeguards mode of operation .....

Remarks/Status

MNS ILT 20-1R NRC Written MNS SRO NRC Reta QUESTION 13

B

SYS022 A4.03 - Containment Cooling System (CCS)
Ability to manually operate and/or monitor in the control room: (CFR: 41.7 / 45.5 to 45.8)
Dampers in the CCS .....

Given the following on Unit 2:

- 13:00 - A LOCA occurred
- 13:01 - Containment Pressure is 3.5 PSIG and rising

At time 13:01, the Containment Air Return Fans ___(1)___ be running.

In order to open, Containment Air Return Dampers require differential pressure to be less than or equal to a MAXIMUM of ___(2)___ PSID.

Which ONE of the following completes the statements above?

A. 1. will
2. 0.35

B. 1. will NOT
2. 0.5

C. 1. will
2. 0.5

D. 1. will NOT
2. 0.35

General Discussion

Containment Air Return Fans will automatically start 10 minutes following the receipt of an Sp signal.

Containment Air Return Dampers will open 10 seconds following receipt of an Sp signal if the following conditions are met:
-greater than or equal to 0.35 psig from CPCS
-less than or equal to 0.5 psid (lower compartment pressure vs. upper compartment)

Answer A Discussion

INCORRECT:

Plausible:
Part 1 is plausible because the Containment Air Return Isolation Damper opens within the first minute (10 seconds signal to open after Sp Signal).

Part 2 is plausible because the dampers require 0.35 psig from CPCS to open.

Answer B Discussion

CORRECT. See explanation above.

Answer C Discussion

INCORRECT:

Plausible:
Part 1 is plausible because the Containment Air Return Isolation Damper opens within the first minute (10 seconds signal to open after Sp Signal).

Part 2 is correct.

Answer D Discussion

INCORRECT:

Plausible:
Part 1 is correct.

Part 2 is plausible because the dampers require 0.35 psig from CPCS to open.

Basis for meeting the KA

The applicant is required to demonstrate the ability to monitor (through demonstration of knowledge of required automatic starts) operation of fans which provide containment cooling under accident conditions.

Basis for Hi Cog

The applicant has to evaluate the given time since the LOCA occurred as well as the given containment pressure to determine status of the CARFs.

Basis for SRO only

Job Level	Cognitive Level	QuestionType	Question Source
RO	Comprehension	BANK	MNS Bank

Development References	Student References Provided
OP-MC-CNT-VX	

SYS022 A4.03 - Containment Cooling System (CCS)
Ability to manually operate and/or monitor in the control room: (CFR: 41.7 / 45.5 to 45.8)
Dampers in the CCS .....

Remarks/Status

MNS ILT 20-1R NRC Written MNS SRO NRC Reta QUESTION 14

D

SYS025 K4.02 - Ice Condenser System
Knowledge of ice condenser system design feature(s) and/or interlock(s) which provide for the following: (CFR: 41.7)
System control .....

Given the following conditions on Unit 1:

- A SBLOCA has occurred
- NC System pressure is 1940 PSIG and lowering slowly
- Containment pressure is 2.3 PSIG and rising slowly

Based on the conditions above:

NF (ICE CONDENSER) system valve(s) _____ will receive a signal to CLOSE.

Which ONE of the following completes the statement above?

COMPONENT LEGEND:

1NF-228A (RB GLYCOL SUPPLY CONT OUTSIDE ISOL)
1NF-233B (RB GLYCOL RETURN CONT INSIDE ISOL)
1NF-234A (RB GLYCOL RETURN CONT OUTSIDE ISOL)

A. 1NF-233B ONLY

B. 1NF-228A AND 1NF-233B ONLY

C. 1NF-228A AND 1NF-234A ONLY

D. 1NF-228A, 1NF-233B AND 1NF-234A

General Discussion

There are containment isolation valves on the supply and return header (NF-228A "RB Glycol Supply C/I Otsd", NF-233B "RB Glycol Return C/I Insd", and NF-234A "RB Glycol Return C/I Otsd") which will close on an ST signal (refer to Drawing 7.6). These valves can be operated from the Control Room on MC-11 with "Open /Close" pushbuttons.

Phase "A" Containment Isolation (St) signal aligns various non-essential containment penetrations at the onset of an accident. It is actuated by a Safety Injection (SS) or Manually (1/2 pushbuttons). Phase "A" Containment Isolation (St) and Safety Injection (Ss) differ in that the Safety Injection signal aligns key essential valves and components throughout the plant, the Phase "A" Containment Isolation signal only aligns valves associated with the isolation of containment penetrations. A Manual Phase "A" (St) Containment Isolation actuation will also actuate SH (Containment Ventilation Isolation).

Answer A Discussion

INCORRECT: See explanation above.

PLAUSIBLE:
Plausible if the applicant concludes that ONLY inside containment isolation valves close on a Phase A (St) signal and outside containment isolation valves close on a Phase B (Sp) signal

Answer B Discussion

INCORRECT: See explanation above.

PLAUSIBLE:
Plausible if the applicant concludes that closing one containment inside isolation and one containment outside isolation would provide complete isolation for the NF system.

Answer C Discussion

INCORRECT: See explanation above.

PLAUSIBLE:
Plausible if the applicant concludes that ONLY outside containment isolation valves close on a Phase A (St) signal and inside containment isolation valves close on a Phase B (Sp) signal.

Answer D Discussion

CORRECT: See explanation above.

Basis for meeting the KA

The KA is matched because by demonstrating a knowledge of the operation of the NF System Containment Isolation valves.

Basis for Hi Cog

Applicant is required to analyze plant conditions and determine which safety signal has been generated and then recall from memory which NF containment isolation valves close.

Basis for SRO only

Job Level	Cognitive Level	QuestionType	Question Source
RO	Comprehension	BANK	Bank Question 5847

Development References

OP-MC-CNT-NF, Ice Condenser Lesson

Student References Provided

SYS025 K4.02 - Ice Condenser System
Knowledge of ice condenser system design feature(s) and/or interlock(s) which provide for the following: (CFR: 41.7)
System control .....

Remarks/Status

MNS ILT 20-1R NRC Written MNS SRO NRC Reta QUESTION 15

B

SYS026 K4.02 - Containment Spray System (CSS)
Knowledge of CSS design feature(s) and/or interlock(s) which provide for the following: (CFR: 41.7)
Neutralized boric acid to reduce corrosion and remove inorganic fission product iodine from steam (NAOH) in containment spray .....

Concerning operation of the Containment Spray System (NS):

Aligning suction from the _____(1)_____ with a specific _____(2)_____ limits post-accident Iodine concentration and minimizes stress corrosion.

Which ONE of the following completes the statement above?

A. 1. FWST
   2. pH

B. 1. containment sump
   2. pH

C. 1. FWST
   2. boron concentration

D. 1. containment sump
   2. boron concentration

General Discussion

During recirc , the containment spray system is aligned to the containment sump.

One function of the ice bed and Containment Spray system is to remove fission product iodine following a Design Basis Accident. This is accomplished by ensuring an alkaline pH is present in the sump water.

Answer A Discussion

INCORRECT:

PLAUSIBLE:
Part 1 is plausible because the Containment Spray System suction is normally aligned to the FWST at power.

Part 2 is correct.

Answer B Discussion

CORRECT. See explanation above.

Answer C Discussion

INCORRECT:

PLAUSIBLE:
Part 1 is plausible because the Containment Spray System suction is normally aligned to the FWST at power.

Part 2 is plausible because specific requirements do exist for boron concentration (related to ensuring post accident subcriticality) and this concentration does contribute to alkaline pH requirements.

Answer D Discussion

INCORRECT:

PLAUSIBLE:
Part 1 is correct.

Part 2 is plausible because specific requirements do exist for boron concentration (related to ensuring post accident subcriticality) and this concentration does contribute to alkaline pH requirements.

Basis for meeting the KA

The applicant is required to demonstrate knowledge of a design feature of Containment Spray System and the method for reduction of iodine.

Basis for Hi Cog

Basis for SRO only

Job Level	Cognitive Level	QuestionType	Question Source
RO	Memory	BANK	2017 CNS NRC (BANK 7140)

Development References	Student References Provided
OP-MC-CNT-NF, Ice Condenser OP-MC-ECC-NS, Containment Spray	

SYS026 K4.02 - Containment Spray System (CSS)
Knowledge of CSS design feature(s) and/or interlock(s) which provide for the following: (CFR: 41.7)
Neutralized boric acid to reduce corrosion and remove inorganic fission product iodine from steam (NAOH) in containment spray .....

Remarks/Status

MNS ILT 20-1R NRC Written MNS SRO NRC Reta QUESTION 16

A

SYS026 A3.01 - Containment Spray System (CSS)
Ability to monitor automatic operation of the CSS, including: (CFR: 41.7 / 45.5)
Pump starts and correct MOV positioning .....

Given the following on Unit 2:

- A Large Break LOCA has occurred
- One train of NS has been aligned for recirc per ES-1.3 (TRANSFER TO COLD LEG RECIRC)

As Containment pressure lowers, the NS Pump will automatically secure at a MAXIMUM Containment pressure of ___(1)___ PSIG.

Following this NS Pump shutdown, if Containment pressure rises above the auto-secure setpoint, the NS Pump discharge valves ___(2)___ automatically OPEN.

Which ONE of the following completes the statements above?

A. 1. 0.35
   2. will NOT

B. 1. 0.8
   2. will NOT

C. 1. 0.35
   2. will

D. 1. 0.8
   2. will

General Discussion

The Containment Spray System will be started manually from the Control Room. For the manual start, CPCS must be at least 0.35 psig for the discharge valves to be manually opened or for the pumps to be manually started. Either of the train related discharge valves must also be open to allow a pump start. If the containment pressure decreases to < .35 psig (after the initial pump start) containment spray pumps are automatically turned off and the discharge valves are automatically closed. NS Pump discharge valves will not automatically open.

Answer A Discussion

CORRECT: See explanation above.

Answer B Discussion

INCORRECT: See explanation above.

PLAUSIBLE:
Part 1 is plausible because this setpoint represents the value at which Containment Air Return Fans start.

Part 2 is correct.

Answer C Discussion

INCORRECT: See explanation above.

PLAUSIBLE:
Part 1 is correct.

Part 2 is plausible because the NS pump discharge valves do have an automatic signal associated with containment pressure, but not to open these valves.

Answer D Discussion

INCORRECT: See explanation above.

PLAUSIBLE:
Part 1 is plausible because this setpoint represents the value at which Containment Air Return Fans start.

Part 2 is plausible because the NS pump discharge valves do have an automatic signal associated with containment pressure, but not to open these valves.

Basis for meeting the KA

The K/A is matched because the question tests the automatic setpoint for pumps to secure and discharge valve operation.

Basis for Hi Cog

Basis for SRO only

Job Level	Cognitive Level	QuestionType	Question Source
RO	Memory	BANK	2018 MNS NRC (Bank 7403)

Development References	Student References Provided
OP-MC-ECC-NS	

SYS026 A3.01 - Containment Spray System (CSS)
Ability to monitor automatic operation of the CSS, including: (CFR: 41.7 / 45.5)
Pump starts and correct MOV positioning .....

Remarks/Status

SYS039 K5.01 - Main and Reheat Steam System (MRSS)
Knowledge of the operational implications of the following concepts as the apply to the MRSS: (CFR: 441.5 / 45.7)
Definition and causes of steam/water hammer .....

Given the following on Unit 1:

- A reactor trip has occurred due to a secondary system malfunction
- E-0 (REACTOR TRIP OR SAFETY INJECTION) has been performed and the crew has transitioned to ES-0.1 (REACTOR TRIP RESPONSE)

Subsequently,

- The crew enters FR-H.2 (RESPONSE TO STEAM GENERATOR OVERPRESSURE)
- The crew is preparing to dump steam from the affected S/G

FR-H.2 will NOT allow steam to be released from the affected S/G if NR level exceeds a MINIMUM of ___(1)___ due to ___(2)___ concerns, without an overfill evaluation being completed.

Which ONE of the following completes the statements above?

A. 1. 92%
   2. steamline water hammer

B. 1. 92%
   2. condenser tube damage

C. 1. 83%
   2. steamline water hammer

D. 1. 83%
   2. condenser tube damage

General Discussion

The procedure for S/G high pressure directs operators to enter the procedure for S/G high level if level is ≥ 92% in order to prevent a water hammer event if steam is released above this setpoint.

Following reduction of S/G level, an evaluation must be performed due to the potential for water intrusion into the steamline.

Answer A Discussion

CORRECT: See explanation above.

Answer B Discussion

INCORRECT:

PLAUSIBLE:
Part 1 is correct.

Part 2 is plausible because it could be reasoned that water entry into the condenser via steam dumps may cause tube damage.

Answer C Discussion

INCORRECT:

PLAUSIBLE:
Part 1 is plausible because this is the setpoint identified in FR-H.3 " Throughout this procedure, "affected" refers to any S/G in which N/R level is greater than 83%" and this is also the setpoint for P-14 (Hi-Hi S/G Level Interlock).

Part 2 is correct.

Answer D Discussion

INCORRECT:

PLAUSIBLE:
Part 1 is plausible because this is the setpoint identified in FR-H.3 " Throughout this procedure, "affected" refers to any S/G in which N/R level is greater than 83%" and this is also the setpoint for P-14 (Hi-Hi S/G Level Interlock).

Part 2 is plausible because it could be reasoned that water entry into the condenser via steam dumps may cause tube damage.

Basis for meeting the KA

The K/A is matched because the applicant is required to determine the implication of high S/G water level as related to the potential for water hammer.

Basis for Hi Cog

Basis for SRO only

Job Level	Cognitive Level	QuestionType	Question Source
RO	Memory	BANK	2020 MNS NRC (BANK 7821)

Development References

FR-H.2
FR-H.3
OP-MC-EP-FRH

Student References Provided

SYS039 K5.01 - Main and Reheat Steam System (MRSS)
Knowledge of the operational implications of the following concepts as the apply to the MRSS: (CFR: 441.5 / 45.7)
Definition and causes of steam/water hammer .....

Remarks/Status

SYS059 K3.03 - Main Feedwater (MFW) System
Knowledge of the effect that a loss or malfunction of the MFW will have on the following: (CFR: 41.7 / 45.6)
S/GS .....

Given the following on Unit 1:

- A shutdown is in progress
- Turbine Inlet Pressure is 400 PSIG

At time 13:00 the following occurs:

- CF-32 (A S/G CF CNTRL VALVE) 20% OPEN with CF-104 (A S/G CF CNTRL VLV BYPASS) fully CLOSED
- CF-23 (B S/G CF CNTRL VALVE) 10% OPEN with CF-105 (B S/G CNTRL VLV BYPASS) OPEN
- CF-28 (C S/G CF CONT OUTSIDE ISOL) CLOSED
- CF-26 (D S/G CF CONT OUTSIDE ISOL) CLOSED

At time 13:01 the above valve positions have not changed.

Based on the above conditions, AMSAC actuation ____(1)____ occur.

Depressing "BLOCK" on the AMSAC ACTUATION BLOCK/UNBLOCK pushbutton _____(2)_____ prevent AMSAC ACTUATION if a loss of both CF pumps occurred.

(CONSIDER EACH QUESTION SEPARATELY)

Which ONE of the following completes the statements above?

A. 1. will
2. will

B. 1. will
2. will NOT

C. 1. will NOT
2. will

D. 1. will NOT
2. will NOT

General Discussion

When a CF containment isolation valve goes fully closed a signal is sent to AMSAC.

A CF main feed regulating valve (FRV) must be at least 25% open if its associated bypass valve is not fully open in order for AMSAC to consider the flow path viable.

If 3 out of 4 flow paths are not viable for 30 seconds, AMSAC will actuate.

Any combination of containment isolation valve closure or CF main FRV closure from 3 out of 4 S/G flow paths will actuate AMSAC.

The Block/Unblock logic only applies to the Loss of CF Flow path logic. The loss of both CF pumps logic is always active.

Answer A Discussion

INCORRECT:

PLAUSIBLE:
Part 1 is correct.

Part 2 is plausible because you can block the loss of CF flow path logic but not loss of CF pumps.

Answer B Discussion

CORRECT: See explanation above.

Answer C Discussion

INCORRECT:

PLAUSIBLE:
Part 1 is plausible if the applicant concludes the loss of flow path logic is 3 out of 4 of either containment isolation valve closure or 3 out of 4 FRV position and not a combination of both.

Part 2 is plausible Part 2 is plausible because you can block the loss of CF flow path logic but not loss of CF pumps.

Answer D Discussion

INCORRECT:

PLAUSIBLE:
Part 1 is plausible if the applicant concludes the loss of flow path logic is 3 out of 4 of either containment isolation valve closure or 3 out of 4 FRV position and not a combination of both.

Part 2 is correct.

Basis for meeting the KA

The K/A is matched because the applicant demonstrates knowledge of the affect a loss of the feedlines to the S/Gs will have (lead to an AMSAC actuation).

Basis for Hi Cog

The question is Hi Cog because the applicant has to evaluate the given feed conditions, t and time period the conditions exist to determine the effect on AMSAC.

Basis for SRO only

Job Level	Cognitive Level	QuestionType	Question Source
RO	Comprehension	NEW	

Development References	Student References Provided
Lesson Plan OP-MC-CF-CF, Main Feedwater System	

SYS059 K3.03 - Main Feedwater (MFW) System
Knowledge of the effect that a loss or malfunction of the MFW will have on the following: (CFR: 41.7 / 45.6)
S/GS .....

SYS061 K6.02 - Auxiliary / Emergency Feedwater (AFW) System

Knowledge of the effect of a loss or malfunction of the following will have on the AFW components: (CFR: 41.7 / 45.7)

Pumps .....

Given the following on Unit 2:

- A small break LOCA has occurred
- Safety Injection has been initiated
- The sequencer has not been reset
- S/G NR levels indicate the following:

S/G	2A	2B	2C	2D
NR Level (%)	20	19	16	20

Subsequently:

- The normal incoming breaker to 2ETA opens

Based on the conditions above, the 2A and 2B SGs are _____.

Which ONE of the following completes the statement above?

A. not being fed

B. being fed by the 2A MDCA pump ONLY

C. being fed by the U2 TDCA pump ONLY

D. being fed by the 2A MDCA pump and U2 TDCA pump

General Discussion

The MDCA Pumps will start on Safety Injection and Blackout.

The TDCA Pump will start on a blackout except as follows:
If the Safety Injection occurs first or coincident with the Blackout, the Safety Injection will BLOCK the Turbine Driven CA Pump start because the sequencer selects the Priority Mode. (This does not affect the Low-Low SG Level auto start signal or the SSF Low-Low Level start signal.)

So for this case the SI will start both MDCA pumps. 2A MDCA Pump will lose power on the loss of 2ETA but will be reloaded by the sequencer. The TDCA Pump will not get a start signal on the blackout because SI occurred first. The TDCA Pump also needs 2/4 S/Gs below low-low level and currently only 2C is below 17%.

Answer A Discussion

INCORRECT:

PLAUSIBLE:
Plausible if the applicant applies the Safety Injection followed by a blackout start logic for the TDCA pump to the MDCA and concludes that the MDCA will stay OFF.

Answer B Discussion

CORRECT: See explanation above.

Answer C Discussion

INCORRECT:

PLAUSIBLE:
Plausible if the applicant applies the Safety Injection followed by a blackout start logic for the TDCA pump to the MDCA and concludes that the MDCA will stay OFF and determines the TDCA pump started on low-low level from the 2C S/G. (TDCA pump start from the SSF is 1/2 logic).

Answer D Discussion

INCORRECT:

PLAUSIBLE:
Plausible if the applicant determines the TDCA pump started on low-low level from the 2C S/G. (TDCA pump start from the SSF is 1/2 logic).

Basis for meeting the KA

The KA is matched because the applicant must have knowledge of the effect of and SI and blackout on CA pumps.

Basis for Hi Cog

This is a higher cognitive level question because it requires more than one mental step.

First the applicant must recall from memory which MD CA pumps are powered from which busses and apply that recalled knowledge to the conditions given to determine which MD CA pump is running.

Next, the applicant must analyze the conditions given to determine that because the Blackout signal occurred after the SI signal and because only 1 S/G NR level decreased below 17%, the U2 TDCA pump did NOT auto-start.

Basis for SRO only

Job Level	Cognitive Level	QuestionType	Question Source
RO	Comprehension	MODIFIED	Bank Question 5853

Development References	Student References Provided
OP-MC-CF-CA, Auxiliary Feedwater	

SYS061 K6.02 - Auxiliary / Emergency Feedwater (AFW) System
Knowledge of the effect of a loss or malfunction of the following will have on the AFW components: (CFR: 41.7 / 45.7)
Pumps .....

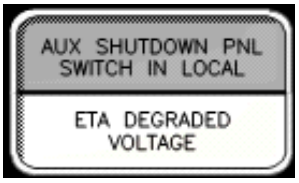
C

MNS ILT 20-1R NRC Written MNS SRO NRC Reta QUESTION 20

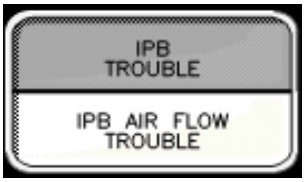
SYS062 2.4.45 - AC Electrical Distribution System
SYS062 GENERIC
Ability to prioritize and interpret the significance of each annunciator or alarm. (CFR: 41.10 / 43.5 / 45.3 / 45.12)

Given the following on Unit 1:

- Unit is at 100% RTP
- The following separate annunciators are illuminated on 1AD-11:



TCC reports low grid voltage is present



- Both IPB Fans are OFF and will not restart
- NO fire is present

- NO other annunciators are present
- NO lockouts are present

Based on the conditions above, an automatic action will occur after a MINIMUM of _____ minutes. **(Assume No operator action)**

Which ONE of the following completes the statement above?

A. 3

B. 5

C. 10

D. 30

General Discussion

When degraded Voltage is detected on the 4 kV bus, two time delay relays begin timing to verify the event is sustained. If the first timer completes its cycle (10 seconds), an alarm will be initiated in the control room. Also, the first time delay duration is sufficient to not activate trip logic during voltage transients such as motor starts. The second time delay relay is provided to allow additional time following the first time delay for the operators and/or the TCC to improve voltage. If the Degraded Voltage Condition is still present when the second timing cycle is complete (10 minutes), a blackout will be initiated on that train by opening the 4 kV bus Normal and Standby incoming circuit breakers.

There are automatic actions associated with the IPB AIR FLOW TROUBLE. Manual action must be take to lower bus current.

Answer A Discussion

INCORRECT:

PLAUSIBLE:
Plausible because an IPB air flow trouble alarm will be generated upon a trip of both IPB fans. Which will occur on an 86A, B or G Zone lockout which would result in a generator runback to 55% in 3 minutes.

Answer B Discussion

INCORRECT:

PLAUSIBLE:
Plausible because if IPB AIR FLOW TROUBLE is lit and a zone lockout was to occur , an operator would need to check for signs of fire within 5 minutes.

Answer C Discussion

CORRECT. See explanation above.

Answer D Discussion

INCORRECT:

PLAUSIBLE:
Plausible because a Zone 'A' lockout relay 86A/2A will be initiated to if both transformer cooler power circuits are lost for 30 minutes and the transformer is tied to the switchyard via PCB 58 or 59.

Basis for meeting the KA

The K/A is matched because the applicant has to evaluate two separate alarms to determine how much time the crew has to take action before automatic action will occur.

Basis for Hi Cog

The question is Hi Cog because the crew has to evaluate a set of conditions given to determine the amount of time allowed to respond prior to automatic plant action.

Basis for SRO only

Job Level	Cognitive Level	QuestionType	Question Source
RO	Comprehension	NEW	

Development References

OP-MC-EL-EP, Main Power Distribution
OP-MC-GEN-IPB, Isolated Phase Bus Cooling
OP/1/A/6100/010 L, Annunciator Response for 1AD-11 J5

Student References Provided

SYS062 2.4.45 - AC Electrical Distribution System
SYS062 GENERIC
Ability to prioritize and interpret the significance of each annunciator or alarm. (CFR: 41.10 / 43.5 / 45.3 / 45.12)

Remarks/Status

SYS063 A2.01 - DC Electrical Distribution System

Ability to (a) predict the impacts of the following malfunctions or operations on the DC electrical systems; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: (CFR: 41.5 / 43.5 / 45.3 / 45.13)

Grounds .....

Given the following:

- A fault required battery EVCA to be removed from service
- The crew is aligning charger EVCC and battery EVCC to supply distribution center EVDA per OP/0/A/6350/001A Enclosure 4.13 (REMOVAL OF BATTERY EVCA FROM SERVICE)

Subsequently:

- 1AD-11 C3 (BATT EVCC GROUND) alarms in the Control Room
- Relay Board 2EB5 indicates a negative leg ground exists on EVCC

Based on the conditions above:

1) The detector lamp on 2EB5 will be _____ to indicate a ground.

2) Per Enclosure 4.13, Limits and Precautions, the alignment of EVCC should NOT occur if a _____ leg ground exists on EVDA.

Which ONE of the following completes the statements above?

A. 1. bright
   2. positive

B. 1. dim
   2. positive

C. 1. bright
   2. negative

D. 1. dim
   2. negative

General Discussion

Control room annunciators (1AD11 B-3, C-3, E-3, and F-3) and computer alarms continuously monitor the DC buses (EVCA, EVCB, EVCC, and EVCD) for grounds. Should an alarm be activated, two white lamps are provided, on the electrical boards (backside of the main control boards) as indication of ground detection relay operation. One is designated "battery ground positive leg" and the other is designated "battery ground negative leg". These lamps burn dimly under normal conditions and they burn brightly under grounded conditions.

OP Limits and Precautions state - Do NOT cross tie busses if one has a negative leg ground and the other has a positive leg ground.

Answer A Discussion

CORRECT. See explanation above.

Answer B Discussion

INCORRECT:

PLAUSIBLE:
Part 1 is plausible if the applicant believes that for a negative leg ground the lights would be dim and for positive they would be bright.

Part 2 is correct.

Answer C Discussion

INCORRECT:

PLAUSIBLE:
Part 1 is correct.

Part 2 is plausible if the applicant believes that having two of the same type of ground would be more susceptible to equipment damage if aligned.

Answer D Discussion

INCORRECT:

PLAUSIBLE:
Part 1 is plausible if the applicant believes that for a negative leg ground the lights would be dim and for positive they would be bright.

Part 2 is plausible if the applicant believes that having two of the same type of ground would be more susceptible to equipment damage if aligned.

Basis for meeting the KA

The K/A is matched because the applicant demonstrates the ability to predict the impacts of a ground while shifting battery chargers and the use of procedures to control/mitigate the event.

Basis for Hi Cog

Basis for SRO only

Job Level	Cognitive Level	QuestionType	Question Source
RO	Memory	NEW	

Development References	Student References Provided
OP-MC-EL-EPL, 125VDC AND 120VAC VITAL I&C POWER	

SYS063 A2.01 - DC Electrical Distribution System
Ability to (a) predict the impacts of the following malfunctions or operations on the DC electrical systems; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: (CFR: 41.5 / 43.5 / 45.3 / 45.13)
Grounds .....

C

MNS ILT 20-1R NRC Written MNS SRO NRC Reta QUESTION 22

SYS063 A4.01 - DC Electrical Distribution System
Ability to manually operate and/or monitor in the control room: (CFR: 41.7 / 45.5 to 45.8)
Major breakers and control power fuses .....

Given the following on Unit 2:

- A Loss of Offsite Power has occurred
- 2B D/G started but subsequently tripped on overspeed
- 60 seconds have passed since the Loss of Offsite Power occurred

Based on the conditions above,

1) 125 VDC Power Panel Board 2EVDD will be energized from _____.

2) this can be verified by checking control power available to 4160V pumps powered from _____.

Which ONE of the following completes the statements above?

A. 1. Battery EVCD
   2. 2ETA

B. 1. Standby Charger EVCS
   2. 2ETA

C. 1. Battery EVCD
   2. 2ETB

D. 1. Standby Charger EVCS
   2. 2ETB

General Discussion

During a blackout or LOOP event, the essential motor control centers feeding the vital I & C battery chargers associated with the affected train, will be load-shed by the diesel generator loading sequencer. Normally the battery chargers would be reloaded but in the scenario given the associated D/G has tripped and is not available. During the time period that the battery chargers are de-energized, the batteries alone feed the vital instrumentation and control loads. In this case it would be Battery EVCD feeding power panel board 2EVDD.
Normal alignment of the vital busses is for Unit 1 to power battery chargers EVCA and EVCB and Unit 2 to power battery chargers EVCC and EVCD.
EVDA and EVDD supply control power to ETA and ETB respectively.

Answer A Discussion

INCORRECT:

PLAUSIBLE:
Part 1 is correct.

Part 2 is plausible since this would be correct if verifying 125VDC power panel board 2EVDA was energized.

Answer B Discussion

INCORRECT:

PLAUSIBLE:
Part 1is plausible since other busses in the vital and aux power systems will automatically swap to a standby source upon loss of normal power. This alignment can be made but all actions are performed manually.

Part 2 is plausible since this would be correct if verifying 125VDC power panel board 2EVDA was energized.

Answer C Discussion

CORRECT: See explanation above.

Answer D Discussion

INCORRECT:

PLAUSIBLE:
Part 1 is plausible since other busses in the vital and aux power systems will automatically swap to a standby source upon loss of normal power. This alignment can be made but all actions are performed manually.

Part 2 is correct.

Basis for meeting the KA

The KA is matched because the applicant must demonstrate the ability to monitor operation of the DC electrical system as it applies to a LOOP with the failure of one emergency D/G and use alternate indications to prove the DC bus is energized.

Basis for Hi Cog

This is a high cognitive question because it involves a level of analysis of the given stem conditions to determine the effect it will have on the DC electrical distribution system.

Basis for SRO only

Job Level	Cognitive Level	QuestionType	Question Source
RO	Comprehension	BANK	2018 MNS Audit (Bank 7521)

Development References	Student References Provided
OP-MC-EL-EPL (125 VDC (EPL) and 120 VAC (EPG) VITAL I & C POWER)	

SYS063 A4.01 - DC Electrical Distribution System
Ability to manually operate and/or monitor in the control room: (CFR: 41.7 / 45.5 to 45.8)
Major breakers and control power fuses .....

SYS064 A4.01 - Emergency Diesel Generator (ED/G) System
Ability to manually operate and/or monitor in the control room: (CFR: 41.7 / 45.5 to 45.8)
Local and remote operation of the ED/G .....

Given the following on Unit 1:

- The 1A D/G has been placed in operation to facilitate a power swap on 1ETA from 1ATC to SATA
- Indicated load is 400 KW and 75 KVARS
- 1A DG is currently powering 1ETA with the 1ETA Normal Breaker and 1ETA Stdby Breaker OPEN

Based on the conditions above,

1) depressing the "1A D/G Gov Cntrl" "Raise" pushbutton will result in raising 1A D/G _____.

2) rotating the "1A D/G Volt Adjust" switch to "Raise," will result in raising 1A D/G _____.

Which ONE (1) of the following completes the statements above?

A. 1. frequency
2. KVARs

B. 1. load
2. KVARs

C. 1. frequency
2. voltage

D. 1. load
2. voltage

General Discussion

While in the Isochronous mode, (with the D/G separated from the power grid), adjusting the "Gov Cntrl" pushbutton changes FREQUENCY (D/G speed), but does NOT affect load (KW). Adjusting the "Volt Adjust" switch changes VOLTAGE, but does NOT affect Power Factor or KVars.

Answer A Discussion

INCORRECT:

PLAUSIBLE:
Part 1 is correct.

Part 2 is plausible because this would be true if the D/G were in droop mode.

Answer B Discussion

INCORRECT:

PLAUSIBLE:
Part 1 is plausible because this would be true if the D/G were in droop mode.

Part 2 is plausible because this would be true if the D/G were in droop mode.

Answer C Discussion

CORRECT. See Explanation Above.

Answer D Discussion

INCORRECT:

PLAUSIBLE:
Part 1 is plausible because this would be true if the D/G were in droop mode.

Part 2 is correct.

Basis for meeting the KA

The KA is matched because the applicant demonstrates the ability to locate and operate controls associated with the Emergency Diesel Generator by demonstrating a knowledge of the effect of those controls in both parallel and isochronous mode.

Basis for Hi Cog

This is a higher cognitive level question because it requires more than one mental step. First, the applicant must analyze the given conditions to determine if the DG is operating in parallel or isochronous mode. Then the applicant must determine the effect of operating each of the controls in the specified position.

Basis for SRO only

Job Level	Cognitive Level	QuestionType	Question Source
RO	Comprehension	BANK	MNS Exam Bank

Development References	Student References Provided
OP-MC-DG-DG	

SYS064 A4.01 - Emergency Diesel Generator (ED/G) System
Ability to manually operate and/or monitor in the control room: (CFR: 41.7 / 45.5 to 45.8)
Local and remote operation of the ED/G .....

Remarks/Status

SYS073 A2.02 - Process Radiation Monitoring (PRM) System

Ability to (a) predict the impacts of the following malfunctions or operations on the PRM system; and (b) based on those predictions, use procedures to cor- rect, control, or mitigate the consequences of those malfunctions or operations: (CFR: 41.5 / 43.5 / 45.3 / 45.13)

Detector failure .....

Given the following on Unit 2:

- Unit is at 100% RTP
- Train "A" equipment is in service
- The power supply to 2EMF-46A (TRAIN A KC) has FAILED

Based on the conditions above,

1) 2KC-122 (KC SURGE TANK VENT) _____ receive a signal to auto-close.

2) A "Cabinet Trouble" alarm _____ be generated.

Which ONE of the following completes the statement above?

A. 1. does
   2. will

B. 1. does NOT
   2. will

C. 1. does
   2. will NOT

D. 1. does NOT
   2. will NOT

General Discussion

The RP-86A modules are fail-safe and actuate Trip 1 and Trip 2 during a loss of power. Should a Trip 2 high radiation alarm be received on either 2EMF-46A or 2EMF-46B, the component cooling water surge tank vent 2KC122 is automatically closed to prevent release of volatile fission products.
When a failure occurs for an RP-86 Digital Readout Module, a "Cabinet Trouble" annunciator will also alarm.

Answer A Discussion

CORRECT. See explanation above.

Answer B Discussion

INCORRECT.

PLAUSIBLE:
Part 1 is plausible if the applicant fails to recall the correct compensatory actions for EMF-46A.

