Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	1	
	Group #	1	
	K/A #	007EK3.01	
	Importance rating	4.0	

Reactor Trip – Stabilization – Recovery: Knowledge the reasons for the following as they apply to a Reactor Trip: Actions contained in the EOP for Reactor Trip.

Question: 01

Following a Reactor Trip, the operators are required to "Check RCS Temperature – Stable at or Trending to 547˚F".

The reason for performing this step is to:

A. Verify adequate steam generator heat sink.

B. Ensure that RCS temperature remains above the P-12 set point.

C. Verify that heat is properly removed from the RCS.

D. Ensure adequate sub-cooling margin is maintained.

Answer: C

Explanation: C is correct, Basis for E-0.1 Step 1, states that this step ensures that RCS heat is properly being removed through the secondary side.

Technical Reference(s): EOP Bkg for E-0.1, step 1, page 7, Rev. 4; LPE-0, Rev. 9, page 35

Proposed references to be provided to applicants during examination: None

Learning Objective: LPE-0 Obj. 7920 (As available)

Question Source	Bank #		
	Modified Bank #		(Note changes or attach parent)
	New	XX	

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

Comments:

Examination Outline Cross-reference:

Level	RO	SRO
Tier #	1	
Group #	1	
K/A #	008AK3.02	
Importance rating	3.6	

Pressurizer Vapor Space Accident: Knowledge of the reasons for the following responses as they apply to the Pressurizer vapor space accident: Why PORV or code safety exit temperature is below RCS or PZR temperature.

Question: 02

Given the following:

- Reactor Coolant pressure = 1090 psig
- Reactor Coolant temperature = 400°F
- Pressurizer is saturated with a liquid level of 70%
- PRT pressure = 5 psig.
- PRT temperature = 140°F
- Containment average temperature = 110°F

Assuming that the above conditions do not change, what will be the approximate value of Pressurizer Safety Valve tail pipe temperature if one of the safety valves begins to leak by and does not reseat?

A. 230°F

B. 300°F

C. 340°F

D. 557°F

Answer: B

Explanation: Answer A is incorrect, but is the value of tailpipe temperature if the RCS were at NOP. Answer B is correct. 300°F is the temperature based on the superheat conditions that will exist at the tailpipe when 1090 psig (1105 psia) steam discharges to the PRT at 5 psig (20 psia). C is incorrect, but is the temperature when 1090 psig (1105 psia) steam (isenthalpically) crosses the saturation line. D is incorrect, but is the value of T-sat corresponding to an RCS pressure of 1090 psig (1105 psia).

Technical Reference(s): OIM A-4-1 Rev 24 Steam Tables/Mollier Diagram

Proposed references to be provided to applicants during examination: Steam Tables

Learning Objective: 40738 (As available)

Question Source
Bank #
Modified Bank # (Note changes or attach parent)
New XX

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

Comments: Calculating the correct value demonstrates an understanding of why the temperature reads less than PZR temperature and more than ambient temperatures. The candidate has to use the correct pressure downstream of the valve in order to correctly ascertain the temperature downstream of the leaking valve.

Examination Outline Cross-reference:

Level	RO	SRO
Tier #	1	
Group #	1	
K/A #	009EK1.01	
Importance rating	4.2	

Small Break LOCA: Knowledge of the operational implications of the following concepts as they apply to the small break LOCA: Natural circulation and cooling including reflux boiling.

Question: 03

EOP E-1, Loss of Reactor or Secondary Coolant, step 4, directs the operator to check S/G narrow range level > 6%, or AFW flow > 435 gpm.

What is the basis for this requirement?

A. To ensure that an adequate heat sink is provided for core heat removal via forced flow or natural circulation.

B. To keep the U-tubes covered in order to minimize the radiological consequences of a tube rupture, should one occur in that SG.

C. To ensure that an adequate heat sink is provided for core heat removal via radiative and evaporative cooling.

D. To minimize the ∆P across the S/G tubes to reduce the risk of a tube rupture.

Answer: A

Explanation: Answer A is correct. B is incorrect, although this could be a minor benefit if a SGTR did occur in that SG. C is incorrect. Radiative cooling requires no fluid and since temperature would need to be extremely high for effective radiative cooling, it is not considered.. D is incorrect as the tubes are generally rated for 1600 psid, but can likely withstand a greater ∆P, but this is not the basis for maintaining a heat sink.

Technical Reference(s): EOP E-1, Rev. 24, page 5; LPE-1A, Loss of Coolant Response, page 22, Rev. 9

Proposed references to be provided to applicants during examination: NONE

Learning Objective: 7920 (As available)

Question Source
- Bank # ______
- Modified Bank # ______ (Note changes or attach parent)
- New XX

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

Comments:

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	1	____
	Group #	1	____
	K/A #	015/17AK3.03	
	Importance rating	3.7	____

RCP Malfunctions: Knowledge of the reasons for the following responses as they apply to the Reactor Coolant Pump malfunctions (loss of RC flow): Sequence of events for manually tripping Reactor and RCP as a result of RCP malfunction.

Question: 04

Unit 1 is at 25% power when RCP 1-3 motor bearing temperature suddenly increases to 310°F. What actions are required to be performed by the operating crew concerning RCP 1-3, and why should these actions be taken? Assume that the high bearing temperature has been verified.

A. Trip the reactor and then trip RCP 1-3 to minimize pump damage.

B. Trip the reactor and then trip RCP 1-3 to reduce heat input to the RCS.

C. Immediately stop RCP 1-3 then trip the reactor to minimize pump damage.

D. Immediately stop RCP 1-3 then trip the reactor to reduce heat input to the RCS.

Answer: __A___

Explanation: Answer A is correct – the sequence (in mode 1) should always be to trip the reactor first and then the RCP to avoid operation in an unanalyzed condition. However, he RCP is promptly tripped (as EOP E-0 is entered) in order to minimize damage to the pump. B is incorrect since even with only three operating RCPs, there is sufficient heat removal capacity at this power level (25%) to maintain the necessary margin to DNB. C and D are incorrect since the reactor is always tripped first if an RCP exceeds its trip criteria in mode 1.

Technical Reference(s): _OP AP-28, RCP Malfunctions, Rev. 4, page 25 (step 3)_

Proposed references to be provided to applicants during examination: ___None_______________

Learning Objective: _7927_______________ (As available)

Question Source	Bank #	__________	
	Modified Bank #	__________	(Note changes or attach parent)
	New	___XX____	

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

Comments:

Examination Outline Cross-reference:

Level	RO	SRO
Tier #	1	
Group #	1	
K/A #	022AA1.04	
Importance rating	3.3	

Loss of Rx Coolant Makeup: Ability to operate and/or monitor the following as they apply to the Loss of Reactor Coolant Makeup: Speed demand controller and running indicators (positive displacement pump)

Question: 05

Unit 2 is at 100% power when a fire occurs in the Centrifugal Charging Pump (CCP) room resulting in the loss of both CCPs. Attempts to start the Positive Displacement Pump (PDP) from the control room are unsuccessful and an operator is dispatched to attempt to start the pump by closing the breaker. The operator informs the control room that the breaker is about to be closed. This is followed by the ammeter for the PDP pegging high and slowly returning to minimum amps.

Which of the following actions should the crew take?

A. Trip the PDP from the control room.

B. Direct the dispatched operator to locally open the PDP breaker.

C. Adjust PDP speed control to stabilize charging flow.

D. Align the PDP suction to the RWST.

Answer: C

Explanation: Answer A is incorrect as this is a normal indication following a start of the PDP. Starting current will peg the ammeter and then it will return to scale. If it remained off-scale it would be grounds for tripping the pump. Answer B is incorrect but could be conceived as a possible action as the fuses are removed at the breaker to do a local start so tripping may also be considered to be a local operator action. Answer C is correct as the pump indicates that it has started and is running normally. Answer D is incorrect although a change in suction may change the load on the pump.

Technical Reference(s): STG B1A page 2.2-26; OP B-1A:V page 4, Rev. 24
OP AP-17 pages 3 & 29 (U-2) Rev 0A

Proposed references to be provided to applicants during examination: None

Learning Objective: LPA-17 3477 (As available)

Question Source: Bank # ____
Modified Bank # ____ (Note changes or attach parent)
New XX

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

Comments:

Examination Outline Cross-reference:

Level	RO	SRO
Tier #	1	
Group #	1	
K/A #	025AK2.02	
Importance rating	3.2	

Loss of RHR System: Knowledge of the interrelations between the Loss of Residual Heat Removal System and the following: LPI or Decay Heat Removal/RHR pumps.

Question: 06

Unit 1 is in Mode 5 with normal RHR cooling when Reactor Vessel Refueling Level Indication System (RVRLIS) begins to decrease about 1 foot every 3 minutes. Level has decreased to 110' and is still decreasing even though letdown has been isolated. One RHR pump is in service at a flow rate of 2800 gpm. Pump discharge pressure and amps are stable.

Which of the following actions should be performed first to ensure that core cooling is maintained?

A. Stop the running RHR pump and realign it for low head Safety Injection operation.

B. Start a second RHR pump.

C. Increase the running RHR pump flow rate.

D. Decrease RHR flow rate to delay the onset of pump cavitation as level decreases.

Answer: D

Explanation: Answer A is incorrect as the RHR pump is OK at present and should be left in service per the OP-AP. Answer B is incorrect as promptly starting a second pump would shorten the time to cavitation. Answer C is incorrect and although the added cooling would delay the onset of boiling if RHR was lost, the delay would only be minutes and not any real benefit and he increased flow rate could cause cavitation. Answer D is correct as the RHR flow reduction will provide time before pump cavitation occurs for mitigating the event before taking actions such as aligning one or both RHR pumps to inject from the RWST.

Technical Reference(s): OP-AP SD-2 pages 3-4 Rev. 16

Proposed references to be provided to applicants during examination: None

Learning Objective: LPA-SD Obj. 3477 (As available)

Question Source
- Bank # ____
- Modified Bank # ____ (Note changes or attach parent)
- New XX

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

Comments:

Examination Outline Cross-reference:

Level	RO	SRO
Tier #	1	
Group #	1	
K/A #	026AK3.02	
Importance rating	3.6	

Loss of Component Cooling Water: Knowledge of the reasons for the following responses as they apply to the Loss of CCW: The automatic actions (alignments) within the CCWS resulting from the actuation of the ESFAS.

Question: 07

Why does CCW Header C (non-vital components inside containment) isolate when a Containment Phase B isolation occurs?

A. The RCPs are stopped and no longer require cooling.

B. To prevent potential release of radioactive material from containment.

C. Additional CCW flow is required to maintain ESF component cooling.

D. The reduction in CCW flow anticipates loss of one CCW pump during recovery from a design basis event.

Answer: B

Explanation: Answer A is incorrect because the procedure contains steps to stop the RCPs if a Phase B isolation occurs because CCW has been lost to the pumps. However, it is a reasonable choice for the individual that mixes up the cause and effect. Answer B is correct. Answer C is incorrect as the CIB isolated loads are non-ESF (RCPs). Answer D is incorrect but is sometimes a reason for EOP actions. And CIB typically occurs well before ECCS recirculation commences, therefore CCW possesses sufficient cooling capacity for both vital and non-vital loads.

Technical Reference(s): EOP-E-0 Appendix E Rev 32
LP E-0 page 16, Rev. 9

Proposed references to be provided to applicants during examination: None

Learning Objective: LPE-0 Obj. 5442 (As available)

Question Source
Bank #
Modified Bank # (Note changes or attach parent)
New XX

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

Comments:

Examination Outline Cross-reference:

Level	RO	SRO
Tier #	1	
Group #	1	
K/A #	029EA2.06	
Importance rating	3.8	

ATWS: Ability to determine or interpret the following as they apply to an ATWS: Main Turbine trip switch position indication.

Question: 08

The operating crew is responding to a valid reactor trip signal; however, the reactor failed to trip. The crew entered EOP-E-0, Reactor Trip or Safety Injection, and promptly transitioned to EOP-FR-S.1, Response to Nuclear Power Generation/ATWS.

According to EOP-FR-S.1, which Control Room indication confirms that the immediate action to manually trip the Main Turbine was successful?

A. All 4 Stop Valve closed bistable status lights are on.

B. Triconex main display shows all 4 governor valves indicating closed.

C. Triconex main display turbine trip red light is on.

D. PK12-11 “Turbine Trip” main annunciator is on.

Answer: A

Explanation: Answer A is correct and is the only indication procedurally checked to verify that the turbine is tripped. Selections B, C, & D would be expected indications if the turbine tripped, but are not specifically identified in E-0 or FR-S.1.

Technical Reference(s): STG C3B pages 2.1-22, 2.2-9, & 2.2-22, Rev. 10
EOP FR-S.1, Rev 16a, page 2

Proposed references to be provided to applicants during examination: None

Learning Objective: STG C3B Obj. 8, 11 (As available)

Question Source
- Bank # ____
- Modified Bank # ____ (Note changes or attach parent)
- New XX

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

Comments:

Examination Outline Cross-reference:

Level	RO	SRO
Tier #	1	
Group #	1	
K/A #	038G2.3.11	
Importance rating	2.7	

Steam Gen. Tube Rupture: Ability to control radiation releases.

Question: 09

Which of the following actions is designed to minimize the radiological release from a ruptured Steam Generator?

A. Isolate all feed water flow to the ruptured steam generator regardless of level.

B. Depressurize the ruptured steam generator as the RCS is cooled down.

C. Terminate ECCS flow once the initial RCS cooldown and depressurization are complete.

D. Set ruptured S/G 10% Steam Dump controller in automatic at the same pressure as the lowest code safety valve setpoint.

Answer: C

Explanation: Answer A is only correct after the S/G level has increased to the point of covering the tubes (6% NR). If FW flow is terminated too early it can actually make any release worse as the Reactor Coolant would not have the benefit of the cool S/G water. Answer B is incorrect as the goal is to keep the ruptured S/G pressure higher than the other S/Gs and equal to RCS pressure as it will act as a second pressurizer during a plant cooldown. Keeping the pressure up will stop RCS flow to the S/G. Some candidates might think that the lower the pressure the less chance of a release which is only true while the S/G is near the safety relief point. Answer C is correct as stopping the ECCS flow will prevent a pressure increase and overfill of the S/G which could lead to more uncontrolled releases. Answer D is incorrect as challenging the safety valve is not a good thing to do because it could stick open and not be isolable. So although setting the 10% dump valve setpoint high is a good way to reduce the release rate, too high could be detrimental to plant radiation control.

Technical Reference(s): WOG ERG background doc. for E-3; EOP E-3, Rev 28

Proposed references to be provided to applicants during examination: None

Learning Objective: LPE-3 Obj. 7920 (As available)

Question Source
- Bank #: ______
- Modified Bank #: ______ (Note changes or attach parent)
- New: XX

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

Comments:

Examination Outline Cross-reference:

Level	RO	SRO
Tier #	1	____
Group #	1	____
K/A #	040AA1.10	
Importance rating	4.1	____

Steam Line Rupture: Ability to operate or monitor the following as they apply to the Steam Line Rupture: AFW System

Question: 10

While operating at 100% power, a main steam line break occurred resulting in a reactor trip and SI signal. Reactor trip could NOT be verified, and ALL attempts to manually trip the reactor from the Control Room FAILED. Containment pressure is 9 psig.

With all S/G levels out of sight low on the NR, what is the MINIMUM satisfactory secondary heat sink?

A. One motor driven auxiliary feed pump running.

B. Greater than 23% WR level in one intact S/G.

C. Total AFW flow greater than 470 gpm

D. Total AFW flow greater than 850 gpm

Answer: __D__

Explanation: The AFW flow required for heat removal is considerably higher in FR-S.1 due to the potential for nuclear heat production (Answer C is incorrect). The required AFW flow is > 1 MDAFP can provide (Answer A is incorrect) and provides considerably more heat removal than 1 SG at 23% WR can provide (Answer B is incorrect). Answer D is correct as this is the standard given in FR-S.1.

Technical Reference(s): EOP FR-S.1, Rev. 16A, step 10 RNO; LPE-S, Rev. 7, page 12

Proposed references to be provided to applicants during examination: None

Learning Objective: 7920 (As available)

Question Source
- Bank # P47638
- Modified Bank # ________ (Note changes or attach parent)
- New ________

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

Comments:

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	1	
	Group #	1	
	K/A #	055EA1.02	
	Importance rating	4.3	

Station Blackout: Ability to operate or monitor the following as they apply to a station blackout: Manual EDG start.

Question: 11

Following a loss of all AC power, operators are attempting a manual start of Diesel Generator 1-1 from the control room. What action places the Diesel Generator in the isochronous mode of operation?

A. Placing the Control Room Mode Selector switch in the MANUAL position.

B. Placing the Control Room Mode Selector switch in the AUTO position.

C. Directing an operator to place the local Droop Switch in the ISOC position.

D. Closing the output breaker to 4160V bus H as the sole power source.

Answer: B

Explanation: Answer A is incorrect as this will place the droop circuit in the control circuit. Answer B is correct as this places the generator in ISOC mode when operated from the control room. Answer C is incorrect but is the action that would be taken if the generator was going to be paralleled to the bus from the local station. This switch is not in the circuit unless the local transfer switch is selected to the "Local" position. Answer D is incorrect but is a design used by some EDG suppliers.

Technical Reference(s): OP J-6B:IV Rev 23
STG J6B, pages 2.7-19 & 28, Rev. 19

Proposed references to be provided to applicants during examination: None

Learning Objective: LPECA-0 Obj. 3827 (As available)

Question Source
Bank #
Modified Bank # (Note changes or attach parent)
New XX

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

Comments:

Examination Outline Cross-reference:

Level	RO	SRO
Tier #	1	
Group #	1	
K/A #	056AA1.10	
Importance rating	4.3	

Loss of Off-site Power: Ability to operate or monitor the following as they apply to the Loss of Offsite power: Auxiliary/emergency feedwater pump (motor driven).

Question: 12

Following a Unit 1 reactor trip from 100% power, all off-site power is lost. The unit is stable at normal operating pressure and temperature (NOP/NOT). Only the 1-2 Emergency Diesel Generator properly started, and it energized and loaded its 4KV Bus, G. The other Unit 1 DG's failed to start. All other Unit 1 ESF/ECCS equipment that is energized is functioning as designed.

Assuming no operator intervention, what is the present configuration of the Auxiliary Feed Water Pumps at Unit 1?

A. Only Motor Driven Pump 1-2 is running.

B. Only Motor Driven Pump 1-3 is running..

C. Only Turbine Driven Pump 1-1 is running.

D. Only Turbine Driven Pump 1-1 and Motor Driven Pump 1-3 are running.

Answer: C

Explanation: The LOOP resulted in a loss of all normal feed and a subsequent reactor-turbine trip. Following the trip the TADFW Pump will automatically start on either AMSAC or low-low SG level. However, 4KV busses F and H are both de-energized which means that neither MDAFW pump has power.

Technical Reference(s): OIM J-1-1, Rev. 22
OIM D-1-2, Rev. 27

Proposed references to be provided to applicants during examination: None

Learning Objective: ____________ (As available)

Question Source
Bank # ________
Modified Bank # ________ (Note changes or attach parent)
New XX

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

Comments:

Examination Outline Cross-reference:

Level	RO	SRO
Tier #	1	
Group #	1	
K/A #	057AA1.02	
Importance rating	3.8	

Loss of Vital AC Inst. Bus: Ability to operate and/or monitor the following as they apply to the Loss of Vital AC Instrument Bus: Manual control of PZR level.

Question: 13

Given the following:

- Unit 1 is at 100% power
- Power to Vital Instrument Bus PY11 has just been lost.

Which of the following describes the effect on plant operation?

A. Automatic 4 kV bus transfers are prevented.

B. Pressurizer level control system will experience multiple failures.

C. AFW Turbine driven pump will start.

D. Diesel Generator 1-1 will start and run unloaded.

Answer: B

Explanation: A is incorrect as 4 KV breakers use DC control power. B is correct as the controller will fail to the auto-hold mode and the LT associated with PCV-459, causing letdown to isolate. C is incorrect because a single channel failure will not cause the TDAFW pump to start. D is incorrect, the diesel generator will not start, however, it will have no control power.