Part 2 is correct.

Answer C Discussion

INCORRECT:

PLAUSIBLE:
Part 1 is correct.

Part 2 is plausible because if the Trip 2 was due to actual Hi-Rad the cabinet trouble would not alarm

Answer D Discussion

INCORRECT.

PLAUSIBLE:
Part 1 is plausible if the applicant fails to recall the correct compensatory actions for EMF-46A.

Part 2 is plausible because if the Trip 2 was due to actual Hi-Rad the cabinet trouble would not alarm

Basis for meeting the KA

The KA is matched because test the ability to predict the impacts a detector failure has on the process radiation monitor system

Basis for Hi Cog

Basis for SRO only

Job Level	Cognitive Level	QuestionType	Question Source
RO	Memory	BANK	MNS Exam Bank

Development References	Student References Provided
OP-MC-WE-EMF	

SYS073 A2.02 - Process Radiation Monitoring (PRM) System
Ability to (a) predict the impacts of the following malfunctions or operations on the PRM system; and (b) based on those predictions, use procedures to cor- rect, control, or mitigate the consequences of those malfunctions or operations: (CFR: 41.5 / 43.5 / 45.3 / 45.13)
Detector failure .....

Remarks/Status

MNS ILT 20-1R NRC Written MNS SRO NRC Reta QUESTION 25

C

SYS064 A1.05 - Emergency Diesel Generator (ED/G) System

Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating the ED/G system controls including: (CFR: 41.5 / 45.5)

ED/G room temperature .....

Given the following on Unit 1:

- Unit is at 100% RTP
- The BOP operator reports that 1B D/G Room average temperature is 105°F and rising at 2°F per minute

Based on the conditions above, the SLC 16.9.16 (AREA TEMPERATURE MONITORING) limit for D/G Room temperature will be exceeded in a MINIMUM of _____ minutes.

Which ONE of the following completes the statement above?

A. 5

B. 7.5

C. 10

D. 22.5

General Discussion

Per SLC 16.9.6 (Area Temperature Monitoring), the D/G rooms shall be maintained greater than or equal to 55 degrees-F and less than or equal to 125 degrees-F.
(125-105)=20. 20/2= 10 minutes

Answer A Discussion

INCORRECT:

PLAUSIBLE:
Plausible because this calculation represents the time required to exceed the OAC Hi temperature limit of 115 degrees.

Answer B Discussion

INCORRECT:

PLAUSIBLE:
Plausible because this calculation represents the time required to exceed the D/G room local annunciator (Building Ventilation Malfunction) temperature limit of 120 degrees.

Answer C Discussion

CORRECT: See explanation above.

Answer D Discussion

INCORRECT:

PLAUSIBLE:
Plausible because this calculation represents the time required to exceed the SLC 16.9.16 temperature limit of 150 degrees (Unit 1 &2 Fuel bldg. and Turbine bldg. terminal boxes).

Basis for meeting the KA

The K/A is matched because the applicant demonstrates the ability to monitor changes in D/G room temperature and predict when that temperature will exceed the SLC limit.

Basis for Hi Cog

This question is higher cognitive because the applicant is required to recall from memory the D/G room temperature limit and perform a calculation to determine when that limit will be exceeded.

Basis for SRO only

Job Level	Cognitive Level	QuestionType	Question Source
RO	Comprehension	NEW	

Development References

SLC 16.9.16 (Area Temperature Monitoring)
OP-MC-DG-DGA
OP/1/A/6101/010 B

Student References Provided

SYS064 A1.05 - Emergency Diesel Generator (ED/G) System
Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating the ED/G system controls including: (CFR: 41.5 / 45.5)
ED/G room temperature .....

Remarks/Status

MNS ILT 20-1R NRC Written MNS SRO NRC Reta QUESTION 26

C

SYS076 K2.04 - Service Water System (SWS)
Knowledge of bus power supplies to the following: (CFR: 41.7)
Reactor building closed cooling water .....

Given the following on Unit 1:

- Unit is at 100% RTP
- "A" Train KC is in service

Subsequently:

- A Blackout occurs on 1ETA

The blackout occurred due to a loss of Unit 1 6900 volt bus ____(1)____.

As a result of the Blackout, "A" Train KC pumps will ____(2)____.

Which ONE of the following completes the statements above?

A. 1. 1TA
   2. receive a manual start permissive

B. 1. 1TC
   2. receive a manual start permissive

C. 1. 1TA
   2. automatically start

D. 1. 1TC
   2. automatically start

General Discussion

Per EP-EL (Main Power), 1TA feeds transformer 1ATC, which feeds 4160v bus 1ETA.
At MNS a Blackout is defined as loss of normal incoming power to the 4160 v bus.

Per PSS-KC, both KC pumps will automatically start on a SI or BO signal.

Answer A Discussion

INCORRECT:

PLAUSIBLE:
Part 1 is correct.

Part 2 is plausible because the KF pump is a 4160v pump powered from 1ETA and it receives a manual start permissive on a blackout signal.

Answer B Discussion

INCORRECT:

PLAUSIBLE:
Part 1 is plausible because 6900v bus 1TC supplies the standby power source to 4160v bus 1ETA.

Part 2 is plausible because the KF pump is a 4160v pump powered from 1ETA and it receives a manual start permissive on a blackout signal.

Answer C Discussion

CORRECT: See explanation above.

Answer D Discussion

INCORRECT:

PLAUSIBLE:
Part 1 is plausible because 6900v bus 1TC supplies the standby power source to 4160v bus 1ETA.

Part 2 is correct.

Basis for meeting the KA

The K/A is matched because the applicant demonstrates knowledge of the power supplies to the Reactor Building Closed Cooling Water system. (KC is the only closed cooling water system in the reactor building at MNS)

Basis for Hi Cog

This question is higher cognitive because the applicants are required to perform more than one mental process to answer the question. The applicants are required to know that a blackout occurs due to the loss of normal incoming power and then determine the affect a blackout will have on the KC pumps.

Basis for SRO only

Job Level	Cognitive Level	QuestionType	Question Source
RO	Comprehension	NEW	

Development References

OP-MC-PSS-KC
OP-MC-EP-EL
OP-MC-FH-KF

Student References Provided

SYS076 K2.04 - Service Water System (SWS)
Knowledge of bus power supplies to the following: (CFR: 41.7)
Reactor building closed cooling water .....

Remarks/Status

Q8 is a power supply question for the Component Cooling Water system (KC).
The exam team has determined that no overlap exists between Q8 and this question.

C

MNS ILT 20-1R NRC Written MNS SRO NRC Reta QUESTION 27

SYS078 K4.03 - Instrument Air System (IAS)
Knowledge of IAS design feature(s) and/or interlock(s) which provide for the following: (CFR: 41.7)
Securing of SAS upon loss of cooling water .....

Regarding the Station Air System (VS):

When running in automatic, the Low Pressure Station Air compressor will trip on low ____(1)____ flow to the oil cooler.

The Low Pressure Station Air system is normally supplied by the ____(2)____.

Which ONE of the following completes the statements above?

A. 1. RL
   2. VI system through 1VI-820

B. 1. RL
   2. Low Pressure Station Air compressor

C. 1. KR
   2. VI system through 1VI-820

D. 1. KR
   2. Low Pressure Station Air compressor

General Discussion

Per OP-MC-SS-VI,
The three protective trips provided during the “automatic” mode of operation for the low pressure station air compressor are:
1.High discharge air temperature (>240□F)
2.Low oil flow to the compressor (factory set value)
3.Low water flow (KR) to the oil cooler (<47 psig)

Low Pressure Station Air System is normally supplied by the VI System, through control valve 1VI-820.

Answer A Discussion

INCORRECT:

PLAUSIBLE:
Part 1 is plausible because the aftercoolers for A, B, and C VI compressors are cooled by RL.

Part 2 is correct.

Answer B Discussion

INCORRECT:

PLAUSIBLE:
Part 1 is plausible because the aftercoolers for A, B, and C VI compressors are cooled by RL.

Part 2 is plausible because the high pressure station air system uses compressors in automatic to maintain system pressure.

Answer C Discussion

CORRECT: See explanation above.

Answer D Discussion

INCORRECT:

PLAUSIBLE:
Part 1 is correct.

Part 2 is plausible because the high pressure station air system uses compressors in automatic to maintain system pressure.

Basis for meeting the KA

The K/A is matched because the applicant demonstrates knowledge of the design feature which secures the station air compressor on loss of cooling water flow.

Basis for Hi Cog

Basis for SRO only

Job Level	Cognitive Level	QuestionType	Question Source
RO	Memory	NEW	

Development References	Student References Provided
OP-MC-SS-VI	

SYS078 K4.03 - Instrument Air System (IAS)
Knowledge of IAS design feature(s) and/or interlock(s) which provide for the following: (CFR: 41.7)
Securing of SAS upon loss of cooling water .....

Remarks/Status

D

MNS ILT 20-1R NRC Written MNS SRO NRC Reta QUESTION 28

SYS103 A3.01 - Containment System
Ability to monitor automatic operation of the containment system, including: (CFR: 41.7 / 45.5)
Containment isolation .....

Regarding Containment isolation signals,

1) the S/G CF Containment Isolation valves (CF-35, 30, 28, & 26) will close if Containment pressure rises to a MINIMUM of _____ PSIG.

2) a Containment Phase A isolation will occur if NC system pressure lowers to less than a MAXIMUM of _____ PSIG.

Which ONE of the following completes the statements above?

A. 1. 3.0
   2. 1845

B. 1. 3.0
   2. 1945

C. 1. 1.0
   2. 1945

D. 1. 1.0
   2. 1845

General Discussion

Phase A containment isolation (St) is generated by:

- any Safety Injection signal
- Manual pushbutton

A Feedwater Isolation (FWI) will occur if Containment pressure increases to 1.0 PSIG. The S/G CF Containment Isolation valves go closed on a Feedwater Isolation signal.

Answer A Discussion

INCORRECT:

PLAUSIBLE:
Part 1is plausible because this is the Phase B Containment isolation setpoint.

Part 2 is correct.

Answer B Discussion

INCORRECT:

PLAUSIBLE:
Part 1 is plausible because the is the Phase B Containment isolation setpoint.

Part 2 is plausible because this is the Reactor Trip setpoint on low pressurizer pressure.

Answer C Discussion

INCORRECT:

PLAUSIBLE:
Part 1 is correct.

Part 2 is plausible because this is the Reactor Trip setpoint on low pressurizer pressure.

Answer D Discussion

CORRECT: See explanation above.

Basis for meeting the KA

The K/A is matched because the applicant demonstrates the ability to monitor automatic operation of the containment system relative to containment isolations by demonstrating the ability to evaluate a given set of conditions and determine what automatic containment isolation should have occurred.

Basis for Hi Cog

First, the applicant must evaluate what happens if Containment pressure increases to 1.0 PSIG and 3.0 PSIG. They will determine that at 1.0 PSIG a Safety Injection signal is generated which in turn generates a FWI signal.

Second, the applicant must determine what happens if NC system pressure decreases to less than 1945 PSIG or 1845 PSIG. At 1845 PSIG a Safety Injection signal is generated and a Phase A signal is generated.

Since this question involves more than one mental step, it is higher cognitive level.

Basis for SRO only

Job Level	Cognitive Level	QuestionType	Question Source
RO	Comprehension	BANK	Bank Question 5937

Development References	Student References Provided
OP-MC-ECC-ISE	

SYS103 A3.01 - Containment System
Ability to monitor automatic operation of the containment system, including: (CFR: 41.7 / 45.5)

MNS ILT 20-1R NRC Written MNS SRO NRC Reta QUESTION 29

B

SYS001 2.1.23 - Control Rod Drive System
SYS001 GENERIC
Ability to perform specific system and integrated plant procedures during all modes of plant operation. (CFR: 41.10 / 43.5 / 45.2 / 45.6)

Give the following on Unit 1:

- Unit is in MODE 3
- Shutdown Banks are being withdrawn in preparation for startup per OP/1/A/6100/003 (CONTROLLING PROCEDURE FOR UNIT OPERATION)

Subsequently:

- 1AD-2 / D10 (RPI URGENT ALARM) has just alarmed
- DRPI and OAC RODS position indication for rod D-8 in Shutdown Bank E has been lost

What action is required by SLC 16.7.9 (ROD POSITION INDICATION SYSTEM - SHUTDOWN)?

A. Place rods in manual

B. IMMEDIATELY open the reactor trip breakers

C. IMMEDIATELY insert the shutdown banks

D. Restore rod position indication within 1 hour

General Discussion

SLC 16.7.9 (Rod Position Indication System - Shutdown) requires that at least one rod position indicator be operable and capable of determining the control rod position within + 12 steps for each rod not fully inserted.
This SLC is applicable to Modes 3,4,5.
In the situation given in this question, the unit is in Mode 3 in the process of withdrawing S/D Banks. If rod position is lost for any rod, Condition A requires that the Reactor Trip breakers be opened immediately.

Answer A Discussion

INCORRECT:

PLAUSIBLE:
Plausible because with any malfunction involving the control rods this would be the required action in AP-14.

Answer B Discussion

CORRECT: See explanation above.

Answer C Discussion

INCORRECT:

PLAUSIBLE:
Plausible because OP/1/A/6100/003, Enclosure 4.3 (Guidelines for Approaching Criticality) has actions to insert rods for various situations during startup.

Answer D Discussion

INCORRECT:

PLAUSIBLE:
Plausible because this would satisfy the requirements of TS 3.1.4 (Rod Group alignment limit) Action B. With One rod not within alignment limits, Action B.1 requires the rod to be restored within alignment limits within 1 hour.

Basis for meeting the KA

The K/A is matched because the applicant demonstrates the ability to perform specific plant procedures during Mode 3.

Basis for Hi Cog

Basis for SRO only

Job Level	Cognitive Level	QuestionType	Question Source
RO	Memory	BANK	Bank Question 2729

Development References

SLC 16.7.9
TS 3.1.4
OP/1/A/6100/003
AP-14

Student References Provided

SYS001 2.1.23 - Control Rod Drive System
SYS001 GENERIC
Ability to perform specific system and integrated plant procedures during all modes of plant operation. (CFR: 41.10 / 43.5 / 45.2 / 45.6)

Remarks/Status

SYS011 A2.07 - Pressurizer Level Control System (PZR LCS)
Ability to (a) predict the impacts of the following malfunctions or operations on the PZR LCS; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: (CFR: 41.5 / 43.5 / 45.3 / 45.13)
Isolation of letdown .....

Given the following on Unit 1:

- Unit is at 100% RTP
- The SLIM for 1NV-238 (CHARGING FLOW CONTROL) has been placed in MANUAL due to a malfunction of the Pressurizer Level Master Controller
- 1NV-238 SLIM output is lowered to reduce Pressurizer level
- Charging Line Flow is inadvertently lowered to 18 GPM for one minute

Based on the conditions above:

1) If the 1NV-238 controller output remains constant, pressurizer level will be _____.

2) The crew will use _____ to address pressurizer level.

Which ONE of the following completes the statements above?

PROCEDURE LEGEND:
OP/1/A/6102/003 (DISTRIBUTED CONTROL SYSTEM OPERATION)
AP/1/A/5500/12 (LOSS OF LETDOWN, CHARGING OR SEAL INJECTION)

A. 1. rising
2. AP-12

B. 1. rising
2. OP/1/A/6102/003

C. 1. lowering
2. AP-12

D. 1. lowering
2. OP/1/A/6102/003

General Discussion

Letdown will isolate and pressurizer heaters will de-energize if charging flow remains <20 gpm for > 20 seconds.

In this question, the charging flow is lowered to 18 GPM which would result in a L/D isolation. Approximately 12 GPM will still be leaving the NC system via NCP seal leakoff so with 18 GPM total charging, PZR level will be increasing and PZR heaters will be off.

Since letdown isolated the crew will enter AP-12 to recover pzr level.

Answer A Discussion

CORRECT: See explanation above.

Answer B Discussion

INCORRECT:

PLAUSIBLE:
Part 1 is correct.

Part 2 is plausible because the OP can be used to correct malfunctions with the PZR Level Master.

Answer C Discussion

INCORRECT:

PLAUSIBLE:
Part 1 is plausible if the applicant fails to realize that letdown is isolated or concludes that NCP seal leakoff is greater than the current charging flow.

Part 2 is correct.

Answer D Discussion

INCORRECT:

PLAUSIBLE:
Part 1 is plausible if the applicant fails to realize that letdown is isolated or concludes that NCP seal leakoff is greater than the current charging flow.

Part 2 is plausible because the OP can be used to correct malfunctions with the PZR Level Master.

Basis for meeting the KA

The KA is matched because the applicant demonstrates the ability to predict the impact that a loss of lettdown will have on Pressurizer level and then use procedures to control/mitigate the consequences of the event.

Basis for Hi Cog

This is a higher cognitive level question because it require more than one mental step. First the applicant must analyze the given condition to determine the status of the LCS and the potential consequences of the initial conditions. The applicant must then recall from memory the protective features which can be affected by operating the level control system in the configuration given and determine which protective actions are going to occur and in what order.

Basis for SRO only

Job Level	Cognitive Level	QuestionType	Question Source
RO	Comprehension	MODIFIED	2018 MNS Audit (BANK 7536)

Development References

OP-MC-PS-ILE-DCS (Pressurizer Level Control)
AP/1/A/5500/12, LOSS OF LETDOWN, CHARGING OR SEAL INJECTION
OP/1/A/6102/003, DISTRIBUTED CONTROL SYSTEM OPERATION

Student References Provided

SYS011 A2.07 - Pressurizer Level Control System (PZR LCS)
Ability to (a) predict the impacts of the following malfunctions or operations on the PZR LCS; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: (CFR: 41.5 / 43.5 / 45.3 / 45.13)
Isolation of letdown .....

MNS ILT 20-1R NRC Written MNS SRO NRC Reta QUESTION 31

B

SYS015 K6.03 - Nuclear Instrumentation System (NIS)
Knowledge of the effect of a loss or malfunction on the following will have on the NIS: (CFR: 41.7 / 45.7)
Component interconnections .....

Given the following on Unit 1:

- Unit is in MODE 6
- A series of alarms associated with the NI's has occurred
- The BOP operator reports that the Instrument Power and Control Power lights on the PR N43 drawers are DARK

Which ONE of the following is the cause of these indications?

A. The feeder breaker for panelboard 1EKVD has tripped.

B. Inverter 1EVIC has tripped.

C. The feeder breaker for panelboard 1EKVB has tripped.

D. Inverter 1EVIA has tripped.

General Discussion

Per AP-15 Enclosure 16, NIS Channel 3 (PR N43) is powered from 1EKVC which is fed from Static Inverter 1EVIC.

Answer A Discussion

INCORRECT:

PLAUSIBLE:
This answer is plausible because panelboard 1EKVD provides power to NIS Channel IV (N44).

Answer B Discussion

CORRECT: See explanation above.

Answer C Discussion

INCORRECT:

PLAUSIBLE:
This answer is plausible because panelboard 1EKVB provides power to NIS Channel 2 (N32, N36, and N42).

Answer D Discussion

INCORRECT:

PLAUSIBLE:
This answer is plausible because Static Inverter 1EVIA supplies panelboard 1EVCA which powers NIS Channel 1 (N31, N35, and N41).

Basis for meeting the KA

The KA is matched because the applicant demonstrates knowledge of the affect that a loss of power will have on NI cabinet indicating lights.

Basis for Hi Cog

Basis for SRO only

Job Level	Cognitive Level	QuestionType	Question Source
RO	Memory	BANK	Bank Question 2732

Development References	Student References Provided
MC-OP-EL-EPL AP-15	

SYS015 K6.03 - Nuclear Instrumentation System (NIS)
Knowledge of the effect of a loss or malfunction on the following will have on the NIS: (CFR: 41.7 / 45.7)
Component interconnections .....

Remarks/Status

MNS ILT 20-1R NRC Written MNS SRO NRC Reta QUESTION 32

A

SYS016 K4.01 - Non-Nuclear Instrumentation System (NNIS)
Knowledge of NNIS design feature(s) and/or interlock(s) which provide for the following: (CFR: 41.7)
Reading of NNIS channel values outside control room .....

Given the following on Unit 1:

- A condition has occurred requiring evacuation of the Control Room
- AP-17 (LOSS OF CONTROL ROOM) has been implemented

For the above AP, which ONE of the following indications will be available to the Reactor Operator ONLY at the remote panel dispatched to and NOT available at the other remote panel?

A. Letdown Pressure

B. Pressurizer Level

C. Wide Range NC Pressure

D. Incore Thermocouples

General Discussion

When the Control Room has to be evacuated either AP/17 or AP/24 will be used.

When AP/17 is used control will be shifted to the ASP vice the SSF.

Letdown Pressure is found on the ASP but not the SSF.

Answer A Discussion

CORRECT. See explanation above.

Answer B Discussion

INCORRECT:

PLAUSIBLE:
This answer is plausible because Pressurizer Level can be read on the ASP but can also be read at the SSF.

Answer C Discussion

INCORRECT:

PLAUSIBLE:
This answer is plausible because Wide Range Pressure can be read on the ASP but can also be read at the SSF.

Answer D Discussion

INCORRECT:

PLAUSIBLE:
This answer is plausible if the applicant concludes that control will be shifted to the SSF for AP/17 and because Incore Thermocouples can be read on the SSF Control Panel only.

Basis for meeting the KA

The K/A is matched because the applicant demonstrates knowledge of indications (both Nuclear and Non-Nuclear) available at the SSF and ASP.

Basis for Hi Cog

The question is higher cognitive because the applicant has to determine the correct location from the implemented procedure and then determine the available indication at that location.

Basis for SRO only

Job Level	Cognitive Level	QuestionType	Question Source
RO	Comprehension	NEW	

Development References

OP-MC-CP-AD, Safe Shutdown Facility
OP-MC-CP-ASP, Auxiliary Shutdown Panel

Student References Provided

SYS016 K4.01 - Non-Nuclear Instrumentation System (NNIS)
Knowledge of NNIS design feature(s) and/or interlock(s) which provide for the following: (CFR: 41.7)
Reading of NNIS channel values outside control room .....

Remarks/Status

C

MNS ILT 20-1R NRC Written MNS SRO NRC Reta QUESTION 33

SYS028 A1.01 - Hydrogen Recombiner and Purge Control System (HRPS)

Ability to predict and/or monitor changes in parameter (to prevent exceeding design limits) associated with operating the HRPS controls including: (CFR: 41.5 / 45.5)

Hydrogen concentration .....

Given the following on Unit 1:

- A LOCA has occurred
- Containment hydrogen concentration is 7%
- The TSC has recommended placing the H2 Purge Blower in service

While in operation, the H2 Purge blower return line vents air from containment to the ____(1)____ and the blower return line is ____(2)____.

Which ONE of the following completes the statement above?

A. 1. Auxiliary Building
   2. Unfiltered

B. 1. Auxiliary Building
   2. Filtered

C. 1. Annulus
   2. Unfiltered

D. 1. Annulus
   2. Filtered

General Discussion

The Hydrogen Purge System assists in the reduction of H2 buildup in containment following a LOCA by diluting the containment atmosphere with outside air and venting it back to the annulus. The H2 Blower takes a suction on the outside and discharges the air into containment. A separate return line vents the air from containment into the annulus area.

There is no filtration on the blower lines to containment or the return line to the annulus from containment.

Answer A Discussion

INCORRECT:

PLAUSIBLE:
Part 1 is plausible because the blower inlet is from the Aux Building.

Part 2 is correct.

Answer B Discussion

INCORRECT:

PLAUSIBLE:
Part 1 is plausible because the blower inlet is from the Aux Building.

Part 2 is plausible because the Annulus Ventilation System (VE) has HEPA filters before it exhausts to the Unit Vent.

Answer C Discussion

CORRECT. See explanation above.

Answer D Discussion

IINCORRECT:

PLAUSIBLE:
Part 1 is correct.

Part 2 is plausible because the Annulus Ventilation System (VE) has HEPA filters before it exhausts to the Unit Vent.

Basis for meeting the KA

KA is matched because the applicant demonstrates the ability to predict a loweing H2 concentration by understanding the flowpath associated with the H2 Purge Blower used to reduce Hydrogen Concentration.

Basis for Hi Cog

Basis for SRO only

Job Level	Cognitive Level	QuestionType	Question Source
RO	Memory	MODIFIED	Bank Question 4791

Development References

OP-MC-CNT-VE, Annulus Ventilation System.

Student References Provided

SYS028 A1.01 - Hydrogen Recombiner and Purge Control System (HRPS)
Ability to predict and/or monitor changes in parameter (to prevent exceeding design limits) associated with operating the HRPS controls including: (CFR: 41.5 / 45.5)
Hydrogen concentration .....

Remarks/Status

MNS ILT 20-1R NRC Written MNS SRO NRC Reta QUESTION 34

B

SYS035 K5.01 - Steam Generator System (S/GS)
Knowledge of operational implications of the following concepts as the apply to the S/GS: (CFR: 41.5 / 45.7)
Effect of secondary parameters, pressure, and temperature on reactivity ..

Given the following on Unit 2:

- A reactor startup is in progress following a mid-cycle outage
- Reactor power is 20%

Subsequently:

- Governor Valve #4 drifts OPEN approximately 10% from its initial position
- NC Tavg lowers and stabilizes at 548°F

Based on the conditions above:

1) Reactor power will _____.

2) Per T.S. 3.4.2 (RCS MINIMUM TEMPERATURE FOR CRITICALITY), Tavg must be restored above 551°F within a MINIMUM _____ minutes.

Which ONE of the following completes the statements above?

A. 1. rise
2. 15

B. 1. rise
2. 30

C. 1. lower
2. 15

D. 1. lower
2. 30

General Discussion

Governor valve #4 opening will cause Tavg to lower therefore adding positiive reactivity resulting in an increase in reactor power.

Per TS 3.4.2 the crew will have 30 minutes to restore Tavg above 551F or the plant will need to be Mode 2 with Keff <1.0.

Answer A Discussion

INCORRECT:

PLAUSIBLE:
Part 1 is correct.

Part 2 is plausible because there are T.S. required completion times of 15 min (ex. T.S. 3.4.10 for Pressurizer Safety Valves).

Answer B Discussion

CORRECT. See explanation above

Answer C Discussion

INCORRECT:

PLAUSIBLE:
Part 1 is plausible since a reactor with a positive MTC would result in reactor power lowering, but this would not be the condition given that the plant is at mid-cycle.

Part 2 is plausible because there are T.S. required completion times of 15 min (ex. T.S. 3.4.10 for Pressurizer Safety Valves).

Answer D Discussion

NCORRECT:

PLAUSIBLE:
Part 1 is plausible since a reactor with a positive MTC would result in reactor power lowering, but this would not be the condition given that the plant is at mid-cycle.

Part 2 is correct.

Basis for meeting the KA

The K/A is matched because the applicant demonstrates knowledge of how opening of a governor valve will effect secondary parameters and ultimately reactivity as well as the operational implications of Tavg lowering.

Basis for Hi Cog

The question is higher cognitive because the applicant has to evaluate the effect of a governor valve opening on Tavg, reactivity and reactor power, then recall from memory the TS LCO actions for minimum temperature for criticality.

Basis for SRO only

Job Level	Cognitive Level	QuestionType	Question Source
RO	Comprehension	BANK	2017 Ginna NRC Exam

Development References

TS 3.4.2, RCS Minimum Temperature for Criticality.

Student References Provided

SYS035 K5.01 - Steam Generator System (S/GS)
Knowledge of operational implications of the following concepts as the apply to the S/GS: (CFR: 41.5 / 45.7)
Effect of secondary parameters, pressure, and temperature on reactivity ..

Remarks/Status

SYS041 K3.01 - Steam Dump System (SDS)/Turbine Bypass Control
Knowledge of the effect that a loss or malfunction of the SDS will have on the following: (CFR: 41.7 / 45.6)
S/G .....

Given the following Unit 1 conditions:

- The Unit was operating at 100% RTP
- A Reactor Trip occurs
- Reactor Trip breaker 1RTB fails to open on the trip

Based on the conditions above with regards to the Steam Dump System:

The ____(1)____ controller will be in service.

Operator action ____(2)____ be required to lower T_{AVG} to 557°F.

Which ONE of the following completes the statements above?

A. 1. Plant Trip
2. will

B. 1. Load Rejection
2. will

C. 1. Plant Trip
2. will NOT

D. 1. Load Rejection
2. will NOT

General Discussion

If Train "A" P-4 fails, and Train "B" P-4 actuates, the plant trip controller is selected by the Train "B" P-4. Steam Dump valves will not be Armed by Train "A" P-4, but will be Armed via C-7A.
If Train "B" P-4 Fails, and Train "A" P-4 actuates, Load Rejection Controller will remain in service (plant trip controller not selected). Steam Dump valves will be armed via Train "A", P-4 (or C-7A). The Load Rejection Controller will compare TAVG to TREF and modulate to reduce TAVG to within 3□ of TREF (Load rejection controller has 3°F dead band). This will require operator action to reduce TAVG to 557°F by verifying the STM PRESS CONTROLLER setpoint at 1092 psig in 'AUTO" and selecting STEAM PRESS Mode. Another option in this mode is to control the dumps manually in the STM PRESS mode.

Answer A Discussion

INCORRECT:

PLAUSIBLE:
Part 1 is plausible if the candidate does not recall which Train of P-4 will arm the plant trip controller.

Part 2 is correct.

Answer B Discussion

CORRECT. See explanation above.

Answer C Discussion

INCORRECT:

PLAUSIBLE:
Part 1 is correct.

Part 2 is plausible if the candidate believes there is a setpoint of 557F for both controllers.

Answer D Discussion

INCORRECT:

PLAUSIBLE:
Part 1 is correct.

Part 2 is plausible if the candidate believes there is a setpoint of 557F for both controllers.

Basis for meeting the KA

The K/A is matched because a failure of 1RTB causes the steam dump controller to act differently as designed. The effect of this on Steam Dump operation will require manual operator action to dump steam from the S/Gs to lower to No Load Tavg of 557 degrees.

Basis for Hi Cog

The question is HI Cog because the applicant has to evaluate the failure of 1RTB and it effects on Steam Dump Operation and reaching No Load Tavg

Basis for SRO only

Job Level	Cognitive Level	QuestionType	Question Source
RO	Comprehension	BANK	MNS Exam Bank

Development References	Student References Provided
OP-MC-STM-IDE	

SYS041 K3.01 - Steam Dump System (SDS)/Turbine Bypass Control
Knowledge of the effect that a loss or malfunction of the SDS will have on the following: (CFR: 41.7 / 45.6)
S/G .....

Remarks/Status

MNS ILT 20-1R NRC Written MNS SRO NRC Reta QUESTION 36

C

SYS045 A3.05 - Main Turbine Generator (MT/G) System
Ability to monitor automatic operation of the MT/G system, including: (CFR: 41/7 / 45.5)
Electrohydraulic control .....

The turbine Overspeed Protection Control (OPC) circuit limits turbine speed to a MAXIMUM of ____(1)____ by closing the ____(2)____.

Which ONE of the following completes the statement above?

A. 1. 103%
   2. IVs ONLY

B. 1. 111%
   2. IVs ONLY

C. 1. 103%
   2. GV and IVs

D. 1. 111%
   2. GVs and IVs

General Discussion

The OPC circuit will close the GVs and IVs if turbine speed exceeds 103% of rated speed.

Answer A Discussion

INCORRECT:

PLAUSIBLE:
Part 1 is correct.

Part 2 is plausible because the IVs can operate independently for an OPC actuation during a Complete Loss of Load.

Answer B Discussion

INCORRECT:

PLAUSIBLE:
Part 1 is plausible because 111% is a setpoint used by the OPC circuit but is used as backup turbine trip.

Part 2 is plausible because the IVs can operate independently for an OPC actuation during a Complete Loss of Load.

Answer C Discussion

CORRECT. See explanation above.

Answer D Discussion

INCORRECT:

PLAUSIBLE:
Part 1 is plausible because 111% is a setpoint used by the OPC circuit but is used as backup turbine trip.

Part 2 is correct.

Basis for meeting the KA

The K/A is matched because the applicant demonstrates the ability to monitor an automatic function of the EHC system for the turbine (OPC actuation).

Basis for Hi Cog

Basis for SRO only

Job Level	Cognitive Level	QuestionType	Question Source
RO	Memory	BANK	Bank Question 4472

Development References

OP-MC-GEN-EHC, Digital Electro-Hydraulic Control System (EHC)

Student References Provided

SYS045 A3.05 - Main Turbine Generator (MT/G) System
Ability to monitor automatic operation of the MT/G system, including: (CFR: 41/7 / 45.5)
Electrohydraulic control .....

Remarks/Status

SYS055 K1.06 - Condenser Air Removal System (CARS)

Knowledge of the physical connections and/or cause-effect relationships between the CARS and the following systems: (CFR: 41.2 to 41.9 / 45.7 to 45.8)

PRM system .....

Given the following on Unit 2:

- 2A S/G has developed a 200 GPD tube leak
- 2EMF-33 (CSAE DISCHARGE) Trip 2 light is illuminated

The normal discharge flowpath for the Condenser Steam Jet Air Ejectors (CSAE) is to the ____(1)____.

As a result of the Trip 2 condition on 2EMF-33, ____(2)____.

Which ONE of the following completes the statements above?

A. 1. Turbine Building roof
   2. an annunciator alarm ONLY occurs

B. 1. Unit vent
   2. an annunciator alarm ONLY occurs

C. 1. Turbine Building roof
   2. an annunciator alarms and the CSAE discharge path isolates

D. 1. Unit vent
   2. an annunciator alarms and the CSAE discharge path isolates

---

General Discussion

Per OP-MC-MT-ZM, the CSAEs discharge to the Unit Vent. In the past, the CSAEs discharged to the Turbine Building roof and the discharge swapped to the Unit Vent on a 1EMF-33 Trip 2 condition. However, that automatic action has been defeated and the CSAEs now continuously discharge to the Unit Vent.

Per OP-MC-WE-EMF, 1EMF-33 now only performs a monitoring function with no automatic actions.

Answer A Discussion

INCORRECT:

PLAUSIBLE:
Part 1 is plausible because the discharge flow path for EMF-33 did go to the turbine building roof at one time. Also plausible in that most other steam flowpaths in the turbine building discharge to the turbine building roof.

Part 2 is correct.

Answer B Discussion

CORRECT: See explanation above.