Technical Reference(s): LPA-4, page 7, Rev. 10; OP AO-10, Rev. 17, page 3

Proposed references to be provided to applicants during examination: None

Learning Objective: LPA-4 Obj. 4274 (As available)

Question Source
Bank # ______
Modified Bank # ______ (Note changes or attach parent)
New XX

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

Comments:

Examination Outline Cross-reference:

Level	RO	SRO
Tier #	1	
Group #	1	
K/A #	062AK3.03	
Importance rating	4.0	

Loss of Nuclear Svc Water: Knowledge of the reasons for the following responses as they apply to the Loss of Nuclear Service Water: Guidance action contained in the EOP for loss of nuclear service water.

Question: 14

Due to a tsunami warning, the control room crew is previewing procedures, CP M-5, Respond to Tsunami Warning, and OP AP-10, Loss of Auxiliary Saltwater (ASW). Why is the standby ASW pump taken to "Manual" when preparing for a possible tsunami event?

A. To prevent pump runout by limiting total ASW flow.

B. To prevent damage to the traveling screens if the ASW pump should start with low intake bay level.

C. To prevent water-hammer following a pump start when the discharge ASW piping may be less than full.

D. To prevent an ASW pump auto start without an adequate suction supply.

Answer: D

Explanation: Answer A is incorrect since runout is a function of discharge flow path and resistance (or lack of resistance) to flow. B is incorrect since there should be no impact to screen operation. C is not correct. A pump discharge check valve maintains the piping water solid (along with the one running pump). D is correct. The surf will recede prior to a tsunami surge which could result in inadequate NPSH for the pump that otherwise (in auto) would automatically start.

Technical Reference(s): LPE -7, Misc. Emergency Procedures, Rev. 13

Proposed references to be provided to applicants during examination: None

Learning Objective: LPE -7, obj. 9142 (As available)

Question Source
- Bank # ____
- Modified Bank # ____ (Note changes or attach parent)
- New XX

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

Comments:

Examination Outline Cross-reference:

Level	RO	SRO
Tier #	1	
Group #	1	
K/A #	065AA1.04	
Importance rating	3.5	

Loss of Instrument Air: Ability to operate and/or monitor the following as they apply to Loss of Instrument Air: Emergency Air compressor.

Question: 15

The operating crew is performing actions to align Service Air to the Instrument Air System accordance with OP AP-9, Loss of Instrument Air. Which of the following conditions must be verified before opening the Service Air to Instrument Air cross-tie valve?

A. Use of the Instrument Air system for maintenance activities has been terminated.

B. Service Air compressor, PAC 0-9 is in service to maximize the volume of air available.

C. Service Air compressor, PAC 0-9 cooling water system is aligned.

D. Use of the Instrument Air System for breathing air has been terminated.

Answer: B

Explanation: Answer A is incorrect. Instrument air is not used for maintenance activities. B is correct since PAC 0-9 has higher capacity and is required by procedure (OP AP-9) to be in service. C is incorrect since PAC 0-9 is an air cooled compressor. D is incorrect since Instrument Air is not used for breathing air.

Technical Reference(s): OP AP-9, step 11, Page 5, Rev. 23

Proposed references to be provided to applicants during examination: None

Learning Objective: 3477 (As available)

Question Source
- Bank #: ______
- Modified Bank #: ______ (Note changes or attach parent)
- New: XX

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

Comments:

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	1	
	Group #	1	
	K/A #	W/E04EK2.1	
	Importance rating	3.5	

LOCA Outside Containment: Knowledge of the interrelations between the LOCA Outside CTMT and the following: Components and functions of control and safety systems including instrumentation, signals, interlocks, failure modes, and automatic and manual features.

Question: 16

Which of the following systems is considered to be the most likely location for a rupture or break outside containment, and therefore is the only system verified to be isolated during EOP ECA-1.2, LOCA Outside Containment?

A. Residual Heat Removal

B. Normal Letdown

C. RCP Seal Injection

D. RCP Seal Water return

Answer: A

Explanation: Answer A is correct. The EOP Bkg. Document discusses how multiple interfacing check valves could fail in RHRS exposing low pressure piping outside of CNMT to fluid at RCS pressure. It is possible that Normal letdown could also experience similar failures, but analyses have shown this to be much less likely than the RHR failures. The seal injection and return lines would isolate on an SIS so are extremely unlikely sources of leakage outside CNMT.

Technical Reference(s): EOP ECA-1.2 Background, Rev. 2, page 2
LPE-1-C, Rev. 8, page 43

Proposed references to be provided to applicants during examination: None

Learning Objective: LPE-1C Obj. 3549 (As available)

Question Source
Bank # ____
Modified Bank # ____ (Note changes or attach parent)
New XX

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

Comments:

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	1	
	Group #	1	
	K/A #	W/E11G2.4.46	
	Importance rating	3.5	

Loss of Emergency Coolant Recirculation: Emergency Procedures/Plan: Ability to verify that the alarms are consistent with the plant conditions.

Question: 17

The crew has entered EOP ECA-1.1, Loss of Emergency Coolant Recirculation, from EOP ECA-1.2, LOCA Outside Containment. A plant cooldown has been initiated and the following conditions currently exist when annunciator PK08-06, PZR SI PERMISSIVE P-11, alarms:

- RCS pressure = 1910 psig
- RCS temperature = 510°F
- Bistable light lit for Pzr High Press bistable PC455B.
- Bistable lights out for Pzr High Press bistables PC456B and 457B.

Which of the following actions should be taken?

A. Wait until either PC456B or 457B lights, then block the Low Steamline Pressure SI.

B. Wait until both PC456B and 457B light, then block the Low Steamline Pressure SI.

C. Block the Low Steamline Pressure SI based on the present conditions.

D. Report malfunction of the P-11 permissive due to an alarm without meeting the 2 of 3 coincidence.

Answer: C

Explanation: Answer A is incorrect as this alarm comes in as the bistables de-energize so the permissive is met (bistable status lights go out when P-11 changes state on decreasing PZR pressure). Answer B is incorrect as the permissive needs 2 of 3 to sound the alarm and that condition is met. Answer C is correct. The permissive is met. Answer D is incorrect as the permissive is met and the alarm confirms that it is.

Technical Reference(s): EOP ECA-1.1 step 10-11, rev. 20; STG B6A page 2.3-16 rev. 15

Proposed references to be provided to applicants during examination: None

Learning Objective: LPE-1C Obj. 5458 (As available)

Question Source	Bank #	
	Modified Bank #	(Note changes or attach parent)
	New	XX

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

Comments:

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	1	
	Group #	1	
	K/A #	W/E05EK3.2	
	Importance rating	3.7	

Loss of Secondary Heat Sink: Knowledge of the reasons for the following responses as they apply to the Loss of Secondary Heat Sink: Normal, abnormal, and emergency operating procedures associated with Loss of Sec. Heat Sink.

Question: 18

A loss of secondary heat sink and reactor trip from 100% power has occurred on Unit-1, and EOP FR-H.1, Response to Loss of Secondary Heat Sink, has been implemented.

Why are the RCPs tripped early in the procedure?

A. To reduce the time until bleed and feed can be initiated.

B. So natural circulation can be established.

C. To delay the time until bleed and feed must be initiated.

D. To minimize the risk of RCP seal failures.

Answer: C

Explanation: The concern is lack of heat sink, therefore forced (vs. natural) convection will have minimal effect. The RCPs simply become a source of heat (equal to about 1/3% RTP). Therefore, they are stopped to buy time and delay when B & F would be needed (answer C)

Technical Reference(s): FR H.1 background document, page 74; LPE-H, Rev. 10, pages 11, 18

Proposed references to be provided to applicants during examination: None

Learning Objective: LPE-H Obj. 3826 (As available)

Question Source	Bank #	P-0212
	Modified Bank #	(Note changes or attach parent)
	New	

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

Comments:

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	1	
	Group #	2	
	K/A #	001 AA2.05	
	Importance rating	4.4	

Continuous Rod Withdrawal: Ability to determine and interpret the following as they apply to continuous rod withdrawal: uncontrolled rod withdrawal from available indications.

Question: 19

The plant is operating at 90% steady-state power. All equipment is operable. Rod Control is in automatic and control bank D (CBD) rods are at 210 steps (demand counters). Unexpectedly, CBD rod demand counters begin stepping out at 8 steps/minute.

What diverse indications can the operator use to confirm that CBD rods are actually stepping out of the core?

A. DRPI Rod Deviation LEDs, AFD (Δ flux) shifting positive, and T-ref greater than T-avg

B. DRPI Urgent Failure LEDs, C-11 actuation, and T-avg greater than T-ref

C. DRPI Rod Position LEDs, AFD (Δ flux) shifting positive, and T-avg greater than T-ref

D. DRPI General Warning LEDs (for CBD rods), C-11 actuation, and T-ref greater than T-avg

Answer: C

Explanation: Selection A is incorrect since there will be no DRPI Rod Deviation (all 9 CBD rods move) and T-ref will be < T-avg. B is incorrect since there will not be a DRPI urgent failure. C is correct – rod control steps rods out and CBD DRPI position LEDs advance every 6 steps. D is incorrect since there will be no DRPI GW and T-ref will be < T-avg.

Technical Reference(s): OP AP-12A, Rev. 5C, page 1, AR PK03-15, Rev. 11

Proposed references to be provided to applicants during examination: None

Learning Objective: LA 3B- DRPI, Rev. 11 Obj. 9 (As available)-

Question Source			
	Bank #		
	Modified Bank #		(Note changes or attach parent)
	New	XX	

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

Comments:

Examination Outline Cross-reference:

Level	RO	SRO
Tier #	1	____
Group #	2	____
K/A #	032AK2.01	
Importance rating	2.7	____

Loss of Source Range NI: Knowledge of the interrelations between the loss of source range nuclear instrumentation and the following: power supplies including proper switch positions.

Question: 20

The reactor is subcritical during a reactor startup and neutron flux levels are below the P-6 interlock. The Level Trip Bypass switch for source range channel N-31 is selected to the “Bypass” position. The same switch for channel N-32 is selected to “Normal”.

What will be the effect on source range instrumentation and the reactor if a loss of Vital Instrument Bus 1-1 power to the Source Range Nuclear Instrumentation System (NIS) were to occur?

A. The reactor will trip due to the actuation of the high level trip signal on channel N-31, which occurs due to the loss of control power.

B. A high level trip signal will actuate on channel N-31, but the reactor will not trip due to the bypass.

C. The reactor will trip due to the failure of the N-31 detector, which occurs due to the loss of instrument power.

D. The high level trip is inhibited on channel N-31 due to the bypass; the reactor will not trip.

Answer: ___A____

Explanation: Answer A is correct. The loss of the Vital Bus will de-energize the control power and thus provide trip input to the SSPS input bay regardless of the bypass switch position. B is incorrect since bypassing impacts instrument power only, not control power- therefore, the reactor will trip. C is incorrect since loss of detector voltage (instrument power) is what the bypass feature protects against. D is incorrect since the reactor will trip.

Technical Reference(s): OIM B-4-2; LB-4 (page 12), STG B-4, Rev 14, page 2-5

Proposed references to be provided to applicants during examination: __None___________

Learning Objective: __LB-4, obj 7,13 STG B4 obj 19_________ (As available)

Question Source
Bank # _________
Modified Bank # _________ (Note changes or attach parent)
New ___XX____

Question Cognitive Level:
Memory or Fundamental Knowledge ______
Comprehension or Analysis __X__

Comments:

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	1	____
	Group #	2	____
	K/A_	051 AA1.04	
	Importance rating	2.5	____

Loss of Condenser Vacuum: Ability to operate and/or monitor the following as they apply to the loss of condenser vacuum: rod position

Question: 21

The unit is at 90% and ramping up with "MW Feedback In." Control Bank D rods are at 210 steps. All equipment is operable and in the proper alignment for power operations. Due to condenser seal degradation and subsequent air in-leakage, condenser vacuum begins to slowly degrade.

How is this event expected to affect control rod position?

A. Control rods will slowly step in due to T-avg vs. T-ref and/or power mismatch.

B. Control rods will slowly step out due to T-avg vs. T-ref and/or power mismatch.

C. A demand will exist for control rods to step out, but due to C-11, rods will remain at 210 steps.

D. Control rods remain at 210 steps as degraded condenser vacuum will not affect power or T-avg.

Answer: ___B____

Explanation: Answer A is incorrect, B is correct. As vacuum degrades, efficiency is reduced, but DEHC will attempt to maintain the same load. This means that more MW's will be required from the RCS resulting in a reduced T-avg which results in a "rods-out" demand to restore T-avg. C is incorrect since C-11 does not stop control bank D withdrawal until its position is 220 steps. D is incorrect since turbine efficiency will affect reactor power and/or T-avg resulting in auto rod withdrawal.

Technical Reference(s): OP-AP-7, Rev. 34, page 2

Proposed references to be provided to applicants during examination: __None___________

Learning Objective: ______STG C7A, Rev. 15, obj 22__________ (As available)

Question Source	Bank #	_________	
	Modified Bank #	_________	(Note changes or attach parent)
	New	___XX___	

Question Cognitive Level:	Memory or Fundamental Knowledge	______
	Comprehension or Analysis	___X___

Comments:

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	1	
	Group #	2	
	K/A #	059 Generic 2.3.11	
	Importance rating	2.7	

Accidental Liquid Rad Waste Release: Ability to control radiation releases.

Question: 22

Several Auxiliary Building radiation alarms are received. It is confirmed that Liquid Hold-Up Tank 1-1 has ruptured, and is leaking in the Auxiliary Building.

What action must be taken to prevent the offsite release of radioactive particulate and iodine?

A. Select "S" signal test, secure one Aux Bldg Ventilation train, and energize charcoal heaters.

B. Push "Status Reset" at POV1 and POV2, and reset the "S" signal.

C. Stop all Aux Bldg supply and exhaust fans, and energize charcoal heaters.

D. Locally close dampers that isolate the Waste Gas Decay Tank rooms.

Answer: A

Explanation: AP-14, step 2 provides direction for placing 100% of the ABVS exhaust through the charcoal filters for both units. This sequence is provided in answer A. The actions and sequences in B, C, & D will not accomplish the intent of the step.

Technical Reference(s): OP-AP-14, rev. 12, step 2, page 2

Proposed references to be provided to applicants during examination: None

Learning Objective: 3477 (As available)

Question Source	Bank #	B-0367
	Modified Bank #	(Note changes or attach parent)
	New	

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

Comments:

Examination Outline Cross-reference:

Level	RO	SRO
Tier #	1	
Group #	2	
K/A #	000067 AA2.16	
Importance rating	3.3	

Plant Fire On-Site: Ability to determine and interpret the following as they apply to the plant fire on site: vital equipment and control systems to be maintained and operated during a fire.

Question: 23

How does the plant fire water system ensure that ECCS CCP injection flow will be available under all postulated challenges to CCP operability?

A. Dedicated hose reels are provided for each pump room to suppress a fire before significant damage occurs to the affected pump.

B. A deluge valve is provided in each pump room to suppress a fire and in the process limit the spread of the fire.

C. Fire water can be readily aligned to one CCP oil cooler in the event that CCW or ASW systems are unavailable.

D. Fire water can be readily aligned to the suction header of the CCPs in the event that the RWST is unavailable.

Answer: C

Explanation: Answer A is incorrect. Hose reels are used (as well as sprinklers) but the design objective of the suppression system is to limit the spread of the fire. B is incorrect as deluge valves are not used for CCP fire suppression. C is correct. D is incorrect. A way may be identified to align fire water to the CCP suction header, but there no adapters or components pre-staged for this purpose.

Technical Reference(s): STG K2C, Rev. 13, page 2-2

Proposed references to be provided to applicants during examination: None

Learning Objective: 68568 (As available)

Question Source
- Bank #:
- Modified Bank #: (Note changes or attach parent)
- New: XX

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

Comments:

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	1	
	Group #	2	
	K/A #	076 2.2.22	
	Importance rating	3.4	

High Reactor Coolant Activity: Knowledge of Limiting Conditions for Operations and Safety Limits.

Question: 24

The Chemistry Foreman reports Dose Equivalent Iodine 131 is exceeding the Tech Spec limit of 1.0 uCi/gm. This condition has existed for 2 days, with the plant at steady state conditions.

The SFM begins preparations for a Unit shutdown to Mode 5.

Why is the shutdown required?

A. To minimize the dose consequences in the event of a loss of containment integrity.

B. To verify the high activity is not due to Iodine “Spiking”.

C. To minimize the dose consequences in the event of a SGTR or SLB.

D. To verify the high activity is not due to a fuel defect.

Answer: C

Explanation: The RCS LCO (3.4.16) limit is 1.0 μCi/gm for DEI-131 and applies in modes 1-4. The basis for shutting down to mode 5 is to reduce RCS and MSL pressure to minimize any potential challenge to piping, tubes, or relief valves.

Technical Reference(s): Technical Specification LCO 3.4.16 and Basis B 3.4.16

Proposed references to be provided to applicants during examination: None

Learning Objective: 10811 (As available)

Question Source
- Bank #: ______
- Modified Bank #: ______ (Note changes or attach parent)
- New: XX

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

Comments:

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	1	
	Group #	2	
	K/A #	W/E16 EK1.3	
	Importance rating	3.0	

High Containment Radiation: Knowledge of the operational implications of the following concepts as they apply to the (high containment radiation): annunciators and conditions, indicating signals, and remedial actions associated with the (high containment radiation).

Question: 25

Given the following post LOCA conditions:

- containment pressure is 2.5 psig and stable
- dynamic range RVLIS for 3 RCPs running indicates 41%
- RE-30 reads 2 X 10^6 R/Hr

How will the control room crew compensate for instrument inaccuracies for those instruments located in containment?

A. Apply adverse containment EOP rules of usage.

B. Implement rules of usage strategy of OP1.DC10, "Conduct of Operations."

C. Use full range RVLIS.

D. No compensation required; PAMS instrumentation already compensates for instrument inaccuracies.

Answer: A

Explanation: Answer A is correct – a containment activity level > 10^5 R/Hr (or 10^6 R cumulative) constitutes adverse CNMT which requires use of bracketed values in the EOPs, where applicable. B is incorrect since the EOPs have their own usage rules that must be followed. C is incorrect since full range RVLIS is used only when all RCPs are OFF. D is incorrect. PAMS instruments are qualified for use in adverse environments, but the bracketed adverse values must still be used.

Technical Reference(s): EOP F-0, Rev. 14; LPERULE, Rev. 11, page 16

Proposed references to be provided to applicants during examination: None

Learning Objective: 5970 (As available)

Question Source Bank # B0209
Modified Bank # ______ (Note changes or attach parent)
New ______

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

Comments:

Examination Outline Cross-reference:

Level	RO	SRO
Tier #	1	
Group #	2	
K/A #	W/E03 EK2.2	
Importance rating	3.7	

LOCA Cooldown - Depressurization: Knowledge of the interrelations between the (LOCA cool down and depressurization) and the following: 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.

Question: 26

Procedure EOP E-1.2, Post LOCA Cooldown and Depressurization, states:

"Depressurize the RCS to Refill the Pressurizer."

One reason this action is performed is to ensure that pressurizer level does not drop off scale when an RCP is started in a subsequent step.

Why would pressurizer level decrease after an RCP is started?

A. Due to the decreased RCS subcooling after the RCP start.

B. Due to the increased core heat removal.

C. Due to the increased heat input into the RCS from the RCP.

D. Due to the collapse of any voids in the RCS.

Answer: D

Explanation: Answer A is incorrect. SCM will increase as mass flowrate will inncease. B is incorrect. Core heat removal will increase which means that SCM is lower, RCS voiding is higher which tends to raise PZR level. C is incorrect for the same reason as A. D is correct.

Technical Reference(s): EOP E-1.2, Post LOCA Cooldown and Depressurization, Rev. 18; LPE-1B, Rev. 9, page 33

Proposed references to be provided to applicants during examination: None

Learning Objective: 5709 (As available)

Question Source
- Bank #
- Modified Bank # (Note changes or attach parent)
- New XX

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

Comments:

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	1	
	Group #	2	
	K/A #	W/E9&10 EA1.1	
	Importance rating	3.8	

Natural Circulation: Ability to operate and/or monitor the following as they apply to the (natural circulation with steam void in vessel with/without RVLIS): components and functions of control and safety systems including instrumentation, signals, interlocks, failure modes, and automatic and manual features.

Question: 27

The crew has entered EOP E-0.3, Natural Circulation Cooldown with Steam Void in Vessel (with RVLIS). At 0100, RCS loop T-cold is 514°F on all loops with a cooldown rate of 24°F/hr. Which of the following sets of recorded RCS T-cold temperatures would exceed the maximum allowable RCS cooldown rate?