Answer C Discussion

INCORRECT:

PLAUSIBLE:
Part 1 is plausible because the discharge flow path for EMF-33 did go to the turbine building roof at one time. Also plausible in that most other steam flowpaths in the turbine building discharge to the turbine building roof.

Part 2 is plausible because the PRM control function used to work this way and all of the other PRM's that monitor a flowpath which discharges directly to the environment have comp actions that will isolate the discharge flowpath.

Answer D Discussion

INCORRECT:

PLAUSIBLE:
Part 1 is correct.

Part 2 is plausible because the PRM control function used to work this way and all of the other PRM's that monitor a flowpath which discharges directly to the environment have comp actions that will isolate the discharge flowpath.

Basis for meeting the KA

The K/A is matched because the applicant demonstrates knowledge of the discharge flowpath of the CARS (physical connection) and the affect of an alarm associated with the PRM which monitors this system.

Basis for Hi Cog

Basis for SRO only

Job Level	Cognitive Level	QuestionType	Question Source
RO	Memory	BANK	Bank Question 2235

Development References	Student References Provided
OP-MC-MT-ZM OP-MC-WE-EMF	

SYS055 K1.06 - Condenser Air Removal System (CARS)

Knowledge of the physical connections and/or cause-effect relationships between the CARS and the following systems: (CFR: 41.2 to 41.9 / 45.7 to 45.8)

PRM system .....

SYS068 A4.03 - Liquid Radwaste System (LRS)
Ability to manually operate and/or monitor in the control room: (CFR: 41.7 / 45.5 to 45.8)
Stoppage of release if limits exceeded .....

Given the following on Unit 1:

- Unit is at 100% RTP
- The Unit 1 VUCDT is being released

Subsequently:

- Annunciator 1RAD2 C/2 (1EMF-44 CONT VENT DRN TANK HI RAD) alarms
- 1WL-320 (VUCDT RAD MONITOR OUTLET) indicates OPEN
- 1WP-35 (WMT & VUCDT TO RC CNTRL) indicates CLOSED
- 1WP-37 (LIQUID WASTE TO RC CNTRL) indicates OPEN

Based on the conditions above, _____ has/have failed to automatically close.

If VUCDT activity level is too high for a normal "batch" release to RC, the VUCDT can be transferred to the _____.

Which ONE of the following completes the statements above?

A. 1. 1WL-320 ONLY
2. WMT (Waste Monitor tank)

B. 1. 1WL-320 ONLY
2. FDT (Floor Drain tank)

C. 1. 1WL-320 AND 1WP-37
2. WMT (Waste Monitor tank)

D. 1. 1WL-320 AND 1WP-37
2. FDT (Floor Drain tank)

General Discussion

Per OP-MC-WE-EMF,
A 1(2) EMF-44(L) Trip 2 high radiation alarm closes the following to terminate the discharge from the VUCDT:
•1(2)WL-320 (1(2) EMF-44 Outlet
•1WP-35
•1WM-46 (normally isolated)

Per OP-MC-WE-RLR,
The VUCDT is normally discharged as a "batch", but can be released on a continuous basis or, if activity is too high, transferred to the FDT for processing prior to release to RC via a WMT.

Answer A Discussion

INCORRECT:

PLAUSIBLE:
Part 1 is correct.

Part 2 is plausible because the contents of the Floor Drain tank are pumped to the Waste Monitor tank for release to RC. There are no piping connections to allow transferring the VUCDT to the WMT.

Answer B Discussion

CORRECT: See explanation above.

Answer C Discussion

INCORRECT:

PLAUSIBLE:
Part 1 is plausible because if minimum RC flow is less than required for the release of the VUCDT, 1WP-37 will receive an auto close signal.

Part 2 is plausible because the contents of the Floor Drain tank are pumped to the Waste Monitor tank for release to RC. There are no piping connections to allow transferring the VUCDT to the WMT.

Answer D Discussion

INCORRECT:

PLAUSIBLE:
Part 1 is plausible because if minimum RC flow is less than required for the release of the VUCDT, 1WP-37 will receive an auto close signal.

Part 2 is correct.

Basis for meeting the KA

The K/A is matched because the applicant demonstrates the ability to monitor stoppage of a Liquid release if limits are exceeded (by ensuring the correct valves are closed and identifying other plant alignments that could mitigate a high activity event).

Basis for Hi Cog

This question is higher cognitive because more than one mental step is involved. First the applicant must recall from memory the correct compensatory actions for an EMF-44 Hi Rad condition and then use integrated plant knowledge to determine other plant ialignments that could mitigate the event.

Basis for SRO only

Job Level	Cognitive Level	QuestionType	Question Source
RO	Comprehension	MODIFIED	2014 MNS Audit (BANK 3152)

Development References	Student References Provided
OP-MC-WE-EMF OP-MC-WE-RLR	

SYS068 A4.03 - Liquid Radwaste System (LRS)
Ability to manually operate and/or monitor in the control room: (CFR: 41.7 / 45.5 to 45.8)
Stoppage of release if limits exceeded .....

D

MNS ILT 20-1R NRC Written MNS SRO NRC Reta QUESTION 39

EPE007 EK1.02 - Reactor Trip
Knowledge of the operational implications of the following concepts as they apply to the reactor trip: (CFR 41.8 / 41.10 / 45.3)
Shutdown margin .....

Given the following on Unit 1:

- Unit is at 100% RTP
- OAC indications of Xe Worth are:
  - 2793.70 PCM
  - 0.02 PCM/MIN

Subsequently:

- The plant trips due to a loss of both Feed pumps

Shutdown Margin due to Xenon will initially _____(1)_____ due to the loss of the Xenon ___(2)____.

Which ONE of the following completes the statement above?

A. 1. lower
   2. burnup

B. 1. lower
   2. decay

C. 1. rise
   2. decay

D. 1. rise
   2. burnup

General Discussion

the unit is at 100% power, the OAC indications including the rate (PCM/MIN) show the Xe is at equilibruim value.

Xe concentration provides a negative reactivity and contributes to Shutdown Margin.

Xenon approximately -3,000 per cent mille (pcm) (varies with power level)

On a reactor trip, Xenon peaks with a negative reactivity of almost 5,000 pcm and decays back to zero (0) pcm after about three (3) days. This is a significant reactivity transient.

Based on 18 to 24 month cycles, the neutron flux is such that at 100% power approximately 75% of the removal is from burnout and approximately 25% removal is from decay. Decay would be the predominant removal term below approximately 10% power.

Answer A Discussion

INCORRECT:

PLAUSIBLE:
Part 1 is plausible if power were to increase (increasing neutron flux) the burnout term would increase and cause the concentration of Xe to go down, thus decreasing SDM

Part 2 is correct

Answer B Discussion

INCORRECT:

PLAUSIBLE:
Part 1 is plausible if power were to increase (increasing neutron flux) the burnout term would increase and cause the concentration of Xe to go down, thus decreasing SDM

Part 2 is plausible because the decay of I-135 is the primary Xe production term and below 10% power decay of Xe is the primary removal term.

Answer C Discussion

INCORRECT:

PLAUSIBLE:
Part 1 is correct

Part 2 is plausible because the decay of I-135 is the primary Xe production term and below 10% power decay of Xe is the primary removal term.

Answer D Discussion

CORRECT: See explanation above.

Basis for meeting the KA

The K/A is matched because a Reactor Trip is presented in the stem and the operational implications of Xe changes post trip are evaluated for the effects on plant Shutdown Margin.

Basis for Hi Cog

This question is higher cognitive because more than one mental step is involved. Frist, the applicant must recall from memory the affect a reactor trip will have on Xenon and then apply that to determine the affect a change in Xeneon will have on SDM. Applicant must also recall the contributing factors to Xenon production (burnout and decay).

Basis for SRO only

Job Level	Cognitive Level	QuestionType	Question Source
RO	Comprehension	NEW	

Development References	Student References Provided
GFE lesson fission Product Poison 192006 Obj. 3 & 5b page 5, 7, 11	

EPE007 EK1.02 - Reactor Trip
Knowledge of the operational implications of the following concepts as they apply to the reactor trip: (CFR 41.8 / 41.10 / 45.3)

D

MNS ILT 20-1R NRC Written MNS SRO NRC Reta QUESTION 40

APE008 AK2.03 - Pressurizer (PZR) Vapor Space Accident (Relief Valve Stuck Open)
Knowledge of the interrelations between the Pressurizer Vapor Space Accident and the following: (CFR 41.7 / 45.7)
Controllers and positioners .....

Given the following on Unit 2:

- Unit 2 is at 100% RTP
- A small leak has developed on the line connecting the pressurizer to the PORVs

Based on the conditions above,

1) the output (error signal) of the Pressurizer Pressure Master Controller will _____.

2) the transient will cause the setpoint for **OPΔT** to _____.

Which ONE of the following completes the statements above?

A. 1. raise
   2. remain the same

B. 1. lower
   2. lower

C. 1. raise
   2. lower

D. 1. lower
   2. remain the same

General Discussion

With actual pressure equal to the reference setpoint, this controller is setup to have a 0 psig (Error) output, if no integral function has built in. As actual pressure goes high, the controller output will go up, and this will cause the control system to try to decrease pressure. So it follows that as pressure goes down the output will lower to increase PZR heater amps to increase pressure.

OPDT (2/4 channels = variable) - protects against excessive fuel centerline temperature due to high fuel rod power density (kW/ft). The setpoint is a function of the 109% full power Delta T, Tavg, Rate of Tavg increase, and Delta Flux. Tavg above 585F causes the setpoint to decrease with no credit for Tavg below 585F. A Delta Flux more positive than the limit in the COLR (positive breakpoint) or more negative than the limit in the COLR (negative breakpoint) causes the setpoint to decrease. This circuit also provides a rod withdrawal stop and Turbine Runback 2% (C-4) below the trip setpoint.

Answer A Discussion

INCORRECT:

PLAUSIBLE:
Part 1 is plausible if the applicant revereses the affect that output will have on the error signal that drives Pzr heaters to energize.

Part 2 is correct.

Answer B Discussion

INCORRECT:

PLAUSIBLE:
Part 1 is correct.

Part 2 is plausible because this would be true for the OT delta T setpoint.

Answer C Discussion

INCORRECT:

PLAUSIBLE:
Part 1 is plausible if the applicant revereses the affect that output will have on the error signal that drives Pzr heaters to energize.

Part 2 is plausible because this would be true for the OT delta T setpoint.

Answer D Discussion

CORRECT: See explanation above.

Basis for meeting the KA

The K/A is matched because the applicant demonstrates knowledge of a vapor space accident (leak in the PORV supply line) and its interrelation with the PZR master controller.

Basis for Hi Cog

This question is higher cognitive level because the applicant is required to evaluate the conditions in the stem to determine the controller response to system conditions.

Basis for SRO only

Job Level	Cognitive Level	QuestionType	Question Source
RO	Comprehension	NEW	

Development References	Student References Provided
OP-MC-PS-IPE OP-MC-IC-IPE	

APE008 AK2.03 - Pressurizer (PZR) Vapor Space Accident (Relief Valve Stuck Open)
Knowledge of the interrelations between the Pressurizer Vapor Space Accident and the following: (CFR 41.7 / 45.7)
Controllers and positioners .....

MNS ILT 20-1R NRC Written MNS SRO NRC Reta QUESTION 41

B

EPE009 EK2.03 - Small Break LOCA
Knowledge of the interrelations between the small break LOCA and the following: (CFR 41.7 / 45.7)
S/Gs .....

Given the following on Unit 1:

- A Safety Injection due to High Containment pressure has occurred
- The crew has implemented E-0 (REACTOR TRIP OR SAFETY INJECTION)
- NV pump flow to the NC system Cold Legs is 390 GPM
- NC system pressure is 1350 PSIG and STABLE
- SG pressures are 1092 PSIG and STABLE
- NC system subcooling on the ICCM is 22°F and STABLE

Per E-0 Foldout Page, the crew ____(1)____ secure NC pumps.

Upon transition to E-1 (LOSS OF REACTOR OR SECONDARY COOLANT), Steam Generators ____(2)____ be required for heat removal.

Which ONE of the following completes the statements above?

A. 1. will NOT
   2. will NOT

B. 1. will NOT
   2. will

C. 1. will
   2. will NOT

D. 1. will
   2. will

General Discussion

Although NV pumps are injecting into the RCS, subcooling is not less than 0°F. Therefore, E-0 foldout page will not direct the RCPs to be secured.

Additionally, since NC system pressure is greater than SG pressures and both NC system and SG pressures are stable, the SGs are required for NC system cooling.

Answer A Discussion

INCORRECT:

PLAUSIBLE:
Part 1 is correct.

Part 2 is plausible because the applicant may conclude that the SGs are not required for NC system heat removal since there is 390 GPM of flow to the cold legs from the NV pumps.

Answer B Discussion

CORRECT: See explanation above.

Answer C Discussion

INCORRECT:

PLAUSIBLE:
Part 1 is plausible because the applicant may conclude that NC pumps should not be running since a Safety Injection has occurred and the NV pumps are injecting into the cold legs at 390 GPM.

Part 2 is plausible because the applicant may conclude that the SGs are not required for NC system heat removal since there is 390 GPM of flow to the cold legs from the NV pumps.

Answer D Discussion

INCORRECT:

PLAUSIBLE:
Part 1 is plausible because the applicant may conclude that NC pumps should not be running since a Safety Injection has occurred and the NV pumps are injecting into the cold legs at 390 GPM.

Part 2 is correct.

Basis for meeting the KA

This K/A is matched because the applicant must evaluate a given situation where a small break LOCA has occurred and determine that the SGs are still required for NC system heat removal.

Basis for Hi Cog

This question requires more than one mental step. The applicant must analyze the given information, compare to knowledge recalled from memory, and then make a determination in order to correctly answer the question.

Basis for SRO only

Job Level	Cognitive Level	QuestionType	Question Source
RO	Comprehension	BANK	2019 CNS NRC (BANK 8306)

Development References	Student References Provided
EP-E-0 EP-E1 Bckgd doc	

EPE009 EK2.03 - Small Break LOCA
Knowledge of the interrelations between the small break LOCA and the following: (CFR 41.7 / 45.7)
S/Gs .....

C

MNS ILT 20-1R NRC Written MNS SRO NRC Reta QUESTION 42

EPE011 2.4.11 - Large Break LOCA
EPE011 GENERIC
Knowledge of abnormal condition procedures. (CFR: 41.10 / 43.5 / 45.13)

Given the following on Unit 1:

- A LBLOCA has occurred.
- The crew has just transitioned to ES-1.3 (TRANSFER TO COLD LEG RECIRCULATION).
- "CONT SUMP LEVEL GREATER THAN 2.5 FT" on 1AD-14 is LIT.
- "CONT SUMP LEVEL GREATER THAN 3.0 FT" on 1AD-14 is DARK.

Per ES-1.3:

1) The MINIMUM Containment sump level required to align ND to cold leg recirculation _____ met.

2) When FWST level lowers to a MAXIMUM of _____ INCHES, NV and NI can be aligned to cold leg recirculation.

Which ONE of the following completes the statements above?

A. 1. is
2. 95

B. 1. is NOT
2. 95

C. 1. is
2. 20

D. 1. is NOT
2. 20

General Discussion

IAW ES-1.3, the minimum required sump level to align ND to CLR is 2.5 feet. NV and NI are aligned to CLR when the FWST lowers to a level of 20 inches (LO-LO alarm).

Answer A Discussion

INCORRECT:

PLAUSIBLE:
Part 1 is correct.

Part 2 is plausible because 95 inches is the FWST LO level alarm.

Answer B Discussion

INCORRECT:

PLAUSIBLE:
Part 1 is plausible because 3.0 feet is the required sump level to align NS to CLR.

Part 2 is plausible because 95 inches is the FWST LO level alarm.

Answer C Discussion

CORRECT. See Explanation Above.

Answer D Discussion

INCORRECT:

PLAUSIBLE:
Part 1 is plausible because 3.0 feet is the required sump level to align NS to CLR.

Part 2 is correct.

Basis for meeting the KA

The KA is matched because the applicant is required to determine the conditions that will allow aligning for CLR during a LBLOCA.

Basis for Hi Cog

Basis for SRO only

Job Level	Cognitive Level	QuestionType	Question Source
RO	Memory	BANK	MNS Exam Bank

Development References

EP/1/A/5000/ES-1.3, Transfer to Cold Leg Recirc

Student References Provided

EPE011 2.4.11 - Large Break LOCA
EPE011 GENERIC
Knowledge of abnormal condition procedures. (CFR: 41.10 / 43.5 / 45.13)

Remarks/Status

APE015/017 AK2.10 - Reactor Coolant Pump (RCP) Malfunctions

Knowledge of the interrelations between the Reactor Coolant Pump Malfunctions (Loss of RC Flow) and the following: (CFR 41.7 / 45.7)

RCP indicators and controls .....

Given the following on Unit 2:

- Unit is in MODE 3 with Shutdown Banks withdrawn
- 2B, 2C, and 2D NC pumps are in service
- Bus 2TA is de-energized with its supply breaker racked out for maintenance

Subsequently:

- The 2B NC pump 6.9KV NC pump feeder breaker trips

Based on the conditions above:

1) The 2C and 2D NC pumps SAFETY BREAKERS indicate _____.

2) The Unit 2 Reactor Trip breakers _____.

Which ONE of the following completes the statements above?

A. 1. CLOSED
   2. remain CLOSED

B. 1. CLOSED
   2. are TRIPPED

C. 1. OPEN
   2. remain CLOSED

D. 1. OPEN
   2. are TRIPPED

General Discussion

If an under-frequency condition exists on 2 or more pumps, the Reactor Coolant Pump Safety breakers will be tripped, regardless of the power level. Therefore, 3/4 NCP Bus Supply Breakers must be closed to allow a Safety Breaker to be closed. Otherwise, the Safety Breaker will trip on underfrequency.

For this particular instance, the 2TA bus is already de-energized. When the 2B NC Pump 6.9KV breaker opens, the NC Pump monitoring system sees an underfrequency condition on 2/4 busses and opens all NC pump Safety Breakers.

Since Reactor Power is less than P-7 (10% power) the Two Loop Loss of Flow reactor trip is automatically blocked. Therefore, the reactor trip breakers remain closed.

Answer A Discussion

INCORRECT:

PLAUSIBLE:
Part 1 is plausible if the applicant does not recall that three of the four NC pump 6.9KV feeder breakers must be closed for the NC pump Safety Breakers to be closed.
Also plausible in that an undervoltage condition will not result in tripping all NCP safety breakers.

Part 2 is correct.

Answer B Discussion

INCORRECT:

PLAUSIBLE:
Part 1 is plausible if the applicant does not recall that three of the four NC pump 6.9KV feeder breakers must be closed for the NC pump Safety Breakers to be closed.
Also plausible in that an undervoltage condition will not result in tripping all NCP safety breakers.

Part 2 is plausible if the applicant does not recall the NC system flow related trips (i.e. both measure flow and NC pump breakers open) are automatically blocked when power is below P-7 (10% power).

Answer C Discussion

CORRECT: See explanation above.

Answer D Discussion

INCORRECT:

PLAUSIBLE:
Part 1 is correct.

Part 2 is plausible if the applicant does not recall the NC system flow related trips (i.e. both measure flow and NC pump breakers open) are automatically blocked when power is below P-7 (10% power).

Basis for meeting the KA

The K/A is matched because a malfunction has occurred that effects a running NC pump. Based on that malfunction, the applicant must determine the effect on the NC pump monitoring system (EME) and the resulting indications for the NC pumps.

Basis for Hi Cog

This is a higher cognitive level question because it requires more than one mental step. The applicant must first recall from memory where the power supply undervoltage and underfrequency conditions are sensed in relation to the Bus Supply breaker and Safety Breaker. The applicant must then determine from the conditions given whether only one NC pump is affected or whether all NC pumps are affected and what caused the breaker(s) to trip.

Basis for SRO only

Job Level	Cognitive Level	QuestionType	Question Source
RO	Comprehension	BANK	2011 MNS NRC (BANK 4395)

MNS ILT 20-1R NRC Written MNS SRO NRC Reta QUESTION 43

C

Development References	Student References Provided
OP-MC-PS-NCP	

APE015/017 AK2.10 - Reactor Coolant Pump (RCP) Malfunctions

Knowledge of the interrelations between the Reactor Coolant Pump Malfunctions (Loss of RC Flow) and the following: (CFR 41.7 / 45.7)

RCP indicators and controls .....

Remarks/Status

APE022 AK3.01 - Loss of Reactor Coolant Makeup

Knowledge of the reasons for the following responses as they apply to the Loss of Reactor Coolant Makeup: (CFR 41.5, 41.10 / 45.6 / 45.13)

Adjustment of RCP seal backpressure regulator valve to obtain normal flow . . . . . .

Given the following on Unit 1:

- Unit is at 100% RTP
- The CRS has implemented AP-12 (LOSS OF LETDOWN, CHARGING OR SEAL INJECTION) following a trip of 1A NV Pump

Subsequently:

- 1B NV Pump has been started

When initially restoring seal injection flow, the BOP will **slowly** throttle ____(1)____ on 1NV-241 (U1 SEAL WATER INJ FLOW CONTROL) to ____(2)____.

Which ONE of the following completes the statement above?

A. 1. OPEN
   2. establish 8-10 gpm seal flow per NC pump

B. 1. OPEN
   2. limit NCP lower bearing cooldown rate to 1°F/min

C. 1. CLOSED
   2. limit NCP lower bearing cooldown rate to 1°F/min

D. 1. CLOSED
   2. establish 8-10 gpm seal flow per NC pump

General Discussion

Per AP-12, following a loss of a charging pump, prior to the start of the standby pump 1NV-241 is fully opened and 1NV-238 is closed.

Once the standby pump is started and flow is verified to be less than 6 gpm, then 1NV-238 is slowly throttled open to re-establish charging flow and 1NV-241 is slowly throttled closed to raise seal injection flow at a rate to ensure the cooldown of the NCP lower radial bearing is less than or equal to 1 degree per minute.

Answer A Discussion

INCORRECT:

PLAUSIBLE:
Part 1 is plausible because 1NV-238 is required to be opened to establish charging flow. Also plausible in that opening a valve would normally initiate flow, however, 1NV-241 is reverse acting.

Part 2 is plausible because seal flow of 8-10 gpm is the normal band for establishing NCP seal flow.

Answer B Discussion

INCORRECT:

PLAUSIBLE:
Part 1 is plausible because 1NV-238 is required to be opened to establish charging flow. Also plausible in that opening a valve would normally initiate flow, however, 1NV-241 is reverse acting.

Part 2 is correct

Answer C Discussion

CORRECT: See explanation above.

Answer D Discussion

INCORRECT:

PLAUSIBLE:
Part 1 is correct

Part 2 is plausible because seal flow of 8-10 gpm is the normal band for establishing NCP seal flow.

Basis for meeting the KA

The K/A is matched because given a loss of Reactor Coolant Makeup, the applicant is required to demonstrate knowledge of the reasons (establishment of required minimum flow) as applied to adjustment of the RCP seal backpressure regulator valve to obtain normal flow (required adjustment to obtain required flow). In this case the flow is used to control the lower radial bearing temperature

Basis for Hi Cog

This question is higher cognitive because the applicant must recall information related to the operation of the RCP Seal Injection Control valve (backpressure regulator) and compare this knowledge with given information to determine reason for slowly throttling closed on 1NV-241.

Basis for SRO only

Job Level	Cognitive Level	QuestionType	Question Source
RO	Comprehension	MODIFIED	2017 CNS NRC (BANK 7103)

Development References	Student References Provided
AP/1/A/5500/012, Rev. 24	

APE022 AK3.01 - Loss of Reactor Coolant Makeup
Knowledge of the reasons for the following responses as they apply to the Loss of Reactor Coolant Makeup: (CFR 41.5, 41.10 / 45.6 / 45.13)
Adjustment of RCP seal backpressure regulator valve to obtain normal flow . . . . . .

Remarks/Status

APE025 AA2.07 - Loss of Residual Heat Removal System (RHRS)
Ability to determine and interpret the following as they apply to the Loss of Residual Heat Removal System: (CFR: 43.5 / 45.13)
Pump cavitation .....

Given the following:

- Unit 2 is in MODE 5 and drained to Mid-loop
- ND Train 2A is in service
- ND system flow rate is 2500 GPM
- NC System level is 7 inches and stable
- 2A ND pump amps and discharge pressure begin to oscillate
- The crew has entered AP-19, LOSS OF ND OR ND SYSTEM LEAKAGE

Based on the conditions above:

The 2A ND pump _____(1)_____ cavitating.

Per AP/19, the crew will _____(2)_____.

Which ONE of the following completes the statements above?

A. 1. is
   2. secure 2A ND Pump

B. 1. is
   2. reduce ND flow

C. 1. is not
   2. secure 2A ND Pump

D. 1. is not
   2. reduce ND flow

General Discussion

The ND pumps are cavitating. If the ND pumps were experiencing runout, the current indication would be high but would not be oscillating and the pump discharge pressure would be low and would not be oscillating.

If an ND pump is on and showing signs of cavitation step 5.J will direct stopping the pump.

The flow band per AP-19 is between 3000 and 1500 gpm.

Answer A Discussion

CORRECT: See explanation above.

Answer B Discussion

INCORRECT:

PLAUSIBLE:
Part 1 is correct

Part 2 is plausible since reducing flow could stabilize pump conditions if vortexing was the problem with the abnormal pump indications.

Answer C Discussion

INCORRECT:

PLAUSIBLE:
Part 1 is plausible if the applicant believes that the flow rate is high for current plant conditions. If so, it is reasonable to believe that the pumps are in a runout condition.

Part 2 is correct.

Answer D Discussion

INCORRECT:

PLAUSIBLE:
Part 1 is plausible if the applicant believes that the flow rate is high for current plant conditions. If so, it is reasonable to believe that the pumps are in a runout condition.

Part 2 is plausible since reducing flow could stabilize pump conditions if vortexing was the problem with the abnormal pump indications.

Basis for meeting the KA

The K/A is matched because the applicant is required to analyze the data acquired from monitoring ND system flow and ND pump ammeter and discharge pressure gauge to determine the status of the ND pump.

Basis for Hi Cog

This question is a hi cognitive question because the applicant is required to analyze the data given and determine current status of the operating ND pump.

Basis for SRO only

Job Level	Cognitive Level	QuestionType	Question Source
RO	Comprehension	BANK	2015 CNS NRC (BANK 6547)

Development References

References:
AP-19, Step 4, 5.J, Page 128
OP-MC-AP-19 Obj 3

Student References Provided

APE025 AA2.07 - Loss of Residual Heat Removal System (RHRS)
Ability to determine and interpret the following as they apply to the Loss of Residual Heat Removal System: (CFR: 43.5 / 45.13)
Pump cavitation .....

MNS ILT 20-1R NRC Written MNS SRO NRC Reta QUESTION 46

D

APE027 AA1.01 - Pressurizer Pressure Control System (PZR PCS) Malfunction
Ability to operate and / or monitor the following as they apply to the Pressurizer Pressure Control Malfunctions: (CFR 41.7 / 45.5 / 45.6)
PZR heaters, sprays, and PORVs .....

Given the following on Unit 1:

- Unit is at 100% RTP, normal temperature and pressure

Subsequently:

- The Pressurizer Pressure Master controller suffers an internal failure resulting in a "Pressurizer Pressure Error" of +100 PSIG
- Actual Pressurizer Pressure is 2100 PSIG and lowering

Pressurizer Spray valves are currently _____(1)_____.

At the time of the failure, _____(2)_____ received a signal to open.

Which ONE of the following completes the statements above?

A. 1. CLOSED
   2. 1NC-34A ONLY

B. 1. CLOSED
   2. all Pressurizer PORVs

C. 1. OPEN
   2. all Pressurizer PORVs

D. 1. OPEN
   2. 1NC-34A ONLY

General Discussion

With a +100 PSIG error signal, PORV 1NC-34A and the Spray Valves would be open. Pressurizer PORVs 1NC-32B and 1NC-36B receive a signal to open from SPP-2. Since this channel never saw pressure at +100 PSIG, these valves did not open.

Answer A Discussion

INCORRECT:

PLAUSIBLE:
Part 1 is plausible if the applicant reasons that a low pressurizer pressure block exists from SPP-2 for the pressurizer spray valves like for the Pressurizer PORVs (block closed at 2177 PSIG decreasing).

Part 2 is correct.

Answer B Discussion

INCORRECT:

PLAUSIBLE:
Part 1 is plausible if the applicant reasons that a low pressurizer pressure block exists from SPP-2 for the pressurizer spray valves like for the Pressurizer PORVs (block closed at 2177 PSIG decreasing).

Part 2 is plausible because it would be true if actual Pzr pressure was at +100 PSIG.

Answer C Discussion

INCORRECT:

PLAUSIBLE:
Part 1 is correct.

Part 2 is plausible because it would be true if actual Pzr pressure was at +100 PSIG.

Answer D Discussion

CORRECT: See explanation above.

Basis for meeting the KA

The KA is matched because a malfunction has occurred on the Pressurizer Pressure Master Controller and the applicant must determine the effect on the Pressurizer Pressure Control System.

Basis for Hi Cog

Question is Comprehension based on the operator having to analyze the effect of the error signal on individual components.

Basis for SRO only

Job Level	Cognitive Level	QuestionType	Question Source
RO	Comprehension	BANK	2016 CNS NRC (BANK 6310)

Development References	Student References Provided
OP-MC-PS-IPE	

APE027 AA1.01 - Pressurizer Pressure Control System (PZR PCS) Malfunction
Ability to operate and / or monitor the following as they apply to the Pressurizer Pressure Control Malfunctions: (CFR 41.7 / 45.5 / 45.6)
PZR heaters, sprays, and PORVs .....

Remarks/Status

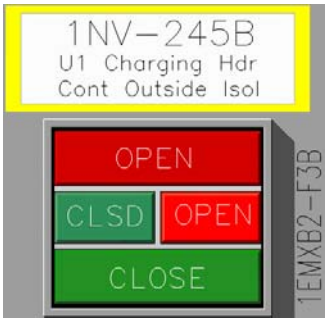
EPE029 EA1.06 - Anticipated Transient Without Scram (ATWS)
Ability to operate and monitor the following as they apply to a ATWS: (CFR 41.7 / 45.5 / 45.6)
Operating switches for normal charging header isolation valves .....

Given the following on Unit 1:

- Unit was at 100% RTP

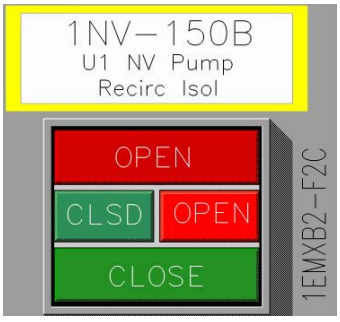
Subsequently:

- A turbine trip occurs
- The CRS has implemented FR-S.1 (RESPONSE TO NUCLEAR POWER GENERATION/ATWS) due to inability to open the trip breakers
- A Pzr safety lifted and did not reseat
- Pzr pressure lowered to a pressure of 1600 PSIG and is now slowly trending up
- The following indications are observed:



OPEN Light – LIT

CLSD Light - DARK



OPEN Light – LIT

CLSD Light - DARK

1. Which ONE of the following valves is in the CORRECT position?

2. FR-S.1 _____ direct the use of the ESF Monitor Light Panel to check all ESF valve positions.

Which ONE of the following completes the statement above?

A. 1. 1NV-150B
   2. will

B. 1. 1NV-150B
   2. will NOT

C. 1. 1NV-245B
   2. will

D. 1. 1NV-245B
   2. will NOT

General Discussion

An ATWS condition is presented with primary pressure at 1600 psi. At 1845 psi a Safety Injection will actuate. During an ATWS the normal equipment alignment will not be checked in the main body of the procedure. The procedure will direct another operator check S/I equipment with enclosure 3 (step 7 of page 5).

1NV-245B, U1 Charging Hdr Cont Outside Isol, should close on a S/I signal. The presented indication shows the valve still open.
1NV-150B, U1 NV Pump Recir Isol is manually cylced when pressure drops to 1500 psi and reopened when pressure restores to 2000 psi. The stem gives information that the lowest pressure obtained is 1600 psi. 1NV-150B should be open.

Answer A Discussion

CORRECT: See explanation above.

Answer B Discussion

INCORRECT:

PLAUSIBLE:
Part 1 is correct.

Part 2 is plausible because the Generic Enclosure 10 (S/I Valve Checklist) is performed if the OAC is not available. This is the second method of verification for the correct equipment alignment for a S/I in FR-S.1.

Answer C Discussion

INCORRECT:

PLAUSIBLE:
Part 1 is plausible because a S/I does not always occur during an ATWS. The applicant has to determine that a S/I has occurred. If an S/I has occurred this valve's required position should be closed. With no S/I, this valve's required position will be open.

Part 2 is correct.

Answer D Discussion

INCORRECT:

PLAUSIBLE:
Part 1 is plausible because a S/I does not always occur during an ATWS. The applicant has to determine that a S/I has occurred. If an S/I has occurred this valve's required position should be closed. With no S/I, this valve's required position will be open.

Part 2 is plausible because the Generic Enclosure 10 (S/I Valve Checklist) is performed if the OAC is not available. This is the second method of verification for the correct equipment alignment for a S/I in FR-S.1.

Basis for meeting the KA

The K/A is matched because the applicant demonstrates the ability to monitor valve indication, determine the correct valve position and select the procedure method for equipment verification as it applies to an ATWS condition.

Basis for Hi Cog

This question is higher cogntive because the applicant must recall the S/I set point, correct valve position for current conditions, and identify the correct procedure method for equipment verification.

Basis for SRO only

Job Level	Cognitive Level	QuestionType	Question Source
RO	Comprehension	NEW	

Development References	Student References Provided
EP-S1 pg 5, 11, 25 OP-MC-PS-NV	

EPE029 EA1.06 - Anticipated Transient Without Scram (ATWS)
Ability to operate and monitor the following as they apply to a ATWS: (CFR 41.7 / 45.5 / 45.6)
Operating switches for normal charging header isolation valves .....

C

MNS ILT 20-1R NRC Written MNS SRO NRC Reta QUESTION 48

EPE038 EK1.03 - Steam Generator Tube Rupture (SGTR)
Knowledge of the operational implications of the following concepts as they apply to the SGTR: (CFR 41.8 / 41.10 / 45.3)
Natural circulation .....

Why does the loss of reactor coolant pumps during a steam generator tube rupture increase the risk of voiding during the subsequent cooldown and depressurization?

A. The NCS hot legs reach saturation temperature during the rapid depressurization from the tube rupture, causing the NCS to flash.

B. More ECCS flow is injected into the ruptured loop cold leg due to the reduced pressure, resulting in less flow to the core and less heat removal.

C. The upper head region becomes inactive and the fluid temperature in that region significantly lags the temperatures in the NCS loop.

D. The isolation of the steam generator in the affected loop causes that loop to stagnate; therefore, insufficient heat removal capacity is available to cool the NCS.

General Discussion

Per E-3, NOTE:

If all NC pumps are off, the upper head region may void during NC System depressurization.

Without NC pumps running, there is very little flow into the upper head region. Fluid in that region remains relatively hot even though the fluid temperature in the active regions of the primary system has been significantly reduced. As the reactor coolant system is depressurized, this hotter fluid may flash to steam, forming an upper head void. Similar behavior may occur in the S/G tube region of the ruptured loop, although the fluid temperature in the tubes is expected to follow the temperature in the active regions more closely. Pzr level will go up rapidly as water displaced from these hotter regions replaces steam in the Pzr. The Pzr may fill within a few minutes.

Answer A Discussion

INCORRECT:

PLAUSIBLE:
But the bulk NCS fluid is not susceptible to flashing; only the upper head region is susceptible.

Answer B Discussion

INCORRECT:

PLAUSIBLE:
Since SGTR is a type of small break LOCA. ECCS design, specifically the flow balancing valves in the injection lines, limits the amount of flow out of the break.

Answer C Discussion

CORRECT: See explanation above.

Answer D Discussion

INCORRECT:

PLAUSIBLE:
Since isolation of the S/G does cause a stagnant loop condition. This results in an increase in the potential for a PTS event, not upper head voiding.

Basis for meeting the KA

The KA is matched because the operator must demonstrate knowledge of operational implications of loss of NC pumps during a SGTR.

Basis for Hi Cog

The question is higher cognitive level because the operator must demonstrate an understanding of the phenomenon of Reflux Cooling/Boiling, in order to answer the question correctly.

Basis for SRO only

Job Level	Cognitive Level	QuestionType	Question Source
RO	Comprehension	BANK	Watts Bar 2009 NRC Exam

Development References	Student References Provided
OP-MC-EP-E3 Lesson Plan	

EPE038 EK1.03 - Steam Generator Tube Rupture (SGTR)
Knowledge of the operational implications of the following concepts as they apply to the SGTR: (CFR 41.8 / 41.10 / 45.3)
Natural circulation .....

Remarks/Status

MNS ILT 20-1R NRC Written MNS SRO NRC Reta QUESTION 49

D

APE054 AA2.03 - Loss of Main Feedwater (MFW)
Ability to determine and interpret the following as they apply to the Loss of Main Feedwater (MFW): (CFR: 43.5 / 45.13)
Conditions and reasons for AFW pump startup .....

Regarding the operation of the CA system:

1) ONLY the Motor-Driven CA pump(s) will start if a _____ occurs.

2) The CA system is capable of supplying sufficient flow to maintain S/G inventory provided reactor power is less than a MAXIMUM of _____.

Which ONE of the following completes the statements above?

A. 1. Blackout signal on 1ETA and/or 1ETB
   2. 5%

B. 1. Blackout signal on 1ETA and/or 1ETB
   2. 3%

C. 1. Trip of both CF pumps
   2. 5%

D. 1. Trip of both CF pumps
   2. 3%

General Discussion

On a trip of both CF pumps, the MD CA pumps only will start.
On a Blackout the MD and TD CA pumps will start.

The CA system is capable of supplying all main feedwater during a normal plant startup and shutdown provided the flow is less than 3% maximum design feedwater flow.

Answer A Discussion

INCORRECT:

PLAUSIBLE:
Part 1 is plausible because it is true that both MDCA pumps start on a Blackout signal.However the TDCA pump also starts.

Part 2 is plausible because at 5% RTP a mode change to Mode 1 occurs. Plasuible to conclude CA flow would be adequate while in Mode 2.

Answer B Discussion

INCORRECT:

PLAUSIBLE:
Part 1 is plausible because it is true that both MDCA pumps start on a Blackout signal.However the TDCA pump also starts.

Part 2 is correct.

Answer C Discussion

INCORRECT:

PLAUSIBLE:
Part 1 is correct.

Part 2 is plausible because at 5% RTP a mode change to Mode 1 occurs. Plasuible to conclude CA flow would be adequate while in Mode 2.

Answer D Discussion

CORRECT: See explanation above.

Basis for meeting the KA

The K/A is matched because the applicant must have knowledge of what will start the CA pumps on a loss of feedwater (i.e. both CF pumps tripped). Additionally, the applicant must have knowledge of the flow capability of the CA system (which is the basis for tripping the reactor if both CF pumps trip).

Basis for Hi Cog

Basis for SRO only

Job Level	Cognitive Level	QuestionType	Question Source
RO	Memory	BANK	Bank Question 5741

Development References

OP-MC-CF-CA, Auxiliary Feedwater

Student References Provided

APE054 AA2.03 - Loss of Main Feedwater (MFW)
Ability to determine and interpret the following as they apply to the Loss of Main Feedwater (MFW): (CFR: 43.5 / 45.13)
Conditions and reasons for AFW pump startup .....

Remarks/Status

C

MNS ILT 20-1R NRC Written MNS SRO NRC Reta QUESTION 50

EPE055 2.2.37 - Loss of Offsite and Onsite Power (Station Blackout)
EPE055 GENERIC
Ability to determine operability and/or availability of safety related equipment. (CFR: 41.7 / 43.5 / 45.12)

Given the following conditions:

- Both units have experienced a Loss of Offsite Power (LOOP)
- ECA-0.0 (LOSS OF ALL AC POWER) was implemented on Unit 1 and the crew transitioned to ECA-0.1 (LOSS OF ALL AC POWER RECOVERY WITHOUT S/I REQUIRED)

Current conditions:

- NC Subcooling is greater than 0°F
- S/G pressures are STABLE at 470 PSIG
- NC Thots are STABLE
- Core Exit T/Cs - STABLE
- NC Tcolds are 500°F and STABLE

Consider Each Statement Separately

Natural Circulation flow ____(1)____ currently established.

If Natural Circulation flow is NOT established, then ____(2)____ will be used to dump steam.

Which ONE of the following completes the statements above?

REFERENCE PROVIDED

A. 1. is
2. Main Steam PORVs

B. 1. is
2. Steam Dumps

C. 1. is NOT
2. Main Steam PORVs

D. 1. is NOT
2. Steam Dumps

General Discussion

EP/1/A/5000/ECA-0.1, Loss of All AC Power Recovery without S/I Required, will direct performance of Generic Enclosure 33, Natural Circulation Parameters. With the given S/G parameters and NC Tcolds compared to the graph on Enclosure 33, NC Tcolds are outside the acceptable region.
Natural circulation cannot be supported.
EP/1/A/5000/ECA-0.1 maintains S/G pressure with SM PORVS.

Answer A Discussion

INCORRECT:

PLAUSIBLE:
Part 1 is plausible if the wrong values for S/G pressure and NC Tcolds are used when comparing the graph.

Part 2 is correct.

Answer B Discussion

INCORRECT:

PLAUSIBLE:
Part 1 is plausible if the wrong values for S/G pressure and NC Tcolds are used when comparing the graph.

Part 2 is plausible because in ES-0.2, Natural Circulation Cooldown, MSIVs will be open if available and steam dumps will be used.

Answer C Discussion

CORRECT. See explanation above.

Answer D Discussion

INCORRECT:

PLAUSIBLE:
Part 1 is correct.

Part 2 is plausible because in ES-0.2, Natural Circulation Cooldown, MSIVs will be open if available and steam dumps will be used.

Basis for meeting the KA

The K/A is matched because the operator demonstrates the ability to determine if the Main Steam PORVs are available as applicable with a Loss of Offsite and Onsite Power. The Main Steam PORVs are safety related equipment.

Basis for Hi Cog

This question is higher cognitive because the applicant has to evaluate plant conditions and use a reference to determine if Natural Circulation is supported and know that based on the loss of power that the Steam Dumps are not available due to MSIVs being closed.

Basis for SRO only

Job Level	Cognitive Level	QuestionType	Question Source
RO	Comprehension	BANK	MNS Bank

Development References

EP-G-1, Encl. 33 (Natural Circulation Parameters)
ECA-0.1
ES-0.2

Student References Provided

Generic Enclosure 33 (page 211)

EPE055 2.2.37 - Loss of Offsite and Onsite Power (Station Blackout)
EPE055 GENERIC
Ability to determine operability and/or availability of safety related equipment. (CFR: 41.7 / 43.5 / 45.12)

Remarks/Status

APE056 AA1.18 - Loss of Offsite Power
Ability to operate and / or monitor the following as they apply to the Loss of Offsite Power: (CFR 41.7 / 45.5 / 45.6)
Control room normal ventilation supply fan .....

Given the following:

- VC/YC Mode Select Switch is in TRAIN A with all A Train equipment in operation, except CR-OAPFT-1
- VC/YC Train B Mode Select Switch is in OFF with all B Train equipment selected to AUTO
- No smoke or fire detection alarms, associated with VC/YC, are active

Subsequently:

- A blackout occurs on 1ETB occurs

Based on the conditions above,

1) The Train B CR-AHU _____ be running.

2) The Train A CR-OAPFT-1 will _____.

Which ONE of the following completes the statement above?

A. 1. will NOT
   2. start

B. 1. will NOT
   2. remain OFF

C. 1. will
   2. start

D. 1. will
   2. remain OFF

General Discussion

Per OP-MC-PSS-VC,
The Control Room air handling units (CR-AHU) on the affected bus will start on a unit 1 or 2 blackout regardless of the status of the VC/YC train selector switch.

Per OP-MC-PSS-VC,
the OAPFT on the affected bus will start on a unit 1 or 2 blackout or if the train related safety actuation initiate pushbutton is depressed regardless of train selector switch, heater, or start/stop switch status. (In the condition presented, 1ETB is the affected bus).

Answer A Discussion

INCORRECT:

PLAUSIBLE:
Part 1 is plausible because the Control Room Area air handling units (CRA-AHU) on the affected bus will start on a blackout but ONLY if the VC/YC mode selector switch is selected to that train.

Part 2 is plausible because the OAPFT would start on a blackout of the affected bus on either Unit 1 or 2. The applicant may conclude the start is on a blackout of either bus instead of either unit.

Answer B Discussion

INCORRECT:

PLAUSIBLE:
Part 1 is plausible because the Control Room Area air handling units (CRA-AHU) on the affected bus will start on a blackout but ONLY if the VC/YC mode selector switch is selected to that train.

Part 2 is correct.

Answer C Discussion

INCORRECT:

PLAUSIBLE:
Part 1 is correct.

Part 2 is plausible because the OAPFT would start on a blackout of the affected bus on either Unit 1 or 2. The applicant may conclude the start is on a blackout of either bus instead of either unit.

Answer D Discussion

CORRECT: See explanation above.

Basis for meeting the KA

The K/A is matched because the applicate demonstrates the ability to monitor control room normal ventilation fans and air handling units as they apply to a loss of offsite power.

Basis for Hi Cog

Basis for SRO only

Job Level	Cognitive Level	QuestionType	Question Source
RO	Memory	NEW	

Development References	Student References Provided
OP-MC-PSS-VC	

APE056 AA1.18 - Loss of Offsite Power
Ability to operate and / or monitor the following as they apply to the Loss of Offsite Power: (CFR 41.7 / 45.5 / 45.6)
Control room normal ventilation supply fan .....

APE057 AK3.01 - Loss of Vital AC Electrical Instrument Bus

Knowledge of the reasons for the following responses as they apply to the Loss of Vital AC Instrument Bus: (CFR 41.5,41.10 / 45.6 / 45.13)

Actions contained in EOP for loss of vital ac electrical instrument bus ...

Given the following on Unit 1:

- A loss of EVDD has occurred
- The CRS has implemented AP-15 (LOSS OF VITAL OR AUX CONTROL POWER)

Due to the isolation of ____(1)____, the operating crew will be required to respond to rising containment pressure.

To aid in controlling containment pressure, LOWER Containment TEMPERATURE will be maintained less than a MAXIMUM of ____(2)____, as required by TS 3.6.5 (CONTAINMENT AIR TEMPERATURE).

Which ONE of the following completes the statements above?

A. 1. the VQ (Containment Air Addition and Release) system
   2. 100°F

B. 1. RV (Containment Cooling) to Lower Containment
   2. 100°F

C. 1. the VQ (Containment Air Addition and Release) system
   2. 120°F

D. 1. RV (Containment Cooling) to Lower Containment
   2. 120°F

.

General Discussion

Loss of VQ capability is caused by a loss of any one of several control power busses (EVDA, EVDD, KXA, and KXB). Due to VI leaks, containment pressure will increase slowly. Contingency actions to slow this rate of increase are to increase cooling capability of the containment atmosphere by starting additional VL fans, VU fans, and RV pumps. These are only temporary actions that merely slow down the rate of increase of containment pressure. The operator will monitor containment temperature to ensure compliance with Tech Spec 3.6.1.5. (FSAR sections consulted: 6.2.1) (Tech Specs consulted: 3.6.1.5, 3.6.1.4)

TS 3.6.5 LCO for Containment temperature, Containment average temperature shall be:
≥ 75°F and ≤ 100°F for the containment upper compartment and
≥ 100°F and ≤ 120°F for the containment lower compartment

Answer A Discussion

INCORRECT:

PLAUSIBLE:
Part 1 is correct.

Part 2 is plausible since 100°F is the maximum temperature limit for Upper Containment temperatures per TS LCO 3.6.5.

Answer B Discussion

INCORRECT:

PLAUSIBLE:
Part 1 is plausible because RV to upper containment is isolated on a loss of Bus EVDD and would contribute to rising containment pressure. (RV to Lower containment is NOT isolated)

Part 2 is plausible since 100°F is the maximum temperature limit for Upper Containment temperatures per TS LCO 3.6.5.

Answer C Discussion

CORRECT: See explanation above.

Answer D Discussion

INCORRECT:

PLAUSIBLE:
Part 1 is plausible because RV to upper containment is isolated on a loss of Bus EVDD and would contribute to rising containment pressure. (RV to Lower containment is NOT isolated)

Part 2 is correct.

Basis for meeting the KA

The K/A is matched because the applicant is given a situation where power is lost to a Vital AC instrument bus and the applicant must know the reason for the containment pressure increase and what actions are required to mitigate.

Basis for Hi Cog

This question is higher cognitive because the applicant must evaluate the affect a loss of EVDD versus a loss of EVDA will have on the systems providing temperature and pressure control to containment and then recall from memory the TS limit on lower containment temperature.

Basis for SRO only

Job Level	Cognitive Level	QuestionType	Question Source
RO	Comprehension	MODIFIED	2014 MNS NRC (BANK 5194)

Development References

AP-15
AP-15 Background Document
TS 3.6.5 (Containment Air Temperature)

Student References Provided

APE057 AK3.01 - Loss of Vital AC Electrical Instrument Bus
Knowledge of the reasons for the following responses as they apply to the Loss of Vital AC Instrument Bus: (CFR 41.5,41.10 / 45.6 / 45.13)
Actions contained in EOP for loss of vital ac electrical instrument bus ...

MNS ILT 20-1R NRC Written MNS SRO NRC Reta QUESTION 53

B

APE062 AA2.01 - Loss of Nuclear Service Water
Ability to determine and interpret the following as they apply to the Loss of Nuclear Service Water: (CFR: 43.5 / 45.13)
Location of a leak in the SWS .....

Given the following initial conditions on Unit 1:

- The Unit is operating at 100% RTP

Subsequently,

- 1AD8 / D2 (SUMP B GROUNDWATER DRAINAGE HI HI LVL) alarms
- An AO has been dispatched to investigate reports that the B Groundwater sump is overflowing

Which ONE (1) of the following describes the source of the flooding?

A. 2A RN strainer basket shaft seal failure

B. 2B RN Pump Suction piping weld failure

C. RF piping break in the Unit 1 CA pump Room

D. 1B RN strainer automatic backwash valve has failed open

General Discussion

The applicant is presented with indications of flooding in the vicinity of Groundwater Sump B. This is one of 3 groundwater sumps in the Aux building. Sump A is located in the U-1 CA Pump Room, Sump B is located in the U-2 CA pump room. A third Sump "C" is located on the same elevation on the north end of the aux building. The suction strainers and associated piping for the nuclear service water (RN) pumps are located in these rooms as well with the "A" train components for both units located in the U-1 CA pump room and the "B" Train components located in the U-2 CA pump room.

With the indication given, the location of the leak is located in the U-2 CA pump room. (B Groundwater sump). The 2B RN suction piping is located in this room and a leak large enough to cause the sump to overflow would threaten other safety related equipment in the area including the U-2 Aux feedwater pump and the U-2 Aux Shutdown panel. This leak would have to be isolated and would result in a loss of that train of RN.

Answer A Discussion

INCORRECT:

PLAUSIBLE:
This answer is plausible if the applicant recognizes that the leak is located in the U-2 CA pump room but confuses the location of the U-2 A Train RN strainer. It is a U-2 component but located in the U-1 CA Pump room.

Answer B Discussion

CORRECT: See explanation above.

Answer C Discussion

INCORRECT:

PLAUSIBLE:
This answer is plausible if the applicant confuses the location of the "B" groundwater sump with the "A" sump which is located in the U-1 CA pump room this would be a probable source.

Answer D Discussion

INCORRECT:

PLAUSIBLE:
This answer is plausible if the applicant recognizes that the leak is located in the U-2 CA pump room and that the 1B RN strainer is located in the same room but confuses the flowpath for the strainer backwash. The manual backwash for this strainer discharges to the B sump but not the auto backwash, the applicant could reverse the two.

Basis for meeting the KA

The K/A is matched because the applicant must determine the location of a leak in the Nuclear Service Water system given indirect indication. The 2B RN suction piping is located in this room and a leak large enough to cause the sump to overflow would threaten other safety related equipment in the area including the U-2 Aux feedwater pump and the U-2 Aux Shutdown panel. This leak would have to be isolated and would result in a loss of that train of RN.

Basis for Hi Cog

Basis for SRO only

Job Level	Cognitive Level	QuestionType	Question Source
RO	Memory	BANK	2013 MNS NRC (BANK 5272)

Development References	Student References Provided
OP-MC-SS-WZ AP-44 (Plant Flooding) Enclosure 2 (Unit 1 CA Pump Room Flooding)	

APE062 AA2.01 - Loss of Nuclear Service Water
Ability to determine and interpret the following as they apply to the Loss of Nuclear Service Water: (CFR: 43.5 / 45.13)
Location of a leak in the SWS .....

APE065 AK3.04 - Loss of Instrument Air

Knowledge of the reasons for the following responses as they apply to the Loss of Instrument Air: (CFR 41.5,41.10 / 45.6 / 45.13)

Cross-over to backup air supplies .....

Given the following:

- Both Units at 100% RTP
- A loss of VI has occurred
- AP-22 (LOSS OF VI) has been implemented on both units

Subsequently:

- A Loss of Off-Site Power occurs

Based on the conditions above, the Auxiliary Bldg Instrument Air headers ____(1)____ be supplied from the D/G Starting Air system (VG).

The air supplied by the Auxiliary Bldg Instrument Air headers will be used to ensure valves essential to safe operation ____(2)____.

Which ONE of the following completes the statements above?

A. 1. can NOT
   2. can be used to achieve unit shutdown to COLD Shutdown

B. 1. can NOT
   2. attain their "fail safe" position

C. 1. can
   2. can be used to achieve unit shutdown to COLD Shutdown

D. 1. can
   2. attain their "fail safe" position

General Discussion

Since the blackout loads, supplied by the Emergency Diesel Generators, do not include the VI Compressors, the "A" & "B" Train Auxiliary Building & Containment VI Essential Headers, are aligned to the Diesel Generator Starting Air System (VG) through a normally closed manual isolation valve and a normally closed solenoid-operated valve. The solenoid valve will automatically open upon receipt of a LOOP signal and a "Diesel Running" (greater than or equal to 95% speed) signal, without an SI signal.

Should a loss of instrument air occur during normal power operation, many of the pneumatically operated valves, essential for safe operation, will require an air supply in order to control their position and provide an orderly plant shutdown to Cold Shutdown.

Answer A Discussion

INCORRECT:

PLAUSIBLE:
Part 1 is plausible because VI is required to supply components under both Blackout and Safety Injection conditions, however VG is not aligned to VI if an SI signal is present.

Part 2 is correct.

Answer B Discussion

INCORRECT:

PLAUSIBLE:
Part 1 is plausible because VI is required to supply components under both Blackout and Safety Injection conditions, however VG is not aligned to VI if an SI signal is present.

Part 2 is plausible because the valves esential for safe operation are required to attain their "fail safe" position. However, this occurs upon the loss of motive force from VI.

Answer C Discussion

CORRECT: See explanation above.

Answer D Discussion

INCORRECT:

PLAUSIBLE:
Part 1 is correct.

Part 2 is plausible because the valves esential for safe operation are required to attain their "fail safe" position. However, this occurs upon the loss of motive force from VI.

Basis for meeting the KA

The K./A is matched because the applicant demonstrates knowledge of the backup supply of air to the aux bldg instrument air headers and the reason why the backup source is required.

Basis for Hi Cog

Basis for SRO only

Job Level	Cognitive Level	QuestionType	Question Source
RO	Memory	NEW	

Development References	Student References Provided
OP-MC-SS-VI, Instrument Air	

APE065 AK3.04 - Loss of Instrument Air
Knowledge of the reasons for the following responses as they apply to the Loss of Instrument Air: (CFR 41.5,41.10 / 45.6 / 45.13)
Cross-over to backup air supplies .....

MNS ILT 20-1R NRC Written MNS SRO NRC Reta QUESTION 55

B

WE05 2.4.2 - Loss of Secondary Heat Sink
WE05 GENERIC
Knowledge of system set points, interlocks and automatic actions associated with EOP entry conditions. (CFR: 41.7 / 45.7 / 45.8)

Given the following on Unit 2:

- A LOCA has occurred
- Containment pressure peaked at 3.2 PSIG and is currently 2.5 PSIG
- NO CA flow is available
- E-1 (LOSS OF REACTOR OR SECONDARY COOLANT) has been implemented

Given the following parameters:

	TIME			
Highest SG NR Level	0200	0210	0220	0230
2A S/G	35%	25%	15%	10%
2B S/G	31%	24%	15%	9%
2C S/G	34%	25%	12%	8%
2D S/G	32%	23%	10%	7%

Which ONE of the following is the EARLIEST time that the crew is required to implement FR-H.1 (LOSS OF SECONDARY HEAT SINK)?

A. 0200

B. 0210

C. 0220

D. 0230

General Discussion

Although Containment pressure is now less than 3.0 PSIG, because it peaked above 3.0 PSIG, adverse numbers apply.

Therefore, FR-H.1 must be implemented when all S/G NR levels are less than 32%.

Answer A Discussion

INCORRECT:

PLAUSIBLE:
Plausible if the applicant concludes that only one S/G needs to be below the level required by FR-H.1 (32% ACC value)

Answer B Discussion

CORRECT. See explanation above.

Answer C Discussion

INCORRECT:

PLAUSIBLE:
Plausible if the applicant concludes that only one S/G needs to be below the level required by FR-H.1 (11% Non-ACC value).

Answer D Discussion

INCORRECT:

PLAUSIBLE:
Plausible because these levels are all below the normal (non-ACC) value for transition to FR-H.1 (11% Non-ACC).

Basis for meeting the KA

The K/A is matched because the applicant demonstrates knowledge of the entry conditions for FR-H.1 (Loss of Secondary Heat Sink).

Basis for Hi Cog

This question is higher cognitive because the applicant has to evaluate containment pressure, determine that no feed flow exists, determine ACC values exist and then compare S/G levels and times to determine the correct entery condition.

Basis for SRO only

Job Level	Cognitive Level	QuestionType	Question Source
RO	Comprehension	BANK	(2017 CNS Audit BANK 7253)

Development References	Student References Provided
EP/2/A/5000/F-0, Critical Safety Function Status Trees	

WE05 2.4.2 - Loss of Secondary Heat Sink
WE05 GENERIC
Knowledge of system set points, interlocks and automatic actions associated with EOP entry conditions. (CFR: 41.7 / 45.7 / 45.8)

Remarks/Status

WE12 EK1.2 - Uncontrolled Depressurization of all Steam Generators

Knowledge of the operational implications of the following concepts as they apply to the (Uncontrolled Depressurization of all Steam Generators)

(CFR: 41.8 / 41.10 / 45.3)

Normal, abnormal and emergency operating procedures associated with (Uncontrolled Depressurization of all Steam Generators).

EP-ECA-2.1 (UNCONTROLLED DEPRESSURIZATION OF ALL STEAM GENERATORS) contains actions to limit total AFW flow.

The basis for the minimum feed flow value is to _____.

Which ONE of the following completes the statement above?

A. prevent Steam Generator dryout

B. prevent water hammer in the feed rings

C. meet the minimum heat sink flow requirements

D. minimize water inventory to prevent a Steam Generator overfill condition

---

General Discussion

Per EP-ECA-2.1, feed flow is lowered to 25 gpm.
Per EP-ECA-2.1 basis document, this flow rate is established to 1) minimize any additional cooldown resulting from the addition of feedwater, 2) To prevent steam generator tube dryout by maintaining a minimum feed flow to the steam generators and, 3) To minimize the water inventory in the steam generators that eventually is the source of additional steam flow to containment or the environment.

Answer A Discussion

CORRECT: See explantion above.

Answer B Discussion

INCORRECT:

PLAUSIBLE:
This is plausible because design changes such as J-tube installation on feed-rings have occurred over the years to mitigate water hammer concerns and water hammer continues to be a concern.

Answer C Discussion

INCORRECT:

PLAUSIBLE:
This is plausible because other EP circumstances does limit AFW flow rates to meet minimum heat sink requirements.

Answer D Discussion

INCORRECT:

PLAUSIBLE:
This is plausible because the ECA-2.1 basis document discusses control of feed flow to minimize water inventory, but it is done so to minimize the amount of water that will become steam discharged to the containment or the atmosphere.

Basis for meeting the KA

The K/A is matched because the applicant demonstrates knowledge of the operational implications of emergency procedure actions as they apply to uncontrollded depressurization of all S/Gs.

Basis for Hi Cog

Basis for SRO only

Job Level	Cognitive Level	QuestionType	Question Source
RO	Memory	BANK	2019 HBR NRC (BANK 8413)

Development References

ECA-2.1
OP-MC-EP-E2

Student References Provided

WE12 EK1.2 - Uncontrolled Depressurization of all Steam Generators
Knowledge of the operational implications of the following concepts as they apply to the (Uncontrolled Depressurization of all Steam Generators)
(CFR: 41.8 / 41.10 / 45.3)
Normal, abnormal and emergency operating procedures associated with (Uncontrolled Depressurization of all Steam Generators).

Remarks/Status

APE003 AA1.05 - Dropped Control Rod
Ability to operate and / or monitor the following as they apply to the Dropped Control Rod: (CFR 41.7 / 45.5 / 45.6)
Reactor power - turbine power .....

Given the following on Unit 1:

- Unit is at 40% RTP and stable
- Rod Control is in automatic
- The MW feedback loop is OUT of service
- NC T-Avg is 567°F

Subsequently,

- Control Bank 'D' Rod M-12 drops fully into the core
- The crew has implemented AP-14 (ROD CONTROL MALFUNCTION)
- NC T-Avg is 563°F

Turbine power ____(1)____ stabilize at a lower value.

Per AP-14, the crew will FIRST ____(2)____ to restore T-Avg to T-Ref.

Which ONE of the following completes the statements above?

A. 1. will
   2. adjust turbine load

B. 1. will
   2. move control rods in manual

C. 1. will NOT
   2. adjust turbine load

D. 1. will NOT
   2. move control rods in manual

General Discussion

The MW IN/MW OUT pushbutton is an alternate action push-button that when depressed places the megawatt feedback loop in or out of service. The MW loop is "in service" when the pushbutton is lit. Taking the MW feedback loop in and out of service is a bumpless transfer to ensure no control valve movement. The MW feedback signal is derived from the output of the Main Generator and is fed into the EHC. This feedback signal is compared to the desired MW output and is used to fine tune the EHC, which will adjust Governor Valve position to obtain the desired megawatt, output.

Per AP-14 background document,
A dropped rod has the potential to cause a substantial NC cooldown; so a step in the RNO instructs the operator to lower turbine load as necessary to restore NC temperature. It is not desirable to move control rods to adjust temperature until the rod control problem has been properly identified and evaluated.

Answer A Discussion

CORRECT: See explanation above.

Answer B Discussion

INCORRECT:

PLAUSIBLE:
Part 1 is correct.

Part 2 is plausible because after I&E determines cause of dropped rod, rod movement in manual could be allowed and would be the preferred method for temperature control.

Answer C Discussion

INCORRECT:

PLAUSIBLE:
Part 1 is plausible because MW control and Speed control are the inputs used for the Load Control function. When the Speed control loops fail or is taken out of service the governor valves will not move and turbine power will remain constant.

Part 2 is correct.

Answer D Discussion

INCORRECT:

PLAUSIBLE:
Part 1 is plausible because MW control and Speed control are the inputs used for the Load Control function. When the Speed control loops fail or is taken out of service the governor valves will not move and turbine power will remain constant.

Part 2 is plausible because after I&E determines cause of dropped rod, rod movement in manual could be allowed and would be the preferred method for temperature control.

Basis for meeting the KA

The K/A is matched because the applicant must demonstrate the ability to monitor the affect a dropped rod will have on turbine power.

Basis for Hi Cog

This question is higher cognitive because the applicant must analyze the conditions in the stem and apply those conditions to determine the affect a dropped rod will have on turbine power.

Basis for SRO only

Job Level	Cognitive Level	QuestionType	Question Source
RO	Comprehension	BANK	MNS NRC 20-1 (Bank Question 7862)

Development References

GEN-EHC (Digital Electro-Hydraulic Control System) lesson plan
AP-14 (Rod Control Malfunction), Rev 16
AP-14 Bckgd Doc, Rev 14

Student References Provided

APE003 AA1.05 - Dropped Control Rod
Ability to operate and / or monitor the following as they apply to the Dropped Control Rod: (CFR 41.7 / 45.5 / 45.6)

MNS ILT 20-1R NRC Written MNS SRO NRC Reta QUESTION 58

B

APE024 AK3.02 - Emergency Boration
Knowledge of the reasons for the following responses as they apply to Emergency Boration: (CFR 41.5, 41.10 / 45.6 / 45.13)
Actions contained in EOP for emergency boration . . . . . .

Given the following on Unit 2:

- The CRS has implemented FR-S.1, (RESPONSE TO NUCLEAR POWER GENERATION - ATWS)
- The crew is initiating emergency boration
- 2NV-265B (BA TO NV PMPS) is OPEN
- 2A NV pump is “ON”
- Both Boric Acid Transfer Pumps are OFF.
- 2NV-244A and 2NV-245B, (CHRG LINE CONT ISOLs) are OPEN

Per FR-S.1, the crew is required to start ____(1)____ boric acid transfer pump(s) and to ensure a MINIMUM boric acid flow of ____(2)____.

Which ONE of the following completes the statement above?

A. 1. ONE
   2. 30 gpm

B. 1. Both
   2. 30 gpm

C. 1. ONE
   2. 60 gpm

D. 1. Both
   2. 60 gpm

General Discussion

FR-S.1 directs the operator to start both boric acid transfer pumps and ensure emergency boration flow is greater than 30 gpm.

Answer A Discussion

INCORRECT:

PLAUSIBLE:
Part 1 is plausible because one boric acid xfer pump is adequate for normal boration.

Part 2 is correct.

Answer B Discussion

CORRECT. See explanation above.

Answer C Discussion

INCORRECT:

PLAUSIBLE:
Part 1 is plausible because one boric acid xfer pump is adequate for normal boration.

Part 2 is plausible since 60 gpm is referenced in some abnormal and emergency procedures for minimum emergency boration flow.

Answer D Discussion

INCORRECT:

PLAUSIBLE:
Part 1 is correct.

Part 2 is plausible since 60 gpm is referenced in some abnormal and emergency procedures for minimum emergency boration flow.

Basis for meeting the KA

KA is matched because the applicant is tested on knowledge of what the actions for emergency boration require and the reason why those actions are required in FR-S.1.

Basis for Hi Cog

Basis for SRO only

Job Level	Cognitive Level	QuestionType	Question Source
RO	Memory	BANK	MNS Exam Bank

Development References

Student References Provided

APE024 AK3.02 - Emergency Boration
Knowledge of the reasons for the following responses as they apply to Emergency Boration: (CFR 41.5, 41.10 / 45.6 / 45.13)
Actions contained in EOP for emergency boration . . . . . .

Remarks/Status

APE036 AK1.02 - Fuel Handling Incidents
Knowledge of the operational implications of the following concepts as they apply to Fuel Handling Incidents : CFR 41.8 / 41.10 / 45.3)
SDM .....

Given the following on Unit 1:

- Unit entered MODE 3 at 0710 on 9/18/2020

Current Conditions:

- Unit is in MODE 6
- NC system Boron Concentration is 2750 ppm
- At 0530 on 9/21/2020 a fuel bundle is being withdrawn from the core.

Based on the conditions above, the required action of ____(1)____ is applicable.

The required action is to ____(2)____ IMMEDIATELY.

Which ONE of the following completes the statements above?

LEGEND:
SLC 16.9.17 (REFUELING OPERATIONS - DECAY TIME)
TS 3.9.1 (REFUELING OPERATIONS - BORON CONCENTRATION)

A. 1. SLC 16.9.17
2. suspend positive reactivity additions

B. 1. SLC 16.9.17
2. suspend movement of irradiated fuel

C. 1. TS 3.9.1
2. suspend positive reactivity additions

D. 1. TS 3.9.1
2. suspend movement of irradiated fuel

General Discussion

Per SLC 16.9.7, The reactor shall be subcritical for at least 72 hours during movement of irradiated fuel in the reactor vessel.
I this commitment is not met, the required action is to suspend all operations involving movement of irradiated fuel in reactor vessel Immediately.