	0100	0130	0200	0230	0300
A.	514°F	482°F	453°F	400°F	351°F
B.	514°F	460°F	419°F	381°F	350°F
C.	514°F	448°F	416°F	356°F	326°F
D.	514°F	476°F	420°F	379°F	339°F

Answer: A

Explanation: Answer A is correct. E-0.3 limits the RCS cooldown rate to "less than 100°F in any one hour." Answer A includes a 102°F cooldown between 0200 and 0300 which exceeds this limit.

Technical Reference(s): EOP E-0.3, Natural Circulation Cooldown with Steam Void in Vessel (with RVLIS), Rev. 16, page 4, step 3.a

Proposed references to be provided to applicants during examination: None

Learning Objective: 5812 (As available)

Question Source
- Bank # ______
- Modified Bank # ______ (Note changes or attach parent)
- New XX

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

Comments:

Examination Outline Cross-reference:

Level	RO	SRO
Tier #	2	____
Group #	1	____
K/A #	003 K1.10	
Importance rating	3.0	____

Reactor Coolant Pump: Knowledge of the physical connections and/or cause-effect relationships between the RCPs and the following: RCS.

Question: 28

The plant is operating at stable 20% power with all equipment operable and in the required alignment for the current power level. Assuming that the reactor does not trip, which of the following describes the effect on RCS loop flow if one of the reactor coolant pumps (RCP) trips?

	Loop with tripped RCP	Loops with running RCPs
A.	stagnant	unchanged
B.	reverse	increased
C.	stagnant	increased
D.	reverse	unchanged

Answer: B

Explanation: Distracters A and C are incorrect since there are no check valves in the loops, the discharge head from the three running (parallel) pumps will force reverse flow through the affected loop. D is incorrect since fluid flow dynamics will result in an increased flowrate in the unaffected (RCP running) loops.

Technical Reference(s): Fluid flow theory – parallel pump operation;
STG A-6, page 3-6, Rev. 14

Proposed references to be provided to applicants during examination: None

Learning Objective: LA-6-RCP (Rev. 10), Obj 3; STG-A6-RCP (Rev. 14), Objs 9, 10, page 3-6

Question Source
Bank # ____
Modified Bank # ____ (Note changes or attach parent)
New XX

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

Comments:

Examination Outline Cross-reference:

Level	RO	SRO
Tier #	2	
Group #	1	
K/A #	004 K3.04	
Importance rating	3.7	

Chemical and Volume Control System: Knowledge of the effect that a loss or malfunction of the CVCS will have on the following: RCPs.

Question: 29

The plant is stable at 100% power with all equipment operable and properly aligned when the RCP seal water return filter becomes severely clogged such that no water can pass through. If no operator actions are taken, to where will RCP number 1 seal leakoff flow be directed?

Number 1 seal leakoff flow will be diverted to the…

A. Pressurizer Relief Tank (PRT) through a relief valve.

B. Number 2 seal which will become a film riding seal.

C. Reactor Coolant Drain Tank (RCDT) through a relief valve.

D. Volume Control Tank (VCT) through a relief valve.

Answer: A

Explanation: A is correct. By design when the containment isolates, seal return backpressure builds until pressure in the seal return header (inside CNMT) is high enough to lift the relief. The seal return filter is on the same header (but outside CNMT), If it clogs as to not pass water, it would be like the header at CNMT isolating, thus causing the PRT relief to lift. B is incorrect since the #2 seal would only become face-riding at near RCS nominal pressure which is well above the PRT relief pressure of 150 psig. C is incorrect as there is no relief path (only manual valve lines) to the RCDT. D is incorrect since the seal return header relief to the VCT is downstream of the seal return filter.

Technical Reference(s): OVID 106708 sheet 2 (Rev. 123) & sheet 5 (Rev. 121); OIM page A-6-1

Proposed references to be provided to applicants during examination: None

Learning Objective: LA 6-RCP obj. 8

Question Source
Bank # ______
Modified Bank # ______ (Note changes or attach parent)
New XX

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

Comments:

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	2	
	Group #	1	
	K/A #	004 K6.36	
	Importance rating	2.9	

Chemical and Volume Control System: Knowledge of the effect of a loss or malfunction on the following CVCS components: Letdown pressure control to prevent RCS flashing to steam in letdown piping.

Question: 30

The plant is at normal full power conditions with all equipment operable and in the proper alignment. Letdown flow is stable at 75 gpm through orifice isolation valve, CVCS-8149B. Charging flow is stable at 87 gpm. VCT and PZR levels are stable.

An event occurs with the following control room indications:

- Alarm PK04-21, LETDOWN PRESS / FLOW TEMP actuates with the following two inputs active:
  - (1) Letdn Orifice Dwnstrm RV Temp Hi (TC129)
  - (2) Letdn HX Outlet Press Hi (PC135B)
- Letdown heat exchanger outlet flow, FI-134 indicates 0 gpm
- Letdown heat exchanger outlet pressure, PI-135 is off-scale high
- Letdown relief valve, RV-8117 tail pipe temperature, TI-129 is 220°F and slowly increasing
- VCT level is rapidly decreasing.
- PZR level is stable at program level
- Regen heat exchanger outlet temperatures are stable

Which of the following events is the cause of the observed indications?

A. Letdown relief valve to the PZR Relief Tank, RV-8117 has failed open.

B. Letdown heat exchanger outlet flow element, FE-134 has failed low.

C. Letdown heat exchanger outlet pressure instrument, PI-135 has failed high.

D. Letdown heat exchanger outlet pressure control valve, PCV-135 has failed closed.

Answer: D

Explanation: A is incorrect but plausible since there is clear indication that there is flow through the relief valve, however offscale high LDHX outlet pressure does not support this failure (it would indicate closer to 0 psig if all letdown were diverted to the PRT). B is incorrect since a failure of FE-134 has no control implications. C is incorrect. If PI-135 did fail high, PCV-135 would go full open to reduce pressure. D is correct. If the PCV fails closed, all letdown will divert to the PRT via RV-8117 and tailpipe temperature would rise to the saturation temperature of the PRT (typically at 5-10 psig). With the PCV closed, pressure would attempt to hydrostatically equalize with the RCS, but the relief lifts at 600 psig. Flow through the LDHX would go to 0 gpm. Flow through the Regen HX would remain unchanged, thus both outlet temperatures would remain stable. With no VCT input and normal charging flow, VCT level would drop as PZR stays constant since net charging and letdown remain unchanged.

Technical Reference(s): OIM page B-1-1, Rev. 24, OVID 106708, Sheet 3, Rev. 116, AR-PK04-21, Rev 15

Proposed references to be provided to applicants during examination: __None___________

Learning Objective: __STG B1A-CVCS objectives 7, 13, &15___________________________

Question Source
Bank # _________
Modified Bank # _________ (Note changes or attach parent)
New ___XX____

Question Cognitive Level:
Memory or Fundamental Knowledge ______
Comprehension or Analysis ___X__

Comments:

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	2	____
	Group #	1	_____
	K/A #	005 A1.01	
	Importance rating	3.5	_____

Residual Heat Removal System: Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating the RHRS controls including: Heatup/cooldown rates.

Question: 31

The Residual Heat Removal (RHR) System has been placed in service to continue a cooldown to mode 5. CCW is aligned to both RHR heat exchangers. RHR heat exchanger bypass valve, HCV-670 is 30% open to establish a 20°F/hour RCS cooldown rate.

Which of the following actions or events could reduce the RCS cooldown rate?

A. HCV-670 is throttled open from 30% to 50%.

B. RHR heat exchanger bypass valve, HCV-670 is throttled closed from 30% to 10% open.

C. RHR heat exchanger #1 outlet flow control valve, HCV-638 is opened from 70% to 90%

D. Instrument air to HCV-637 is isolated.

Answer: ___A____

Explanation: A is correct. Opening the bypass valve will divert coolant away from the HX's resulting is less cooling. B is incorrect since throttling closed the bypass valve will force more flow through the HX's and increase the cooldown rate. C is incorrect since opening the HX outlet valve promotes more flow through the HX. D is incorrect since loss of air to HCV-637 will cause the pneumatic valve to fail open which will promote more flow through the HX which will increase the cooldown rate.

Technical Reference(s): OP B-2:V Rev. 25, section 6; LB2-RHRS, Rev. 13, page 6 of 40; OP AP-9, Loss of IA, Rev. 23, page 17 (for failure condition of HCV-637)

Proposed references to be provided to applicants during examination: STG B-2, Fig. RHR-04_

Learning Objective: __STG B2-RHR (Section 3, Normal Ops.) obj 12, 15, & 16__

Question Source	Bank #	_________	
	Modified Bank #	_________	(Note changes or attach parent)
	New	XX	

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

Comments: OPEN REFERENCE
:

Examination Outline Cross-reference: Level

	RO	SRO
Tier #	2	
Group #	1	
K/A #	006 A3.02	
Importance rating	4.1	

Emergency Core Cooling: Ability to monitor automatic operation of the ECCS, including: pumps.

Question: 32

With the plant at normal, full power conditions, an inadvertent Safety Injection Signal (SIS) actuates. The control operator is tasked with determining if all Emergency Core Cooling System (ECCS) equipment and systems are aligned in their safeguards position.

Which of the following would provide the best means to verify that Safety Injection Pump 1-1 is running?

A. Safety Injection Pump 1-1 discharge flow rate indicator, FI-918.

B. Amperage on Safety Injection Pump 1-1 motor.

C. Safety Injection Pump 1-1 green status light is out.

D. Indications of cold leg loop injection flow on indications FI-974, 975, 976, & 977.

Answer: B

Explanation: A is incorrect since flow rate would equal 0 gpm if safety injection pump 1-1 was dead-headed due to insufficient RCS pressure decline. B is correct since there will be an amp indication, even with the safety injection head 1-1 pump deadheaded, since there will be miniflow back to the RWST (Note: miniflow tap is upstream of FI-918). C is incorrect since the green light status comes from the control circuit which is a demand signal not actual pump status. Or, the green light could be burned out, or the control circuit could be without power. D is incorrect since pump 1-1 could be deadheaded. Also, SI pump 1-2 injects to the RCS through the same lines.

Technical Reference(s): EOP E-0, Rx Trip or Safety Injection, Rev. 31, Appendix E, step 8.d (RNO)

Proposed references to be provided to applicants during examination: None

Learning Objective: STG B3-ECCS, Rev 16 Obj. 20

Question Source
- Bank # ______
- Modified Bank # ______ (Note changes or attach parent)
- New XX

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

Comments:

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	2	____
	Group #	1	____
	K/A #	007 2.4.48	
	Importance rating	3.5	____

Pressurizer Relief / Quench Tank: Ability to interpret control room indications to verify the status and operation of the system, and understand how operator actions and directives affect plant and system conditions.

Question: 33

Unit 2 is at 100% power when PK 05-25 "PRT PRESS/LVL TEMP" alarm activates on the control board. The pressurizer PORVs and safety valves have been verified shut. The following are current indications for the PRT:

- PRT pressure: 3.0 PSIG
- PRT temperature: 100°F
- PRT level: 92%

Which of the following caused this alarm?

A. Nitrogen supply valve 8035 is leaking by.

B. Primary water supply 8030 is leaking by.

C. PRT Drain Valve 8031 is leaking by.

D. Reactor Vessel Flange O-ring leaking by.

Answer: B

Explanation: The alarm is caused by high water level since it is the only abnormal PRT parameter. The only selections adding water are B & D (C is removing water, so it is incorrect). The O-ring leakage would add liquid inventory to the PRT but would also raise its temperature, which is normal so D is incorrect. N2 would only raise the pressure which is also normal (A incorrect). Therefore B is the only correct choice.

Technical Reference(s): STG A4B Pg. 3-2, Rev. 10

Proposed references to be provided to applicants during examination: None

Learning Objective: STG A4B-PRT, Rev 10 Obj. 6, 13

Question Source	Bank #	________	
	Modified Bank #	________	(Note changes or attach parent)
	New	XX	

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

Comments:

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	2	
	Group #	1	
	K/A #	008 A1.01	
	Importance rating	2.8	

Component Cooling Water: Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating the CCWS controls including: CCW flow rate.

Question: 34

Unit 1 is at 100% steady-state power, with all systems and equipment operable and in the proper full power alignment.

Which of the following is a potential consequence of placing a second ASW/CCW train in service?

A. The colder letdown water exiting the letdown heat exchanger could result in a positive reactivity addition.

B. Spent fuel pool over-cooling could result in a positive reactivity addition large enough to challenge the minimum K_{eff} requirement.

C. RCP thermal barrier return CCW flow could isolate on high flow, which will necessitate prompt action to trip the reactor and all RCPs.

D. The Seal Water Heat Exchanger, by over-cooling the RCP seal injection water, could change seal tolerances enough to affect the amount of seal leakage.

Answer: A

Explanation: A is correct because cooler water tends to deposit boron atoms in the demineralizers, especially at BOL (high Cb). This could cause power to go above the license limit. B is incorrect as SFP boron concentration satisfies minimum SDM requirement. The statement in answer C that TB return valve may close is correct, but the requirement to tip the Rx and RCPs would only apply if seal injection was lost also. D is incorrect since the SWHX function is to cool seal leakoff flow, not injection flow. The amount of seal leak-off flow that may be over-cooled is insignificant compared to the volume in the VCT, thus seal injection temperature should not change significantly.

Technical Reference(s): Reactor Theory; Components (demineralizers) GFE program;
STG B1A, Rev. 15, page 3-2

Proposed references to be provided to applicants during examination: None

Learning Objective: STG F2-CCW, Rev 15 Obj. 13, 17

Question Source	Bank #	
	Modified Bank #	(Note changes or attach parent)
	New	XX

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

Comments:

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	2	
	Group #	1	
	K/A #	010 K2.02	
	Importance rating	2.5	

Pressurizer Pressure Control: Knowledge of the bus power supplies to the following: Controller for PZR Spray valve(s).

Question: 35

Unit 1 is at steady-state, 100% power with all systems and components operable and in their normal alignment for full power operation. Due to a bus ground, 125 VDC vital bus 1-3 de-energizes. A reactor trip has actuated. What is the impact, if any, on operation of the PZR spray valves from the DC bus 1-3 failure?

A. No impact since there are redundant DC inputs to the PZR master and spray valve controllers.

B. Both spray valves fail fully open since CTMT instrument air supply valve, FCV-584, fails closed.

C. Both spray valves fail fully closed since their respective controllers go into the “Auto-Hold” mode.

D. Both spray valves fail fully closed since CTMT instrument air supply valve, FCV-584, fails closed.

Answer: D

Explanation: Answer D is correct. The loss of DC bus 1-3 causes a loss of control signal to instrument air containment isolation valve, FCV-584, causing it to fail closed, thus depressurizing the instrument air header inside containment. Both spray valves are air-to-open and fail-closed valves, therefore on a loss of bus 1-3, regardless of the spray controller outputs, both spray valves will close. A is incorrect since there is no redundant DC. B is incorrect since both valves fail closed on loss of air. C is incorrect since both spray valves fail closed on loss of air.

Technical Reference(s): OP AP-23, Loss of Vital DC Bus, Rev. 12, page 14, Appendix C

Proposed references to be provided to applicants during examination: None

Learning Objective: STG J9-DC Power Rev. 16 Obj. 8

Question Source	Bank #		
	Modified Bank #		(Note changes or attach parent)
	New	XX	

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

Comments:

Examination Outline Cross-reference:

Level	RO	SRO
Tier #	2	____
Group #	1	____
K/A #	010 A3.02	
Importance rating	3.6	____

Pressurizer Pressure Control: Ability to monitor automatic operation of the PZR PCS, including: PZR pressure.

Question: 36

Unit 1 is at stable 22% power with all RCS control circuits in automatic except for one of the backup heater groups, which was manually placed in the "ON" position one hour ago for RCS mixing. A small leak develops in the RCS causing pressurizer pressure to slowly decrease.

Which of the following sequences of actions will occur as RCS pressure decreases with no operator actions?

A. The open spray valves close, pressurizer heaters energize, PORV interlock removed, Reactor trips, SIS.

B. The open spray valves close, PORV interlock removed, pressurizer heaters energize, Reactor trips, SIS.

C. No change in position of the spray valves, pressurizer heaters energize, Reactor trips, PORV interlock removed, SIS.

D. No change in position of the spray valves, pressurizer heaters energize, PORV interlock removed, Reactor trips, SIS.

Answer: A

Explanation: One spray valve should initially be open. Due to the integral nature of the PZR pressure master controller, a short time after the backup heater group was turned on, a spray valve should have opened and will be the first pressure control component to respond (valve close) as PZR pressure decreases. Answer A is correct. B is incorrect since the heaters energize before the PORV interlock is removed. Answers C and D are incorrect since neither addresses the spray valve.

Technical Reference(s): STG A4A, Rev. 14, page 22-8, OIM A-4-6, Rev. 26

Proposed references to be provided to applicants during examination: None

Learning Objective: STG A4A-PP&LCS, Rev. 14, Obj 13, 22

Question Source
- Bank # ____
- Modified Bank # ____ (Note changes or attach parent)
- New XX

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

Comments:

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	2	
	Group #	1	
	K/A #	012 A1.01	
	Importance rating	2.9	

Reactor Protection: Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating the RPS controls including: Trip setpoint adjustment.

Question: 37

Unit 1 is at 80% power during a plant startup. Assuming that RCS and flux distribution parameters remain on program/target, as power is raised to 100%, how are the over-temperature (OT) and over-power (OP) differential temperature (ΔT) Rx protection setpoints expected to change?

	OTΔT setpoint	OPΔT setpoint
A.	increase	stay the same
B.	decrease	decrease
C.	decrease	stay the same
D.	stay the same	increase

Answer: C

Explanation: The OPΔT setpoint never increases from its nominal value (at 100% power, programmed T-avg of 572°F). It will, however decrease if T-avg deviates above its nominal 100% power program value (572°F). Since T-avg at 80% power is less than 572°F, the OPΔT setpoint will be at its nominal full power value and thus, will not change from 80 to 100% power assuming T-avg stays on program. This eliminates B and D. The OTΔT setpoint, on the other hand can increase or decrease from its nominal value. Since program T-avg will increase 5 more degrees, the trip setpoint will become more limiting, decreasing to its nominal full power value. C is therefore, the correct answer.

Technical Reference(s): T.S. Table 3.3.1-1, pages 6-7; STG B6A, pages 2.1-2.3 & 2.7

Proposed references to be provided to applicants during examination: None

Learning Objective: 37049

Question Source	Bank #	
	Modified Bank #	(Note changes or attach parent)
	New	XX

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

Comments:

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	2	
	Group #	1	
	K/A #	013 K2.01	
	Importance rating	3.6	

Engineered Safety Features Actuation: Knowledge of the bus power supplies to the following: ESFAS/safeguards equipment control.

Question: 38

Unit 1 is operating at steady-state, 100% power with all equipment operable and aligned for normal full power conditions. What is the effect on the status and operation of engineered safeguards features (ESF) equipment if vital 120 VAC instrument bus 1-1 (PY-11) de-energizes?

A. Most SSPS channel 1 input bay relays for both trains will trip.

B. Most SSPS channel 1 input bay relays for train "A" only will trip.

C. None of the SSPS input bay relays on either train will trip..

D. Most SSPS channel 1 input bay relays for train "B" only will trip.

Answer: A

Explanation: A is correct. PY-11 maintains most of the input bay relays for both trains in the energized, non-trip condition. One exception would be CNMT Hi-3 which is an energize-to-trip relay which is designed to prevent inadvertent CSS actuation. B is incorrect since input relays on both trains will actuate and SSPS train A will lose slave relay power (the logic cards have redundant power). C is incorrect since input relays on both trains will actuate, but the train A equipment will not auto start/actuate without slave relay power. D is incorrect since relays on both trains will actuate but no equipment will start or realign.

Technical Reference(s): STG B6B-Eagle 21 & SSPS, Rev. 14 pp 2.2-4 & 5

Proposed references to be provided to applicants during examination: None

Learning Objective: LB 6B-Eagle 21 & SSPS, Rev. 10 Obj. 7

Question Source	Bank #		
	Modified Bank #		(Note changes or attach parent)
	New	XX	

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

Comments:

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	2	
	Group #	1	
	K/A #	013 K3.02	
	Importance rating	4.3	

Engineered Safety Features Actuation: Knowledge of the effect that a loss or malfunction of the ESFAS will have on the following: RCS.

Question: 39

Unit 2 is operating at steady-state, 100% power when a reactor trip signal and ATWS occurs. The crew enters and performs EOP FR-S.1, Response to Nuclear Power Generation / ATWS.