Answer A Discussion

INCORRECT:

PLAUSIBLE:
Part 1 is correct.

Part 2 is plausible because this action is required if the NC system boron concentration does not meet the limit of TS 3.9.1.

Answer B Discussion

CORRECT: See explantion above.

Answer C Discussion

INCORRECT:

PLAUSIBLE:
Part 1 is plausible because the current boron concentration is less than 2775 ppm and the applicant may conclude this is the limit for refueling operations (2675 ppm is the COLR limit for refueling operatons).

Part 2 is plausible because this action is required if the NC system boron concentration does not meet the limit of TS 3.9.1.

Answer D Discussion

INCORRECT:

PLAUSIBLE:
Part 1 is plausible because the current boron concentration is less than 2775 ppm and the applicant may conclude this is the limit for refueling operations (2675 ppm is the COLR limit for refueling operatons)..

Part 2 is correct.

Basis for meeting the KA

The KA is matched because conditions involve a fuel handling incident; i.e., placing a fuel bundle in the upender prior to when it is allowed, is a fuel handling incident.

The "operational implications of SDM" is met because it tests what is operationally required, and, though the question does not specifically ask WHY, it is inherent in the specification itself; i.e., to address shutdown margin requirements.

Basis for Hi Cog

This question is higher cognitive because it involves analysis of conditions to determine if a Tech. Spec. entry is required. Applicant must recognize the significance of the time since Mode 3 entry, and the determine the effect that has on which guidance applies. Once that determination is made, the applicant must recall the Required Action.

Basis for SRO only

Job Level	Cognitive Level	QuestionType	Question Source
RO	Comprehension	NEW	

Development References	Student References Provided
SLC 16.9.17 TS 3.9.1 COLR	

APE036 AK1.02 - Fuel Handling Incidents
Knowledge of the operational implications of the following concepts as they apply to Fuel Handling Incidents : CFR 41.8 / 41.10 / 45.3)
SDM .....

MNS ILT 20-1R NRC Written MNS SRO NRC Reta QUESTION 60

A

APE037 AA2.04 - Steam Generator (S/G) Tube Leak
Ability to determine and interpret the following as they apply to the Steam Generator Tube Leak: (CFR: 43.5 / 45.13)
Comparison of RCS fluid inputs and outputs, to detect leaks .....

Given the following on Unit 2:

- The crew has implemented AP-10 (NC SYSTEM LEAKAGE), Case 1 (S/G TUBE LEAKAGE)
- Letdown flow is 45 GPM
- Charging flow is 110 GPM
- Pressurizer level is stabilized

Upon entry into AP-10, the Balance of Plant Operator will establish a __(1)__ GPM mismatch between letdown flow and charging flow per Excellence Criteria.

Based on the conditions above, the estimated leak rate is __(2)__ GPM.

Which ONE of the following completes the statements above?

A. 1. 30
   2. 53

B. 1. 30
   2. 65

C. 1. 10
   2. 53

D. 1. 10
   2. 65

General Discussion

The BOP will establish a 30 gpm mismatch between letdown and charging flow to help quickly determine leak rate for AP-10.

The estimated leak rate is 110 gpm (Charging flow) - [45 gpm (Letdown flow) + 12 gpm (Seal return)],which equals 53 gpm.

Answer A Discussion

CORRECT: See explanation above.

Answer B Discussion

INCORRECT:

PLAUSIBLE:
Part 1 is correct.

Part 2 is plausible because 65 gpm will be calculated as the leak rate if the applicant only subtracts letdown flow from charging flow and fails to include seal return in their calculation.

Answer C Discussion

INCORRECT:

PLAUSIBLE:
Part 1 is plausible because 10 gpm is the identified leakage from T.S. 3.4.13 that the crew is trying to determine if they have exceeded in AP-10.

Part 2 is correct.

Answer D Discussion

INCORRECT:

PLAUSIBLE:
Part 1 is plausible because 10 gpm is the identified leakage from T.S. 3.4.13 that the crew is trying to determine if they have exceeded in AP-10.

Part 1 is plausible because 65 gpm will be calculated as the leak rate if the applicant only subtracts letdown flow from charging flow and fails to include seal return in their calculation.

Basis for meeting the KA

The KA is matched because the applicant is required to monitor letdown flow during a S/G tube leakage event and use this data to determine the leakage rate.

Basis for Hi Cog

This is a higher cognitive level question because the applicant must perform a level of analysis concerning the given indications and then perform a calculation (solve a problem) to determine leak rate.

Basis for SRO only

Job Level	Cognitive Level	QuestionType	Question Source
RO	Comprehension	MODIFIED	2018 MNS Audit (BANK 7558)

Development References	Student References Provided
OP-MC-PS-NV (Chemical Volume Control System) OP/1/A/6200/001 A (Chemical and Volume Control System Letdown)	

APE037 AA2.04 - Steam Generator (S/G) Tube Leak
Ability to determine and interpret the following as they apply to the Steam Generator Tube Leak: (CFR: 43.5 / 45.13)
Comparison of RCS fluid inputs and outputs, to detect leaks .....

Remarks/Status

MNS ILT 20-1R NRC Written MNS SRO NRC Reta QUESTION 61

D

APE051 2.1.31 - Loss of Condenser Vacuum
APE051 GENERIC
Ability to locate control room switches, controls, and indications, and to determine that they correctly reflect the desired plant lineup. (CFR: 41.10 / 45.12)

Given the following on Unit 1:

- Unit is at 40% RTP
- Exhaust Hood temperature is 160°F
- Condenser vacuum on 1MC-1 indicates 26 inches HG and DEGRADING
- (1ZJP5000) CSAE steam pressure, is reading 100 PSIG
- AP-23 (LOSS OF CONDENSER VACUUM) has been implemented
- Main Condenser Vacuum has been established as a critical parameter

Alternate condenser vacuum indication is available on ___(1)____.

Based on the conditions above, the CRS will direct ___(2)____ to mitigate the event.

Which ONE of the following best completes the statements above?

A. 1. the OAC ONLY
   2. dispatching an operator to increase CSAE steam pressure

B. 1. the OAC ONLY
   2. opening the Exhaust Hood Spray valves

C. 1. 1MC-13 and the OAC
   2. opening the Exhaust Hood Spray valves

D. 1. 1MC-13 and the OAC
   2. dispatching an operator to increase CSAE steam pressure

---

General Discussion

Per AP-23,
Condenser vacuum indication is available in 3 places: 1MC-1, 1MC-13, and the OAC.

The CSAE steam pressure is low and increasing CSAE steam pressure will be most effective in mitigating the degrading vacuum.

Answer A Discussion

INCORRECT:

PLAUSIBLE:
Part 1 is plausible the OAC would be used for trending and not many parameters have vacuum on the front control boards and back control boards.

Part 2 is correct.

Answer B Discussion

INCORRECT:

PLAUSIBLE:
Part 1 is plausible the OAC would be used for trending and not many parameters have vacuum on the front control boards and back control boards.

Part 2 is plausible because AP-23 directs opening the Exhaust Hood spray valves but only if greater than 175F.

Answer C Discussion

INCORRECT:

PLAUSIBLE:
Part 1 is correct.

Part 2 is plausible because AP-23 directs opening the Exhaust Hood spray valves but only if greater than 175F.

Answer D Discussion

CORRECT: See explanation above.

Basis for meeting the KA

The K/A is matched because the applicant has to determine that CSAE indication is not at the desired pressure and that dispatching an operator to increase pressure will mitigate the event as well as determining that more than one vacuum indication must be monitored.

Basis for Hi Cog

The question is higher cognitive because the applicant has to evaluate mulitple given indications to determine what will properly mitigate the event.

Basis for SRO only

Job Level	Cognitive Level	QuestionType	Question Source
RO	Comprehension	MODIFIED	Bank Question 3019

Development References

AP-23, Loss of Condenser Vacuum

Student References Provided

APE051 2.1.31 - Loss of Condenser Vacuum
APE051 GENERIC
Ability to locate control room switches, controls, and indications, and to determine that they correctly reflect the desired plant lineup. (CFR: 41.10 / 45.12)

Remarks/Status

D

MNS ILT 20-1R NRC Written MNS SRO NRC Reta QUESTION 62

APE068 AK2.01 - Control Room Evacuation
Knowledge of the interrelations between the Control Room Evacuation and the following: (CFR 41.7 / 45.7)
Auxiliary shutdown panel layout .....

Given the following:

- The Control Room has been evacuated due to toxic gas

An adequate heat sink is maintained by controlling S/G levels within the specified range by _____.

Shutdown margin will be maintained by use of the _____.

Which ONE of the following completes the statements above?

A. 1. manually throttling the motor operated isolation valves in the doghouses
   2. Standby Makeup Pump

B. 1. manually throttling the motor operated isolation valves in the doghouses
   2. Boric Acid Transfer Pumps

C. 1. adjusting the manual loaders at the local CA pump panels
   2. Standby Makeup Pump

D. 1. adjusting the manual loaders at the local CA pump panels
   2. Boric Acid Transfer Pumps

General Discussion

Per AP-17, an operator is dispatched to the CA pump panel to take local control of the CA pumps and control SG levels at the CA pump panel.

Per CP-AD and CP-ASP, controls for the Boric Acid Transfer pumps are located on the ASP while the Safe Shutdown Facility contains controls for the Standby Makeup Pump.

Answer A Discussion

INCORRECT:

PLAUSIBLE:
Part 1 is plausible because during an SSF event SG levels can be controlled in the interior and exterior doghouses using the TD CA pump motor operated valves.

Part 2 is plausible if the applicant is unaware of the control location for the Standby Makeup Pump vs. the Boric Acid Transfer Pump or is unaware of the proper control area location following a Control Room evacuation due to toxic gas.

Answer B Discussion

INCORRECT:

PLAUSIBLE:
Part 1 is plausible because during an SSF event SG levels can be controlled in the interior and exterior doghouses using the TD CA pump motor operated valves.

Part 2 is correct.

Answer C Discussion

INCORRECT:

PLAUSIBLE:
Part 1 is correct.

Part 2 is plausible if the applicant is unaware of the control location for the Standby Makeup Pump vs. the Boric Acid Transfer Pump or is unaware of the proper control area location following a Control Room evacuation due to toxic gas.

Answer D Discussion

CORRECT: See explanation above.

Basis for meeting the KA

The K/A is matched because the applicant demonstrates knowledge of the interrelations between Control Room evacuation and the aux shutdown panel. Knowledge of the layout is demonstrated by knowing if the indication/control is available at the ASP or SSF.

Basis for Hi Cog

This question is higher cognitive because the applicant must determine from the conditions in the stem which procedure is applicable for addressing those conditions (AP-24 or AP-17). Next the applicant must apply that determination to recalled information about available instrumentation.

Basis for SRO only

Job Level	Cognitive Level	QuestionType	Question Source
RO	Comprehension	MODIFIED	2015 CNS NRC (BANK 6623)

Development References	Student References Provided
AP-17 (Loss of Control Room), OP-MC-CP-ASP OP-MC-CP-AD	

APE068 AK2.01 - Control Room Evacuation
Knowledge of the interrelations between the Control Room Evacuation and the following: (CFR 41.7 / 45.7)
Auxiliary shutdown panel layout .....

WE03 EK2.2 - LOCA Cooldown and Depressurization

Knowledge of the interrelations between the (LOCA Cooldown and Depressurization) and the following:
(CFR: 41.7 / 45.7)

Facility*s heat removal systems, including primary coolant, emergency coolant, the decay heat removal systems, and relations between the proper operation of these systems to the operation of the facility.

Per ES-1.2 (POST LOCA COOLDOWN AND DEPRESSURIZATION):

1) The crew will FIRST attempt to establish an NC system cooldown using the ____(1)____.

2) The crew will cooldown ____(2)____.

Which ONE of the following completes the statements above?

A. 1. Condenser Dumps
   2. at a rate not to exceed 100°F in an hour

B. 1. Condenser Dumps
   2. at maximum rate

C. 1. SM PORVs
   2. at a rate not to exceed 100°F in an hour

D. 1. SM PORVs
   2. at maximum rate

General Discussion

ES-1.2 directs the operators to first attempt to establish a cooldown using Steam Dumps.

ES-1.2 specifies a cooldown rate based on NC T-colds as close as possible without exceeding 100°F in an hour.

Answer A Discussion

CORRECT: See explanation above.

Answer B Discussion

INCORRECT:

PLAUSIBLE:
Part 1 is correct.

Part 2 is plausible because cooling down at the maximum rate is a strategy that is used in other situations in the EOP network when an NC system cooldown is required (E-3, ECA-1.2).

Answer C Discussion

INCORRECT:

PLAUSIBLE:
Part 1 is plausible because the PORVs will be used in ES-1.2 if C-9 (Condenser available for steam dump) is not lit or MSIVs on intact S/Gs cant be opened.

Part 2 is correct.

Answer D Discussion

INCORRECT:

PLAUSIBLE:
Part 1 is plausible because the PORVs will be used in ES-1.2 if C-9 (Condenser available for steam dump) is not lit or MSIVs on intact S/Gs cant be opened.

Part 2 is plausible because cooling down at the maximum rate is a strategy that is used in other situations in the EOP network when an NC system cooldown is required (E-3, ECA-1.2).

Basis for meeting the KA

The K/A is matched because the applicant demonstrates knowledge of the interrelationship with Post LOCA cooldown and depressurization and heat removal (maximum permissible cooldown rate and method of cooldown).

Basis for Hi Cog

Basis for SRO only

Job Level	Cognitive Level	QuestionType	Question Source
RO	Memory	BANK	2015 CNS NRC (BANK 6625)

Development References	Student References Provided
ES-1.2 (Post LOCA Cooldown and Depressurization)	

WE03 EK2.2 - LOCA Cooldown and Depressurization
Knowledge of the interrelations between the (LOCA Cooldown and Depressurization) and the following:
(CFR: 41.7 / 45.7)

Facility*s heat removal systems, including primary coolant, emergency coolant, the decay heat removal systems, and relations between the proper operation of these systems to the operation of the facility.

C

MNS ILT 20-1R NRC Written MNS SRO NRC Reta QUESTION 64

WE08 EA2.2 - Pressurized Thermal Shock
Ability to determine and interpret the following as they apply to the (Pressurized Thermal Shock)
(CFR: 43.5 / 45.13)
Adherence to appropriate procedures and operation within the limitations in the facility*s license and amendments.

Given the following on Unit 1:

- An event has occurred that resulted in a RED condition on the NC Integrity CSF Status Tree
- The CRS has implemented FR-P.1 (RESPONSE TO IMMINENT PRESSURIZED THERMAL SHOCK)
- The crew is performing a soak per FR-P.1

Which of the following actions is permitted by FR-P.1 during the soak?

A. Energize PZR heaters

B. Start an additional NV Pump

C. Place Auxiliary Spray in service

D. Initiate a cooldown at less than 50°F per hour

General Discussion

When the step in FR-P.1 requiring performance of a soak is reached, the procedure allows performance of other procedures that do not cool down the NC system or increase NC system pressure.

For this particular condition placing Auxiliary Spray in service could be performed because the effect would be to reduce NC system pressure.

Answer A Discussion

INCORRECT:

PLAUSIBLE:
Plausible if the applicant concludes that energizing the PZR heaters to establish normal pressure control is a desirable condition. Normal pressure control is desirable in most Eps.

Answer B Discussion

INCORRECT:

PLAUSIBLE:
Plausible if the applicant does not understand the effect of starting an NV pump on NC system temperature.

Answer C Discussion

CORRECT: See explanation above.

Answer D Discussion

INCORRECT:

PLAUSIBLE:
Plausible because this is an action that is directed by FR-P.1 within the same step that directs the soak to be performed. However, it is directed after the soak is completed.

Basis for meeting the KA

The K/A is matched because the applicant demonstrates the ability to adhere to appropriate procedures and operation within limitations as it applies to a PTS condition (FR-P.1)

Basis for Hi Cog

This is a higher cognitive level question because it requires the applicant to analyze each of the answers to determine the overall effect of that action on NC system temperature and pressure.

Basis for SRO only

Job Level	Cognitive Level	QuestionType	Question Source
RO	Comprehension	BANK	2015 CNS NRC (BANK 6626)

Development References	Student References Provided
FR-P.1 (Response to Imminent Pressurized Thermal Shock Condition)	

WE08 EA2.2 - Pressurized Thermal Shock
Ability to determine and interpret the following as they apply to the (Pressurized Thermal Shock)
(CFR: 43.5 / 45.13)
Adherence to appropriate procedures and operation within the limitations in the facility*s license and amendments.

Remarks/Status

WE15 EK1.2 - Containment Flooding

Knowledge of the operational implications of the following concepts as they apply to the (Containment Flooding) (CFR: 41.8 / 41.10, 45.3)

Normal, abnormal and emergency operating procedures associated with (Containment Flooding).

Given the following on Unit 1:

- A large break LOCA has occurred
- At 1215 containment sump level is 10 feet and slowly rising

If containment sump level is rising at a constant rate of 0.25 feet per minute, FR-Z.2 (RESPONSE TO CONTAINMENT FLOODING) entry will be REQUIRED at ____(1)____.

The reason that safe plant recovery is not assured for a design-basis Large Break LOCA when Containment water level requires entry into FR Z.2 is because operation of ____(2)____.

Which ONE of the following completes the statements above?

A. 1. 1225
   2. the hydrogen skimmer system is compromised by the suction line becoming submerged

B. 1. 1229
   2. the hydrogen skimmer system is compromised by the suction line becoming submerged

C. 1. 1225
   2. critical ECCS components needed for safe recovery are endangered by submersion

D. 1. 1229
   2. critical ECCS components needed for safe recovery are endangered by submersion

General Discussion

Per EP-F-0, FR-Z.2 will be entered due to an Orange condition upon Containment Sump level increasing to 12.5 feet. (0.25 ft/min x 10 min = 2.5 feet increase)

Per FR-Z.2 background document, Containment flooding is a concern since critical plant components necessary for plant recovery may be damaged and rendered inoperable.

Answer A Discussion

INCORRECT:

PLAUSIBLE:
Part 1 is correct.

Part 2 is plausible since Hydrogen Skimmer fans are safety related and required by tech specs, these fans take a suction on various lower containment dead end spaces and discharge into upper containment.

Answer B Discussion

INCORRECT:

PLAUSIBLE:
Part 1 is plausible because it will take 14 minutes to reach 13.5 ft. Containment sump level will stop going up at about 13.5 ft. as this is the level at which spillover to the in-core instrument room sump will occur.

Part 2 is plausible since Hydrogen Skimmer fans are safety related and required by tech specs, these fans take a suction on various lower containment dead end spaces and discharge into upper containment.

Answer C Discussion

CORRECT. See explanation above.

Answer D Discussion

INCORRECT:

PLAUSIBLE:
Part 1 is plausible because it will take 14 minutes to reach 13.5 ft. Containment sump level will stop going up at about 13.5 ft. as this is the level at which spillover to the in-core instrument room sump will occur.

Part 2 is CORRECT.

Basis for meeting the KA

The K/A is matched because the applicant has to know operational implications of entering FR-Z.2 because of containment water level.

Basis for Hi Cog

The question is Hi Cog because the applicant has to take the given information and calculate the time requried to meet FR-Z.2 entry conditions.

Basis for SRO only

Job Level	Cognitive Level	QuestionType	Question Source
RO	Comprehension	BANK	MNS Exam Bank

Development References	Student References Provided
EP/1/A/5000/F-0, Critical Safety Function Status Trees. OP-MC-EP-FRZ, Containment.	

WE15 EK1.2 - Containment Flooding
Knowledge of the operational implications of the following concepts as they apply to the (Containment Flooding)
(CFR: 41.8 / 41.10, 45.3)
Normal, abnormal and emergency operating procedures associated with (Containment Flooding).

GEN2.1 2.1.5 - GENERIC - Conduct of Operations

Conduct of Operations

Ability to use procedures related to shift staffing, such as minimum crew complement, overtime limitations, etc. (CFR: 41.10 / 43.5 / 45.12)

Per AD-OP-ALL-0107 (MAINTENANCE OF RO AND SRO LICENSES), at a MINIMUM, a Reactor Operator must:

1) Perform _____ 12 hour shifts per calendar quarter as RO or BOP.

2) Complete a doctor's medical exam _____.

Which ONE of the following completes the statements above?

A. 1. four
   2. yearly

B. 1. four
   2. every two years

C. 1. five
   2. every two years

D. 1. five
   2. yearly

General Discussion

Licensed Operators must perform five 12 hour shifts per calendar quarter to maintain an active license status.

Reactor Operators may obtain active hours at the same time in dual unit Control Rooms as long as each is assigned either the OATC or the BOP position for a specific unit.

Licensed Operators are required to complete a biennial physical examination per ANSI/ANS 3.4/1983 conducted by the Duke Energy OH facility and the SEP.

Answer A Discussion

INCORRECT:

PLAUSIBLE:
Part 1 plausible because to reactivate a license an individual has to have a minimum of 40 hours of contact time with a licensed watchstander. This usually takes four 12 hour shifts to accomplish.

Part 2 is plausible because hearing tests and fire brigade respirator tests are performed yearly.

Answer B Discussion

INCORRECT:

PLAUSIBLE:
Part 1 plausible because to reactivate a license an individual has to have a minimum of 40 hours of contact time with a licensed watchstander. This usually takes four 12 hour shifts to accomplish.

Part 2 is correct.

Answer C Discussion

CORRECT: See explanation above.

Answer D Discussion

INCORRECT:

PLAUSIBLE:
Part 1 is correct.

Part 2 is plausible because hearing tests and fire brigade respirator tests are performed yearly.

Basis for meeting the KA

The K/A is matched because the applicant demonstrates the ability to use procedures related to shift staffing

Basis for Hi Cog

Basis for SRO only

Job Level	Cognitive Level	QuestionType	Question Source
RO	Memory	BANK	MNS Exam Bank

Development References

AD-OP-ALL-0107, Maintenance of RO and SRO Licenses.

Student References Provided

GEN2.1 2.1.5 - GENERIC - Conduct of Operations
Conduct of Operations
Ability to use procedures related to shift staffing, such as minimum crew complement, overtime limitations, etc. (CFR: 41.10 / 43.5 / 45.12)

Remarks/Status

MNS ILT 20-1R NRC Written MNS SRO NRC Reta QUESTION 67

B

GEN2.1 2.1.14 - GENERIC - Conduct of Operations

Conduct of Operations

Knowledge of criteria or conditions that require plant-wide announcements, such as pump starts, reactor trips, mode changes, etc. (CFR: 41.10 / 43.5 / 45.12)

Per AD-OP-ALL-1000 (CONDUCT OF OPERATIONS),

1) Plant announcements are required if starting or stopping plant equipment of greater than or equal to a MINIMUM of _____.

2) The use of cameras _____ an acceptable alternative to verify that plant personnel are clear of equipment prior to starting.

Which ONE of the following completes the statements above?

A. 1. 4 kv
   2. is NOT

B. 1. 4 kv
   2. is

C. 1. 6.9 kv
   2. is NOT

D. 1. 6.9 kv
   2. is

General Discussion

Per AD-OP-ALL-1000,
Plant Announcements shall be made to inform personnel of the following:
• Unplanned changes in risk levels.
• Starting or stopping 4kV equipment or greater.
• Changing plant conditions.

Operators shall be dispatched to the location to verify that plant personnel are clear of the equipment and a plant announcement shall be made to clear the area of the equipment.
An acceptable alternative to dispatching Operators, is the use of cameras to verify that plant personnel are clear of the equipment

Answer A Discussion

INCORRECT:

PLAUSIBLE:
Part 1 is correct.

Part 2 is plausible because there is a requirement for operators to stay on station when starting a component until proper operation is confirmed.

Answer B Discussion

CORRECT: See explanation above.

Answer C Discussion

INCORRECT:

PLAUSIBLE:
Part 1 is plausible because 6.9 kv is the load size for most non-essential major pumps (CCW, Main Condensate, NC pumps).

Part 2 is plausible because there is a requirement for operators to stay on station when starting a component until proper operation is confirmed.

Answer D Discussion

INCORRECT:

PLAUSIBLE:
Part 1 is plausible because 6.9 kv is the load size for most non-essential major pumps (CCW, Main Condensate, NC pumps).

Part 2 is correct.

Basis for meeting the KA

The K/A is matched because the applicant demonstrates knowledge of the criteria for plant wide announcements.

Basis for Hi Cog

Basis for SRO only

Job Level	Cognitive Level	QuestionType	Question Source
RO	Memory	NEW	

Development References	Student References Provided
AD-OP-ALL-1000	

GEN2.1 2.1.14 - GENERIC - Conduct of Operations
Conduct of Operations
Knowledge of criteria or conditions that require plant-wide announcements, such as pump starts, reactor trips, mode changes, etc. (CFR: 41.10 / 43.5 / 45.12)

GEN2.2 2.2.36 - GENERIC - Equipment Control

Equipment Control

Ability to analyze the effect of maintenance activities, such as degraded power sources, on the status of limiting conditions for operations. (CFR: 41.10 / 43.2 / 45.13)

Given the following on Unit 1:

- Unit is in Mode 6 with refueling in progress
- 1B D/G is tagged for maintenance
- 1ETB is powered by SATB from Unit 2
- 1A ND pump is in service
- 1B ND pump is in standby

Subsequently:

- 1B busline is de-energized in preparation for tagging

Based on the conditions above:

1) TS 3.8.2 (AC SOURCES - SHUTDOWN) _____ met.

2) TS 3.9.5 (RHR and COOLANT CIRCULATION - HIGH LEVEL) _____ met.

Which ONE of the following completes the statements above?

A. 1. is
   2. is NOT

B. 1. is
   2. is

C. 1. is NOT
   2. is NOT

D. 1. is NOT
   2. is

General Discussion

Per TS 3.8.2, only one offsite transmission line is required in Mode 6 during refueling, so with the 1A busline still operable, TS 3.8.2 is met.
Per TS 3.9.5, only one train of RHR is required to be operable and in operation at this refueling water level, so with the 1A ND still operating and in operation, TS 3.9.5 is met.

Answer A Discussion

INCORRECT:

PLAUSIBLE:
Part 1 is correct.

Part 2 is plausible because this would be correct for this mode with a lower refueling cavity water level (TS 3.9.6).

Answer B Discussion

CORRECT: See explanation above.

Answer C Discussion

INCORRECT:

PLAUSIBLE:
Part 1 is plausible because this would be correct for modes 1-4 per TS 3.8.1.

Part 2 is plausible because this would be correct for mode 6 with a lower refueling cavity water level (TS 3.9.6).

Answer D Discussion

INCORRECT:

PLAUSIBLE:
Part 1 is plausible because this would be correct for modes 1-4 per TS 3.8.1.

Part 2 is correct.

Basis for meeting the KA

The K/A is matched because the applicant demonstrates the ability to analyze the effect of a maintenance activity (DG Tagged out), causing a degraded power source condition due to less redundancy. A scenario is provided which changes the number of available trains of decay heat removal (RHR) pumps, and the effect on limiting conditions for operations must be determined.

Basis for Hi Cog

This question is higher cognitive because the applicant must analyze the plant conditions in the stem and then determine the affect those conditions will have on the ability to meet multiple TS LCOs.

Basis for SRO only

Job Level	Cognitive Level	QuestionType	Question Source
RO	Memory	BANK	2010 Farley Exam

Development References

TS 3.8.1
TS 3.8.2
TS 3.9.5
TS 3.9.6

Student References Provided

GEN2.2 2.2.36 - GENERIC - Equipment Control
Equipment Control
Ability to analyze the effect of maintenance activities, such as degraded power sources, on the status of limiting conditions for operations. (CFR: 41.10 / 43.2 / 45.13)

MNS ILT 20-1R NRC Written MNS SRO NRC Reta QUESTION 69

D

GEN2.2 2.2.42 - GENERIC - Equipment Control

Equipment Control

Ability to recognize system parameters that are entry-level conditions for Technical Specifications. (CFR: 41.7 / 41.10 / 43.2 / 43.3 / 45.3)

Given the following on Unit 1:

- Unit is in Mode 3
- NC System pressure is 2750 PSIG

Per TS 2.1 (SAFETY LIMITS), NC System pressure is required to be reduced to less than or equal to a MAXIMUM of ____(1)____ PSIG and this is required to be accomplished within a MAXIMUM of ____(2)____.

Which ONE of the following completes the statement above?

A. 1. 2485
   2. 1 hour

B. 1. 2485
   2. 5 minutes

C. 1. 2735
   2. 1 hour

D. 1. 2735
   2. 5 minutes

General Discussion

Per TS 2.1, RCS pressure shall be maintained less than or equal to 2735 PSIG in Modes 1-5 and if violated in Modes 3, 4 or 5, restore compliance within 5 minutes.

Answer A Discussion

INCORRECT:

PLAUSIBLE:
Part 1 is plausible because this is the lift setpoint for the Pzr safeties.

Part 2 is plausible because if the unit had been in modes 1 or 2 this would be correct.

Answer B Discussion

INCORRECT:

PLAUSIBLE:
Part 1 is plausible because this is the lift setpoint for the Pzr safeties.

Part 2 is correct.

Answer C Discussion

INCORRECT:

PLAUSIBLE:
Part 1 is correct.

Part 2 is plausible because if the unit had been in modes 1 or 2 this would be correct.

Answer D Discussion

CORRECT: See explanation above.

Basis for meeting the KA

The KA is matched because the applicant demonstrates the ability to recognize entry level conditions for the safety limits tech spec.

Basis for Hi Cog

Basis for SRO only

Job Level	Cognitive Level	QuestionType	Question Source
RO	Memory	BANK	BANK 472

Development References	Student References Provided
TS 2.1 OP-MC-PS-NC	

GEN2.2 2.2.42 - GENERIC - Equipment Control
Equipment Control
Ability to recognize system parameters that are entry-level conditions for Technical Specifications. (CFR: 41.7 / 41.10 / 43.2 / 43.3 / 45.3)

Remarks/Status

MNS ILT 20-1R NRC Written MNS SRO NRC Reta QUESTION 70

B

GEN2.1 2.1.21 - GENERIC - Conduct of Operations
Conduct of Operations
Ability to verify the controlled procedure copy. (CFR: 41.10 / 45.10 / 45.13)

In accordance with AD-HU-ALL-004 (PROCEDURE AND WORK INSTRUCTION USE AND ADHERENCE):

1) if committed to memory, a user _____ perform Information Use procedures without referring to the procedure with the understanding that they are accountable for procedure compliance.

2) for technical procedures, the user shall verify the latest revision of the procedure prior to job start and at least every _____ days while work is being performed.

Which ONE of the following completes the statements above?

A. 1. can
2. 7

B. 1. can
2. 14

C. 1. can NOT
2. 7

D. 1. can NOT
2. 14

General Discussion

In accordance with AD-HU-ALL-004 (PROCEDURE AND WORK INSTRUCTION USE AND ADHERENCE) only Information procedures can be performed from memory.

In accordance with AD-HU-ALL-004 (PROCEDURE AND WORK INSTRUCTION USE AND ADHERENCE) Attachment 1 (Use and Adherence Matrix), technical procedures must be verified at least every 14 days for the latest revision.

Answer A Discussion

INCORRECT:

PLAUSIBLE:
Part 1 is correct.

Part 2 is plausible because many administratively required checks and surveillances are performed on a 7 day frequency (i.e. narrative log).

Answer B Discussion

CORRECT: See explanation above.

Answer C Discussion

INCORRECT:

PLAUSIBLE:
Part 1is plausible because Technical and Reference use procedure require strict adherence to each written procedure step.

Part 2 is plausible because many administratively required checks and surveillances are performed on a 7 day frequency (i.e. narrative log).

Answer D Discussion

INCORRECT:

PLAUSIBLE:
Part 1is plausible because Technical and Reference use procedure require strict adherence to each written procedure step.

Part 2 is correct.

Basis for meeting the KA

The K/A is matched because it requires the applicant to have knowledge of the administrative time requirement to verify the working copy of a procedure against the control copy of the procedure.

Basis for Hi Cog

Basis for SRO only

Job Level	Cognitive Level	QuestionType	Question Source
RO	Memory	BANK	2015 CNS Audit (BANK 6571)

Development References	Student References Provided
AD-HU-ALL-004	

GEN2.1 2.1.21 - GENERIC - Conduct of Operations
Conduct of Operations
Ability to verify the controlled procedure copy. (CFR: 41.10 / 45.10 / 45.13)

Remarks/Status

MNS ILT 20-1R NRC Written MNS SRO NRC Reta QUESTION 71

B

GEN2.3 2.3.4 - GENERIC - Radiation Control
Radiation Control
Knowledge of radiation exposure limits under normal or emergency conditions. (CFR: 41.12 / 43.4 / 45.10)

Given the following:

- An operator has been assigned work in the radiologically controlled area
- The dose rate in the area is 500 mR/hr
- The operator has a current yearly dose of 0.5 Rem TEDE

Which ONE of the following identifies the MAXIMUM time that the operator can perform work BEFORE reaching the Duke Energy Annual Administrative Dose Limit without receiving an extension?

A. 1 hour

B. 3 hours

C. 4 hours

D. 7 hours

General Discussion

Per PD-RP-ALL-000, the Table associated with Step 5.2.2.1 states that the Duke Energy Annual Administrative Dose Limit is 2 Rem Annually. There is an allowable exposure of 1500 mrem before the Admin Limit is reached. This would permit the operator to work for 3 hours before the limit is reached.

Answer A Discussion

INCORRECT:

PLAUSIBLE:
This is plausible because this would be correct if the operator incorrectly believed that the Admin Limit was 1 Rem Annually.

Answer B Discussion

CORRECT: See explanation above.

Answer C Discussion

INCORRECT:

PLAUSIBLE:
This is plausible because this would be correct if the operator incorrectly believed that the Admin Limit was 2.5 Rem Annually.

Answer D Discussion

INCORRECT:

PLAUSIBLE:
This is plausible because this would be correct if the operator incorrectly believed that the Admin Limit was 4 Rem Annually.

Basis for meeting the KA

The K/A is matched because the operator must demonstrate Knowledge of radiation exposure limits under normal conditions, specifically with respect to local administrative TEDE limits.

Basis for Hi Cog

The question is higher cognitive level because the operator must recall a bit of information (Annual Dose Limit) and use this information to predict an outcome, in order to answer the question correctly.

Basis for SRO only

Job Level	Cognitive Level	QuestionType	Question Source
RO	Comprehension	BANK	2015 RNS NRC (BANK 6868)

Development References	Student References Provided
PD-RP-ALL-0001	

GEN2.3 2.3.4 - GENERIC - Radiation Control
Radiation Control
Knowledge of radiation exposure limits under normal or emergency conditions. (CFR: 41.12 / 43.4 / 45.10)

Remarks/Status

GEN2.3 2.3.13 - GENERIC - Radiation Control

Radiation Control

Knowledge of radiological safety procedures pertaining to licensed operator duties, such as response to radiation monitor alarms, containment entry requirements, fuel handling responsibilities, access to locked high-radiation areas, aligning filters, etc. (CFR: 41.12 / 43.4 / 45.9 / 45.10)

An Operator needs to access an area with a general area radiation dose rate of 1100 mREM/hr to hang a clearance tag

For the area above:

Per CSD-RP-ALL-1013 (RADIATION PROTECTION STANDARD GLOSSARY OF TERMS), the correct radiation posting is a ____(1)____.

Continuous RP coverage ____(2)____ satisfy the additional dose monitoring requirements of AD-RP-ALL-0005 (ACCESS CONTROLS FOR HIGH AND LOCKED HIGH RADIATION AREAS).

Which ONE of the following completes the statements above?

A. 1. High Radiation Area
   2. does NOT

B. 1. High Radiation Area
   2. does

C. 1. Locked High Radiation Area
   2. does NOT

D. 1. Locked High Radiation Area
   2. does

General Discussion

Per CSD-RP-ALL-1013,
Locked High Radiation Area (LHRA) - Any area accessible to individuals in which deep dose equivalent rates are greater than or equal to 1 rem per hour (but less than 500 rads in one hour at 1 meter) 30 centimeters from the source of radiation or from any surface that the radiation penetrates.
Per AD-RP-ALL-0005,
provide each individual or group of individuals entering an HRA or LHRA with one of the following: An individual qualified in radiation protection procedures with a radiation dose rate monitoring device.

Answer A Discussion

INCORRECT:

PLAUSIBLE:
Part 1 is plausible because the dose rates associated with High (>100 mr/hr but less than 1000 mr/hr) are exceeded. However, the dose rates for Locked High (>1000 mr/hr) Radiation areas are also exceeded.

Part 2 is plausible if the applicant believes that all 3 listed requirements must be met.

Answer B Discussion

INCORRECT:

PLAUSIBLE:
Part 1 is plausible because the dose rates associated with High (>100 mr/hr but less than 1000 mr/hr) are exceeded. However, the dose rates for Locked High (>1000 mr/hr) Radiation areas are also exceeded.

Part 2 is correct.

Answer C Discussion

INCORRECT:

PLAUSIBLE:
Part 1 is correct.

Part 2 is plausible if the applicant believes that all 3 listed requirements must be met

Answer D Discussion

CORRECT: See explanation above.

Basis for meeting the KA

The K/A is matched because it requires the applicant to have knowledge of how a locked high-radiation area is defined and associated entry requirements.

Basis for Hi Cog

Basis for SRO only

Job Level	Cognitive Level	QuestionType	Question Source
RO	Memory	BANK	2017 CNS NRC (BANK 7169)

Development References

CSD-RP-ALL-1013
AD-RP-ALL-0005

Student References Provided

GEN2.3 2.3.13 - GENERIC - Radiation Control
Radiation Control
Knowledge of radiological safety procedures pertaining to licensed operator duties, such as response to radiation monitor alarms, containment entry requirements, fuel handling responsibilities, access to locked high-radiation areas, aligning filters, etc. (CFR: 41.12 / 43.4 / 45.9 / 45.10)

GEN2.4 2.4.20 - GENERIC - Emergency Procedures / Plan
Emergency Procedures / Plan
Knowledge of the operational implications of EOP warnings, cautions, and notes. (CFR: 41.10 / 43.5 / 45.13)

E-3 (STEAM GENERATOR TUBE RUPTURE) contains the following statement:

"Preference should be given to running 1B NC pump to provide Pzr spray capability. If 1B NC pump is not available, running 1A NC pump along with one or two additional NC pumps may be required for adequate spray."

The statement above is an example of a ____(1)____ because it gives ____(2)____.

Which ONE of the following completes the statement above?

A. 1. NOTE
2. advisory information to support operator actions

B. 1. NOTE
2. critical information to prevent actions that could result in damage to equipment

C. 1. CAUTION
2. advisory information to support operator actions

D. 1. CAUTION
2. critical information to prevent actions that could result in damage to equipment

---

General Discussion

The given statement in E-3 is a NOTE.

A NOTE provides advisory or administrative information to support operator actions.

Answer A Discussion

CORRECT. See explanation above.

Answer B Discussion

INCORRECT:

PLAUSIBLE:
Part 1 is correct.

Part 2 is plausible because the applicant may determine the statement to be essential or critical information but it is not information that must be observed to prevent actions that could result in damage to equipment, loss of plant stability, injury to plant personnel, or danger to public health and safety.

Answer C Discussion

INCORRECT:

PLAUSIBLE:
Part 1 is plausible because the applicant may determine the statement to be essential or critical information but it is not information that must be observed to prevent actions that could result in damage to equipment, loss of plant stability, injury to plant personnel, or danger to public health and safety.

Part 2 is correct.

Answer D Discussion

INCORRECT:

PLAUSIBLE:
Plausible because the applicant may determine the statement to be essential or critical information but it is not information that must be observed to prevent actions that could result in damage to equipment, loss of plant stability, injury to plant personnel, or danger to public health and safety.

Basis for meeting the KA

The K/A is matched because the applicant demonstrates knowledge of the operational difference between a NOTE and CAUTION as it applies to the EOP network.

Basis for Hi Cog

Basis for SRO only

Job Level	Cognitive Level	QuestionType	Question Source
RO	Memory	MODIFIED	2012 Diablo Canyon

Development References

OP-MC-EP-INTRO, Introduction to Emergency Procedures.

Student References Provided

GEN2.4 2.4.20 - GENERIC - Emergency Procedures / Plan
Emergency Procedures / Plan
Knowledge of the operational implications of EOP warnings, cautions, and notes. (CFR: 41.10 / 43.5 / 45.13)

Remarks/Status

MNS ILT 20-1R NRC Written MNS SRO NRC Reta QUESTION 74

A

GEN2.4 2.4.35 - GENERIC - Emergency Procedures / Plan
Emergency Procedures / Plan
Knowledge of local auxiliary operator tasks during an emergency and the resultant operational effects. (CFR: 41.10 / 43.5 / 45.13)

Per AD-OP-ALL-1001 (CONDUCT OF ABNORMAL OPERATIONS), the dispatch of Auxiliary Operators (AOs) to perform tasks outside the control room ____(1)____.

Per OMP 4-3 (USE OF EMERGENCY AND ABNORMAL PROCEDURES AND FLEX SUPPORT GUIDELINES), during an emergency if a dispatched operator cannot operate a manual valve, a valve wrench ____(2)____ be used without supervisor approval.

Which ONE of the following completes the statements above?

A. 1. is performed by the Reactor Operators
   2. can

B. 1. is performed by the Reactor Operators
   2. can NOT

C. 1. requires CRS approval
   2. can

D. 1. requires CRS approval
   2. can NOT

General Discussion

Per AD-OP-ALL-1001 (Conduct of Abnormal Operations), it is the responsibility of the Reactor operators to dispatch Auxiliary operators to perform tasks outside the control room.

Per OMP 4-3, in an actual emergency, dispatched operators should exhaust all reasonable efforts to place a component in its desired position.
Examples:
If a manual valve cannot be operated smoothly, then use a valve wrench.

Answer A Discussion

CORRECT: See explanation above.

Answer B Discussion

INCORRECT:

PLAUSIBLE:
Part 1 is correct.

Part 2 is plausible because per OMP 13-1states prior to using a valve wrench on any plant valve, SRO shall be contacted for approval AND required actions for position verification such as peer checks AND Maintenance support.

Answer C Discussion

INCORRECT:

PLAUSIBLE:
Part 1 is plausible because the CRS is responsible for tracking dispatches to aid in making crew direction decisions based on manpower availability.

Part 2 is correct.

Answer D Discussion

INCORRECT:

PLAUSIBLE:
Part 1 is plausible because the CRS is responsible for tracking dispatches to aid in making crew direction decisions based on manpower availability.

Part 2 is plausible because per OMP 13-1states prior to using a valve wrench on any plant valve, SRO shall be contacted for approval AND required actions for position verification such as peer checks AND Maintenance support.

Basis for meeting the KA

The K/A is matched because the applicant demonstrates knowledge of local auxiliary tasks during an emergency and the resultant operatonal effects (by understanding when and why valve wrenches are allowed to be used).

Basis for Hi Cog

Basis for SRO only

Job Level	Cognitive Level	QuestionType	Question Source
RO	Memory	MODIFIED	2020 MNS NRC (BANK 7878)

Development References

AD-OP-ALL-1001
OMP 4-3
OMP 13-1

Student References Provided

GEN2.4 2.4.35 - GENERIC - Emergency Procedures / Plan
Emergency Procedures / Plan
Knowledge of local auxiliary operator tasks during an emergency and the resultant operational effects. (CFR: 41.10 / 43.5 / 45.13)

MNS ILT 20-1R NRC Written MNS SRO NRC Reta QUESTION 75

B

GEN2.4 2.4.39 - GENERIC - Emergency Procedures / Plan
Emergency Procedures / Plan
Knowledge of RO responsibilities in emergency plan implementation. (CFR: 41.10 / 45.11)

Given the following on Unit 1:

- A Site Area Emergency has been declared
- A Site Assembly is being conducted in accordance with RP/0/A/5700/011 (CONDUCTING A SITE ASSEMBLY, SITE EVACUATION, OR CONTAINMENT EVACUATION)

Per RP-011,

1) the announcement for the Site Assembly shall be repeated every _____ minutes until notification that the Site Assembly has been completed.

2) the Site Assembly shall be completed within a MAXIMUM of _____ minutes.

Which ONE of the following completes the statements above?

A. 1. 15
   2. 30

B. 1. 10
   2. 30

C. 1. 15
   2. 60

D. 1. 10
   2. 60

General Discussion

In accordance with RP/0/A/5700/011, the Site Assembly should be completed within 30 minutes of initiation and the announcement for Site Assembly is repeated every 10 minutes until notification is received that the Site Assembly has been completed.

Answer A Discussion

INCORRECT: See explanation above.

PLAUSIBLE:
Part 1 is plausible because the procedure requires calling Security to request a printout of unaccounted personnel when 15 minutes have elapsed.

Part 2 is correct.

Answer B Discussion

CORRECT: See explanation above.

Answer C Discussion

INCORRECT:

PLAUSIBLE:
Part 1 is plausible because the procedure requires calling Security to request a printout of unaccounted personnel when 15 minutes have elapsed.

Part 2 is plausible as this is the time requirement for followup notifications during a Site Area Emergency.

Answer D Discussion

INCORRECT:

PLAUSIBLE:
Part 1 is correct.

Part 2 is plausible as this is the time requirement for followup notifications during a Site Area Emergency.

Basis for meeting the KA

The KA is matched because the applicant demonstrates knowledge of the responsibilities RO's have during the implementation of the emergency plan.

Basis for Hi Cog

Basis for SRO only

Job Level	Cognitive Level	QuestionType	Question Source
RO	Memory	BANK	2015 MNS Audit (BANK 6086)

Development References

RP/0/A/5700/011 (Conducting a Site Assembly, Site Evacuation, or Containment Evacuation)

Student References Provided

GEN2.4 2.4.39 - GENERIC - Emergency Procedures / Plan
Emergency Procedures / Plan
Knowledge of RO responsibilities in emergency plan implementation. (CFR: 41.10 / 45.11)

Remarks/Status

SYS005 A2.02 - Residual Heat Removal System (RHRS)

Ability to (a) predict the impacts of the following malfunctions or operations on the RHRS, and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: (CFR: 41.5 / 43.5 / 45.3 / 45.13)

Pressure transient protection during cold shutdown .....

Given the following on Unit 1:

- Unit is in MODE 5
- NC temperature is 70°F
- LTOP is in service
- Engineering requests a test procedure be performed which requires BOTH NI Pumps to be capable of injecting into the NC system
- Both NV pumps will be racked out and tagged for the test

Entry into the Action statement of T. S. 3.4.12 (LTOP SYSTEM) ____(1)____ required to perform this test.

Per T.S. 3.4.12 Bases, ONE OPERABLE ND suction relief valve ONLY ____(2)____ satisfy the LTOP RCS vent requirement.

Which ONE of the following completes the statements above?

A. 1. is
2. will NOT

B. 1. is
2. will

C. 1. is NOT
2. will NOT

D. 1. is NOT
2. will

General Discussion

Per TS 3.4.12, An LTOP System shall be OPERABLE with a maximum of one centrifugal charging pump or one safety injection pump capable of injecting into the RCS and the accumulators isolated and either a or b below:
a. Two power operated relief valves (PORVs) with lift setting < 385 psig or
b. The RCS depressurized and an RCS vent of > 2.75 square inches.

Per a note in the LCO statement, Two charging pumps may be made capable of injecting for ≤ 1 hour for pump swap operations.

Per TS 3.4.12 Bases, Two pumps may be capable of injecting into the RCS provided the RHR suction relief valve is OPERABLE with:
1. RCS cold leg temperature > 174oF (Unit 1), or
2. RCS cold leg temperature > 89oF (Unit 2), or
3. RCS cold leg temperature > 74oF and cooldown rate < 20oF/hr (Unit 1), or
4. RCS cold leg temperature > 74oF and cooldown rate < 60oF/hr (Unit 2), or
5. two PORVs secured open with associated block valves open and power removed, or
6. a RCS vent of > 4.5 square inches, or
7. a RCS vent of > 2.75 square inches and two OPERABLE PORVs (the RCS vent shall not be one of the two OPERABLE PORVs).

Answer A Discussion

CORRECT: See explanation above.

Answer B Discussion

INCORRECT:

PLAUSIBLE:
Part 1 is correct.

Part 2 is plausible because an operable ND suction relief can be used, but for the conditions given, would also require two PORVs secured open.

Answer C Discussion

INCORRECT:

PLAUSIBLE:
Part 1 is plausible because entry into TS 3.4.12 action statement is not required for two charging pumps capable of injecting for less than or equal to one hour for pump swap operations.

Part 2 is correct.

Answer D Discussion

INCORRECT:

PLAUSIBLE:
Part 1 is plausible because entry into TS 3.4.12 action statement is not required for two charging pumps capable of injecting for less than or equal to one hour for pump swap operations.

Part 2 is plausible because an operable ND suction relief can be used, but for the conditions given, would also require two PORVs secured open.

Basis for meeting the KA

The K/A is matched because pressure transient protection during cold shutdown is provided by the LTOP system. By demonstrating a knowledge of this Tech Spec, the
applicant demonstrates the ability to predict the impact of operations on ND and use procedures (Tech Spec 3.4.12) to control the consequences of a pressure
transient while in cold shutdown.

Basis for Hi Cog

This question is higher cognitive because it requires the applicant to compare given conditions to that recalled from memory and determine TS applicability based on analysis.

Basis for SRO only

This question meets the following criteria for an SRO only question as described in NUREG 1021, Rev. 11, ES-401, Attachment 2 (Tech Specs):

This question requires knowledge of TS required actions as detailed in the applicable Bases section.

MNS ILT 20-1R NRC Written MNS SRO NRC Reta QUESTION 76

A

Job Level	Cognitive Level	QuestionType	Question Source
SRO	Comprehension	NEW	

Development References
TS 3.4.12 TS 3.4.12 Bases

Student References Provided

SYS005 A2.02 - Residual Heat Removal System (RHRS)

Ability to (a) predict the impacts of the following malfunctions or operations on the RHRS, and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: (CFR: 41.5 / 43.5 / 45.3 / 45.13)

Pressure transient protection during cold shutdown .....

Remarks/Status

MNS ILT 20-1R NRC Written MNS SRO NRC Reta QUESTION 77

B

SYS006 A2.11 - Emergency Core Cooling System (ECCS)

Ability to (a) predict the impacts of the following malfunctions or operations on the ECCS; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: (CFR: 41.5 / 45.5)

Rupture of ECCS header .....

Given the following on Unit 1:

- The CRS has implemented ECA-1.2 (LOCA OUTSIDE CONTAINMENT)
- The crew has determined the leak is NOT on the ND system
- NC System pressure is 1700 PSIG and lowering
- Pzr Level is 22% and lowering
- FWST level is 110 inches and lowering

The CRS will NEXT be required to transition to ____(1)____.

After transition is made, if FWST level lowers to less than a MAXIMUM of ____(2)____ inches, the CRS will direct securing ALL pumps taking suction on the FWST.

Which ONE of the following completes the statements above?

PROECDURE LEGEND:
ECA-1.1 (LOSS OF EMERGENCY COOLANT RECIRC)
ES-1.2 (POST LOCA COOLDOWN AND DEPRESSURIZATION)

A. 1. ECA-1.1
2. 95

B. 1. ECA-1.1
2. 20

C. 1. ES-1.2
2. 95

D. 1. ES-1.2
2. 20

General Discussion

Per ECA-1.2, Step 7C checks the leak known to be isolated. The RNO for this step checks if leak location is on ND. If leak is not suspected on ND (as given in the stem of the question), direction is given to transition to ECA-1.1.

Per ECA-1.1 Steps 29 & 30, if FWST level is less than 20 inches (FWST Lo-Lo level), stop ND, NS, NV and NI (All ECCS) pumps taking suction on the FWST.

Answer A Discussion

INCORRECT:

PLAUSIBLE:
Part 1 is correct.

Part 2 is plausible because 95 inches is the FWST Low Level setpoint at which the Containment Sump Isolation Valves automatically open.

Answer B Discussion

CORRECT: See explanation above.

Answer C Discussion

INCORRECT:

PLAUSIBLE:
Part 1 is plausible because ES-1.2 is entered from ECA-1.2 if NC pressure is going down at step 19B RNO.

Part 2 is plausible because 95 inches is the FWST Low Level setpoint at which the Containment Sump Isolation Valves automatically open.

Answer D Discussion

INCORRECT:

PLAUSIBLE:
Part 1 is plausible because ES-1.2 is entered from ECA-1.2 if NC pressure is going down at step 19B RNO.

Part 2 is correct.

Basis for meeting the KA

The K/A is matched because the applicant demonstrates the ability to predict the impact of low FWST level on the ECC system and uses procedures to mitigate the consequences of a rupture of the ECCS header outside containment.

Basis for Hi Cog

This question is higher cognitive because the applicant is required to analyze the conditions in the stem and apply those conditions to recalled knowledge to select the appropriate procedure for mitigation of this event.

Basis for SRO only

This question meets the following criteria for an SRO only question as described in NUREG 1021, Rev. 11, ES-401, Attachment 2 (Assessment and selection of procedures):

This question requires knowledge of specific procedure requirements, assessment of plant conditions, and selection of the proper procedure for recovery.

Job Level	Cognitive Level	QuestionType	Question Source
SRO	Comprehension	NEW	

Development References
ECA-1.2 ECA-1.1 ES-1.3

Student References Provided

SYS006 A2.11 - Emergency Core Cooling System (ECCS)

Ability to (a) predict the impacts of the following malfunctions or operations on the ECCS; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: (CFR: 41.5 / 45.5)

Rupture of ECCS header .....

SYS013 A2.04 - Engineered Safety Features Actuation System (ESFAS)

Ability to (a) predict the impacts of the following malfunctions or operations on the ESFAS; and (b) based Ability on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations; (CFR: 41.5 / 43.5 / 45.3 / 45.13)

Loss of instrument bus .....

Given the following on Unit 2:

- Unit is at 100% RTP
- A loss of 2EKVD has occurred
- The CRS has implemented AP-15 (LOSS OF VITAL OR AUX CONTROL POWER)
- NO Tech Spec actions have been addressed

The current Containment Pressure channel logic, for the remaining Containment Pressure channels, which will cause a **Phase B** actuation is ____(1)____.

Per TS 3.3.2 (ESFAS INSTRUMENTATION) LCO Actions, when the failed channel is removed from service, I&E will place the Containment Pressure **Hi-Hi** Bistable in ____(2)____.

Which ONE of the following completes the statements above?

A. 1. 1/3
   2. Trip

B. 1. 1/3
   2. Bypass

C. 1. 2/3
   2. Trip

D. 1. 2/3
   2. Bypass

General Discussion

The normal logic for Phase B actuation based on Hi-Hi Containment Pressure is 2/4 channels. With a loss of EKVD, the associated channel 4 bistable would not be in a tripped condition because Phase B is required to be energized to actuate. Therefore, two of the remaining three channels would be required to actuate.
Per TS 3.3.2 (ESFAS Instrumentation), the Containment Pressure Hi-Hi Bistable will be placed in BYPASS when the channel is removed from service. The basis for this is that an inadvertent signal on any one of the remaining Containment Pressure Hi-Hi
Bistables would result in an inadvertent Phase B isolation.

Answer A Discussion

INCORRECT:

PLAUSIBLE:
Part 1 is plausible because this would be the correct answer if this instrument actuated upon a loss of power.

Part 2 is plausible because when most channels are removed from service the bistables associated with the failed channel are placed in Trip (including Containment Pressure HI).

Answer B Discussion

INCORRECT:

PLAUSIBLE:
Part 1 is plausible because this would be the correct answer if this instrument actuated upon a loss of power.

Part 2 is correct.

Answer C Discussion

INCORRECT:

PLAUSIBLE:
Part 1 is correct.

Part 2 is plausible because when most channels are removed from service the bistables associated with the failed channel are placed in Trip (including Containment Pressure HI).

Answer D Discussion

CORRECT: See explanation above.

Basis for meeting the KA

The K/A is matched because given a loss of a vital instrument bus, the applicant is required to predict the impact of this malfunction on an ESFAS system and use procedures (TS) to mitigate the consequences.

Basis for Hi Cog

This is higher cognitive because the applicant must recall from memory the logic for Phase B actuation and then analyze given conditions to determine the effect upon this logic.
The applicant must then recall from memory the requirement for removing a Containment Pressure channel (Hi vs. Hi-Hi) from service.

Basis for SRO only

This question meets the following criteria for an SRO only question as described in NUREG 1021, Rev. 11, ES-401, Attachment 2 (Tech Specs):

This question requires knowledge of TS required actions as detailed in the applicable Bases.

Job Level	Cognitive Level	QuestionType	Question Source
SRO	Comprehension	BANK	2017 CNS NRC (BANK 7184)

Development References
TS 3.3.2 TS 3.3.2 Bases AP-15

Student References Provided

SYS013 A2.04 - Engineered Safety Features Actuation System (ESFAS)
Ability to (a) predict the impacts of the following malfunctions or operations on the ESFAS; and (b) based Ability on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations; (CFR: 41.5 / 43.5 / 45.3 / 45.13)

C

MNS ILT 20-1R NRC Written MNS SRO NRC Reta QUESTION 79

SYS059 2.4.20 - Main Feedwater (MFW) System
SYS059 GENERIC
Knowledge of the operational implications of EOP warnings, cautions, and notes. (CFR: 41.10 / 43.5 / 45.13)

Given the following Initial Conditions:

- Unit 1 tripped from 100% RTP following a loss of both Main Feed pumps
- All CA pumps failed to start automatically and cannot be started manually
- The CRS has implemented FR-H.1 (LOSS OF SECONDARY HEAT SINK)
- S/G WR levels are 32% and lowering in all S/Gs

Current Conditions:

- Safety Injection has NOT occurred
- CM flow has been established to the S/Gs
- The crew has transitioned to ES-0.1 (REACTOR TRIP RESPONSE)
- The BOP reports SI initiation criteria for Pzr level is met per the ES-0.1 foldout page

Based on initial conditions, when attempting to establish feed flow from the CM system, the CRS will direct the crew to depressurize ____(1)____ to 500 PSIG.

Based on current conditions, the CRS ____(2)____ direct the BOP to initiate SI.

Which ONE of the following completes the statement above?

A. 1. one S/G
   2. will NOT

B. 1. one S/G
   2. will

C. 1. two S/Gs
   2. will NOT

D. 1. two S/Gs
   2. will

General Discussion

Per FR-H.1 NOTE,
If feed and bleed has not yet been initiated, it is preferable to depressurize two S/Gs in the next step in order to: Leave two S/G levels above Feed and Bleed criteria and Minimize NC System cooldown.
If feed and bleed has been initiated, it is preferable to depressurize just
one S/G in next step.

Per FR-H.1 basis document, when transferring to procedure in effect, it may not be appropriate to manually S/I per guidance on Foldout page for ES-0.1 (Reactor Trip Response) if S/I had not previously been initiated.
Blindly initiating S/I based on low Pzr level would be inappropriate in this case since this would cause a loss of heat sink for an expected Pzr level condition.

Answer A Discussion

INCORRECT:

PLAUSIBLE:
Part 1 is plausible because S/G WR levels are below the ACC value of 36% which would require feed and bleed to be initiated.

Part 2 is correct.

Answer B Discussion

INCORRECT:

PLAUSIBLE:
Part 1 is plausible because S/G WR levels are below the ACC value of 36% which would require feed and bleed to be initiated.

Part 2 is plausible because it is normal practice to perform the action on a foldout page when the criteria are met.

Answer C Discussion

CORRECT: See explanation above.

Answer D Discussion

INCORRECT:

PLAUSIBLE:
Part 1 is correct.

Part 2 is plausible because it is normal practice to perform the action on a foldout page when the criteria are met.

Basis for meeting the KA

The K/A is matched because the applicant demonstrates knowledge of notes contained in the emergency procedures as they pertain to a loss of the main feedwater pumps. The operational implications are seen as a decision to SI or not based on the plant conditions required to address the loss of feedwater.

Basis for Hi Cog

This question is higher cognitive because the applicant is required to analyze the data in the stem, recall setpoints from memory and apply that data to determine if feed and bleed has been initiated.

Basis for SRO only

This question meets the following criteria for an SRO only question as described in NUREG 1021, Rev. 11, ES-401, Attachment 2 (Assessment and selection of procedures):
This question requires additional knowledge of procedure content (information contained in the associated basis document).

Job Level	Cognitive Level	QuestionType	Question Source
SRO	Comprehension	NEW	

Development References

FR-H.1
OP-MC-EP-FRH
ES-0.1

Student References Provided

SYS059 2.4.20 - Main Feedwater (MFW) System
SYS059 GENERIC

C

MNS ILT 20-1R NRC Written MNS SRO NRC Reta QUESTION 80

SYS061 2.4.18 - Auxiliary / Emergency Feedwater (AFW) System
SYS061 GENERIC
Knowledge of the specific bases for EOPs. (CFR: 41.10 / 43.1 / 45.13)

Given the following on Unit 1:

- Unit is responding to a Pressurized Thermal Shock condition in accordance with FR-P.1 (RESPONSE TO IMMINENT PRESSURIZED THERMAL SHOCK CONDITION)
- NC T-Colds are 170°F and lowering
- All S/Gs are FAULTED

Per FR-P.1, CA flow will be throttled to ____(1)____ GPM to each S/G and the basis for this action ____(2)____ to minimize the effects of the RCS cooldown.

Which ONE of the following completes the statement above?

A. 1. 100
   2. is

B. 1. 100
   2. is NOT

C. 1. 25
   2. is

D. 1. 25
   2. is NOT

General Discussion

Per FR-P.1, IF all S/Gs faulted, THEN perform the following: THROTTLE feed flow to
25 GPM to each S/G.

Per FRP-1 basis document, If a faulted S/G is necessary for NC system temperature control or if all S/Gs are faulted, feed flow to those S/Gs is controlled at a minimum measurable value of 25 GPM to minimize the effects of the NC system cooldown due to the secondary side depressurization.

Answer A Discussion

INCORRECT:

PLAUSIBLE:
Part 1 is plausible because 100 gpm is the CA flow established in FR-H.1 to a dry S/G (Less than 12% WR level) .

Part 2 is correct.

Answer B Discussion

INCORRECT:

PLAUSIBLE:
Part 1 is plausible because 100 gpm is the CA flow established in FR-H.1 to a dry S/G (Less than 12% WR level) .

Part 2 is plausible because CA flow is also throttled to 25 gpm in ECA-2.1 and the basis in ECA-2.1 is to minimize thermal stress conditions on S/G components.

Answer C Discussion

CORRECT: See explanation above.

Answer D Discussion

INCORRECT:

PLAUSIBLE:
Part 1 is correct.

Part 2 is plausible because CA flow is also throttled to 25 gpm in ECA-2.1 and the basis in ECA-2.1 is to minimize thermal stress conditions on S/G components.

Basis for meeting the KA

The K/A is matched because the applicant must demonstrate knowledge of AFW flow rates and the basis for the flow rates as they apply to FR-P.1

Basis for Hi Cog

Basis for SRO only

This question meets the following criteria for an SRO only question as described in NUREG 1021, Rev. 11, ES-401, Attachment 2 (Assessment and selection of procedures):
This question requires additional knowledge of procedure content (information contained in the associated basis document).

Job Level	Cognitive Level	QuestionType	Question Source
SRO	Memory	NEW	

Development References

FR-P.1
OP-MC-EP-FRP
OP-MC-EP-E2
FR-H.1

Student References Provided

SYS061 2.4.18 - Auxiliary / Emergency Feedwater (AFW) System
SYS061 GENERIC
Knowledge of the specific bases for EOPs. (CFR: 41.10 / 43.1 / 45.13)

MNS ILT 20-1R NRC Written MNS SRO NRC Reta QUESTION 81

B

SYS002 2.1.25 - Reactor Coolant System (RCS)
SYS002 GENERIC
Ability to interpret reference materials, such as graphs, curves, tables, etc. (CFR: 41.10 / 43.5 / 45.12)

Given the following conditions on Unit 1:

- Unit is in MODE 6 with core RELOAD in progress
- NC system boron concentration is 2705 PPM
- Boric Acid Tank level is 10%
- The following surveillances are being performed:
  - PT/1/A/4600/100 (SURVEILLANCE REQUIREMENTS FOR SHUTDOWN CONDITIONS)
  - PT/1/A/4600/003 C (WEEKLY SURVEILLANCE ITEMS CHECKLIST)

The surveillance for NC system boron concentration performed during PT/1/A/4600/100 (SR 3.9.1.1) ensures that k_{eff} during MODE 6 remains less than or equal to a MAXIMUM of ___(1)___.

Based on the conditions above the MINIMUM required Boric Acid Tank level ___(2)___ met.

Which ONE of the following completes the statements above?

REFERENCE PROVIDED

A. 1. 0.95
   2. is

B. 1. 0.95
   2. is NOT

C. 1. 0.98
   2. is

D. 1. 0.98
   2. is NOT

General Discussion

Per TS 3.9.1 (Boron Concentration), in MODE 6 boron concentration shall be maintained within the limits specified in the COLR. Per the Basis Document for TS 3.9.1, the basis for maintaining boron concentration within limits is to ensure that Keff remains less than 0.95 to ensure that recriticality does not occur while in MODE 6.

Per SLC 16.9.14, Borated Water Sources (Shutdown), for the BAT to be considered OPERABLE it must meet the minimum volume requirements specified in the COLR. There are two conditions that would require different BAT levels. If the unit was in MODE 6 at the end of a cycle after 452 EFPD and the core had not yet been off loaded, Figure 6 of the COLR would be used to determine the minimum volume and the required minimum level would be 8.7%.
For the conditions given, core reload is in progress (i.e. the full cycle core is no longer loaded), the requirements of COLR 2.15 would apply (i.e. 13.6%).

Answer A Discussion

INCORRECT:

PLAUSIBLE:
Part 1 is correct

Part 2 is plausible because this would be the correct answer if the core had not yet been off loaded.

Answer B Discussion

CORRECT: See explanation above.

Answer C Discussion

INCORRECT:

PLAUSIBLE:
Part 1 is plausible because < .99 is the maximum Keff for Cold Shutdown.

Part 2 is plausible because this would be the correct answer if the core had not yet been off loaded.

Answer D Discussion

INCORRECT:

PLAUSIBLE:
Part 1 is plausible because < .99 is the maximum Keff for Cold Shutdown.

Part 2 is correct.

Basis for meeting the KA

This K/A is matched because the applicant demonstrates the ability to interpret reference materials such as graphs and tables to determine the required boric acid tank level as it applies to the current condition of the Reactor Coolant system.

Basis for Hi Cog

This question is higher cognitive level because it requires more than one mental step. The first part of the question requires the applicant to recall from memory the basis for NC system boron surveillance requirement during refueling. The second part requires the applicant to analyze plant conditions and determine which BAT level limit from the COLR applies to the given conditions.

Basis for SRO only

This question is SRO-only knowledge linked to 10CFR55.43(b)(2) (Tech Specs) as described in the "Clarification Guidance for SRO-only Question":

1) The question can NOT be answered solely by knowing ≤ 1 hour TS/TRM action statements.
2) The question can NOT be answered solely by knowing the LCO/TRM information listed "above-the-line".
3) The question can NOT be answered solely by knowing the TS Safety Limits. TS 3.9.1 (Boron Concentration) Basis.
4) The question requires the applicant to have detailed knowledge of the TS basis to analyze TS requirements (i.e. basis for the NC system boron concentration surveillance). As such this constitutes SRO-level knowledge.

Job Level	Cognitive Level	QuestionType	Question Source
SRO	Comprehension	BANK	2015 MNS NRC (BANK 4439)

MNS ILT 20-1R NRC Written MNS SRO NRC Reta QUESTION 81

B

Development References
TS 3.9.1 Bases SLC-16.9.14 Core Operating Limits Report (COLR) - 2.15 and Figure 6

Student References Provided
Unit 1 COLR - Borated Water Sources pages 28-30

SYS002 2.1.25 - Reactor Coolant System (RCS)
SYS002 GENERIC
Ability to interpret reference materials, such as graphs, curves, tables, etc. (CFR: 41.10 / 43.5 / 45.12)

Remarks/Status

SYS034 K4.01 - Fuel Handling Equipment System (FHES)
Knowledge of design feature(s) and/or interlock(s) which provide for the following: (CFR: 41.7)
Fuel protection from binding and dropping .....

Per SLC 16.9.20 (CRANE TRAVEL-SPENT FUEL STORAGE POOL BUILDING):

Loads in excess of ____(1)____ pounds are prohibited from travel over fuel assemblies in the storage pool.