Both trains of ESFAS / SSPS completely fail to actuate any ESF component; however, the ATWS Mitigation System Actuation Circuit (AMSAC) performs exactly as it was designed.

Which actions, of the first three steps of the procedure, will the operators need to perform manually?

A. Open the reactor trip breakers / insert control rods, and trip the turbine only.

B. Trip the turbine and start the turbine-driven AFW pump only.

C. Open the reactor trip breakers / insert control rods, and start all three AFW pumps only.

D. Open the reactor trip breakers / insert control rods only.

Answer: D

Explanation: A is incorrect since AMSAC trips the turbine; B is incorrect since AMSAC trips the turbine and starts all 3 AFW pumps; C is incorrect since AMSAC starts all the AFW pumps; D is correct.

Technical Reference(s): OIM B-6-11, Rev. 27; EOP FR-S.1, Rev. 17, steps 1-3

Proposed references to be provided to applicants during examination: None

Learning Objective: LB-6D-AMSAC, Rev 4 Obj 1,12

Question Source			
	Bank #		
	Modified Bank #		(Note changes or attach parent)
	New	XX	

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

Comments:

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	2	
	Group #	1	
	K/A #	022 A2.04	
	Importance rating	2.9	

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

Question: 40

Due to the loss of one CCW train the operating crew is performing OP AP-11, Appendix B, CCW Heat Load Isolation. The following conditions exist:

- Steady-state 100% power
- Containment vent is in progress
- 3 containment fan cooler units are in operation
- Spent Fuel Pool temperature is 85°F

With current containment temperature at 105°F, which of the following will be the most effective at slowing or stopping the increase of containment air temperature?

A. Reduce reactor power to 95%.

B. Increase CCW flow through spent fuel pool heat exchanger.

C. Stop the containment vent evolution.

D. Turn off all containment fan cooler units.

Answer: B

Explanation: A is incorrect since a 5% power reduction will reduce T-avg by slightly more than 1°F so the impact on containment temperature will be minimal. B is correct as raising CCW flow will convert the SFP into a heat sink. C & D are incorrect since a purge or vent with the CFCUs running would provide desirable air mixing and therefore, should not be secured.

Technical Reference(s): OP-AP-11, Rev. 23, App. B (discussion item 2.b); STG H-2, Rev. 13, page 3-4

Proposed references to be provided to applicants during examination: None

Learning Objective: 40812, 68455

Question Source	Bank #		
	Modified Bank #		(Note changes or attach parent)
	New	XX	

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

Comments:

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	2	
	Group #	1	
	K/A #	026 K3.01	
	Importance rating	3.9	

Containment Spray: Knowledge of the effect that a loss or malfunction of the CSS will have on the following: CCS

Question: 41

Which of the following configurations for containment cooling is the MINIMUM necessary to be adequate for containment heat removal during accident conditions?

A. No containment spray trains and a minimum of three CFCUs.

B. Two containment spray trains and a minimum of zero CFCUs.

C. One containment spray train and a minimum of two CFCUs.

D. One containment spray train and a minimum of three CFCUs.

Answer: C

Explanation: C is correct. Plant design allows a complete loss of one train of AC power which would disable 1 CSS pump and up to 2 CFCU's. However, if one CFCU were initially OOS, loss of the AC power division taking out 2 CFCU's would still leave the minimum of 2 units in operation (C is correct).

Technical Reference(s): STG H2, Rev. 13. page 1-6

Proposed references to be provided to applicants during examination: None

Learning Objective: STG H2, Rev. 13, objs. 4, 5, & 6

Question Source		
Bank #	A-0566	
Modified Bank #		(Note changes or attach parent)
New		

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

Comments:

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	2	
	Group #	1	
	K/A #	039 A4.07	
	Importance rating	2.8	

Main and Reheat Steam: Ability to manually operate and/or monitor in the control room: Steam Dump Valves.

Question: 42

The plant is being cooled down from Mode 3 to Mode 5 per OP L-5, Plant Cooldown From Minimum Load to Cold Shutdown.

When T-avg reaches 543°F…

A. all groups of steam dumps will close, then groups 1 and 2 steam dumps can be re-opened to continue the cooldown.

B. groups 2, 3 and 4 of steam dumps will close, but group 1 steam dumps will stay open for the plant cooldown.

C. all groups of steam dumps will close, then group 1 steam dumps can be re-opened to continue the cooldown.

D. groups 2, 3, and 4 of steam dumps will close, then all groups of steam dumps can be re-opened to continue the cooldown.

Answer: C

Explanation: A is incorrect since only group 1 dump valves can be re-opened. B is incorrect since all groups close at P-12 and group 1 is re-opened. C is correct. D is incorrect since only group one valves can be re-opened.

Technical Reference(s): OIM C-2-2, Rev. 22

Proposed references to be provided to applicants during examination: None

Learning Objective: STG, C2B, objective 10 (68804)

Question Source	Bank #	32731
	Modified Bank #	(Note changes or attach parent)
	New	

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

Comments:

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	2	
	Group #	1	
	K/A #	059 K3.02	
	Importance rating	3.6	

Main Feedwater: Knowledge of the effect that a loss or malfunction of the MFW will have on the following: FW System.

Question: 43

Unit 2 is at 75%, steady-state power with all equipment operable and aligned for normal at-power conditions. Both main feed water (MFW) pumps are in operation. What would be the effect on the auxiliary feed water (AFW) pumps if both MFW pumps trip? Assume no operator action.

A. All three AFW pumps immediately start to restore the heat sink critical safety function.

B. Both motor-driven AFW pumps immediately start; the turbine-driven AFW pump will start when the expected SG low-low water level condition occurs.

C. The turbine-driven AFW pump immediately starts; the motor-driven AFW pumps will start when the expected SG low-low water level condition occurs.

D. All three AFW pumps will start only when the expected SG low-low water level condition occurs.

Answer: B

Explanation: A is incorrect since trip of both MFWPs will only start the MDAFPs; Either AMSAC or SG low-low level (due to NR shrinkage) would generate a TDAFP start signal but it would be delayed. B is correct. C is incorrect since the MDAFPs start on the MFWPs tripping and the TDAFP starts on SG low-low level. D is incorrect since only the MDAFPs start on the MFWPs tripping.

Technical Reference(s): OIM D-1-2, Auxiliary Feed Pump Start Signals, Rev. 27

Proposed references to be provided to applicants during examination: None

Learning Objective: LD-1-AFW, objectives 10, 14

Question Source	Bank #		
	Modified Bank #		(Note changes or attach parent)
	New	XX	

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

Comments:

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	2	
	Group #	1	
	K/A #	059 A4.01	
	Importance rating	3.1	

Main Feedwater: Ability to manually operate and/or monitor in the control room: MFW turbine trip indication.

Question: 44

The plant is at 100% power with all equipment operable and configured for normal full power operation. A MFW Pump trip occurs.

Which of the following changes occur to the tripped MFW Pump Turbine? (Note: LP = Low Pressure, HP = High Pressure, and GV = Governor Valve)

A. The LP and HP steam stops fully close; the LP GV closes and the normally closed HP GV receives a signal to close.

B. The LP and HP steam stops fully close; the HP GV closes and the normally closed LP GV receives a signal to close.

C. Only the LP GV fully closes.

D. Only the HP GV fully closes.

Answer: A

Explanation: A is correct. B is incorrect since at full power the LP GV alone will provide all the steam needed to drive the MFW pump. C is incorrect since the LP & HP GV's also close. D is incorrect since the LP & HP steam stops also close.

Technical Reference(s): STG C8C, MFW Pumps and Turbines, Rev. 15, page 3-4

Proposed references to be provided to applicants during examination: None

Learning Objective: STG C8C, MFW Pumps and Turbines, Rev. 15, obj. 10, 15

Question Source		
	Bank #	
	Modified Bank #	(Note changes or attach parent)
	New	XX

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

Comments:

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	2	
	Group #	2	
	K/A #	001 K1.03	
	Importance rating	3.4	

Control Rod Drive System: Knowledge of the physical connections and/or cause-effect relationships between the CRDS and the following systems: CRDM

Question: 45

Unit 2 was operating at 80% power with all rods out (ARO) except Control Bank D (CBD) which is at 179 steps on the demand counters and 180 steps on DRPI during a power increase back to 100%. The reactor operator has been instructed to raise T-avg slightly above program in preparation for a small turbine load increase. Unknown to the operator, 2 Rod Control Lift Coil Disconnects have been placed in the "rod disconnected" position. The Control Room Rod Bank Selector switch is in "Manual".

How will the Rod Control System respond after the operator attempts to manually withdraw control rods by pulling (out) the in-hold-out switch?

A. The 2 affected CBD rods will partially drop into the core.

B. A DRPI Urgent Failure alarm will actuate.

C. All CBD rods, except the 2 affected rods, will step out; the 2 affected rods will remain at 180 steps on DRPI.

D. A Logic Cabinet Urgent Failure will actuate, which inhibits all rod motion in any mode select position.

Answer: C

Explanation: A is incorrect. The only effect of the LC disconnect being open is that the CRDM Lift Armature will not lift in the Rod step in/out sequence, but the movable gripper coil will remain energized (gripper engaged) whenever the "S" gripper coil is de-energized. B is incorrect since the only Urgent Failure that could occur would be in the Rod Control System; however, even it will not actuate since as long as ≥ one L coil in the group being moved receives and executes the current orders, a Rod Control Urgent Failure condition will not occur. DRPI Urgent Failure does not directly involve CRDS. C is correct. The affected rods will transfer between the S and M grippers, but the L coils will not energize, therefore the affected rods will remain at 180 steps. If the unaffected rods are allowed to move enough steps, a DRPI or Tech. Spec. Rod Deviation condition can result. D is incorrect. Lockup occurs only when rod motion is demanded with a Rod Control Urgent Failure present, which does not exist in this event.

Technical Reference(s): STG A3A, Rev. 13 pages 2-70, 3-9, STG A3B, Rev. 11, page 2-11

Proposed references to be provided to applicants during examination: None

Learning Objective: STG A3A, Rev. 13 Objs. 7 & 9

Question Source Bank # ________

	Modified Bank #	________ (Note changes or attach parent)
	New	___XX____
Question Cognitive Level:	Memory or Fundamental Knowledge	______
	Comprehension or Analysis	__X__

Comments:

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	2	
	Group #	1	
	K/A #	061 K4.08	
	Importance rating	2.7	

Auxiliary/Emergency Feedwater: Knowledge of the AFW design feature(s) and/or interlock(s) which provide for the following: AFW recirculation.

Question: 46

Consider the following water storage locations:

- Condensate Storage Tank (CST)
- Raw Water Reservoir (RWR)
- Firewater Tank (FWT)

For the Auxiliary Feed Water (AFW) system, which of the above can serve as a pump suction source (S) and which can serve as a recipient of pump recirculation flow (R)?

	CST	RWR	FWT
A.	S R	S R	S R
B.	S only	S only	S R
C.	S R	S only	S only
D.	S only	R only	S only

Answer: C

Explanation: A is incorrect since the RWR and FWT are sources only. B is incorrect since the CST is a source and recipient and the FWT is a source only. C is correct. D is incorrect since CST is a source and recipient and the RWR is a source only.

Technical Reference(s): OVID 106703 sheet 3, Rev. 71; OIM Tab "D" page D-1-1, Rev. 15

Proposed references to be provided to applicants during examination: None

Learning Objective: LD-1-AFW, Rev. 11, objs. 10, 16

Question Source	Bank #		
	Modified Bank #		(Note changes or attach parent)
	New	XX	

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

Comments:

Examination Outline Cross-reference:

Level	RO	SRO
Tier #	2	
Group #	1	
K/A #	062 A2.03	
Importance rating	2.9	

AC Electrical Distribution: Ability to (a) predict the impacts of the following malfunctions or operations on the AC distribution system; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: Consequences of improper sequencing when transferring to or from an inverter.

Question: 47

Unit 1 is operating at steady-state 100% power with all equipment operable and properly aligned for full power operation with the following exception. Due to breaker misalignment, the DC battery feed to the Uninterruptible Power Supply (UPS) for a vital 120 VAC PY Panel is unavailable.

Before any operator actions are taken, what is the present status of the affected vital bus?
(TRY = Backup Regulating Transformer)

A. PY panel is presently energized. If UPS AC input breaker trips, then the PY panel will de-energize and remain de-energized until the UPS is restored.

B. PY panel is presently energized. If UPS AC input breaker trips, then the static switch will transfer to the TRY, and the PY panel will remain energized.

C. PY panel momentarily de-energizes. The PY panel will be re-energized from the TRY, through the UPS static switch.

D. PY panel is presently de-energized. The PY panel will remain de-energized until the UPS is restored.

Answer: B

Explanation: A is incorrect since the static switch is still available and supplied from the TRY. B is correct. C and D are incorrect since the UPS rectifier will keep the UPS energized.

Technical Reference(s): STG J10, Instrument AC System, Rev. 13, pages 1-5 and 3-8

Proposed references to be provided to applicants during examination: None

Learning Objective: STG J10, Rev. 13, objs. 13 and 20

Question Source
- Bank # ______
- Modified Bank # ______ (Note changes or attach parent)
- New XX

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

Comments:

Examination Outline Cross-reference:

Level	RO	SRO
Tier #	2	
Group #	1	
K/A #	062 2.2.2	
Importance rating	4.0	

AC Electrical Distribution: Ability to manipulate the console controls as required to operate the facility between shutdown and designated power levels.

Question: 48

Unit 1 is ramping offline with CCW pumps 1-2 and 1-3 running. The operating crew is directed to transfer 4 KV bus H from the auxiliary transformer to the startup transformer. The operator performing the evolution places and holds “4kV Bus H Pwr Xfr Sw” in the "XFER TO S/U” position. Supply breaker from the startup transformer, “52-HH-14” closes as expected, however, supply breaker, “52-HH-13” from the auxiliary transformer does not open.

What action should be performed next by the operating crew?

A. Continue to hold the transfer switch in the “XFER TO S/U” position. The transfer circuit check for synchronism can take several seconds.

B. Immediately stop CCW pump 1-3 and secure any other major loads on bus H; start CCW pump 1-1, then trip both bus H supply breakers.

C. Immediately place the synchroscope key in OFF and release the “XFER TO S/U” switch.

D. Immediately trip either one of the supply breakers, 52-HH-13 or 52-HH-14.

Answer: D

Explanation: A is incorrect since breaker 52-HH-13 will only close if synchronized; a precaution in the procedure cautions against operating with parallel feeds. B is incorrect since this will only lengthen the time that the bus is operated with parallel feeds. C is incorrect since these actions will not open either of the breakers. D is correct, in fact the circuit should have automatically opened 52-HH-13, although either can be manually tripped.

Technical Reference(s): OIM Figure J-1-1, Rev. 27 OP J-6A:II, Rev. 10, Section 6.2.44

Proposed references to be provided to applicants during examination: None

Learning Objective: LJ-15, Electric Power Transfer, Rev. 4 Obj. 11

Question Source
Bank # ______
Modified Bank # ______ (Note changes or attach parent)
New XX

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

Comments:

Examination Outline Cross-reference:

Level	RO	SRO
Tier #	2	
Group #	1	
K/A #	063 A4.03	
Importance rating	3.0	

DC Electrical Distribution: Ability to manually operate and/or monitor in the control room: battery discharge rate.

Question: 49

A vital 125 VDC battery is designed to supply DC loads following a loss of its battery charger, with no DC load shedding, for a minimum of …

A. 1 hours.

B. 2 hours.

C. 4 hours.

D. 8 hours.

Answer: B

Explanation: The station batteries are rated for 2 hours with all loads "connected." Safety analyses use this conservative value. The value is conservative since by selectively stripping low priority and non-class loads, battery life can be extended. Therefore, B is correct and A, C, & D are incorrect.

Technical Reference(s): EOP ECA-0.0, Loss of All Vital AC Power, Rev. 22, Appendix DC, page 26; STG J9, DC Power, Rev 16, page 1-8

Proposed references to be provided to applicants during examination: None

Learning Objective: STG J9, DC Power, Rev. 16 Objective 27

Question Source
Bank # P1368
Modified Bank # ______ (Note changes or attach parent)
New ______

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

Comments: Question was asked on DCPP NRC exam in 2005

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	2	
	Group #	1	
	K/A #	064 K4.10	
	Importance rating	3.5	

Emergency Diesel Generator: Knowledge of EDG system design feature(s) and / or interlock(s) which provide for the following: Automatic load sequencer: blackout

Question: 50

The plant is at 50% power with all equipment operable and in the required configuration when a concurrent station blackout and large main steam line break - MSLB (outside CNMT) occurs. The reactor trips and all 3 emergency diesel generators (EDGs) start and energize their respective busses as designed.

Assuming that safety injection does actuate prior to the EDGs energizing their respective busses, which of the following groups lists all the ESF pumps (and number running of each) which will be started directly by the diesel generator sequence circuits?

A. ASW (2), MDAFWP (2), CCP (2), CCW (3), RHR (2), SIP (2), CSP (2)

B. ASW (2), MDAFWP (2), CCP (2), CCW (3), RHR (2), SIP (2)

C. ASW (2), MDAFWP (2), CCP (2), CCW (2), RHR (2), SIP (2), CSP (2)

D. ASW (2), MDAFWP (2), CCP (2), CCW (2), RHR (2), SIP (2)

Answer: B

Explanation: B is correct. A is incorrect since the CS pumps only start if there is a Hi-3 CNMT signal. C and D are incorrect for similar reasons and all 3 CCW pumps will sequence on vice 2.

Technical Reference(s): OIM J-6-1, Rev. 26

Proposed references to be provided to applicants during examination: None

Learning Objective: LJ-15 objective 4295

Question Source			
	Bank #		
	Modified Bank #		(Note changes or attach parent)
	New	XX	

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

Comments:

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	2	
	Group #	1	
	K/A #	073 K1.01	
	Importance rating	3.6	

Process Radiation Monitoring: Knowledge of the physical connections and/or cause-effect relationships between the PRM system and the following systems: those systems served by PRMs.

Question: 51

The plant is at full power with all systems and components operable and correctly aligned. A small tube leak develops in the Letdown Heat Exchanger, which over time, gets progressively worse. If the leak becomes large enough, how will the CCW system automatically respond?

A. Only the RCP Thermal Barrier common return line isolation valve, FCV-357, will close.

B. Only the CCW Surge Tank vent valve, RCV-16, will close.

C. Only the RCP Thermal Barrier common return line isolation valve, FCV-357 and CCW Surge Tank vent valve, RCV-16, will close.

D. RCP Thermal Barrier common return line isolation valve, FCV-357 and CCW Surge Tank vent valve RCV-16, will close; CCW Surge Tank make-up valves, LCV-69 and LCV-70, will close.

Answer: B

Explanation: A is incorrect as this line will isolate on high flow (dP) that could result from a thermal barrier leak into CCW. B is correct as RE-17A and B provide a signal to close the surge tank vent valve on high CCW activity which could follow a LDHX tube leak since CVCS pressure is higher and leakage would be into CCW. C is incorrect (see explanation for A). D is incorrect since leakage is into CCW and, in fact, the LCVs if open will close as ST level rises; and see explanation for A.

Technical Reference(s): OIM figure G-3-1, Rev. 26; OP AP-11, Rev. 23; OVID 106714, Rev 54, Sh. 6

Proposed references to be provided to applicants during examination: None

Learning Objective: STG G4A, Process Radiation Monitors, Rev. 8, obj 14

Question Source			
	Bank #		
	Modified Bank #		(Note changes or attach parent)
	New	XX	

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

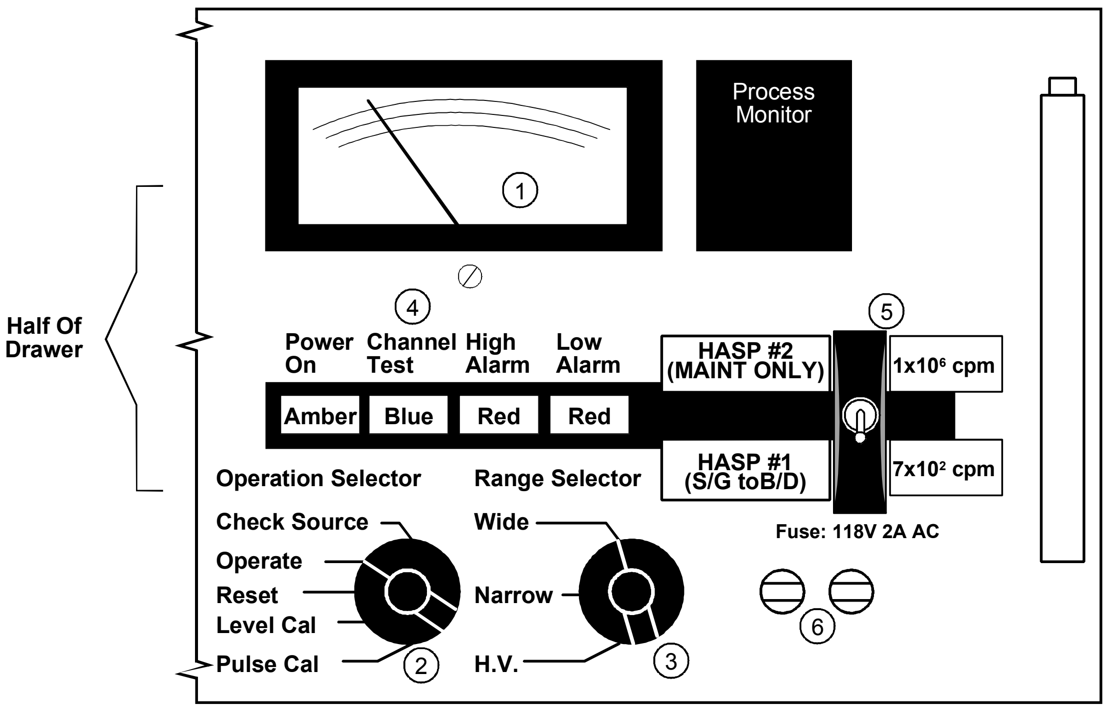
Comments:

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	2	
	Group #	1	
	K/A #	073 A4.03	
	Importance rating	3.1	

Process Radiation Monitoring: Ability to manually operate and/or monitor in the control room: Check source for operability demonstration.

Question: 52

Refer to the figure of the RM-19 Process Radiation Monitor control module for the question that follows.



What indication(s) will the operator observe on the RM-19 (S/G Blowdown Process Radiation Monitor) control module if the Operation Selector switch (#2) is placed in the “Check Source” position?

A. Only the “Low Alarm” status light will illuminate.

B. Only the “High Alarm” status light will illuminate.

C. The “Low Alarm” and “High Alarm” and the “Channel Test” status lights will all illuminate.

D. Only the “Channel Test” status light will illuminate, and the needle will indicate about mid-range.

Answer: D

Explanation: A, B, & C are incorrect since the alarm status light status will not change. D is correct The "Channel Test" status light illuminates to confirm that the check-source test sequence has actuated and the needle goes to midscale to verify its operability.

Technical Reference(s): STG G4A, Radiation Monitoring Rev.9, pp 2.3-31 & 35

Proposed references to be provided to applicants during examination: None

Learning Objective: STG G4A, Radiation Monitoring, Rev. 9, obj 14

Question Source Bank # ________
Modified Bank # ________ (Note changes or attach parent)
New XX

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

Comments:

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	2	
	Group #	1	
	K/A #	076 A2.02	
	Importance rating	2.7	

Service Water: Ability to (a) predict the impacts of the following malfunctions or operations on the SWS; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: Service water header pressure.

Question: 53

What precaution for operating the Auxiliary Saltwater (ASW) system must be followed to minimize the potential for salt water leaking into the component cooling water (CCW) system?

A. Operate 2 ASW pumps through one CCW HX to minimize local erosion-corrosion.

B. Operate one ASW pump through 2 CCW HX's (preferred alignment) to reduce ΔP across the tubes.

C. Maintain CCW pressure on the shell side of the CCW HX(s) higher than the ASW pressure on the tube side.

D. Maintain CCW pressure on the tube side of the CCW HX(s) higher than the ASW pressure on the shell side.

Answer: C

Explanation: A is incorrect as additional flow would increase erosion-corrosion; it may, in fact reduce biological deposits, however, system procedures recommend normally operating 2 ASW pumps and 2 CCW HX's. B is incorrect. The preferred ASW alignment is actually two ASW pumps aligned to two CCW HX's. Also, the difference in tube ΔP is minimal between a single ASW pump and 2 ASW pumps in parallel. C is correct since CCW is on the shell side and keeping it at higher pressure minimizes the potential for CCW in-leakage from ASW. D is incorrect, since CCW is on the shell side and ASW is on the tube side.

Technical Reference(s): OP E-5:II, "Aux. Saltwater System – 2 CCW HX Operation," Rev. 12, Sect. 5

Proposed references to be provided to applicants during examination: None

Learning Objective: STG E5, Auxiliary Saltwater System, Rev. 12, obj 12, 21

Question Source	Bank #		
	Modified Bank #		(Note changes or attach parent)
	New	XX	

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

Comments:

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	2	
	Group #	1	
	K/A #	078 K2.01	
	Importance rating	2.7	

Instrument Air: Knowledge of the bus power supplies to the following: Instrument air compressors.

Question: 54

A loss of power to which of the following busses/load centers would have the most significant impact on Unit 2's ability to maintain normal instrument air header pressure (100 psig – 108 psig)?

A. Unit 2, vital 4KV bus H

B. Unit 1, vital 480V bus/load center G

C. Unit 2, non-vital 480V bus/load center 22J

D. Unit 1, non-vital 480V bus/load center 15E

Answer: D

Explanation: A and B are incorrect since all compressors at both units are powered from non-vital sources. C is incorrect; non-vital bus/load center "J" is located in the Aux. Bldg and does not supply power to any compressor. D is correct. Bus/load center 15E supplies power to one reciprocating and one rotary compressor.

Technical Reference(s): OIM J-1-1, Rev.27; STG K1, Rev. 12, pages 2.1-3,12; STG J7, Rev. 11, page 2-16

Proposed references to be provided to applicants during examination: None

Learning Objective: STG K1, Compressed Air System, Rev 12 obj 23

Question Source			
	Bank #		
	Modified Bank #		(Note changes or attach parent)
	New	XX	

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

Comments:

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	2	
	Group #	1	
	K/A #	103 A3.01	
	Importance rating	3.9	

Containment: Ability to monitor automatic operation of the containment system: including containment isolation.

Question: 55

The plant was at steady-state 100% power with all equipment operable and properly aligned when a main steam line break (MSLB) occurred inside containment. All systems and equipment functioned as designed. Containment pressure rose rapidly at first, peaked at 26 psig, and is currently 25 psig and slowly decreasing. No ESF signals have been reset.

What is the current status of the Containment Isolation – Phase B (CIB) Signal?

CIB has actuated and…

A. cannot be reset until CNMT pressure drops below 22 psig.

B. cannot actuate again unless the signal is reset inside the SSPS logic cabinets.

C. can be reset, but will not auto actuate again until CNMT pressure first drops below 22 psig.

D. can be reset, but would promptly actuate again since CNMT pressure is greater than 22 psig.

Answer: C

Explanation: A is incorrect. CIB can be reset with the initiating signal still present. B is incorrect since the signal can be reset from the control room. C is correct. D is incorrect since the reset includes a logic block to prevent re-actuation of the CIB

Technical Reference(s): STG B6A-SSPS, Reactor Protection System, Rev 15, pages 2.2-22/23; OIM B-6-8, Rev. 21

Proposed references to be provided to applicants during examination: None

Learning Objective: LB-6A, Rx Protection System, Rev 9 objs 10, 12

Question Source			
	Bank #		
	Modified Bank #		(Note changes or attach parent)
	New	XX	

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

Comments:

Examination Outline Cross-reference:

Level	RO	SRO
Tier #	2	
Group #	2	
K/A #	011K4.06	
Importance rating	3.3	

Pressurizer Level Control: Knowledge of PZR LCS design feature(s) and/or interlock(s) which provide for the following: letdown isolation.

Question: 56

Which of the following conditions is necessary and sufficient to cause Letdown to isolate?

A. The cold calibration level channel, LT-462 below 17%, and any one of the 3 Pressurizer hot calibration level channels below 17%.

B. Any one of the 3 Pressurizer hot calibration level channels below 17%.

C. Both the P-7 permissive met, and any one of the 3 Pressurizer hot calibration level channels below 17%.

D. Either the Control or Backup Pressurizer hot calibration level channels below 17%.

Answer: D

Explanation: Answer A may result in a letdown isolation but if the PZR hot calibration level channel that is below 17% is not selected, letdown will not isolate; and the cold cal channel as no input to letdown isolation. Answer B is incorrect as the channel not selected as control or backup will not cause a letdown isolation. Answer C is incorrect since P-7 change of status does not affect letdown isolation. Answer D is correct. Either of the selected hot calibrated level channels will, on a low level < 17%, close the respective series LCV (459 or 460) thus isolating letdown flow.

Technical Reference(s): STG A4A page 2.3-6, rev. 14

Proposed references to be provided to applicants during examination: None

Learning Objective: STG A4A Obj. 13 (As available)

Question Source
Bank # ______
Modified Bank # ______ (Note changes or attach parent)
New XX

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

Comments: The difficulty of this question was increased because the examinee must determine that it is the control and backup channels that cause the actuation and not 459/461 which are normally selected.

Examination Outline Cross-reference:

Level	RO	SRO
Tier #	2	
Group #	2	
K/A #	016K5.01	
Importance rating	2.7	

Non-nuclear Instrumentation: Knowledge of the operational implication of the following concepts as they apply to the NNIS: separation of control and protection circuits.

Question: 57

The reactor protection system is designed to ensure a failure of a control system will not cause or prevent a protective action from occurring. How is this accomplished?

A. Protection channels are maintained completely separate from control channels including separate sensors.

B. Protection and control channels are completely separate except for the sensors that are used as inputs.

C. The use of coincidence in the protection circuits allows for a control channel failure to cause a single protection channel failure.

D. Protective circuits are fail safe so that a failure of the control circuit will input the protective action on the failed channel.

Answer: B

Explanation: Answer A is incorrect as the control and protection channels frequently share the sensor. Answer B is correct. Answer C is incorrect as the coincidence does allow for single channel failure to not cause or prevent a protective action but this is not based on the control channel or only those channels that share control and protection would have coincidence. Answer D is incorrect because the idea of fail safe is not based on the failure of control channels back feeding to protections channels.

Technical Reference(s): STG B6A page 1-13 rev. 15

Proposed references to be provided to applicants during examination: None

Learning Objective: STG B6A Obj. 3 (As available)

Question Source
- Bank # ______
- Modified Bank # ______ (Note changes or attach parent)
- New XX

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

Comments:

Examination Outline Cross-reference:

Level	RO	SRO
Tier #	2	
Group #	2	
K/A #	028K6.01	
Importance rating	2.6	

Hydrogen Recombiner and Purge Control: Knowledge of the effect of a loss or malfunction on the following will have on the HRPS: hydrogen recombiners.

Question: 58

What is the primary concern following a LOCA if both Hydrogen Recombiners are unavailable, and what alternative system should be used to mitigate the accumulation of hydrogen gas in containment if such an event were to occur?

A. Over-pressurization of containment can occur if the hydrogen gas detonates; the Hydrogen Purge System should be used to remove hydrogen gas from containment if its concentration > 3.5%.

B. Over-pressurization of containment can occur if the hydrogen gas detonates; the Normal Containment Purge System should be used to remove hydrogen gas from containment at any concentration.

C. Exposure of important equipment to excessive heat can result if the hydrogen gas detonates; the Hydrogen Purge System should be used to remove hydrogen gas from containment if its concentration > 3.5%.

D. Exposure of important equipment to excessive heat can result if the hydrogen gas detonates; the Normal Containment Purge System should be used to remove hydrogen gas from containment at any concentration.

Answer: A

Explanation: Answer A is correct. The H2 Purge system is used when CNMT H2 concentration approaches the lower-explosive limit. B is incorrect – the H2 purge system is used if the H2 recombiners are unavailable. C and D are incorrect. The concern is a CNMT Bldg integrity challenge from over-pressure if the H2 detonates.

Technical Reference(s): OP H-9 rev 10; Equipment Control Guideline (ECG) 23.4, Rev. 1, page 5 STG H4, CNMT Purge, Rev. 10, page 1-4, STG H8, Rev. 8, page 1-3

Proposed references to be provided to applicants during examination: None

Learning Objective: STG H8, Obj. 1, 3 (As available)

Question Source
- Bank #
- Modified Bank # (Note changes or attach parent)
- New XX

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

Comments:

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	2	
	Group #	2	
	K/A #	034K6.02	
	Importance rating	2.6	

Fuel Handling Equipment: Knowledge of the effect of a loss or malfunction on the following will have on the fuel handling system: radiation monitoring systems.

Question: 59

While off loading fuel from the reactor, RE-12, Containment Gaseous Radiation monitor, goes into a valid high alarm condition. In addition to placing in-transit fuel assemblies in a safe location, what additional action(s) is(are) required to be performed?

A. Evacuate only non-refueling personnel from Containment, and activate Containment closure sequence.

B. Verify portable continuous air monitors are operable and resume fuel movement.

C. Initiate containment ventilation isolation, and once verified, fuel movement may resume.

D. Sound the Containment evacuation alarm and ensure all personnel promptly exit Containment.

Answer: ___D___

Explanation: Answer A is incorrect as all personnel should evacuate, especially if CNMT closure will be initiated. B is incorrect as there is potentially irradiated fuel damage. C is incorrect for the same reason-damaged fuel. D is the correct and prudent (and procedural) action to take.

Technical Reference(s): _OP AP-21, Rev. 10, page 2__

Proposed references to be provided to applicants during examination: ____None_________

Learning Objective: _STG B8 obj. 11__________ (As available)

Question Source
- Bank # _________
- Modified Bank # _________ (Note changes or attach parent)
- New ___XX____

Question Cognitive Level:
- Memory or Fundamental Knowledge __X__
- Comprehension or Analysis _____

Comments:

Examination Outline Cross-reference:

Level	RO	SRO
Tier #	2	
Group #	2	
K/A #	035 2.4.49	
Importance rating	4.0	

Steam Generator: Ability to perform without reference to procedures those actions that require immediate operation of system components and controls.

Question: 60

A Loss of Secondary Heat Sink has occurred on Unit 1. EOP FR-H.1, Loss of Secondary Heat Sink, has been entered. RCS pressure currently ranges from 2280 psig to 2335 psig as PORVs PCV-455C & 456 are currently cycling. S/G levels are as follows:

SG 1-1	SG 1-2	SG 1-3	SG 1-4
21% WR	22% WR	22% WR	23% WR

Given these conditions, what is the expected operating crew response?

A. Immediately stop all RCPs and initiate RCS bleed-and-feed.

B. Continue to monitor SG 1-4 WR level, and when it goes < 23%, stop all RCPs and initiate RCS bleed-and-feed.

C. Immediately commence actions to align a low pressure feedwater source to at least one SG.

D. Immediately isolate any cycling pressurizer PORV.

Answer: A

Explanation: Answer A is correct. The unit satisfies the criteria (3 WR SG levels < 23% -OR- PORVs cycling due to LOSHS) to initiate RCS B & F. B is incorrect. B & F criteria is satisfied; any delays will further complicate event mitigation. C is incorrect, even though this action may be done later, RCS B & F is first priority. D. It is not advisable to isolate PORVs when they are performing an important pressure control function and since B & F criteria are met.

Technical Reference(s): EOP FR-H.1, Rev. 22, Foldout page

Proposed references to be provided to applicants during examination: None

Learning Objective: STG A5, Objective 10 (As available)

Question Source
- Bank # ______
- Modified Bank # ______ (Note changes or attach parent)
- New XX

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

Comments:

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	2	
	Group #	2	
	K/A #	041K5.02	
	Importance rating	2.5	

Steam Dump/Turbine Bypass Control: Knowledge of the operational implications of the following concepts as they apply to the SDS: use of steam tables for saturation temperature and pressure.

Question: 61

A plant cooldown is in progress with the following current conditions:

- RCS temperature = 500°F
- RCS pressure = 1700 psig.

The plant is to stabilize at this point for data collection. Steam dumps are in Pressure Control mode and are ready to be set and placed in automatic to maintain the current RCS temperature. What should the pressure control setpoint be for the current conditions?

A. 5.55 turns

B. 5.67 turns

C. 6.64 turns

D. 6.80 turns

Answer: A

Explanation: Answer A is correct as the saturation pressure for 500°F is 681 psia which converts to 666 psig and then to 5.55 turns based on a 0-1200 psig span on the controller equating to 0-10 turns. Answer B is incorrect and is based on the psia value. Answer C is incorrect and is the psig value based on 0-1000 psig. Answer D is the psia value based on 0-1000 psia.

Technical Reference(s): Steam Tables
STG C2B page 3-1 Rev. 14

Proposed references to be provided to applicants during examination: STEAM TABLES

Learning Objective: STG C2B obj. 10 (As available)

Question Source			
	Bank #		
	Modified Bank #		(Note changes or attach parent)
	New	XX	

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

Comments:

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	2	
	Group #	2	
	K/A #	056A2.04	
	Importance rating	2.6	

Condensate: Ability to (a) predict the impacts of the following malfunctions or operations on the condensate system: and (b) based on those predictions use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: loss of condensate pumps.

Question: 62

Unit 1 is stable at 75% power awaiting chemistry sample results before returning to full power. Both Main Feed Water (MFW) pumps are in operation and condensate/booster pump sets 1-1 and 1-2 are in operation with set 1-3 selected to auto.

4KV bus D de-energizes.

Which of the following actions should the control room operator initially perform?

A. Verify condensate/booster pump set 1-3 automatically starts to restore adequate suction flow to the MFW pumps.

B. Actuate the Load Transient Bypass (LTB) circuit to prevent flashing at the MFW pump suction header.

C. Perform a rapid load reduction until MFW pump suction header pressure is restored high enough to prevent flashing.

D. Trip the reactor; with only one condensate/booster pump set in service, feed flow will be inadequate to maintain SG inventory.

Answer: A

Explanation: Answer A is correct since bus D powers condensate/booster set 1-1 only. Set 1-3 should automatically start which should return feed and condensate parameters back to pre-event values. For this reason, no other actions will be required, therefore, B, C, & D are incorrect.

Technical Reference(s): OP AP-15 section D rev 18; STG C7A, page 2.1-3, Rev. 15

Proposed references to be provided to applicants during examination: None

Learning Objective: STG C7A obj. 22 (As available)

Question Source
- Bank #
- Modified Bank # (Note changes or attach parent)
- New XX

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

Comments:

Examination Outline Cross-reference:

Level	RO	SRO
Tier #	2	____
Group #	2	____
K/A #	075K2.03	
Importance rating	2.6	____

Circulating Water: Knowledge of bus power supplies to the following: emergency/essential SWS pumps.

Question: 63

Assuming that Auxiliary Saltwater (ASW) system cross-connect valve, ASW-601 cannot be opened, which of the following combinations of Unit 1 de-energized 4KV busses would result in a complete loss of Unit 1 ASW cooling flow? Assume that the emergency diesel generators (DGs) do NOT re-energize their respective 4KV busses.

A. F and G only

B. F and H only

C. E and F only

D. G and H only

Answer: __A____

Explanation: The ASW pumps are powered from 4KV busses F (pump 1-1) and G (pump 1-2). Therefore, A is the correct answer and B, C, & D are incorrect.

Technical Reference(s): _OIM J-1-1, Rev. 27, STG J15, Rev. 6, page 2.2-35__

Proposed references to be provided to applicants during examination: __None________

Learning Objective: _STG J15, Rev. 6, obj. 12___________ (As available)

Question Source
Bank # __________
Modified Bank # __________ (Note changes or attach parent)
New ___XX____

Question Cognitive Level:
Memory or Fundamental Knowledge __X___
Comprehension or Analysis _______

Comments:

Examination Outline Cross-reference:

Level	RO	SRO
Tier #	2	
Group #	2	
K/A #	079K1.01	
Importance rating	3.0	

Station Air: Knowledge of the physical connections and/or cause-effect relationships between the SAS and the following systems: IAS.

Question: 64

Which of the following describes the interconnection that allows the Instrument Air (IA) System to supply the Service Air (SA) System?

A. A manual valve located downstream of the Instrument Air System filters.

B. A manual valve located on a header which bypasses the Instrument Air System filters.

C. A normally isolated automatic valve located downstream of the Instrument Air System filters which automatically closes on low IA pressure.

D. A normally isolated automatic valve located on a header which bypasses the Instrument Air System filters, which automatically closes on low IA pressure.