The bases for restricting loads in excess of the nominal weight is to ensure that in the event a load is dropped, it will NOT result in ____(2)____.

Which ONE of the following completes the statements above?

A. 1. 1000
2. exceeding the Exclusion Area Boundary dose limits

B. 1. 1000
2. an activity release greater than that contained in a single fuel assembly

C. 1. 3000
2. exceeding the Exclusion Area Boundary dose limits

D. 1. 3000
2. an activity release greater than that contained in a single fuel assembly

---

General Discussion

Per SLC 16.9.20, Loads in excess of 3000 pounds shall be prohibited from travel over fuel assemblies in the storage pool.
Per SLC 16.9.20 Bases, The restriction on movement of loads in excess of the nominal weight of a fuel and control rod assembly and associated handling tool over other fuel assemblies in the storage pool ensures that in the event this load is dropped: the activity release will be limited to that contained in a single fuel assembly

Answer A Discussion

INCORRECT:

PLAUSIBLE:
Part 1 is plausible because this is a requirement for the auxiliary hoist minimum capacity.

Part 2 is plausible because this is part of the fuel handling accident basis for having the equipment hatch closed during refueling operations.

Answer B Discussion

INCORRECT:

PLAUSIBLE:
Part 1 is plausible because this is a requirement for the auxiliary hoist minimum capacity.

Part 2 is correct.

Answer C Discussion

INCORRECT:

PLAUSIBLE:
Part 1 is correct.

Part 2 is plausible because this is part of the fuel handling accident basis for having the equipment hatch closed during refueling operations.

Answer D Discussion

CORRECT: See explanation above.

Basis for meeting the KA

The K/A is matched because the applicant demonstrates knowledge of fuel handling design features that provide fuel protection from dropping.

Basis for Hi Cog

Basis for SRO only

This question meets the following criteria for an SRO only question as described in NUREG 1021, Rev. 11, ES-401, Attachment 2 (Tech Specs):

This question requires knowledge of TS required actions as detailed in the applicable Bases.

Job Level	Cognitive Level	QuestionType	Question Source
SRO	Memory	BANK	MNS Bank

Development References

SLC 16.9.20 and Bases
SLC 16.9.19

Student References Provided

SYS034 K4.01 - Fuel Handling Equipment System (FHES)
Knowledge of design feature(s) and/or interlock(s) which provide for the following: (CFR: 41.7)
Fuel protection from binding and dropping .....

Remarks/Status

MNS ILT 20-1R NRC Written MNS SRO NRC Reta QUESTION 83

D

SYS071 A2.03 - Waste Gas Disposal System (WGDS)

Ability to (a) predict the impacts of the following malfunctions or operations on the Waste Gas Disposal System ; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: (CFR: 41.5 / 43.5 / 45.3 / 45.13)

Rupture disk failures .....

Given the following:

- "A" WGDT was being prepared for release
- Radwaste reports the radioactivity in the "A" WGDT exceeds the SLC limit

Per SLC 16.11.20 (GAS STORAGE TANKS), the required action is to ____(1)____.

Per SLC 16.11.20 Bases, the radioactivity limit is based on exposure received by a ____(2)____ during an accidental release.

Which ONE of the following completes the statements above?

A. 1. reduce tank contents within the limits within one hour
   2. plant worker

B. 1. reduce tank contents within the limits within one hour
   2. member of the public

C. 1. suspend all additions of radioactive material to the tank immediately
   2. plant worker

D. 1. suspend all additions of radioactive material to the tank immediately
   2. member of the public

General Discussion

Per SLC 16.11-20, a limit of 49,000 Curies for Gas Storage Tanks. If this limit is exceeded, the immediate required action is to suspend all additions of radioactive material.

Per SLC 16.11.20 Bases, the limit on radioactivity provides assurance that in the event of an uncontrolled release of the tank's contents, the resulting whole body exposure to a member of the public at the nearest site boundary will not exceed 0.5 rem.

Answer A Discussion

INCORRECT:

PLAUSIBLE:
Part 1 is plausible because this is a required action, but its completion time is not one hour.

Part 2 is plausible because plant workers are likely to receive higher dose rates from an uncontrolled release of the tank contents.

Answer B Discussion

INCORRECT:

PLAUSIBLE:
Part 1 is plausible because this is a required action, but its completion time is not one hour.

Part 2 is correct.

Answer C Discussion

INCORRECT:

PLAUSIBLE:
Part 1 is correct.

Part 2 is plausible because plant workers are likely to receive higher dose rates from an uncontrolled release of the tank contents.

Answer D Discussion

CORRECT: See explanation above.

Basis for meeting the KA

The K/A is matched because the applicant demonstrates the ability to predict the impact of a rupture disk failure of a WGDT and use of Tech Specs to correct, control or mitigate this event. (the rupture disk failure is implied in the accidental release of tank contents and the ensuing exposure discussed in the bases).

Basis for Hi Cog

Basis for SRO only

This question meets the following criteria for an SRO only question as described in NUREG 1021, ES-401, Attachment 2 (Tech Specs):
This question requires knowledge of SLC required activity limits as detailed in the applicable Bases.

Job Level	Cognitive Level	QuestionType	Question Source
SRO	Memory	MODIFIED	2014 CNS NRC (BANK 6959)

Development References	Student References Provided
SLC 16.11.20 SLC 16.11.20 Bases	

SYS071 A2.03 - Waste Gas Disposal System (WGDS)

Ability to (a) predict the impacts of the following malfunctions or operations on the Waste Gas Disposal System ; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: (CFR: 41.5 / 43.5 / 45.3 / 45.13)

Rupture disk failures .....

MNS ILT 20-1R NRC Written MNS SRO NRC Reta QUESTION 84

A

EPE007 2.4.20 - Reactor Trip
EPE007 GENERIC
Knowledge of the operational implications of EOP warnings, cautions, and notes. (CFR: 41.10 / 43.5 / 45.13)

Given the following on Unit 1:

- A small break LOCA has occurred
- Containment pressure peaked at 3.2 PSIG and is currently stable at 1.5 PSIG
- The CRS has implemented E-0 (REACTOR TRIP OR SAFETY INJECTION)

Based on the conditions above, the CRS ____(1)____ direct the performance of E-0, Enclosure 4 (VX MANUAL START AND ISOLATING RV COOLING).

The basis for isolating RV cooling in Enclosure 4 is to ____(2)____.

Which ONE of the following completes the statements above?

A. 1. will NOT
   2. gain containment sump level margin and avoid sump dilution during small LOCAs

B. 1. will NOT
   2. maintain containment pressure low during the long transient of a LOCA

C. 1. will
   2. gain containment sump level margin and avoid sump dilution during small LOCAs

D. 1. will
   2. maintain containment pressure low during the long transient of a LOCA

General Discussion

Per E-0, step 24, RNO B, If at any time both of the following conditions exist, then perform enclosure 4: containment pressure has remained less than 3 psig and containment pressure is between 1 and 3 psig.
For the conditions given in the stem, containment pressure has exceeded 3 psig and is currently between 1 and 3 psig. Therefore, Enclosure 4 will not be performed at this time.

Per E-0 basis document, One train of containment air return fan is manually started and RV cooling to containment ventilation is isolated to gain sump level margin and avoid sump dilution due to ventilation operation during small LOCA's that slowly pressurize containment.

Answer A Discussion

CORRECT: See explanation above.

Answer B Discussion

INCORRECT:

PLAUSIBLE:
Part 1 is correct.

Part 2 is plausible because it is the basis for performing E-0, Enclosure 2 (Phase B HVAC Equipment) which also checks VX system in operation.

Answer C Discussion

INCORRECT:

PLAUSIBLE:
Part 1 is plausible because containment pressure is currently between 1 and 3 PSIG as required per Enclosure 4. Also plausible because Enclosure 2 (Phase B HVAC Equipment) is required to be performed.

Part 2 is correct.

Answer D Discussion

INCORRECT:

PLAUSIBLE:
Part 1 is plausible because containment pressure is currently between 1 and 3 PSIG as required per Enclosure 4. Also plausible because Enclosure 2 (Phase B HVAC Equipment) is required to be performed.

Part 2 is plausible because it is the basis for performing E-0, Enclosure 2 (Phase B HVAC Equipment) which also checks VX system in operation.

Basis for meeting the KA

The K/A is matched because the applicant demonstrates knowledge of notes as they apply to E-0 (RX Trip and Safety Injection), Enclosure 4 (VX Manual Starting and Isolating RV Cooling).

Basis for Hi Cog

This question is higher cognitive because the applicant is required to analyze the conditions in the stem and apply them to recalled procedural requiements to determine the applicability of an enclosure in the procedure.

Basis for SRO only

This question meets the following criteria for an SRO only question as described in NUREG 1021, Rev. 11, ES-401, Attachment 2 (Assessment and selection of procedures):

This question requires detailed procedure knowledge found in an RNO of the procedure and also requires information contained in the associated basis document.

Job Level	Cognitive Level	QuestionType	Question Source
SRO	Comprehension	NEW	

Development References	Student References Provided
E-0 OP-MC-EP-E-0 (basis doc)	

EPE007 2.4.20 - Reactor Trip

D

MNS ILT 20-1R NRC Written MNS SRO NRC Reta QUESTION 85

APE026 AA2.05 - Loss of Component Cooling Water (CCW)
Ability to determine and interpret the following as they apply to the Loss of Component Cooling Water: (CFR: 43.5 / 45.13)
The normal values for CCW-header flow rate and the flow rates to the components cooled by the CCWS .....

Given the following on Unit 2:

- Unit 2 is at 100% RTP
- SPOC has determined that 2KC-56A (KC To A ND HX) will not open due to breaker damage

If required for core cooling, ES-1.3 (TRANSFER TO COLD LEG RECIRCULATION) will verify a MINIMUM flow of ____(1)____ GPM through 2KC-56A.

Based on the failure of 2KC-56A, 2A ND ____(2)____ OPERABLE.

Which ONE of the following completes the statements above?

A. 1. 6000
   2. is

B. 1. 6000
   2. is NOT

C. 1. 5000
   2. is

D. 1. 5000
   2. is NOT

General Discussion

Per ES-1.3, step 11 verifies that KC flow to ND heat exchangers be greater than 5000 gpm.

Tech. Spec. 3.5.2 requires that two ECCS trains be OPERABLE for the given mode. With valve 2KC-56A not able to be opened, one train of KC is inoperable and one train of ND is inoperable.

Answer A Discussion

INCORRECT:

PLAUSIBLE:
Part 1 is plausible because 6000 gpm is a flow value used in a limit and precaution for total KC flow to the ND Hxs when both trains of KC are in service.

Part 2 is plausible because the failure is on a valve in the KC system and an applicant may conclude TS 3.7.6 (KC System) is the only applicable TS.

Answer B Discussion

INCORRECT:

PLAUSIBLE:
Part 1 is plausible because 6000 gpm is a flow value used in a limit and precaution for total KC flow to the ND Hxs when both trains of KC are in service.

Part 2 is correct.

Answer C Discussion

INCORRECT:

PLAUSIBLE:
Part 1 is correct.

Part 2 is plausible because the failure is on a valve in the KC system and an applicant may conclude TS 3.7.6 (KC System) is the only applicable TS.

Answer D Discussion

CORRECT: See explanation above.

Basis for meeting the KA

The K/A is matched because the applicant must be able to determine the normal value of KC flow that is required for ES-1.3 and determine the affect a loss of that KC flow will have on safety systems.

Basis for Hi Cog

This question is higher cognitive because it involves application of specific procedure knowledge, Tech. Spec. requirements, and analysis of given conditions to arrive at the correct answer.

Basis for SRO only

This question meets the following criteria for an SRO Only question as described in the “Clarification Guidance for SRO-only Questions:
The question involves detailed knowledge of procedure content, and assessment of plant conditions, including analysis (based on application of Tech. Spec. bases information) to determine the correct governing Tech. Spec.

Job Level	Cognitive Level	QuestionType	Question Source
SRO	Comprehension	BANK	2014 CNS NRC (BANK 6974)

Development References

ES-1.3
TS 3.5.2
TS 3.5.2 Bases
TS 3.7.6

Student References Provided

APE026 AA2.05 - Loss of Component Cooling Water (CCW)
Ability to determine and interpret the following as they apply to the Loss of Component Cooling Water: (CFR: 43.5 / 45.13)
The normal values for CCW-header flow rate and the flow rates to the components cooled by the CCWS .....

MNS ILT 20-1R NRC Written MNS SRO NRC Reta QUESTION 86

B

APE058 2.2.37 - Loss of DC Power
APE058 GENERIC
Ability to determine operability and/or availability of safety related equipment. (CFR: 41.7 / 43.5 / 45.12)

Given the following on Unit 1:

- The unit is at 100% RTP
- A loss of Battery Charger EVCA has occurred

Following restoration, Battery EVCA conditions are as follows:

- For two connected cells, the Specific Gravity is 1.180
- For all connected cells, the average Specific Gravity is 1.202
- Electrolyte temperature is 76°F

1) Based on the conditions above, Battery EVCA is _____.

2) One DC CHANNEL _____ adequate to satisfy the MINIMUM requirements of operability for the DC Distribution System.

Which ONE of the following completes the statements above?

REFERENCE PROVIDED

A. 1. INOPERABLE
   2. is

B. 1. INOPERABLE
   2. is NOT

C. 1. OPERABLE
   2. is

D. 1. OPERABLE
   2. is NOT

General Discussion

Per T.S. 3.8.6 basis:
With one or more cells in one or more batteries not within limits (i.e.,Category A limits not met, Category B limits not met, or Category A and B limits not met) but within the Category C limits specified in Table 3.8.6-1in the accompanying LCO, the battery is degraded but there is still sufficient capacity to perform the intended function. Therefore, the affected battery is not required to be considered INOPERABLE solely as a result of Category A or B limits not met and operation is permitted for a limited period.
Category C defines the limits for each connected cell. These values, although reduced, provide assurance that sufficient capacity exists to perform the intended function and maintain a margin of safety. When any battery parameter is outside the Category C limits, the assurance of sufficient capacity described above no longer exists, and the battery must be declared INOPERABLE.

In the example given in the stem, Category B (Limits for each connected cell) and Category C (Allowable Limits for Each Cell) of T.S. 3.8.6, Table 3.8.6-1, are not met.

The OPERABILITY of the DC subsystems is consistent with the initial assumptions of the accident analyses and is based upon meeting the design basis of the unit. This includes maintaining at least one TRAIN of DC sources OPERABLE during accident conditions, in the event of:
a. An assumed loss of all offsite AC power or all onsite AC power; and
b. A worst case single failure.

Answer A Discussion

INCORRECT:

PLAUSIBLE:
Part 1 is correct.

Part 2 is plausible becauseT.S. 3.8.9 (Distribution Systems - Operating) Basis describes the DC portion of the system as, four independent channels (two per train) of DC.

Answer B Discussion

CORRECT: See explanation above.

Answer C Discussion

INCORRECT:

PLAUSIBLE:
Part 1 is plausible because T.S. Table 3.8.6-1 Category B limits are exceeded and per T.S. basis the battery would be OPERABLE but degraded. If the applicant conludes that Category C limits are met, this would be the correct answer.

Part 2 is plausible becauseT.S. 3.8.9 (Distribution Systems - Operating) Basis describes the DC portion of the system as, four independent channels (two per train) of DC.

Answer D Discussion

INCORRECT:

PLAUSIBLE:
Part 1 is plausible because T.S. Table 3.8.6-1 Category B limits are exceeded and per T.S. basis the battery would be OPERABLE but degraded. If the applicant concludes that Category C limits are met, this would be the correct answer.

Part 2 is correct.

Basis for meeting the KA

The K/A is matched because the applicant must determine operability of selected safety related equipment (Vital Battery) related to a Loss of DC Power.

Basis for Hi Cog

This question is higher cognitive because more than one mental step is involved. First, the applicant is required to evaluate parameters given in the stem using the applicable technical specification to make an operability call and then recall from memory information from the technical specification basis.

Basis for SRO only

This question meets the following criteria for an SRO only question as described in NUREG-1021 Rev. 11, ES-401 Attachment 2 "Clarification Guidance for SRO-only Questions" for screening questions linked to 10CFR55.43(b)(2) (Tech Specs):

1) Question can not be answered solely by knowing less than or equal to 1 hour TS Action.
2) Question can not be answered solely by knowing the LCO information listed "above the line".
3) Question can not be answered solely by knowing the TS Safety Limits.
4) Question does require applicants to apply knowledge of TS bases information that is required to analyze TS required actions and terminology,

therefore the question is SRO-only.

Job Level	Cognitive Level	QuestionType	Question Source
SRO	Comprehension	BANK	2020 MNS NRC (BANK 7891)

Development References
TS 3.8.6 (Battery Cell Parameters) TS 3.8.6 Bases TS 3.8.9 Bases

Student References Provided
Copy of TS 3.8.6

APE058 2.2.37 - Loss of DC Power

APE058 GENERIC

Ability to determine operability and/or availability of safety related equipment. (CFR: 41.7 / 43.5 / 45.12)

Remarks/Status

MNS ILT 20-1R NRC Written MNS SRO NRC Reta QUESTION 87

B

APE077 2.2.40 - Generator Voltage and Electric Grid Disturbances
APE077 GENERIC
Ability to apply Technical Specifications for a system. (CFR: 41.10 / 43.2 / 43.5 / 45.3)

Given the following:

- Unit 1 & 2 are at 100% RTP
- The DEC TOP (Transmission Operations) has notified the Control Room that the "Real Time Contingency Analysis" (RTCA) indicates that switchyard voltage would not be adequate should a Unit Trip occur
- AP-05, (GENERATOR VOLTAGE AND ELECTRIC GRID DISTURBANCES) has been implemented on BOTH units

Per Unit 1 AP-05,

1) The CRS _____ be directed to enter Tech. Spec. LCO 3.0.3.

2) T.S. 3.8.1 (AC SOURCES-OPERATING) is required to be entered due to BOTH _____ being INOPERABLE.

Which ONE of the following completes the statements above?

A. 1. will
   2. Emergency D/Gs

B. 1. will
   2. Offsite Power Sources

C. 1. will NOT
   2. Emergency D/Gs

D. 1. will NOT
   2. Offsite Power Sources

General Discussion

Per AP-05, if the TCC has notified the Control Room that the Real Time Contingency Analysis (RTCA) indicates that switchyard voltage would not be adequate should a unit trip occur AND ETA and ETB are both supplied from offsite power, then T.S. 3.0.3. should be entered due to both ECCS trains being inoperable.
Additionally, for the same circumstances AP-05 requires that T.S. 3.8.1 be entered for both offsite power sources being inoperable.

Answer A Discussion

INCORRECT:

PLAUSIBLE:
Part 1 is correct.

Part 2 is plausible because the concern in this event is due to a double-sequencing event of the D/G sequencers and thus the applicant may conclude that both D/Gs are inoperable.

Answer B Discussion

CORRECT: See explanation above.

Answer C Discussion

INCORRECT:

PLAUSIBLE:
Part 1 is plausible because the applicant may fail to conclude that both trains of ECCS are inoperable based on the RTCA report, requiring entry into LCO 3.0.3 (due to both trains having their respective D/G available).

Part 2 is plausible because the concern in this event is due to a double-sequencing event of the D/G sequencers and thus the applicant may conclude that both D/Gs are inoperable.

Answer D Discussion

INCORRECT:

PLAUSIBLE:
Part 1 is plausible because the applicant may fail to conclude that both trains of ECCS are inoperable based on the RTCA report, requiring entry into LCO 3.0.3 (due to both trains having their respective D/G available).

Part 2 is correct.

Basis for meeting the KA

The K/A is matched because the applicant demonstrates the ability to apply tech specs during a degraded grid voltage event.

Basis for Hi Cog

This question is higher cognitive because the applicant must analyze conditions in the stem and then determine the affect those conditions will have on tech specs.

Basis for SRO only

The question is SRO-ONLY because the applicant is being asked to evaluate given conditions which apply to specific procedural steps within an enclosure of AP-05. Those steps provide direction with regards to unit status relative to Tech Spec applicability for the current plant condition.

Job Level	Cognitive Level	QuestionType	Question Source
SRO	Comprehension	BANK	MNS Bank

Development References	Student References Provided
AP-05 AP-05 basis document	

APE077 2.2.40 - Generator Voltage and Electric Grid Disturbances
APE077 GENERIC
Ability to apply Technical Specifications for a system. (CFR: 41.10 / 43.2 / 43.5 / 45.3)

Remarks/Status

MNS ILT 20-1R NRC Written MNS SRO NRC Reta QUESTION 88

C

WE04 2.2.44 - LOCA Outside Containment

WE04 GENERIC

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. (CFR: 41.5 / 43.5 / 45.12)

Given the following on Unit 2:

- The CRS has implemented ECA-1.2 (LOCA OUTSIDE CONTAINMENT)
- U2 FWST level is slowly lowering
- NC system pressure is 1600 PSIG and slowly lowering

Per ECA-1.2, a cooldown and depressurization of the NC System is performed to allow the ___(1)____.

Per ECA 1.2 basis document, the target temperature selected for the NC system cooldown ensures a ____(2)____ event does NOT occur.

Which ONE of the following completes the statements above?

A. 1. Cold Leg Accumulators to inject
   2. Pressurized Thermal Shock (PTS)

B. 1. Cold Leg Accumulators to inject
   2. Core re-criticality

C. 1. ND isolation valves (1NI-173A and 1NI-178B) to close
   2. Pressurized Thermal Shock (PTS)

D. 1. ND isolation valves (1NI-173A and 1NI-178B) to close
   2. Core re-criticality

General Discussion

Per ECA-1.2, there are two critical actions in this EP to ensure core cooling:
Isolate ND suction from FWST to stop rapid depletion of FWST and Stop break flow from NC to ND break after NC cooldown and depressurization by fully closing NI-173A and NI-178B.

Per ECA-1.2 basis document, the target temperature used in the cooldown is higher than the lowest allowable temperature used in E-3. The lowest E-3 target temperature is selected to prevent cooling down to the point where PTS may be of concern. This bounds the target temperature used in ECA-1.2 and ensures this operator action does not cause a PTS event.

Answer A Discussion

INCORRECT:

PLAUSIBLE:
Part 1 is plausible because if the ND leak cannot be isolated before depleting the FWST, a transition to ECA-1.1 (Loss of ECR) would occur, and then the NCS is depressurized to allow CLA injection..

Part 2 is correct.

Answer B Discussion

INCORRECT:

PLAUSIBLE:
Part 1 is plausible because if the ND leak cannot be isolated before depleting the FWST, a transition to ECA-1.1 (Loss of ECR) would occur, and then the NCS is depressurized to allow CLA injection..

Part 2 is plausible because the large cooldown does create a potential reactivity concern, but the McGuire nuclear design group reviewed this cooldown step for potential reactivity concerns to ensure this operator action would not cause a recriticality event.

Answer C Discussion

CORRECT: See explanation above.

Answer D Discussion

INCORRECT:

PLAUSIBLE:
Part 1 is correct.

Part 2 is plausible because the large cooldown does create a potential reactivity concern, but the McGuire nuclear design group reviewed this cooldown step for potential reactivity concerns to ensure this operator action would not cause a recriticality event.

Basis for meeting the KA

The KA is matched because the applicant demonstrates the ability to interpret control room indications requiring a cooldown and depressurization in ECA-1.2 and how the cooldown to target temperature affects system/plant conditions (PTS/Reactivity).

Basis for Hi Cog

Basis for SRO only

This question meets the following criteria for an SRO only question as described in NUREG 1021, Rev. 11, ES-401, Attachment 2 (Assessment and selection of procedures):
This question requires additional knowledge of procedure content (information contained in the associated basis document).

Job Level	Cognitive Level	QuestionType	Question Source
SRO	Memory	MODIFIED	2020 MNS NRC (BANK 7857)

Development References	Student References Provided
ECA-1.2 . OP-MC-EP-E1 Basis doc	

WE04 2.2.44 - LOCA Outside Containment
WE04 GENERIC

D

MNS ILT 20-1R NRC Written MNS SRO NRC Reta QUESTION 89

WE11 EA2.2 - Loss of Emergency Coolant Recirculation
Ability to determine and interpret the following as they apply to the (Loss of Emergency Coolant Recirculation)
(CFR: 43.5 / 45.13)
Adherence to appropriate procedures and operation within the limitations in the facility*s license and amendments.

Given the following on Unit 1:

- A LOCA has occurred
- The CRS has transitioned from ES-1.3 (TRANSFER TO COLD LEG RECIRC) to ECA-1.1 (LOSS OF EMERGENCY COOLANT RECIRC)
- Containment pressure is currently 3.2 PSIG

Per ECA-1.1, while attempting to establish recirculation flow the crew will cool the core by ____(1)____.

While performing ECA-1.1, if a RED Path occurs on Core Cooling the crew ____(2)____ transition to FR-C.1 (RESPONSE TO INADEQUATE CORE COOLING).

Which ONE of the following completes the statements above?

A. 1. aligning the NC system for Feed and Bleed
   2. will NOT

B. 1. aligning the NC system for Feed and Bleed
   2. will

C. 1. dumping steam from the intact Steam Generators
   2. will NOT

D. 1. dumping steam from the intact Steam Generators
   2. will

General Discussion

In accordance with ECA-1.1, NC system cooling is provided by dumping steam from intact S/Gs to the Main Condenser (if it is available) or to atmosphere. For the example given, a Main Steam Line Isolation has occurred. Therefore, the MSI signal must be reset before dumping steam to cooldown the NC system is available. However, the MSI signal can be reset even with Containment pressure greater than 3.0 PSIG.
If a RED Path occurs on Core Cooling while in ECA-1.1, the crew WILL transition to FR-C.1 (Response to Inadequate Core Cooling). The reason for this is that the crew transitioned to ECA-1.1 from ES-1.3 (Transfer to Cold Leg Recirc) when they were unable to establish Cold Leg Recirc. And, all transitions from ES-1.3 to ECA-1.1 have a step prior to the transition to commence monitoring CSFSTs.

Answer A Discussion

INCORRECT:

PLAUSIBLE:
Part 1 is plausible because NC system Feed and Bleed is used in other procedures in the EOP network (i.e. ECA-0.0, FR-H.1). Additionally, because a Main Steam Isolation has occurred, the applicant may conclude that dumping steam is not an option. Especially since Containment pressure is still above 3.0 PSIG (MSI setpoint).

Part 2 is plausible if the applicant does not recall the step in ES-1.3 prior to the transition to ECA-1.1 which directs the crew to commence monitoring CSFSTs. Also plausible since some Emergency procedures (ES-1.3 Transfer to Cold Leg Recirc) require monitoring CSF status trees for information only.

Answer B Discussion

INCORRECT:

PLAUSIBLE:
Part 1 is plausible because NC system Feed and Bleed is used in other procedures in the EOP network (i.e. ECA-0.0, FR-H.1). Additionally, because a Main Steam Isolation has occurred, the applicant may conclude that dumping steam is not an option. Especially since Containment pressure is still above 3.0 PSIG (MSI setpoint).

Part 2 is correct.

Answer C Discussion

INCORRECT:

PLAUSIBLE:
Part 1 is correct.

Part 2 is plausible if the applicant does not recall the step in ES-1.3 prior to the transition to ECA-1.1 which directs the crew to commence monitoring CSFSTs. Also plausible since some Emergency procedures (ES-1.3 Transfer to Cold Leg Recirc) require monitoring CSF status trees for information only.

Answer D Discussion

CORRECT: See explanation above.

Basis for meeting the KA

The K/A is match because the applicant is presented with conditions were ECA-1.1 (Loss of Emergency Coolant Recirc) has been implemented and they must determine based on given conditions if transition to FR-C.1 is allowed should the RED Path conditions for Core Cooling be met.

Basis for Hi Cog

This is a higher cognitive level question because it requires more than one mental step.
First the applicant must recall from memory the methods of cooling the NC system allowed by ECA-1.1.
Next , the applicant must evaluate the conditions given to determine how the crew entered ECA-1.1 to determine if CSFST monitoring has been implemented.

Basis for SRO only

This question meets the following criteria for an SRO only question as described in NUREG 1021, Rev. 11, ES-401, Attachment 2 (Assessment and selection of procedures):

This question requires the applicant to have sufficiently detailed knowledge of the associated procedure to allow them to make a correct decision regarding procedure transition. The applicant must know that prior to all transitions from ES-1.3 that lead to ECA-1.1, there is a step which directs implementation of the Critical Safety Function Status Trees (CSFSTs). This level of detailed procedure knowledge related to procedure transitions is not expected of ROs.
The apllicant must also know the procedure trasitions from ECA-1.1.

MNS ILT 20-1R NRC Written MNS SRO NRC Reta QUESTION 89

D

Job Level	Cognitive Level	QuestionType	Question Source
SRO	Comprehension	BANK	2013 CNS Audit (BANK 4911)

Development References
EP-ECA-1.1 EP-ES-1.3 OP-MC-ECC-ISE

Student References Provided

WE11 EA2.2 - Loss of Emergency Coolant Recirculation
Ability to determine and interpret the following as they apply to the (Loss of Emergency Coolant Recirculation)
(CFR: 43.5 / 45.13)
Adherence to appropriate procedures and operation within the limitations in the facility*s license and amendments.

Remarks/Status

C

MNS ILT 20-1R NRC Written MNS SRO NRC Reta QUESTION 90

APE005 AA2.01 - Inoperable/Stuck Control Rod

Ability to determine and interpret the following as they apply to the Inoperable / Stuck Control Rod: (CFR: 43.5 / 45.13)

Stuck or inoperable rod from in-core and ex-core NIS, in-core or loop temperature measurements .....

Given the following on Unit 1:

- A unit startup is in progress
- Reactor power is at 4% RTP and holding
- The crew determines that Control Rod M-4 is misaligned by greater than 12 steps

Per AP-14 (ROD CONTROL MALFUNCTION), Enclosure 1 (RESPONSE TO DROPPED OR MISALIGNED ROD):

1) The crew will use _____ to determine reactor power during implementation of Enclosure 1.

2) Based on current plant conditions, the CRS will direct the crew to _____.

Which ONE of the following completes the statements above?

A. 1. Excore Nuclear Instruments
   2. shutdown to MODE 3

B. 1. Excore Nuclear Instruments
   2. maintain power stable until the cause of the misaligned rod is corrected

C. 1. Thermal Power Best Estimate
   2. shutdown to MODE 3

D. 1. Thermal Power Best Estimate
   2. maintain power stable until the cause of the misaligned rod is corrected

---

General Discussion

Per AP-14 Enclosure 1, step 6 directs the crew to use Reactor Thermal Power Best Estimate to determine power in subsequent steps.

Per AP-14 Enclosure 1, step 12 RNO b, if in Mode 2, then shutdown to Mode 3 per OP/1/A/6100/003.

Answer A Discussion

INCORRECT:

PLAUSIBLE:
Part 1 is plausible because during the implementation of other APs and EPs (i.e. AP-01, FR-S.1), the crew would use Excore Nuclear Instrument indication to determine reactor power.

Part 2 is correct.

Answer B Discussion

INCORRECT:

PLAUSIBLE:
Part 1 is plausible because during the implementation of other Aps and Eps (i.e. AP-01, FR-S.1), the crew would use Excore Nuclear Instrument indication to determine reactor power.

Part 2 is plausible because AP-14 directs the crews "Do not move rods until IAE determines rod movement is available".

Answer C Discussion

CORRECT: See explanation above.

Answer D Discussion

INCORRECT:

PLAUSIBLE:
Part 1 is correct.

Part 2 is plausible because AP-14 directs the crews "Do not move rods until IAE determines rod movement is available".

Basis for meeting the KA

The K/A is matched because it requires the applicant to demonstrate the ability to use the correct indications for reactor power when determining appropriate actions to mitigate the consequences of a misaligned control rod.

Basis for Hi Cog

This is a higher cognitive level question because it requires more than one mental step. First, the applicant must analyze the given conditions to determine that the reactor is at less than 5% power (i.e. just reached the POAH). The applicant must then recall from memory that, despite the fact that continued operation is allowed by Tech Specs, with power less than 5%, AP-14 requires a shutdown to MODE 3.

Basis for SRO only

This question meets the following criteria for an SRO only question as described in NUREG 1021, Rev. 11, ES-401, Attachment 2 (Assessment and selection of procedures):

The question can NOT be answered solely by knowing entry conditions for AOP or direct entry conditions for EOPs.
1) Neither part of the question is related to entry conditions for AP-14.
2) The question can NOT be answered solely by knowing the purpose, overall sequence of events, or overall mitigative strategy of the procedure.

This is detailed knowledge of procedure step requirements within an enclosure of the abnormal procedure that leads to a procedure transition to shut down the unit.

Job Level	Cognitive Level	QuestionType	Question Source
SRO	Comprehension	BANK	MNS Bank

Development References	Student References Provided
AP-14 TS 3.1.4	

APE005 AA2.01 - Inoperable/Stuck Control Rod
Ability to determine and interpret the following as they apply to the Inoperable / Stuck Control Rod: (CFR: 43.5 / 45.13)

MNS ILT 20-1R NRC Written MNS SRO NRC Reta QUESTION 91

B

APE069 AA2.02 - Loss of Containment Integrity
Ability to determine and interpret the following as they apply to the Loss of Containment Integrity: (CFR: 43.5 / 45.13)
Verification of automatic and manual means of restoring integrity .....

Given the following on Unit 1:

- Unit is at 100% RTP
- The Upper Airlock Inner Door will not close and had been declared INOPERABLE

Per TS 3.6.2 (CONTAINMENT AIR LOCKS), action must be taken within one hour to ____(1)____.

Per TS 3.6.2 Bases, closure of ____(2)____ is required to support containment OPERABILITY.

Which ONE of the following completes the statements above?

A. 1. verify the OPERABLE door is closed
   2. BOTH airlock doors

B. 1. verify the OPERABLE door is closed
   2. a single airlock door ONLY

C. 1. lock the OPERABLE door closed
   2. BOTH airlock doors

D. 1. lock the OPERABLE door closed
   2. a single airlock door ONLY

General Discussion

Per TS 3.6.2, With one or more containment airlock with one airlock door inoperable, the required action is to verify the operable door is closed in the affected airlock within one hour.