Answer: C

Explanation: The interconnect valve, PCV-114 is an automatic valve that is normally isolated (by valve 83) and auto closes on decreasing IA header pressure. The interconnection is located downstream of the IA System after-filters. There is an interconnection on the header that bypasses the IA System filters (via valve 4568), but an in-series check valve only permits this path to supply Service Air to Instrument Air. Therefore, C is the correct answer.

Technical Reference(s): STG K1 pages 1-4 & 1-5, rev. 12; OIM K-1-1, Rev. 19

Proposed references to be provided to applicants during examination: None

Learning Objective: STG K1 Obj 2 (As available)

Question Source
- Bank #
- Modified Bank # (Note changes or attach parent)
- New XX

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

Comments:

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	2	
	Group #	2	
	K/A #	086K4.04	
	Importance rating	3.1	

Fire Protection: Knowledge of the design feature(s) and/or interlock(s) which provide for the following: personnel safety.

Question: 65

Following CARDOX testing, a leak develops in the CARDOX supply to a Diesel Generator Room. How will the operator determine that there is a CO_2 buildup occurring?

A. If CO_2 levels reach 1% an alarm will sound and a red light will flash.

B. The operator will detect a wintergreen odor in the room.

C. An amber leak detection alarm will sound when temperature in the discharge header decreases.

D. The control room will inform the operator that the system pressure is decreasing.

Answer: __B___

Explanation: Answer A sounds reasonable, but will not happen as this is not provided in the DG rooms. Answer B is correct and is the purpose of adding the wintergreen odor to the carbon dioxide. Answer C is a good idea but not part of the design. Answer D is incorrect as a lot of carbon dioxide could be in the DG room before the control room would become aware of the problem.

Technical Reference(s): STG K2B rev. 13, page 2,1-19

Proposed references to be provided to applicants during examination: None

Learning Objective: STG K2B Objectives 6 & 16 (As available)

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

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

Comments:

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	3	
	Group #		
	K/A #	2.1.11	
	Importance rating	3.0	

Conduct of Operations: Knowledge of less than one hour technical specification action statements for systems.

Question: 66

The Unit is stable at 100% power when it is determined that all three AFW pumps are inoperable as defined by Technical Specifications. Which of the following actions should the crew take?

A. Be in Mode 3 within one hour, while attempting to restore at least one AFW pump.

B. Commence a plant shutdown to comply with T.S. 3.0.3.

C. Maintain the plant stable and do not change modes until at least one AFW pump is restored.

D. Reduce power to less than 10% and stabilize the plant until one AFW pump is restored.

Answer: C

Explanation: Answer A is incorrect as this action involves mode changes and would put the plant in jeopardy, especially if MFW was lost. Answer B is incorrect as the AFW action statement specifically excludes using T.S. 3.0.3. Answer C is correct as this is the safest thing to do. Answer D is incorrect but would seem reasonable as the power would be much lower and tend to put the plant further from the edge of the operating envelope. However, the risk of reactor trip could result in a loss of heat sink.

Technical Reference(s): T.S. 3.7.5 Amend. 169

Proposed references to be provided to applicants during examination: None

Learning Objective: STGD-1, objective 22 (As available)

Question Source
- Bank #
- Modified Bank # (Note changes or attach parent)
- New XX

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

Comments:

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	3	
	Group #		
	K/A #	2.1.17	
	Importance rating	3.5	

Conduct of Operations: Ability to make accurate, clear and concise verbal reports.

Question: 67

The crew is in the EOP network and the Shift Foreman has directed that the operator "verify RHR pump 1-2 is running." The operator determines that the RHR pump 1-2 is not running at the present time. How should the operator respond to the Shift Foreman's directive?

A. State "No, starting RHR Pump 1-2," and then start the pump only after obtaining the required peer check.

B. State "No, the pump did not start," and wait for instruction from the SFM before starting the pump.

C. State "No, the pump did not start. Starting RHR pump 1-2."

D. State "No, starting RHR Pump 1-2;" then start the pump only after obtaining the correct procedure.

Answer: __C___

Explanation: Answer A is incorrect as it is not a proper 3 way communication and peer checks are suspended during performance of the EOPs. Answer B is incorrect as the step is a verify so the operator should complete the statement by stating the required action that was performed. Answer C is correct. Answer D is incorrect as action is taken without confirmation that the action is correct.

Technical Reference(s): _OP1.DC10 Rev. 12________

Proposed references to be provided to applicants during examination: ___None__________

Learning Objective: __LADM-5 Obj 3654______ (As available)

Question Source
Bank # _________
Modified Bank # _________ (Note changes or attach parent)
New ___XX____

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

Comments:

Examination Outline Cross-reference:

Level	RO	SRO
Tier #	3	
Group #		
K/A #	2.1.33	
Importance rating	3.4	

Conduct of Operations: Ability to recognize indications for system operating parameters which are entry-level conditions for technical specifications.

Question: 68

The unit is stable at 8% power when a failure in the steam dump system opens a condenser steam dump valve. When the valve is closed the following conditions exist:

- RCS T-avg = 535°F
- RCS pressure = 2,000 psig
- SG levels = 30% narrow range
- Pressurizer level = 17%

Which of the following parameters should be restored first to satisfy Technical Specifications?

A. RCS pressure.

B. RCS T-avg.

C. Pressurizer level.

D. SG level.

Answer: B

Explanation: Answer A is required to be restored within 2 hours to satisfy technical specifications for DNB. Answer B is correct and must be restored within 30 minutes. Answer C is not a technical specification item. Answer D is part of technical specification 3.4.4 in which an minimum SG level is required for RCS Loop operability which has only a 6 hour shutdown to Mode 3 action.

Technical Reference(s): T.S. 3.4.2 Amendment 135; LSL-2, Rev.11, page 8

Proposed references to be provided to applicants during examination: None

Learning Objective: 9896 (As available)

Question Source
- Bank #
- Modified Bank # (Note changes or attach parent)
- New XX

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

Comments:

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	3	
	Group #		
	K/A #	2.2.3	
	Importance rating	3.3	

Equipment Control: Knowledge of the design, procedural, and operational differences between the units.

Question: 69

How is the physical core design different between Unit 1 and Unit 2?

A. The control rods on unit 2 are designed to drop faster on a reactor trip.

B. The neutron absorbers used are different between the two units.

C. The design of the individual rod cluster control assembly (RCCA) is different.

D. The core distribution pattern of the 53 control rods is different between the two units.

Answer: D

Explanation: A is incorrect. Rods drop solely due to gravity and vertical dimensions of the core are the same between the units. B is incorrect. Rodlets are Ag-In-Cd, clad in SS. C is incorrect since the fuel assembly physical design is the same, and therefore, so is the RCCA. D is correct (because of this, the RIL's are different between U1 and U2).

Technical Reference(s): STG A2B, Rev. 12, page 4-3

Proposed references to be provided to applicants during examination: None

Learning Objective: STG A2B, Rev. 12, objs. 2,4

Question Source			
	Bank #		
	Modified Bank #		(Note changes or attach parent)
	New	XX	

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

Comments:

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	3	
	Group #		
	K/A #	2.2.12	
	Importance rating	3.0	

Equipment Control: Knowledge of surveillance procedures.

Question: 70

With Unit 1 at 100% steady-state power, a Licensed Operator is assigned to perform a manual QPTR surveillance calculation using STP R-25, Calculation of Quadrant Power Tilt Ratio. Upon completion, the operator reports that QPTR for Unit 1 is 1.003.

What action is required based on these calculation results?

A. Reduce core thermal power to a value less than or equal to 91% RTP within 2 hours.

B. Reduce core thermal power to 50% RTP or less within 4 hours.

C. Direct the Reactor Engineer to perform a core flux map.

D. No action is required – QPTR is within its allowable range.

Answer: D

Explanation: Answer A is incorrect. This is the action which would be taken if QPTR was 1.02 vs. 1.003. B is incorrect since this is the requirement if a required action and associated completion time is not met. C is incorrect. There is no requirement to perform a core flux map as an action or surveillance for the QPTR Tech. Spec. (3.2.4). D is correct. The action limit for QPTR is 1.02. As long as QPTR is ≥ 1.0 (minimum possible value for peak-to-average calculation) and ≤ 1.03, (Tech. Spec. LCO), no action is required.

Technical Reference(s): T.S. 3.2.4 actions and QPTR definition; LPWRDST, Rev 5, page 12

Proposed references to be provided to applicants during examination: None

Learning Objective: 5977 (As available)

Question Source
Bank #
Modified Bank # (Note changes or attach parent)
New XX

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

Comments:

Examination Outline Cross-reference:

Level	RO	SRO
Tier #	3	
Group #		
K/A #	2.2.30	
Importance rating	3.5	

Equipment Control: Knowledge of RO duties in the control room during fuel handling such as alarms from fuel handling area, communication with fuel storage facility, systems operated from the control room in support of fueling operations, and supporting instrumentation.

Question: 71

In accordance with OP B-8DS1, Core Unloading, and OP B-8DS2, Core Loading, which of the following tasks is performed by the Control Operator, who is responsible for activities associated with fuel movements?

The Control Operator ensures:

A. 3-way communication of correct fuel assembly location prior to latching or unlatching.

B. the 1/M calculation and plot are completed after unlatching a fuel assembly in the core.

C. refueling crew is aware of any unusual trends in the fuel load 1/M plot.

D. core alterations are halted in the event a containment evacuation alarm occurs.

Answer: A

Explanation: Answer A is correct per the procedure. Answer B is not the responsibility of the Control room operator and it is performed prior to unlatching. Answer C is also not the responsibility of the CO, but instead such information should be communicated by the refueling SRO or SFM. Answer D is incorrect as this is the responsibility of the refueling SRO.

Technical Reference(s): OP B-8DS1 & 2, Step 3.6 rev. 36

Proposed references to be provided to applicants during examination: None

Learning Objective: 36965 (As available)

Question Source
- Bank #
- Modified Bank # (Note changes or attach parent)
- New XX

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

Comments:

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	3	
	Group #		
	K/A #	2.3.9	
	Importance rating	2.5	

Radiation Control: Knowledge of the process for performing a containment purge.

Question: 72

During a containment purge, Containment Purge Exhaust Radiation Monitor, RE-44A fails high resulting in a Containment Vent Isolation (CVI) signal.

If the operators decide to reset the CVI signal and return RE-11/12 to service with the failed channel still in service, then the following condition will exist.

A. The CFCU drain collection system must be placed in service.

B. Automatic CVI from future high radiation conditions are inhibited.

C. An automatic CVI from RE-44B is available.

D. The CVI signal will still be actuated.

Answer: B

Explanation: A is incorrect since RE-11 & 12 can be placed in service by resetting CVI. B is correct. CVI reset function is a latching relay with retentative memory, 44A high keeps relay latched in until the alarm input is cleared. Retentative memory passes last input which is reset. Should 44B go into high alarm the relay will not change state. This also makes C and D wrong.
Technical Reference(s): OIM-B-6-9A, Rev. 27

Proposed references to be provided to applicants during examination: None

Learning Objective: STG H4, Rev 10, objs 2, 9 (As available)

Question Source	Bank #	A-0025	
	Modified Bank #		(Note changes or attach parent)
	New		

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

Comments:

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	3	
	Group #		
	K/A #	2.3.11	
	Importance rating	2.7	

Radiation Control: Ability to control radiation releases.

Question: 73

A liquid Radwaste release of a Laundry and Hot Shower Tank (LHST) is in progress when a valid radiation high alarm actuates on RE-18, Liquid Radwaste Discharge monitor.

In accordance with OP G-1:II, Liquid Radwaste System - Discharge of Liquid Radwaste, which of the following should the Unit 1 Control Operator do?

A. If the radiation level spiked and has decreased, reset the alarm.

B. Have the local operator confirm that the LHST pumps tripped.

C. If the radiation level is above the alarm setpoint, have the local operator flush the detector.

D. Have the local operator confirm that RCV-18, Liquid Waste Discharge valve, is closed.

Answer: D

Explanation: Answer A is incorrect as the alarm should not be reset until the reason for the alarm has been investigated. Answer B is incorrect. Answer C is incorrect. Chemistry should be notified and the discharge evolution should not proceed until Chemistry has finished sampling. Answer D is the correct action to take.

Technical Reference(s): OP G-1:II step 6.17 rev. 35

Proposed references to be provided to applicants during examination: None

Learning Objective: None found (As available)

Question Source
- Bank #
- Modified Bank # (Note changes or attach parent)
- New XX

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

Comments:

Examination Outline Cross-reference:

Level	RO	SRO
Tier #	3	
Group #		
K/A #	2.4.35	
Importance rating	3.3	

Emergency Procedures/Plan: Knowledge of local auxiliary operator tasks during emergency operations including system geography and system implications.

Question: 74

Refer to the following acronyms to answer the question below:

- BAST = Boric Acid Storage Tank
- BABT = Boric Acid Batching Tank
- BATP = Boric Acid Transfer Pump
- CMT = Chemical Mixing Tank

The operating crew is performing EOP FR-S.1, Response to Nuclear Power Generation / ATWS, due to a re-criticality event. The Auxiliary Building operator is dispatched to locally verify that potential sources of dilution flow within CVCS are eliminated. The operator has verified that primary (flush) water to the CVCS demineralizers is isolated, and Normal Letdown flow has bypassed the de-borating demineralizers.

In accordance with EOP FR-S.1, Appendix D (Dilution Flowpath Isolation), what additional primary water flowpath(s) is the Auxiliary Building Operator required to verify is(are) isolated to ensure that no further RCS boron dilution will occur?

A. BASTs, BATPs, BABT, and CMT.

B. BASTs, BABT, & CMT only.

C. BATPs and CMT only.

D. BATPs only.

Answer: C

Explanation: Answer A is incorrect as BASTs and the BABT are not addressed in the attachment. B is incorrect since the BASTs are not addressed in the attachment. There are, in fact, multiple series isolation valves for the primary water supply and for draining the BASTs. C is correct – the BATPs each are isolated by a single valve (CVCS-8464A & B) and the CMT could also be a source of dilution water if valves were misaligned or failed. D is incorrect since the CMT must also be verified isolated.

Technical Reference(s): EOP FR-S.1, Response to Nuclear Power Generation / ATWS, Rev. 16a, page 14, Appendix D; LPES Rev 7, page 19

Proposed references to be provided to applicants during examination: None

Learning Objective:	3551	(As available)	
Question Source	Bank #		
	Modified Bank #		(Note changes or attach parent)
	New	XX	
Question Cognitive Level:	Memory or Fundamental Knowledge		
	Comprehension or Analysis	X	

Comments:

Examination Outline Cross-reference:

Level	RO	SRO
Tier #	3	
Group #		
K/A #	2.4.34	
Importance rating	3.8	

Emergency Procedures/Plan: Knowledge of RO tasks performed outside the main control room during emergency operations including system geography and system implications.

Question: 75

Following a control room evacuation, control is established at the Hot Shutdown Panel. The operator considers placing S/G level control valves, LCV-110, 111, 115 and 113 in manual to control AFW flow.

What does OP AP-8A, Control Room Inaccessibility – Establishing Hot Standby, caution the operator about when shifting S/G level control valves to manual?

A. Too much AFW flow can cause a pressure transient in the affected SGs and possibly open the steam line safeties.

B. AFW flow will be erratic using manual control, causing wide swings in SG level and RCS cooldown rate.

C. The operator must ensure AFW pump runout protection by maintaining pump flow < 490 gpm.

D. If the AFW pump trips, the LCVs will need to be returned to automatic prior to a pump re-start.

Answer: C

Explanation: Answer A is incorrect. Too much flow will actually cool the inventory in the affected SG resulting in a pressure decrease since the SG is saturated. B is incorrect. If the operator establishes the optimum AFW LCV position for the desired cooldown rate, AFW should be fairly stable. C is correct. D is incorrect. There is no interlock requiring the LCVs to be in automatic to start an AFW pump, however, flow should be minimized when stating the pump to reduce starting current.

Technical Reference(s): OP AP-8A step 20 notes (page 11) rev. 21, STG D1, Rev 14, page 3-1

Proposed references to be provided to applicants during examination: None

Learning Objective: STG D1, Rev. 13, Obj. 18; LPA-8 Obj. 3477 (As available)

Question Source
Bank # ______
Modified Bank # ______ (Note changes or attach parent)
New XX

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

Comments:

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	_____	1
	Group #	_____	1
	K/A #		007EA2.05
	Importance rating	_____	3.9

Reactor Trip – Stabilization – Recovery: Ability to determine or interpret the following as they apply to a reactor trip: Reactor Trip first-out indication.

Question: 01

Unit 1 is at 100% steady-state power with all equipment operable and in the required alignment for full power operations. There is no testing in progress. A single annunciator, PK04-12, "Reactor Trip Initiate" goes into alarm (red). The reactor trip breakers both indicate closed. There are several bistable lights which have illuminated, but the required coincidence for a Reactor Trip does not appear to be satisfied. No other annunciators are in alarm, and there are no quickly identifiable adverse values or trends.

Which of the following procedure(s) should the operating crew perform?

A. Refer to AR PK04-12, Reactor Trip Initiate, while implementing EOP E-0, Reactor Trip or Safety Injection.

B. Refer to AR PK04-14, Reactor Trip Actuated, while implementing EOP FR-S.1, Response to Nuclear Power Generation / ATWS.

C. Enter EOP FR-S.1, Response to Nuclear Power Generation / ATWS.

D. Enter EOP E-0, Reactor Trip or Safety Injection.

Answer: __D__

Explanation: There should be sufficient uncertainty about whether the reactor should have tripped to take the conservative action and trip it. There are some indications that the trip may not work, so E-0 should be performed first as one of the two entry procedures for the EOP network. Note that E-0 is entered if the reactor actually trips (PK04-14) or if the reactor was demanded to trip (PK04-12). Then depending on whether the reactor could be tripped or not, perform FR-S.1 or E-0.1. Therefore, D is correct. It may be appropriate to perform AR PK04-12 and 14, but they could be done concurrently with the performance of EOP E-0, therefore A and B are incorrect. Answer C is incorrect since EOP FR-S.1 is not an entry point into the EOP network. Only EOP's E-0 or ECA-0.0 are valid entry procedures.

Technical Reference(s): OP1.DC10, Conduct of Operations, Rev. 13, page 21, Section 5.5
AR PK04-12 Rev. 13; Ops. Policy B-8, Rev. 1

Proposed references to be provided to applicants during examination: None

Learning Objective: STG B6A Obj. 7 (As available)

Question Source	Bank #	______	
	Modified Bank #	______	(Note changes or attach parent)
	New	XX	

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

Comments: 10 CFR 55.43 (b) item #5

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	____	1
	Group #	____	1
	K/A #	009 2.4.22	
	Importance rating	____	4.0

Small Break LOCA: Knowledge of the bases for prioritizing safety functions during abnormal/emergency operations.

Question: 02

The Critical Safety Function (CSF) Status Trees are evaluated in a prescriptive sequence of priority while the operating crew is responding to a small break LOCA using the Emergency Operating Procedure (EOP) network.

What is the basis for this CSF sequence?

The CSF sequence is based on:

A. the core damage frequency (CDF) for the various Design Basis Accidents (DBA).

B. significance of the challenge to the fission product barriers in order, beginning with the fuel.

C. conditions which are most likely to negate assumptions used in the symptom based EOPs.

D. the expected frequency of the events covered by the Functional Restoration Guidelines (FRGs).

Answer: __B___

Explanation: A is incorrect. CDF is separately determined as part of the plant PRA analysis which is a function of initial plant conditions (i.e., MDAFW pump OOS). B is correct. The sequence starts with CSFs which pose internal challenges to the fuel barrier (subcriticality only), followed by external challenges to the fuel (core cooling, heat sink) followed by challenges to the RCS/pressure boundary (heat sink, integrity) followed by CNMT. C is incorrect. Although some CSF challenges do sometimes pose a challenge to EOP mitigation strategy, this was not considered when developing the CSF evaluation sequence. D is incorrect since the relative probability of a barrier challenge was also not considered when establishing the priority of the status trees.

Technical Reference(s): WOG Background Document for CSFSTs (F-0) HP/LP, Rev. 2, pages 4, 9-11

Proposed references to be provided to applicants during examination: __None___________

Learning Objective: _LPE-FR Obj. 38107_______ (As available)

Question Source
- Bank # _________
- Modified Bank # _________ (Note changes or attach parent)
- New ___XX____

Question Cognitive Level:
- Memory or Fundamental Knowledge _X___
- Comprehension or Analysis _____

Comments: 10 CFR 55.43 (b) item #5

Examination Outline Cross-reference:

Level	RO	SRO
Tier #		1
Group #		1
K/A #	026AA2.06	
Importance rating		3.1

Loss of Component Cooling Water: Ability to determine or interpret the following as they apply to loss of Component Cooling Water System: The length of time after the loss of CCW flow to a component before that component may be damaged.