Per TS 3.6.2 Bases, each air lock door has been designed and tested to certify its ability to withstand a pressure in excess of the maximum expected pressure following a Design Basis Accident (DBA) in containment. As such, closure of a single door supports containment OPERABILITY.

Answer A Discussion

INCORRECT:

PLAUSIBLE:
Part 1 is correct.

Part 2 is plausible because both airlock doors must be operable for the airlock to be operable.

Answer B Discussion

CORRECT: See explanation above.

Answer C Discussion

INCORRECT:

PLAUSIBLE:
Part 1 is plausible because locking the operable door closed is a required action but it is not required to be done within one hour.

Part 2 is plausible because both airlock doors must be operable for the airlock to be operable.

Answer D Discussion

INCORRECT:

PLAUSIBLE:
Part 1 is plausible because locking the operable door closed is a required action but it is not required to be done within one hour.

Part 2 is correct.

Basis for meeting the KA

The K/A is matched because the applicant is given conditions which could constitute a loss of containment integrity . The applicant is required to know how containment isolation is accomplished under this condition (by applying TS).

Basis for Hi Cog

Basis for SRO only

This question meets the following criteria for an SRO only question as described in NUREG-1021 Rev. 11, ES-401 Attachment 2 "Clarification Guidance for SRO-only Questions" for screening questions linked to 10CFR55.43(b)(2) (Tech Specs):

1) Question can not be answered solely by knowing less than or equal to 1 hour TS Action.
2) Question can not be answered solely by knowing the LCO information listed "above the line".
3) Question can not be answered solely by knowing the TS Safety Limits.
4) Question does require applicants to apply knowledge of TS bases information, therefore the question is SRO-only.

Job Level	Cognitive Level	QuestionType	Question Source
SRO	Memory	MODIFIED	(BANK 4854)

Development References	Student References Provided
TS 3.6.2 TS 3.6.2 Bases	

APE069 AA2.02 - Loss of Containment Integrity
Ability to determine and interpret the following as they apply to the Loss of Containment Integrity: (CFR: 43.5 / 45.13)
Verification of automatic and manual means of restoring integrity .....

C

MNS ILT 20-1R NRC Written MNS SRO NRC Reta QUESTION 92

APE076 2.4.31 - High Reactor Coolant Activity
APE076 GENERIC
Knowledge of annunciator alarms, indications, or response procedures. (CFR: 41.10 / 45.3)

Given the following on Unit 2:

- Unit is at 100% RTP
- 2EMF-48 (REACTOR COOLANT HI RAD) is in alarm

Subsequently:

- The CRS has implemented AP-18 (HIGH ACTIVITY IN REACTOR COOLANT)
- Chemistry reports Dose Equivalent 1-131 is 75 µCi/gm

Per TS 3.4.16 (RCS SPECIFIC ACIVITY), a Unit shutdown ____(1)____ required.

Per TS 3.4.16 Bases, the limit on specific activity of the reactor coolant ensures that resulting doses meet the acceptance criteria following a Steam Line Break or ____(2)___

Which ONE of the following completes the statements above?

A. 1. is
   2. LOCA

B. 1. is NOT
   2. LOCA

C. 1. is
   2. SGTR

D. 1. is NOT
   2. SGTR

General Discussion

Per TS 3.4.16, if DEI is greater than 60 µCi/gm the required action is to be in Mode 3 within 6 hours.

Per TS 3.4.16 Bases, The LCO limits on the specific activity of the reactor coolant ensure that the resulting offsite and control room doses meet the appropriate
acceptance criteria following a SLB or SGTR accident.

Answer A Discussion

INCORRECT:

PLAUSIBLE:
Part 1 is correct.

Part 2 is plausible because other reactor coolant tech specs such as 3.4.13 (RCS Operational Leakage) are related to the safety analyses for a LOCA.

Answer B Discussion

INCORRECT:

PLAUSIBLE:
Part 1 is plausible because the TS limit for DEI is less than 1 µCi/gm and continued operation is allowed while sampling every 4 hours. Also plausible because TS 3.4.16 also limits Xe-133 and continued operation is allowed with Xe-133 out of spec.

Part 2 is plausible because other reactor coolant tech specs such as 3.4.13 (RCS Operational Leakage) are related to the safety analyses for a LOCA.

Answer C Discussion

CORRECT: See explanation above.

Answer D Discussion

INCORRECT:

PLAUSIBLE:
Part 1 is plausible because the TS limit for DEI is less than 1 µCi/gm and continued operation is allowed while sampling every 4 hours. Also plausible because TS 3.4.16 also limits Xe-133 and continued operation is aalowed with Xe-133 out of spec.

Part 2 is correct.

Basis for meeting the KA

The K/A is matched because the applicant demonstrates knowledge of annunciator alarms, indications (chemistry reports) and response procedures (Tech Specs) associated with High Reactor Coolant activity.

Basis for Hi Cog

Basis for SRO only

This question meets the following criteria for an SRO only question as described in NUREG-1021 Rev. 11, ES-401 Attachment 2 "Clarification Guidance for SRO-only Questions" for screening questions linked to 10CFR55.43(b)(2) (Tech Specs):

1) Question can not be answered solely by knowing less than or equal to 1 hour TS Action.
2) Question can not be answered solely by knowing the LCO information listed "above the line".
3) Question can not be answered solely by knowing the TS Safety Limits.
4) Question does require applicants to apply knowledge of TS bases information, therefore the question is SRO-only.

Job Level	Cognitive Level	QuestionType	Question Source
SRO	Memory	NEW	

Development References

TS 3.4.16
TS 3.4.16 Bases
TS 3.4.13 Bases

Student References Provided

APE076 2.4.31 - High Reactor Coolant Activity

WE02 2.1.32 - SI Termination
WE02 GENERIC
Ability to explain and apply system limits and precautions. (CFR: 41.10 / 43.2 / 45.12)

Given the following on Unit 2:

- Unit was at 100% RTP when a spurious Safety Injection occurred due to an instrument malfunction

The CRS will direct initiation of the SI termination sequence per ____(1)____.

SI Termination must be completed within a MAXIMUM of ____(2)____ minutes.

Which ONE of the following completes the statements above?

PROCEDURE LEGEND:
E-0 (REACTOR TRIP OR SAFETY INJECTION)
ES-1.1 (SAFETY INJECTION TERMINATION)

A. 1. E-0
2. 10

B. 1. E-0
2. 15

C. 1. ES-1.1
2. 10

D. 1. ES-1.1
2. 15

General Discussion

Safety Injection termination sequence will be initiated in E-0 if no other transitions have been made per the diagnostic steps. The termination sequence was added to E-0 to reduce the time it takes to terminate SI to prevent going water solid in the PZR.

Time Critical Operation Action - When at normal full temp/press conditions, operations management expectation is that S/I will be terminated and letdown established prior to going solid in Pzr. FSAR limit is to have S/I terminated (i.e. NI-9&10 closed) within 15 minutes.

Answer A Discussion

INCORRECT:

PLAUSIBLE:
Part 1 is correct.

Part 2 is plausible because this is the required time to terminate SI when in LTOP mode.

Answer B Discussion

CORRECT: See explanation above.

Answer C Discussion

INCORRECT:

PLAUSIBLE:
Part 1 is plausible because ES-1.1 will be used to terminate SI in most cases (other than spurious SI).

Part 2 is plausible because this is the required time to terminate SI when in LTOP mode.

Answer D Discussion

INCORRECT:

PLAUSIBLE:
Part 1 is plausible because ES-1.1 will be used to terminate SI in most cases (other than spurious SI)..

Part 2 is correct.

Basis for meeting the KA

The K/A is matched because the applicant is required to demonstrate the ability to apply time critical actions per a station commitment as it applies to SI termination.
(K/A was amended on 7/9/2020 per the CE to include WE02 (SI Termination).

Basis for Hi Cog

Basis for SRO only

This question meets the following criteria for an SRO only question as described in NUREG 1021, Rev. 11, ES-401, Attachment 2 (Assessment and selection of procedures):

This question requires the applicant to assess plant conditions, and then select a procedure to mitigate along with demonstrating knowledge of a time requirement to accomplish recovery actions per station commitment.

Job Level	Cognitive Level	QuestionType	Question Source
SRO	Memory	BANK	2017 CNS NRC (BANK 7180)

Development References

E-0
OP-MC-EP-E-0
ES-1.1
PT/0/A/4600/113 (Time Critical Operator Actions)

Student References Provided

WE02 2.1.32 - SI Termination
WE02 GENERIC
Ability to explain and apply system limits and precautions. (CFR: 41.10 / 43.2 / 45.12)

C

MNS ILT 20-1R NRC Written MNS SRO NRC Reta QUESTION 94

GEN2.1 2.1.20 - GENERIC - Conduct of Operations
Conduct of Operations
Ability to interpret and execute procedure steps. (CFR: 41.10 / 43.5 / 45.12)

Per AD-OP-ALL-1001 (CONDUCT OF ABNORMAL OPERATIONS), regarding variances:

1) Prior to taking action, the CRS approving the Variance _____ from a second SRO.

2) When invoking a Variance that requires departing from Technical Specifications, the NRC Operations Center must be notified within a MAXIMUM of _____.

Which ONE of the following completes the statements above?

A. 1. must ALWAYS obtain concurrence
2. 15 minutes

B. 1. must ALWAYS obtain concurrence
2. 1 HOUR

C. 1. will obtain concurrence if time allows
1. 1 HOUR

D. 1. will obtain concurrence if time allows
2. 15 minutes

General Discussion

Per AD-OP-ALL-1001,
Variance: Taking action during an event not covered by an approved procedure in order to protect public health and safety, or mitigate damage and injury.
Prior to taking action, the CRS approves of the Variance. If time allows, then concurrence from a second SRO should be obtained.

A Variance that departs from Technical Specification is also a Deviation.
Deviations - 10 CFR 50.54x Departure from Licensed Condition for Protection of Public Health and Safety
Notify the NRC per 10 CFR 50.72 requirements due to invoking 50.54(x).
(1) Notify the NRC Operations Center using the Emergency Notification System (ENS).
(2) When time permits, then notify the NRC Operations Center prior to taking the action.
(3) Otherwise, notify the NRC Operations Center as soon as possible and in all cases, within 1 hour after taking the action.

Answer A Discussion

INCORRECT:

PLAUSIBLE:
Part 1 is plausible because Variances are special circumstances and the applicant may conclude a second SRO's concurrence is required. Also plausible in that a peer check / second approval is normal in day to day operations.

Part 2 is plausible because there are notifications to the NRC that are required to made in a 15 minute time period such as emergency notification.

Answer B Discussion

INCORRECT:

PLAUSIBLE:
Part 1 is plausible because Variances are special circumstances and the applicant may conclude a second SRO's concurrence is required. Also plausible in that a peer check / second approval is normal in day to day operations.

Part 2 is correct.

Answer C Discussion

CORRECT: See explanation above.

Answer D Discussion

INCORRECT:

PLAUSIBLE:
Part 1 is correct.

Part 2 is plausible because there are notifications to the NRC that are required to made in a 15 minute time period such as emergency notification.

Basis for meeting the KA

The KA is matched because the applicant demonstrates the ability to interpret and execute procedure steps by knowing when actions contained in station procedures are not effective or required actions are not contained in station procedures and the process to invoke and perform the required actions to place the plant in a safe condition.

Basis for Hi Cog

Basis for SRO only

The question is SRO-ONLY because it requires the operator to possess knowledge of the process by which to take a procedure Variance, including whena variance is a deviation and requires invoking 10CFR50.54(x) which is an SRO function.

Job Level	Cognitive Level	QuestionType	Question Source
SRO	Memory	MODIFIED	2019 RNP (BANK 8797)

Development References	Student References Provided
AD-OP-ALL-1001 (Rev 3)	

GEN2.1 2.1.20 - GENERIC - Conduct of Operations
Conduct of Operations

GEN2.1 2.1.23 - GENERIC - Conduct of Operations

Conduct of Operations

Ability to perform specific system and integrated plant procedures during all modes of plant operation. (CFR: 41.10 / 43.5 / 45.2 / 45.6)

Given the following on Unit 1:

- Unit is at 100% RTP
- 1EMF-33 (CONDENSER AIR EJECTOR EXHAUST) is in Trip 2 alarm
- 1EMF-71 (S/G A LEAKAGE) is in Trip 2 alarm
- Pressurizer level has been stabilized using AP-10 (NC LEAKAGE WITHIN THE CAPACITY OF BOTH NV PUMPS)
- Letdown flow is 45 GPM
- Charging flow is 70 GPM

The MAXIMUM time that AP-10 allows for the unit to reach MODE 3 for the conditions specified is ____(1)____.

Per SLC 16.9.7 (STBY S/D SYSTEM) Condition C (LEAKAGE), the Standby Makeup Pump is ____(2)____.

Which ONE of the following completes the statements above?

A. 1. 6 hours
   2. NON-FUNCTIONAL

B. 1. 6 hours
   2. FUNCTIONAL

C. 1. 3 hours
   2. NON-FUNCTIONAL

D. 1. 3 hours
   2. FUNCTIONAL

General Discussion

With the indications given, the crew would be required to enter AP-10 (NC System Leakage), Case 1 (S/G Tube leakage). This procedure would direct the crew to stabilize PZR level and determine leak size.
Leakage rate is 70 - 45 - 12= 13 gpm. In accordance with SLC 16.9.7, Condition C, the Standby Makeup Pump is FUNCTIONAL . Step 6 of AP-10 Case 1, directs an SRO to evaluate if leakage exceeds SLC 16.9.7 Condition C limits. The limit is defined as >20 GPM.
Per TS 3.4.13 (NC Operational Leakage), the limit for a individual S/G tube leakage of 135 GPD would be exceeded. If this leakage is exceeded, Condition B requires the unit be in Mode 3 in 6 hours. Per Step 7 of AP-10, Case 1, if the leakage in one S/G is greater than 125 GPD, the unit is required to be in Mode 3 within 3 hours of exceeding 125 GPD.

Answer A Discussion

INCORRECT:

PLAUSIBLE:
Part 1 is plausible because this is correct per the requirement of Condition B of TS 3.4.13 (NC Operational Leakage) which requires the unit to be in Mode 3 in 6 hours. It would reasonable for the applicant to believe this would also be the required time specified in AP-10.

Part 2 is plausible if the applicant subtracts letdown flow from charging flow and neglects seal return flow (12 GPM). If that were the case, the applicant would determine that total leakage would be 25 GPM (70 - 45) instead of 13 GPM (70 -45 -12). Since the applicant determines leakage to be greater than 20 GPM, the Standby Makeup Pump would have to be declared NON-FUNCTIONAL.

Answer B Discussion

INCORRECT:

PLAUSIBLE:
Part 1 is plausible because this is correct per the requirement of Condition B of TS 3.4.13 (NC Operational Leakage) which requires the unit to be in Mode 3 in 6 hours. It would reasonable for the applicant to believe this would also be the required time specified in AP-10.

Part 2 is correct.

Answer C Discussion

INCORRECT:

PLAUSIBLE:
Part 1 is correct.

Part 2 is plausible if the applicant subtracts letdown flow from charging flow and neglects seal return flow (12 GPM). If that were the case, the applicant would determine that total leakage would be 25 GPM (70 - 45) instead of 13 GPM (70 -45 -12). Since the applicant determines leakage to be greater than 20 GPM, the Standby Makeup Pump would have to be declared NON-FUNCTIONAL.

Answer D Discussion

CORRECT: See explanation above.

Basis for meeting the KA

The K/A is matched because the applicant demonstrates the ability to perform the S/G tube leakage AP (integrated plant) from 100% RTP.

Basis for Hi Cog

This is a higher cognitive level question because the applicant must perform a calculation, then perform a level of analysis concerning the given indications and determine the correct procedural course of action.

Basis for SRO only

This question meets the following criteria for an SRO only question as described in NUREG 1021, Rev. 11, ES-401, Attachment 2 (Assessment and selection of procedures):

The question can NOT be answered solely by knowing entry conditions for AOP or direct entry conditions for EOPs.
1) Neither part of the question is related to entry conditions for AP-10.
2) The question can NOT be answered solely by knowing the purpose, overall sequence of events, or overall mitigative strategy of the procedure.

This is detailed knowledge of abnormal procedure content related to knowing the plant shutdown requirements which would require a procedure transition to AP-04.
The question also requires the applicant to recall a "below the bar" TS (SLC) limit associated with the S/G tube leakage. Therefore, it is SRO knowledge.

Job Level	Cognitive Level	QuestionType	Question Source
SRO	Comprehension	MODIFIED	2015 MNS Audit (BANK 4440)

MNS ILT 20-1R NRC Written MNS SRO NRC Reta QUESTION 95

D

Development References
AP-10 SLC 16.9.7 TS 3.4.13

Student References Provided

GEN2.1 2.1.23 - GENERIC - Conduct of Operations

Conduct of Operations

Ability to perform specific system and integrated plant procedures during all modes of plant operation. (CFR: 41.10 / 43.5 / 45.2 / 45.6)

Remarks/Status

MNS ILT 20-1R NRC Written MNS SRO NRC Reta QUESTION 96

B

GEN2.2 2.2.15 - GENERIC - Equipment Control

Equipment Control

Ability to determine the expected plant configuration using design and configuration control documentation, such as drawings, line-ups, tag-outs, etc. (CFR: 41.10 / 43.3 / 45.13)

Given the following on Unit 1:

- Unit shutdown and cooldown has been performed in preparation for a refueling outage
- Unit is currently in MODE 6
- NC System level is required to be lowered to 70 inches WR Level

Per AD-WC-ALL-0420 (SHUTDOWN RISK MANAGEMENT), this evolution will place the Unit in a ____(1)____ Inventory condition.

A SOER 91-01/IPTE briefing ____(2)____ required prior to commencing this evolution.

Which ONE of the following completes the statements above?

REFERENCE PROVIDED

A. 1. Lowered
   2. is NOT

B. 1. Lowered
   2. is

C. 1. Reduced
   2. is NOT

D. 1. Reduced
   2. is

General Discussion

Per AD-WC-ALL-0420,
Lowered Inventory is a plant condition where fuel is in the reactor vessel and one of the following conditions exist:
for a PWR, reactor vessel inventory level is at or below the reactor vessel flange.

Per OP/1/A/6100/SO-1,
IF NC System to be lowered to Lowered Inventory, Reduced Inventory OR Mid Loop with fuel in the core, THEN ensure a NC System Drain SOER 91-01/IPTE Briefing has been performed as directed by AD-WC-MNS-0420 (Shutdown Risk Management).

Answer A Discussion

INCORRECT:

PLAUSIBLE:
Part 1 is correct.

Part 2 is plausible because lowered and reduced inventory are more common during outages and applicant may conclude this type of briefing would apply to draining to midloop only. Also plausible because the procedure only requires a management designee and evolution coordinator when draining below reduced inventory.

Answer B Discussion

CORRECT: See explanation above.

Answer C Discussion

INCORRECT:

PLAUSIBLE:
Part 1 is plausible because reduced inventory is a level below the reactor vessel flange but is specifically defined as 60 inches WR level (2 feet below the flange) .

Part 2 is plausible because lowered and reduced inventory are more common during outages and applicant may conclude this type of briefing would apply to draining to midloop only. Also plausible because the procedure only requires a management designee and evolution coordinator when draining below reduced inventory.

Answer D Discussion

INCORRECT:

PLAUSIBLE:
Part 1 is plausible because reduced inventory is a level below the reactor vessel flange but is specifically defined as 60 inches WR level (2 feet below the flange) .

Part 2 is correct.

Basis for meeting the KA

The K/A is matched because the applicant demonstrates the ability to use drawings to determine the expected plant configuration/condition (specifically NC system level for a drain down evolution).

Basis for Hi Cog

This question is higher cognitive because the applicant must apply conditions in the stem to the reference material provided to determine the status of the unit and then recall from memory the procedural requirements for evolution briefings.

Basis for SRO only

This is an SRO-Only question as designated by 10 CFR 55.43(b)(3):
"Facility Licensee Procedures Required to Obtain Authority for Design and Operating Changes"
Specifically, "screening and evaluation processes under 10CFR 5059 (Changes, Tests and Experiments" (Infrequently Performed Tests and Evolutions)
Also demonstrates knowledge of administrative procedures that specify implementation and/or coordination of plant normal procedures.

Job Level	Cognitive Level	QuestionType	Question Source
SRO	Comprehension	NEW	

MNS ILT 20-1R NRC Written MNS SRO NRC Reta QUESTION 96

B

Development References	Student References Provided
AD-WC-ALL-0420 OP/1A/6100/SO-1	OP/1/A/6100/SO-1 page 89

GEN2.2 2.2.15 - GENERIC - Equipment Control

Equipment Control

Ability to determine the expected plant configuration using design and configuration control documentation, such as drawings, line-ups, tag-outs, etc. (CFR: 41.10 / 43.3 / 45.13)

Remarks/Status

D

MNS ILT 20-1R NRC Written MNS SRO NRC Reta QUESTION 97

GEN2.2 2.2.20 - GENERIC - Equipment Control
Equipment Control
Knowledge of the process for managing troubleshooting activities. (CFR: 41.10 / 43.5 / 45.13)

Given the following on Unit 2:

- Unit is at 100% RTP
- 2A Boric Acid Transfer pump has been removed from service for motor replacement
- 2B Boric Acid Transfer pump is protected

Subsequently:

- 2B Boric Acid Transfer pump is secured due to high bearing temperatures
- Maintenance has requested to collect an oil sample from the 2B Boric Acid Transfer pump for troubleshooting

Per AD-OP-ALL-0201 (PROTECTED EQUIPMENT),

1) The WCC SRO ____(1)____ approve a request for work on protected equipment.

2) Prior to approval, a person from ____(2)____ is required to conduct a job site inspection to evaluate impact on protected equipment.

Which ONE of the following completes the statements above?

A. 1. can
   2. the requesting work group

B. 1. can
   2. Operations

C. 1. can NOT
   2. the requesting work group

D. 1. can NOT
   2. Operations

General Discussion

Per AD-OP-ALL-0201, the completed request for work on protected equipment is reviewed and approved by the SM on duty.
Per AD-OP-ALL-0201 Attachment 2 (Approval form), prior to approval, an Operations person has conducted a job-site inspection to evaluate adequacy of work area and potential impact on other protected train equipment.

Answer A Discussion

INCORRECT:

PLAUSIBLE:
Part 1 is plausible because the WCC SRO does evaluate conditions (including protected equipment) and sign on work, thus giving approval for work crews to begin work.

Part 2 is plausible because it is required of the work group to walk down a job at the site and perform the protected area work brief with the SM.

Answer B Discussion

INCORRECT:

PLAUSIBLE:
Part 1 is plausible because the WCC SRO does evaluate conditions (including protected equipment) and sign on work, thus giving approval for work crews to begin work.

Part 2 is correct.

Answer C Discussion

INCORRECT:

PLAUSIBLE:
Part 1 is correct.

Part 2 is plausible because it is required of the work group to walk down a job at the site and perform the protected area work brief with the SM.

Answer D Discussion

CORRECT: See explanation above.

Basis for meeting the KA

The K/A is matched because the applicant displays knowledge of the process for signing on work for troubleshooting activities. Specifically, evaluating and approving work on protected equipment.

Basis for Hi Cog

Basis for SRO only

The question is SRO-ONLY because it tests knowledge of SRO administrative responsibilities for managing troubleshooting activities.

Job Level	Cognitive Level	QuestionType	Question Source
SRO	Memory	BANK	MNS Bank

Development References	Student References Provided
AD-OP-ALL-0201 AD-OP-ALL-1000	

GEN2.2 2.2.20 - GENERIC - Equipment Control
Equipment Control
Knowledge of the process for managing troubleshooting activities. (CFR: 41.10 / 43.5 / 45.13)

Remarks/Status

GEN2.3 2.3.14 - GENERIC - Radiation Control

Radiation Control

Knowledge of radiation or contamination hazards that may arise during normal, abnormal, or emergency conditions or activities. (CFR: 41.12 / 43.4 / 45.10)

Given the following conditions:

- A General Emergency has been declared
- An AO must be dispatched from the Operations Support Center to an area with an identified radiation field of 110 R/hr in order to isolate the pathway for a large release to the environment
- The operator will be in the area for 15 minutes

Per AD-EP-ALL-0205 (EMERGENCY EXPOSURE CONTROLS),

1) the AO selected to perform this isolation ____(1)____ required to be a volunteer.

2) Performance of this task ____(2)____ considered a Planned Special Exposure (PSE).

Which ONE of the following completes the statements above?

A. 1. is
   2. is NOT

B. 1. is
   2. is

C. 1. is NOT
   2. is NOT

D. 1. is NOT
   2. is

General Discussion

Per AD-EP-EP-ALL-0205,
personnel whose exposure during an emergency event that is expected to exceed 25 rem TEDE shall be volunteers
and
a Planned Special Exposure is an infrequent exposure to radiation separate from, and in addition to, the annual dose limits.. This procedure also states that it does not apply to conditions or situations involving emergency dose limits.

Per the question stem, the expected dose for the job would be 27.5 rem TEDE.

Answer A Discussion

CORRECT: See explanation above.

Answer B Discussion

INCORRECT:

PLAUSIBLE:
Part 1 is correct.

Part 2 is plausible because the definition of a Planned Special Exposure is "an infrequent exposure to radiation separate from, and in addition to, the annual dose limits" which is what this is.

Answer C Discussion

INCORRECT:

PLAUSIBLE:
Part 1 is plausible because AD-EP-ALL-0205 only places the requirement that they shall be volunteers when the expected dose is in excess of 25 rem TEDE (Dose must be calculated and could result in a total less than 25 rem).

Part 2 is correct.

Answer D Discussion

INCORRECT:

PLAUSIBLE:
Part 1 is plausible because AD-EP-ALL-0205 only places the requirement that they shall be volunteers when the expected dose is in excess of 25 rem TEDE (Dose must be calculated and could result in a total less than 25 rem).

Part 2 is plausible because the definition of a Planned Special Exposure is "an infrequent exposure to radiation separate from, and in addition to, the annual dose limits" which is what this is.

Basis for meeting the KA

The applicant is required to demonstrate knowledge of radiological hazards that may arise during emergency situations.

Basis for Hi Cog

This question is a higher cognitive order due to requiring the applicants to perform a calculation of expected dose, and applying knowledge of AD-EP-ALL-0205 requirements to determine that the operator selected for this job has to be a volunteer.

Basis for SRO only

This question is SRO level knowledge because it requires detailed procedure knowledge of AD-EP-ALL-0205 (Emergency Exposure Controls) and the task to evaluate personnel and assign tasks during an emergency is an ERO function performed by an SRO (OSC Operations SRO) at MNS.

Job Level	Cognitive Level	QuestionType	Question Source
SRO	Comprehension	BANK	MNS BANK

Development References	Student References Provided
AD-EP-ALL-0205	

GEN2.3 2.3.14 - GENERIC - Radiation Control
Radiation Control

MNS ILT 20-1R NRC Written MNS SRO NRC Reta QUESTION 99

D

GEN2.4 2.4.5 - GENERIC - Emergency Procedures / Plan

Emergency Procedures / Plan

Knowledge of the organization of the operating procedures network for normal, abnormal, and emergency evolutions. (CFR: 41.10 / 43.5 / 45.13)

Given the following on Unit 1:

- A Loss of Offsite Power occurs following a LOCA
- No ECCS injection flow is available
- FR-C.1 (RESPONSE TO INADEQUATE CORE COOLING) has been entered from E-0 (REACTOR TRIP OR SAFETY INJECTION)
- All S/G N/R levels are < 0% with no feed flow available
- "A" train NC vent path aligned by opening 1NC-272AC and 1NC-273AC (U1 A TRAIN HEAD VENT TO PRT ISOL)
- Core Exit Thermocouple temperatures are 1205°F and RISING

Based on current conditions, the CRS will _____ to further mitigate this event.

Which ONE of the following completes the statement above?

A. Implement FR-H.1 (LOSS OF SECONDARY HEAT SINK)

B. Implement E-1 (LOSS OF REACTOR OR SECONDARY COOLANT)

C. Remain in FR-C.1 until Core Exit Thermocouples indicate < 1200°F

D. Implement SAMG/SAG-1 (CONTROL ROOM SEVERE ACCIDENT GUIDELINE INITIAL RESPONSE)

General Discussion

With a LOCA, the normal transition from E-0 is to E-1.

With all S/G N/R levels < 11% and no CA flow available, a RED path on the Heat Sink CSF will be met. If no higher RED path condition is in effect, then FR-H.1 would be entered.

If CET temperatures in the stem of the question were > 1200°F and lowering, the CRS would remain in FR-C.1 until CET temperatures were < 1200°F.

For the conditions given, all attempts at making up to the reactor coolant system have been unsuccessful, and with CET temperatures > 1200°F and rising, FR-C.1 directs that a transition be made to SAMG/SAG1.

Answer A Discussion

INCORRECT:

PLAUSIBLE:
Plausible because with all S/G N/R levels < 11% and no CA flow available, a RED path on the Heat Sink CSF will be met. If no higher RED path condition is in effect, then FR-H.1 would be entered.

Answer B Discussion

INCORRECT:

PLAUSIBLE:
Plausible because with a LOCA, the normal transition from E-0 is to E-1.

Answer C Discussion

INCORRECT:

PLAUSIBLE:
Plausible because if CET temperatures in the stem of the question were > 1200°F and LOWERING, the CRS would remain in FR-C.1 until CET temperatures were < 1200°F.

Answer D Discussion

CORRECT: See explanation above.

Basis for meeting the KA

The K/A is matched because the applicant must analyze conditions involving critical safety function status changes, and the how the emergency procedures are implemented based on that prioritization.

Basis for Hi Cog

This is a higher cognitive level question because the applicant analyzes conditions to determine the priority of emergency procedure implementation.

Basis for SRO only

This question meets the following criteria for an SRO only question as described in NUREG 1021, ES-401, Attachment 2 (Assessment and selection of procedures):

This question requires an assessment of plant conditions (involving F-0 content and rules of usage), and then selecting a procedure with specific content for a specific purpose: to mitigate the Critical Safety Function that has the highest priority per the rules of usage. Therefore, this is an SRO only question.

Job Level	Cognitive Level	QuestionType	Question Source
SRO	Comprehension	BANK	2017 CNS NRC (BANK 7198)

Development References	Student References Provided
F-0 FR-C.1	

GEN2.4 2.4.5 - GENERIC - Emergency Procedures / Plan
Emergency Procedures / Plan
Knowledge of the organization of the operating procedures network for normal, abnormal, and emergency evolutions. (CFR: 41.10 / 43.5 / 45.13)

GEN2.4 2.4.28 - GENERIC - Emergency Procedures / Plan
Emergency Procedures / Plan
Knowledge of procedures relating to a security event (non-safeguards information). (CFR: 41.10 / 43.5 / 45.13)

Given the following:

- The Control Room has been notified by the NRC Headquarters Operations Center that a 747 commercial aircraft has been hijacked
- Ground intelligence indicates a nuclear plant is the intended target
- The airplane's current flight path will intersect with McGuire in **20 minutes**

In accordance with AP-47 (SECURITY EVENTS),

1) the CRS will transition to _____.

2) all non-essential personnel on site will be directed to _____.

Which ONE of the following completes the statements above?

PROCEDURE LEGEND:
Enclosure 1 (AIRCRAFT IMMINENT THREAT)
Enclosure 2 (AIRCRAFT PROBABLE THREAT)

A. 1. Enclosure 1
2. relocate to the MOC

B. 1. Enclosure 1
2. seek shelter in the nearest building

C. 1. Enclosure 2
2. relocate to the MOC

D. 1. Enclosure 2
2. seek shelter in the nearest building

General Discussion

Since time to impact is 20 minutes, AP-47 directs the crew to implement Enclosure 2. Enclosure 2 will direct implementation of Enclosure 21 (Site Relocation During Probable Aircraft Threat). Enclosure 21 directs relocation of plant personnel to the MOC.

If impact time was less than 5 minutes, AP-47 would direct transition to Enclosure 1 (Aircraft Imminent Threat).

Answer A Discussion

INCORRECT: See explanation above.

PLAUSIBLE:
Part 1 is plausible because AP-47 requires transition to Enclosure 1 if time to impact is less than 5 minutes.

Part 2 is correct.

Answer B Discussion

INCORRECT: See explanation above.

PLAUSIBLE:
Part 1 is plausible because AP-47 requires transition to Enclosure 1 if time to impact is less than 5 minutes.

Part2 is plausible because if impact time is less than 5 minutes, Enclosure 1 will have the crew make an annoucement per Enclosure 16 for site personnel to seek shelter in the nearest building.

Answer C Discussion

CORRECT: See explanation above.

Answer D Discussion

INCORRECT: See explanation above.

PLAUSIBLE:
Part 1 is correct.

Part 2 is plausible because if impact time is less than 5 minutes, Enclosure 1 will have the crew make an annoucement per Enclosure 16 for site personnel to seek shelter in the nearest building.

Basis for meeting the KA

The K/A is matched because it requires the applicant to have knowledge of the procedure associated with a security event (i.e. AP-47 - Security Events).

Basis for Hi Cog

Basis for SRO only

This question meets the following criteria for an SRO only question as described in NUREG-1021 Rev. 11, ES-401 Attachment 2 "Clarification Guidance for SRO-only Questions" linked to 10CFR55.43(b)(5) (Assessment and selection of procedures):

1) The question can NOT be answered solely by knowing systems knowledge.

2) The question can NOT be answered by knowing immediate operator actions.

3) The question can NOT be answered solely by knowing entry conditions for AOP or direct entry conditions for EOPs.

4) The question can NOT be answered solely by knowing the purpose, overall sequence of events, or overall mitigative strategy of the procedure. This is detailed knowledge of procedure steps and not the purpose, sequence of events, or overall mitigative strategy of he procedure.

5) The question requires the applicant to analyze the conditions given and based on that analysis determine the appropriate procedure transition. Therefore, it is SRO knowledge.

Job Level	Cognitive Level	QuestionType	Question Source
SRO	Memory	BANK	2020 MNS NRC (BANK 7902)

MNS ILT 20-1R NRC Written MNS SRO NRC Reta QUESTION 100

C

Development References	Student References Provided
AP-47	

GEN2.4 2.4.28 - GENERIC - Emergency Procedures / Plan

Emergency Procedures / Plan

Knowledge of procedures relating to a security event (non-safeguards information). (CFR: 41.10 / 43.5 / 45.13)

Remarks/Status