Question: 03

Unit 1 is in mode 6 for a non-refueling mini-outage, and has been shutdown for 6 days. Due to emergent maintenance issues with the CCW system, the maintenance manager has requested that CCW flow to the 1-2 RHR heat exchanger be isolated. Based on ocean temperature, the system engineer estimates that the remaining RHR heat exchanger can remove 8 MW of thermal (decay) heat from the RCS.

What is the earliest day that the CCW work can be done without causing the RCS to heat up. Assume that all other CCW cooling loads are negligible.

A. Tomorrow

B. 4 days from today

C. 8 days from today

D. 14 days from today

Answer: C

Explanation: Referring to the decay heat graph in OP AP SD-5 (Appendix B), the core generates 8 MW of decay heat on day 14 after shutdown. Therefore, RHR would be sufficient to remove decay heat 8 days from now (answer C is correct).

Technical Reference(s): OP AP-SD-5, Appendix B, Rev. 9

Proposed references to be provided to applicants during examination: OP AP-SD-5, App. B

Learning Objective: ______________ (As available)

Question Source
Bank # ________
Modified Bank # ________ (Note changes or attach parent)
New XX

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

Comments: 10 CFR 55.43 (b) item #5
OPEN REFERENCE

Examination Outline Cross-reference:

Level	RO	SRO
Tier #	_____	1
Group #	_____	1
K/A #	029 2.4.21	
Importance rating	_____	4.3

ATWS: Knowledge of the parameters and logic used to assess the status of safety functions including: 1. Reactivity Control, 2. Core cooling and heat removal, 3. RCS Integrity, 4. Containment conditions, & 5. Radioactivity release control.

Question: 04

The Unit received a valid reactor trip signal and the reactor failed to trip. After entering and performing EOP FR-S.1, Response to Nuclear Power Generation/ATWS, the following conditions exist:

- Both Trip Breakers are still closed and control rods are being driven into the core.
- Turbine is tripped.
- All AFW pumps failed to start.
- All wide range S/G levels are 30% and decreasing.
- Reactor power is 2% and decreasing.

The crew has reached a decision point where, based on reactor criticality status, they either transition to another procedure or loop back to the beginning of EOP FR-S.1. Based on the above conditions, which of the following procedural actions should the crew take?

A. Remain in EOP FR-S.1 until all control rods are fully inserted; return to step 1 of the procedure and continue efforts to open the trip breakers.

B. Transition to SACRG-1, Severe Accident Control Room Guideline Initial Response.

C. Complete EOP E-0, Reactor Trip or Safety Injection, before performing any other FR.

D. Transition to EOP FR-H.1, Response to Loss of Secondary Heat Sink.

Answer: D

Explanation: Answer A is incorrect since nuclear power is < 5% with –SUR, transition criteria out of FR-S.1 are satisfied. Answer B is incorrect but is the transition demanded by the previous step if core cooling exit temperatures reached 1200°F of which there is no indication. Answer C is incorrect but would be correct if there were no other Red or Magenta path CSFSTs. Answer D is correct as this is the highest challenge to the operators after the ATWS, WR levels of 30% mean NR levels are all 0%. With no AFW flow, Heat Sink is severely challenged.

Technical Reference(s): EOP FR-S.1 step 17, 18 Rev. 16A
EOP F-0 Rev. 13A

Proposed references to be provided to applicants during examination: None

Learning Objective: LPE-S Obj. 5433 (As available)

Question Source	Bank #	________	
	Modified Bank #	________	(Note changes or attach parent)
	New	___XX___	

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

Comments: 10 CFR 55.43 (b) item #5

Examination Outline Cross-reference:

Level	RO	SRO
Tier #	____	1
Group #	____	1
K/A #	056 2.4.16	
Importance rating	____	4.0

Loss of Off-Site Power: Knowledge of EOP implementation hierarchy and coordination with other support procedures.

Question: 05

Unit 1 is in Mode 4 when a system fault de-energizes both the 230 KV and the 500 KV power systems. Only DG 1-1 starts and energizes its bus. Shortly after Diesel Generator 1-1 energizes bus H, the DG trips and will not restart.

Which of the following procedures should be performed first, following the trip of the Diesel Generator?

A. OP AP-26, Loss of Offsite Power.

B. OP AP-27, Loss of Vital 4KV and/or 480V Bus.

C. EOP E-0, Reactor Trip or Safety Injection.

D. EOP ECA-0.0, Loss of All Vital AC Power.

Answer: __D___

Explanation: Answer A is incorrect as there is now a loss of all AC power and the EOP network takes precedence over an AOP (i.e., OP AP-26). Answer B is incorrect although it would have been a procedure in use when the DG failed; it is no longer the highest priority procedure. Answer C is incorrect as the only EOP other than E-0 with direct entry is ECA-0.0 which is the procedure that should be in use. Answer D is correct as once all AC power has been lost, it is the most important procedure for the crew to implement.

Technical Reference(s): _EOP ECA-0.0, rev. 21, Entry Conditions; EOP User's Guide

Proposed references to be provided to applicants during examination: ____None_________

Learning Objective: _LPECA-0 Obj. 3552_______ (As available)

Question Source
- Bank # _________
- Modified Bank # _________ (Note changes or attach parent)
- New ___XX____

Question Cognitive Level:
- Memory or Fundamental Knowledge _____
- Comprehension or Analysis __X__

Comments: 10 CFR 55.43 (b) item #5

Examination Outline Cross-reference:

Level	RO	SRO
Tier #		1
Group #		1
K/A #	058AA2.02	
Importance rating		3.6

Loss of DC Power: Ability to determine or interpret the following as they apply to the loss of DC power: 125V dc bus voltage, low/critical low, alarm.

Question: 06

Unit 1 is at 100% power with all equipment operable and in its normal full power alignment. Operator rounds at 0800 hours revealed the following vital DC bus 13 battery parameters:

- Float current = 2.2 amps
- Minimum cell float voltage = 2.18 volts
- Battery terminal voltage = 130.7 volts

Assuming that Battery 13 parameters do not change, what is the latest time that Unit 1 can be placed in mode 3 and still comply with Technical Specification requirements? Assume that no surveillances are performed on batteries 11 & 12.

A. 1600 hours

B. 1800 hours

C. 0200 hours, the next day

D. 0400 hours, the next day

Answer: D

Explanation: Minimum cell float voltage is 2.17 volts and minimum battery terminal voltage is 130.2 volts (60 cells x 2.17 Vpc), therefore both are within spec. The float current is out-of-spec high (greater than 2.0 amps). T/S 3.8.6.Action B allows 12 hours to restore float current < 2 amps as long as battery terminal voltage > 130.2 (given). At 12 hours, if the float current is not reduced to < 2 amps, Battery 13 must be declared inoperable per 3.8.4 Action B which allows 2 hours to restore, else be in Mode 3 within the next 6 hours. Therefore, Unit 1 must be in M3 by 0800 + (12 + 2 + 6) hours which is 0400 hours the next day (correct answer is D).

Technical Reference(s): T/S 3.8.4 actions B & E, 3.8.6 actions B & F and B3.8.6, pages 62-66

Proposed references to be provided to applicants during examination: T/S 3.8.4, 3.8.6

Learning Objective: STG J-9, Rev. 15 Obj. 19 (As available)

Question Source

Bank #	
Modified Bank #	(Note changes or attach parent)
New	XX

Question Cognitive Level: Memory or Fundamental Knowledge ______
Comprehension or Analysis __X__

Comments: 10 CFR 55.43 (b) item #2 OPEN REFERENCE

Examination Outline Cross-reference:

Level	RO	SRO
Tier #	_____	1
Group #	_____	2
K/A #	_____	005 AA2.03
Importance rating	_____	4.4

Inoperable / stuck control rod: Ability to determine and interpret the following as they apply to the inoperable / stuck control rod: Required actions if more than one rod is stuck or inoperable.

Question: 07

While increasing power from 80 to 100%, TWO control rods in Control Bank D (CBD) are observed to be 15 steps lower than their respective group step counters.

What action(s) should the SFM direct the crew to take?

A. Establish steady state conditions and realign the rods one at a time.

B. Perform an operability test of the remaining rods in CBD.

C. Verify SDM to be within the limits of the COLR and commence a plant shutdown to mode 3.

D. Verify SDM to be within the limits of the COLR and reduce power to < 75% within 2 hours.

Answer: C

Explanation: Selection A is incorrect since only rod my be realigned. B is incorrect as there is no requirement or procedural directive perform such a test. C is correct. D is not an option since hot channel factors could be a problem.

Technical Reference(s): Tech. Specs. 3.1.4.D, OP AP-12B, Rev. 12

Proposed references to be provided to applicants during examination: None

Learning Objective: STG A3A-Rod Control, Rev. 13 Objs. 10 & 12 (As available)

Question Source
- Bank # B0089
- Modified Bank # _________ (Note changes or attach parent)
- New _________

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

Comments: 10 CFR 55.43 (b) item #2

Examination Outline Cross-reference:

Level	RO	SRO
Tier #	_____	1
Group #	_____	2
K/A #		W/E13 EA2.1
Importance rating	_______	3.4

Steam Generator Overpressure: Ability to determine and interpret the following as they apply to the (Steam Generator Overpressure): Facility conditions and selection of appropriate procedures during abnormal and emergency operations.

Question: 08

Unit 1 is at full power when a reactor trip and safety injection occur. The crew has just entered EOP E-1.2, Post LOCA Cooldown and Depressurization, when the BOP control operator reports that S/G 1-1 pressure is 1125 psig and slowly rising (Heat Sink Critical Safety Function (CSF) yellow-path condition). All other CSF status trees are satisfied.

How should the crew proceed?

A. Stop the procedure in effect and enter EOP FR-H.2, Response to Steam Generator Overpressure and perform to completion.

B. Enter EOP FR-H.2, Response to Steam Generator Overpressure, at the discretion of the SFM. Once entered, the procedure must be performed to completion unless a red or magenta path condition occurs on another CSF status tree.

C. Continue in EOP E-1.2. At the discretion of the SFM, implement EOP FR-H.2, Response to Steam Generator Overpressure.

D. Do not implement EOP FR-H.2, Response to Steam Generator Overpressure. Since there has been a transition to a recovery guideline (EOP E-1.2), CSF status trees are monitored for information only.

Answer: C

Explanation: A is incorrect since there is no requirement to perform a yellow path FR procedure. B is incorrect since a yellow path procedure, once entered, is not required to be performed in its entirety. C is correct. D is incorrect since the only time CSFSTs are monitored for info only is during loss of and initial recovery from a loss of all vital AC power (ECA-0.0 series).

Technical Reference(s): EOP F-0, Critical Safety Function Status Trees, Rev. 14
EOP FR-H.2, H.3 and Background Documents

Proposed references to be provided to applicants during examination: None

Learning Objective: ________________________________ (As available)

Question Source
- Bank # __________
- Modified Bank # __________ (Note changes or attach parent)
- New XX

Question Cognitive Level:	Memory or Fundamental Knowledge	______
	Comprehension or Analysis	___X___

Comments: 10 CFR 55.43 (b) item #5

Examination Outline Cross-reference:

Level	RO	SRO
Tier #		1
Group #		2
K/A #		W/E15 EA2.1
Importance rating		3.2

Containment Flooding: Ability to determine and interpret the following as they apply to the (Containment Flooding): Facility conditions and selection of appropriate procedures during abnormal and emergency operations.

Question: 09

A large break LOCA has occurred on Unit 1. The crew is currently performing steps in E-1, "Loss of Reactor of Secondary Coolant." The following conditions existed when the STA made his initial scan of the Status Trees:

- Pressurizer level was 0%
- Containment spray had automatically actuated. Cnmt pressure was 12 psig and decreasing.
- Containment radiation monitors RE-30 and RE-31 were in ALARM.
- Containment Recirc Sump water level indicated 96.5 ft.

Which of the following procedures must be entered to address the above containment conditions?

A. EOP FR-Z.2 Response to Containment Flooding

B. EOP FR-Z.1 Response to High Containment Pressure

C. EOP FR-I.2 Response to Low Pressurizer Level

D. EOP FR-Z.3 Response to High Containment Radiation Level

Answer: A

Explanation: The highest priority CSFST is CNMT flooding (> 94') which is a magenta path challenge. Therefore A is correct. B is incorrect since pressure < 22 psig, Z-1 entry condition is not met. C is incorrect. FR-I.2 entry condition is met but it is a yellow priority. D is incorrect. If the radiation levels are exceeded, it too is a yellow path priority.

Technical Reference(s): EOP FR-Z.2, Response to Containment Flooding, Bkg.Doc. Rev. 2

Proposed references to be provided to applicants during examination: None

Learning Objective: ____________________ (As available)

Question Source
Bank # ________
Modified Bank # ________ (Note changes or attach parent)
New XX

Question Cognitive Level:	Memory or Fundamental Knowledge	______
	Comprehension or Analysis	__X__

Comments: 10 CFR 55.43 (b) item #5

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	______	1
	Group #	______	2
	K/A #	______	W/E08 EA2.2
	Importance rating	______	4.1

RCS Overcooling - PTS: Ability to operate and/or monitor the following as they apply to the (Pressurized Thermal Shock). Adherence to appropriate procedures and operation within the limitations in facility's license and amendments.

Question: 10

A large loss of coolant accident (LOCA) has occurred resulting in a rapid and excessive RCS cooldown. The RCS is currently at 150 psig and all T-cold values are < 184°F resulting in an integrity CSF Red Path condition. Many core exit T/C indicate > 600°F.

Concerning EOP FR-P.1, Response to Imminent Pressurized Thermal Shock Condition, what action should be taken by the SFM?

A. Do not enter or perform EOP FR-P.1 since RCS integrity is already lost during a large LOCA.

B. Enter EOP FR-P.1, and if there is sufficient RHR flow, return to procedure and step in effect.

C. Enter EOP FR-P.1, and fully depressurize the RCS after isolating the SI Accumulators.

D. Enter EOP FR-P.1, and secure one full train of ECCS flow.

Answer: B

Explanation: Answer A is incorrect. Unless otherwise directed, always enter the FR procedure (by priority) directed by a CSFST red or magenta condition. B is correct. The procedure will decide (based on RHR flow) if the LOCA is big enough. C is incorrect since the step to isolate the accumulators will not be performed due to inadequate subcooling margin. D is incorrect due to subcooling margin being insufficient to secure any ECCS equipment.

Technical Reference(s): EOP FR-P.1, Response to Imminent Pressurized Thermal Shock Condition

Proposed references to be provided to applicants during examination: None

Learning Objective: ______________________ (As available)

Question Source
- Bank # ______
- Modified Bank # ______ (Note changes or attach parent)
- New XX

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

Comments: 10 CFR 55.43 (b) item #5

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	___	2
	Group #	___	1
	K/A #	___	003 A2.02
	Importance rating	___	3.9

Reactor Coolant Pump: Ability to (a) predict the impacts of the following malfunctions or operations on the RCPS; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: Conditions which exist for an abnormal shutdown of an RCP in comparison to a normal shutdown of an RCP.

Question: 11

Unit 1 is at full power, when multiple alarms are received.

The following conditions are reported by the control room operators:

- CCW FCV-357, thermal barrier CCW outlet valve is closed
- No charging pumps are running
- Letdown is isolated
- CCW Surge Tank RCV-16 is closed

Which of the following procedures should the SFM enter first to respond the these conditions?

A. AP-18, Letdown Line Failure.

B. AP-25, Rapid Load Reduction.

C. AP-28, Reactor Coolant Pump Malfunctions.

D. AP-31, Rapid Containment Entry.

Answer: C

Explanation: C is correct. Multiple indications of pump malfunction require the pump to be stopped, but the reactor should be tripped first. A is incorrect since closure of letdown isolation valves alone does not constitute a letdown line failure. B and D are incorrect since with no seal injection nor CCW flow, the RCPs will need to be shutdown promptly – much sooner than the unit could be shutdown or a CNMT entry be made..

Technical Reference(s): Unit 1 & 2 OP AP-28, Rev. 4, Section E, Attachments 4.1 & 4.2; AR PK05-02, Rev. 29, section 2.1, page 2; AR PK05-05, Rev. 15

Proposed references to be provided to applicants during examination: None

Learning Objective: STG A6-RCP Rev. 14 objective 10 page 4-3

Question Source Bank # ________

	Modified Bank #	________	(Note changes or attach parent)
	New	___XX____	
Question Cognitive Level:	Memory or Fundamental Knowledge	______	
	Comprehension or Analysis	__X__	

Comments: 10 CFR 55.43 (b) item #5

Examination Outline Cross-reference:

Level	RO	SRO
Tier #	_____	2
Group #	_____	1
K/A #	_____	007 A2.02
Importance rating	_____	3.2

Pressurizer Relief / Quench Tank: Ability to (a) predict the impacts of the following malfunctions or operations on the PRTS; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: Abnormal pressure in the PRT

Question: 12

The plant is at normal operating pressure when a spurious SIS actuates which trips the reactor and starts all ECCS pumps. There is no primary or secondary leak and operators have performed E-0, Reactor Trip or Safety Injection, and have just transitioned to E-1.1, SI Termination with the following conditions:

- RCS & secondary plant are intact
- RCS/PZR pressure is 2275 psig and PORV PCV-474 is cycling
- PZR level is 100%
- PRT level is 84% and rising
- PRT pressure is 36 psig and rising

How should the crew respond to these conditions?

A. Temporarily suspend EOP E-1.1 and perform actions to drain the PRT to the RCDT to prevent blowing the PRT rupture disk.

B. Progress promptly through EOP E-1.1 as actions performed such as restoring letdown and terminating high head ECCS flow, will improve PRT conditions.

C. The PRT rupture disk will likely rupture, unless pre-emptive action is taken to reduce RCS pressure and close the PORVs before entering EOP E-1.1.

D. Block/isolate the PZR PORVs to prevent adding more inventory to the PRT; drain the PRT to the RCDT when directed by EOP E-1.1.

Answer: ___B____

Explanation: A is incorrect. The EOPs are higher priority and should continue to be performed until directed out of the EOP network. B is correct. C is incorrect. D is definitely incorrect. Blocking the PORVs could needlessly challenge the code safeties which are less likely to reseat.

Technical Reference(s): E-1.1 including bkg. documents; OP 1 DC10, Attach. 7.2, Rev. 12

Proposed references to be provided to applicants during examination: __None___________

Learning Objective: __STG A4B-PRT, Rev 10 Obj. 6 & 13________

Question Source	Bank #	________	
	Modified Bank #	________	(Note changes or attach parent)
	New	___XX____	

Question Cognitive Level:	Memory or Fundamental Knowledge	___X___
	Comprehension or Analysis	_______

Comments: 10 CFR 55.43 (b) item #5

Examination Outline Cross-reference:

Level	RO	SRO
Tier #	____	2
Group #	____	1
K/A #		012 2.1.12
Importance rating	____	4.0

Reactor Protection: Ability to apply Technical Specifications for a system.

Question: 13

Unit 2 is at 13% power during a plant startup with all equipment operable and in the required alignment for the power level. Intermediate Range (IR) Nuclear Instrument, N35 fails due to a spurious, blown instrument power fuse. Fifteen minutes later while troubleshooting, IR channel N36 loses control power

What Technical Specification required action(s), if any, is (are) the crew required to perform?

A. Trip the reactor since loss of IR channel N36 control power should have generated a reactor trip signal.

B. Immediately suspend operations involving positive reactivity additions and reduce power to below P-6 within 2 hours.

C. Enter LCO 3.0.3 and initiate, within 1 hour, a shutdown to below P-6.

D. No actions are required to be taken at this time; both IR channels will need to be operable before reducing power below P-10.

Answer: D

Explanation: The IR NIS instruments are required to be operable between P-6 and P-10 power levels. Below P-6, SR channels are enabled and above P-10, IR channels are blocked. Since power is 13%, there is no direct Tech. Spec. implication (D), except that both indications will not properly indicate. If examinee does not carefully check applicability, he/she could choose answers B or C. Without knowledge that the IR high flux trip is blocked he/she could select A since the trip coincidence is 1/2.

Technical Reference(s): Technical Specifications LCO 3.3.1, Condition G; Table 3.3.1-1, page 1

Proposed references to be provided to applicants during examination: Tech Spec 3.3.1

Learning Objective: STG M8-Tech Specs, Objectives 16, 26

Question Source
- Bank # ________
- Modified Bank # ________ (Note changes or attach parent)
- New XX

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

Comments: 10 CFR 55.43 (b) item #2 OPEN REFERENCE

Examination Outline Cross-reference:

Level	RO	SRO
Tier #		2
Group #		1
K/A #		063 2.2.5
Importance rating		2.7

DC Electrical Distribution: Knowledge of the process for making changes in the facility as described in the safety analysis report.

Question: 14

Additional monitoring instrumentation is to be installed on Vital 125 VDC Bus 1-1. The instrumentation will be installed for 30 days.

Which of the following processes would be applicable to the installation of the monitoring instrumentation?

A. License Amendment Request (LAR).

B. Minor Maintenance Work Order (MMWO)

C. Temporary Modification (TMOD).

D. Field Correction Transmittal (FCT).

Answer: C

Explanation: A is incorrect and is required for licensing basis change or FSAR changes which this is not. B is incorrect. MMWO's are typically used for minor corrective maintenance items, which are usually intended to last more than 30 days. C is correct. D is incorrect as an FCT is a way to document field changes required to support another modification.

Technical Reference(s): CF4.ID1, Modification Requirements and Authorization, Rev. 13, Attach. 8.1

Proposed references to be provided to applicants during examination: None

Learning Objective:

Question Source
- Bank #
- Modified Bank # (Note changes or attach parent)
- New XX

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

Comments: 10 CFR 55.43 (b) item #3

Examination Outline Cross-reference:

Level	RO	SRO
Tier #		2
Group #		1
K/A #		064 2.2.25
Importance rating		3.7

Emergency Diesel Generator: Knowledge of the bases in Technical Specifications for limiting conditions for operations and safety limits.

Question: 15

Unit 1 is at 100% power, steady-state conditions with Safety Injection Pump (SIP) 1-1 out of service for the past 15 hours. All other equipment is operable and in the normal alignment for full power operations. Which of the following operability conditions would apply if emergency diesel generator (DG) 1-1 were to be declared inoperable?

A. No impact as long as two separate offsite power sources to the 4 KV busses are still operable.

B. No impact until the 72 hour action for SIP 1-1 expires since SIP 1-2 is still considered operable.

C. Enter T/S 3.0.3 immediately for 2 inoperable SIPs, and place Unit 1 in mode 5 within 37 hours.

D. Enter T/S 3.0.3 within 4 hours unless SIP 1-1 or DG 1-1 is made operable during that time.

Answer: D

Explanation: A is incorrect since SIP 1-1 is on bus F and EDG 1-1 supplies bus H and the emergency (EDG) feeder is required for bus operability. B is incorrect since SIP 1-2 is on bus H and with an inoperable EDG, bus H equipment is considered inoperable. C is incorrect since a 4 hour allowance is provided to restore either SIP 1-1 or EDG 1-1 before T/S 3.0.3 is required to be entered. D is correct

Technical Reference(s): Tech. Specs. 3.0.3, 3.8.1, and B3.8.1 (Rev. 4 page 7)

Proposed references to be provided to applicants during examination: T/S 3.8.1

Learning Objective: STG M8 – Technical Specifications, Rev 11, objs. 15, 22

Question Source
- Bank # ______
- Modified Bank # ______ (Note changes or attach parent)
- New XX

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

Comments: 10 CFR 55.43 (b) item #2 OPEN REFERENCE

Examination Outline Cross-reference:

Level	RO	SRO
Tier #	____	2
Group #	____	2
K/A #	014A2.04	
Importance rating	____	3.9

Rod Position Indication: Ability to (a) predict the impacts of the following malfunctions or operations on the Rod Position Indication System; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: Misaligned Rod.

Question: 16

A reactor startup is being performed at Unit 1. With the reactor still subcritical, Control Bank D (CBD) rods are being withdrawn from 60 to 80 steps. Shortly after commencing this 20 step withdrawal, the reactor operator identifies the three "Rod Deviation" LEDs are flashing on the Digital Rod Position Indication (DRPI) display unit in the Control room. The operator promptly stops pulling rods. The following rod position information is available to the operating crew:

- 2 CBD rod position LEDs indicate 60 steps
- The remaining CBD rod position LEDs indicate 72 steps on DRPI
- DRPI display panel Rod Deviation LEDs (3) are flashing
- CBD demand counters indicate 70 steps
- No unusual or unexpected control room alarms

Which of the following is the appropriate crew response to the rod position system indications described above?

A. SFM should direct OP AP-12B be performed to restore full CBD alignment.

B. Verify Shutdown Margin to be within the limits provided in the COLR within 1 hour and be in Mode 3 within 6 hours.

C. Direct CO to open the reactor trip breakers and verify all DRPI rod bottom LEDs illuminate; enter E-0, Reactor Trip or Safety Injection.

D. Direct flux map performance once per 8 hours and log T-avg hourly (to monitor for reactivity excursion). If rod motion is necessary, use bank demand counters to determine rod position.

Answer: __A___

Explanation: Answer A is correct. Rod alignment is defined as demand (step) counters vs. indicated (DRPI) rod position. That comparison is required to be within +/- 12 steps. For the above described condition, demand vs. DRPI is 10 steps, so the LCO would not be entered. However, it would be prudent to have rods aligned as close as possible so the misalignment AOP (OP AP-12B) should be performed. Answer B is incorrect and describes the required actions if > 1 rod is misaligned in modes 1 or 2 (T/S 3.1.4). Answer C is incorrect and is the required action for a DRPI failure in mode 3. D is incorrect.

Technical Reference(s): _T/S 3.1.7, 3.4.1, B3.4.1, ECG 41.1, OP AP-12b

Proposed references to be provided to applicants during examination: T/S 3.1.4 & 3.1.7

Learning Objective:	_LPA-12 Obj. 7926________ (As available)		
Question Source	Bank #	_________	
	Modified Bank #	_________	(Note changes or attach parent)
	New	___XX____	
Question Cognitive Level:	Memory or Fundamental Knowledge	_____	
	Comprehension or Analysis	__X__	

Comments: OPEN REFERENCE
10 CFR 55.43 (b) items #2 & #5

Examination Outline Cross-reference:

Level	RO	SRO
Tier #	____	2
Group #	____	2
K/A #	056A2.05	
Importance rating	____	2.5

Condensate System: Ability to (a) predict the impacts of the following malfunctions or operations on the Condensate System; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: Condenser tube leakage.

Question: 17

The SFM has entered OP AP-20, Condenser Tube Leak, based on chemistry reports that secondary coolant samples reveal slowly rising condensate conductivity values, which currently range from 1.2 to 1.5 μS/cm. The unit is currently at 100% power with normal SG blowdown in service. All other systems are in normal full power alignment.

PT-506 fails low causing FCV-230, Condensate Polisher Bypass Valve, to open.

How should the operating crew proceed in this current situation?

A. When conductivity exceeds 4.0 μS/cm, commence a load reduction.

B. Prepare for a load reduction, and attempt to locate the condenser tube leak.

C. Enter OP AP-5, Malfunction of Eagle 21 Protection or Control Channel.

D. Trip the reactor and enter EOP E-0, Reactor Trip and Safety Injection, while continuing efforts to mitigate the condenser tube leak.

Answer: D

Explanation: Answer A is incorrect. Conductivity is high enough to take action now. B lists correct actions to perform, but at the present conductivity, condensate polishers should be in service. C is incorrect since the polishers need to be aligned for Na removal. D is correct per step 3 of OP AP-20.

Technical Reference(s): OP AP-20, Rev. 11, Caution on page 3

Proposed references to be provided to applicants during examination: None

Learning Objective: ________________ (As available)

Question Source
- Bank # __________
- Modified Bank # __________ (Note changes or attach parent)
- New XX

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

Comments: 10 CFR 55.43 (b) item #5

Examination Outline Cross-reference:

Level	RO	SRO
Tier #	_____	2
Group #	_____	2
K/A #	071A2.02	
Importance rating	_____	3.6

Waste Gas Disposal: 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: Use of waste gas release monitor, radiation, gas flow rate and totalizer.

Question: 18

Gas Decay Tank (GDT) discharge radiation monitor, RE-22 has been determined to be inoperable.

What action, if any, will allow for a discharge of a GDT?

A. Attach a SFM caution tag to RE-22.

B. Attach a SFM danger tag to FCV-410, Gaseous Radwaste Discharge Valve.

C. Discharges are never allowed when RE-22 is inoperable.

D. Verify the release calculations have been verified by at least two qualified staff members.

Answer: D

Explanation: The provisions of OP G-2:V clearly stipulate the conditions under which a GDT release may be performed without process monitor RE-22 being operable. That requirement is that the operator must verify the release calculations have been verified by at least two qualified staff members (answer D).

Technical Reference(s): OP G-2:V, Rev. 10

Proposed references to be provided to applicants during examination: None

Learning Objective: ______________________________ (As available)

Question Source
- Bank # __________
- Modified Bank # __________ (Note changes or attach parent)
- New XX

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

Comments: 10 CFR 55.43 (b) items #4 & 5

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	_____	3
	Group #	_____	_____
	K/A #	_____	2.1.6
	Importance rating	_____	4.3

Conduct of Operations: Ability to supervise and assume a management role during plant transients and upset conditions.

Question: 19

Unit 1 is responding to an emergency event and is currently in the EOP network.

To significantly reduce offsite radiation dose, the SFM is going to direct action which does not have procedural guidance.

Who must concur with this action before it is taken?

A. Licensed Senior Reactor Operator.

B. Licensed Reactor Operator

C. Site Emergency Coordinator

D. Operations Director.

Answer: ___A____

Explanation: A is correct and is consistent with OP1.DC10, following consultation with the SM, or in the SM's absence another individual with a SRO License, the SFM may direct operations which do not have procedural guidance. B is incorrect – RO may not do this, only SRO's. C is incorrect since the individual is not a licensed SRO. D is incorrect since the individual is not a licensed SRO.

Technical Reference(s): ___________OP1.DC10, Rev. 13 Page 11, item 4______

Proposed references to be provided to applicants during examination: _________None____________

Learning Objective: ________LADM1, Rev. 9, page 17, obj. 2, 5________

Question Source	Bank #	_________	
	Modified Bank #	_________	(Note changes or attach parent)
	New	___XX___	

Question Cognitive Level:	Memory or Fundamental Knowledge	___X___
	Comprehension or Analysis	______

Comments: 10 CFR 55.43 (b) item #5

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #		3
	Group #		
	K/A #	2.1.34	
	Importance rating		2.9

Conduct of Operations: Ability to maintain primary and secondary plant chemistry w/i allowable limits.

Question: 20

Unit 1 is operating at 100%. There has been an increase in Air Ejector Off-Gas monitors, RM15 and RM15R, count rate. No radiation monitors are in alarm.

Chemistry has been analyzing grab samples and determined that total SG tube leakage has increased gradually from an initial rate of 45 gpd over the last 24 hours at a rate of approximately 5 gpd/hr.

The latest sample was taken at 1200 hours and indicates 160 gpd leakage in SG 1-1.

What action is required?

A. Use OP AP-3, "Steam Generator Tube Failure," to be in Hot Standby by 1800 hours.

B. Use OP L-4, "Normal Operation at Power," to reduce power to 50% by 1300 and be in Hot Standby by 1500 hours.

C. Use OP L-4, "Normal Operation at Power," to be in Hot Standby by 1800 hours.

D. Use OP AP-3, "Steam Generator Tube Failure," to reduce power to 50% by 1300 and be in Hot Standby by 1500 hours.

Answer: C

Explanation: The Tech. Spec. limit for primary-to-secondary leakage is 150 gpd in any one SG which is the case for SG 1-1. T/S 3.4.13 requires the unit to be in Mode 5 in 36 hours. OP O-4 defines action levels. A.L. 3b is > 150 gpd which this event is. The requirement is to be in Mode 3 w/i 6 hours and mode 5 in 36 hours (consistent with T/S 3.4.13). Therefore C is correct and A, B, & D are incorrect.

Technical Reference(s): T/S 3.4.13; OP O-4, page 10, step 6.6, Rev. 18; OP AP-3, Rev. 8

Proposed references to be provided to applicants during examination: OP O-4

Learning Objective: ______________ (As available)

Question Source	Bank #	B0096	
	Modified Bank #		(Note changes or attach parent)
	New		

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

Comments: 10 CFR 55.43 (b) item #5 OPEN REFERENCE

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #		3
	Group #		
	K/A #	2.2.29	
	Importance rating		3.8

Equipment Control: Knowledge of SRO fuel handling responsibilities.

Question: 21

A refueling is in progress when source range channel N-31 fails. SR channel N-32 remains operable. Which of the following four evolutions, if any, is the refueling team permitted to perform?

1. Move the source from one location to another
2. Remove 4 assemblies from the core
3. Reposition the temporary nuclear detectors
4. Reposition the underwater camera

A. 1 and 2 only.

B. 3 and 4 only

C. 1, 2, 3, and 4

D. None of the evolutions are permitted until N-31 is again operable.

Answer: B

Explanation: If a SR detector is inoperable, Tech. Specs. restricts CORE ALTERATIONS of which movement of the source or fuel assemblies would qualify, but not the camera or detector. Therefore, only 3 and 4 may be performed (Answer B is correct; Selections A, C, & D are incorrect.).

Technical Reference(s): T/S 3.9.3 and Definitions, Section 1.1

Proposed references to be provided to applicants during examination: None

Learning Objective: None provided. (As available)

Question Source	Bank #	B0311
	Modified Bank #	(Note changes or attach parent)
	New	

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

Comments: 10 CFR 55.43 (b) item #2 & #7

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	____	3
	Group #	____	____
	K/A #		2.3.2
	Importance rating	______	2.9

Radiation Control: Knowledge of the facility ALARA program.

Question: 22

A task needs to be performed on a component located in the radiologically controlled area (RCA). At a distance of one meter from this component in all directions, the dose rate is 2 R/hr due exclusively to fixed contamination. There is no removable or airborne contamination in the area. In the spirit of ALARA, which of the following teams of operators should be chosen by the SFM to perform the task? Assume that prior to performance of this task, all individuals have a current yearly dose of 0 mrem.

A. 2 operators can perform the task in 45 minutes if they work exactly 1 meter from the component.

B. 2 operators can perform the task in 70 minutes if they work exactly 2.5 meters from the component.

C. 3 operators can perform the task in 90 minutes if they work exactly 3 meters from the component.

D. 3 operators can perform the task in 55 minutes if they work exactly 1.5 meters from the component.

Answer: B

Explanation:

A. (2 workers) x (2 R/60 min.) x 45 min. = 3.0 person-rem

B. (2 workers) x (2 R/$(2.5)^2$) x (1/60 min.) x 70 min. = 0.75 person-rem - Correct answer

C. (3 workers) x (2 R/3^2) x (1/60 min.) x 90 min. = 1.0 person-rem

D. (3 workers) x (2 R/$(1.5)^2$) x (1/60 min.) x 55 min. = 2.44 person-rem.

Technical Reference(s): Source theory (inverse-squared relationship); OIM S-3-1, Rev. 18

Proposed references to be provided to applicants during examination: Scientific calculator

Learning Objective: NA

Question Source		
Bank #	______	
Modified Bank #	______	(Note changes or attach parent)
New	XX	

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

Comments: 10 CFR 55.43 (b) item #4

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #		3
	Group #		
	K/A #		2.3.3
	Importance rating		2.9

Radiation Control: Knowledge of SRO responsibilities for auxiliary systems that are outside the control room (e.g., waste disposal and handling systems).

Question: 23

A 0.23g magnitude earthquake is felt in the control room and verified on the EQFM.

Damage to the unit 1 Spent Fuel Pool (SFP) has resulted and is presently being evaluated.

Rad Monitors, RM-14 and RM-14R indicate that a release is in progress. Calculations performed in accordance with EP R-2, "Release of Airborne Radioactive Materials," indicate that the projected dose at the site boundary is 150 mR Total Effective Dose Equivalent (TEDE).

What is the appropriate emergency classification for these events per EP G-1?

A. Alert on Unit 1 only.

B. Alert on Units 1 and 2.

C. Site area emergency (SAE) on Unit 1 only.

D. Site area emergency (SAE) on Units 1 and 2.

Answer: C

Explanation: EP G-1, Attachment 7.1, pages 5-6 specifies that a dose > 100 mrem at the site boundary is a SAE, therefore A and B are incorrect. D is incorrect since releases are classified for the unit which is actually having the release (EP G-3, Attach. 6.1), therefore C is correct and D is incorrect.

Technical Reference(s): EP G-1, Attach. 7.1, page 7, Rev. 35; EP G-3, Attach. 6.1, page 1 of 7

Proposed references to be provided to applicants during examination: EP G-1, EP G-3

Learning Objective: ____________ (As available)

Question Source
- Bank # ____
- Modified Bank # ____ (Note changes or attach parent)
- New XX

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

Comments: 10 CFR 55.43 (b) item #5 OPEN REFERENCE

Examination Outline Cross-reference:

Level	RO	SRO
Tier #		3
Group #		
K/A #		2.4.5
Importance rating		3.6

Emergency Procedures/Plan: Knowledge of the organization of the operating procedures network for normal, abnormal, and emergency evolutions.

Question: 24

The crew is responding to a loss of coolant accident (LOCA) with no available core injection flow. The crew is performing EOP FR-C.1 in response to a severe challenge to the core cooling Critical Safety Function (CSF). Assuming that core exit thermocouple (CETC) temperatures remain above 1200°F, and a negative startup rate is maintained, to what procedure/guideline, if any, should the SFM transition?

A. EOP E-1, Loss of Reactor or Secondary Coolant.

B. Severe Accident Control Room Guideline No. 1 (SACRG-1).

C. FR-S.1, Response to Nuclear Power Generation / ATWS.

D. None. Transition out EOP FR-C.1 is contingent on reducing CETC's below 1200°F.

Answer: B

Explanation: A is incorrect since the mitigation strategy of E-1 depends on long term cooling, which is presently unavailable. B is correct (if CETC temps. are > 1200°F and rising). C is incorrect as long as SUR is negative, D is incorrect since if FR-C.1 mitigation strategy is not working, more extreme (SAMG) measures need to be taken.

Technical Reference(s): EOPs FR-C1 and FR-S.1

Proposed references to be provided to applicants during examination: None

Learning Objective: NA

Question Source
- Bank # ______
- Modified Bank # ______ (Note changes or attach parent)
- New XX

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

Comments: 10 CFR 55.43 (b) item #5

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	_____	3
	Group #	_____	_____
	K/A #	2.4.48	
	Importance rating	_____	3.8

Emergency Procedures/Plan: Ability to interpret control room indications to verify the status and operation of system, and understand how operator actions and directives affect plant and system conditions.

Question: 25

Following a reactor trip and safety injection actuation the crew transitions to EOP E-3, Steam Generator Tube Rupture and isolates the 1-2 SG as the SG with the tube rupture. The crew has commenced a plant cooldown in accordance with EOP E-3 but the cooldown is being done on Natural Circulation.

As the crew cools the plant down the STA reports a red path condition for the Integrity CSFST. Which of the following actions should the crew take?

A. Stop the cooldown and if the red path clears after the plant is stable, continue the cooldown at a slower rate.

B. Stop the cooldown and transition to EOP FR-P.1, Response to Imminent Pressurized Thermal Shock Condition.

C. Complete the cooldown only and then transition to EOP FR-P.1 to address the red path condition if the red path still exists.

D. Complete the cooldown and depressurization and once the plant is stable, transition to EOP FR-P.1 if the red path still exists.

Answer: D

Explanation: Answer A is incorrect as the cooldown takes priority and may well be the cause of the red path condition. Answer B is incorrect because the cooldown and depressurization must be complete before considering a transition. Answer C is incorrect as the depressurization must also be done before leaving E-3. Answer D is correct.

Technical Reference(s): EOP E-3 step 7 rev. 28

Proposed references to be provided to applicants during examination: None

Learning Objective: LPE-3 obj. 8880 (As available)

Question Source	Bank #	_____	
	Modified Bank #	_____	(Note changes or attach parent)
	New	XX	
Question Cognitive Level:	Memory or Fundamental Knowledge	X	
	Comprehension or Analysis	_____	

Comments: 10 CFR 55.43 (b) item #5