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

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

Proposed Question: 01

The Unit was stable at 100% power when a reactor trip was received. As the crew enters EOP-E-0, Reactor Trip or Safety Injection, the following conditions exist:

- One reactor trip breaker is closed.
- All control rods are fully inserted.
- Intermediate range NIS indicates 1 x 10^{-6} amps and decreasing on both channels.

Which of the following actions should the crew take?

A. Manually trip the reactor; if the reactor trip breaker remains closed, dispatch an operator to locally open it and continue with E-0, step 2.

B. Manually trip the reactor; if the reactor trip breaker remains closed, deenergize 480V buses 13D & 13E and continue with E-0, step 2.

C. Manually trip the reactor; if the reactor trip breaker remains closed, transition to FR-S.1, Response to Nuclear Power Generation/ATWS.

D. Report that the reactor is tripped; remain in the “action/expected response” column and continue with E-0; the closed trip breaker will be addressed in E-0.1.

Proposed Answer: A

Explanation: Answer A is correct. The reactor is verified tripped by indications, but attempt to manually trip the reactor since one trip breaker is closed and then have it opened locally and then continue with E-0. Answer B is incorrect but it could be misconstrued as one trip breaker is still closed. The step is unnecessary and could complicate recovery and should not be done. Answer C is incorrect as the answer to the RNO is that the reactor is tripped. The RNO was performed as the trip breaker was closed but all indications are that the reactor is tripped so a transition to FR-S.1 is not required. Answer D is incorrect as the step requires the RNO to be done if the high level step is not satisfied and it is not when one trip breaker is still closed. So the RNO must be entered but the only actions will be to initiate a manual trip and dispatch an operator to locally open the trip breaker. Emergency boration will occur later due to the stuck rods.

Technical Reference(s): EOP-E-0 step 1 Rev. 31
WOG EOP Rules of Usage

Proposed references to be provided to applicants during examination: None

REACTOR OPERATOR EXAM

Learning Objective:	_LPE-0 Obj. 6852__________ (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 #	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.

Proposed Question: 02

The Unit is stable at 100% power when one Pressurizer Code Safety valve starts to leak. The following plant conditions exist:

- Pressurizer pressure = 2235 psig
- PRT pressure = 12 psig.
- PRT temperature = 140°F
- Containment average temperature = 110°F

If conditions remain constant, what will the Pressurizer Code Safety Valve tail pipe temperature indicate?

A. Less than 140°F.

B. Between 140°F and 160°F.

C. Between 240°F and 260°F.

D. Between 640°F and 660°F.

Proposed Answer: C

Explanation: Answer A is incorrect but could be considered as the ambient temperature is less than this value. Answer B is incorrect but is the PRT temperature at present so if the isenthalpic process is ignored this would be a value to consider. Answer C is correct as this is the saturation temperature of the PRT at present. Answer D is incorrect but would be the correct answer if the temperature element was on the upstream side of the safety valve.

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

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

Learning Objective: STG-A-4a Obj. 4 (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 calculate the temperature 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.

Proposed Question: 03

Following a loss of all AC power the crew enters EOP-ECA-0.0, Loss of All Vital AC Power. While performing this procedure indications of a Small Break LOCA are evident by the following:

- Pressurizer level rapidly decreased to 0%.
- RCS pressure dropped to saturation pressure for core exit temperatures.
- Containment pressure is increasing slowly.

Which of the following mechanisms will become the predominant method of core cooling?

Hot fluids leaving the core will…

A. cool in the S/G and return to the core via the cold leg.

B. cool in the S/G and return to the core via the hot leg.

C. exit the RCS through the break and flash to steam.

D. accumulate and only remove energy when a PZR PORV is opened.

Proposed Answer: B

Explanation: Answer A is incorrect because as the RCS hot leg voids the natural circulation will lose its driving force and stop cooling the core. Answer B is correct as Reflux cooling is the primary method of cooling the core when the RCS piping starts to void. The S/Gs remain the cooling mechanism used to condense fluids in the RCS and remove core decay heat. Answer C is a correct statement but does not cool the core although it does remove BTUs from the reactor coolant system. Answer D is incorrect as reflux cooling is available and opening a PZR PORV under the present conditions would only make a bad situation worse.

Technical Reference(s): WOG BKGD doc for ECA-0.0 steps to maintain S/G level

Proposed references to be provided to applicants during examination: NONE

Learning Objective: LMCDFRC Obj. 5451 (As available)

Question Source Bank #

REACTOR OPERATOR EXAM

	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 #	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.

Proposed Question: 04

Why does OP AP-28, Reactor Coolant Pump Malfunction, always require a reactor trip before tripping the affected reactor coolant pump (RCP)?

A. RCP damage does not occur for several minutes allowing the reactor to be tripped first.

B. Tripping the RCP first could result in exceeding the reactor core safety limit.

C. Tripping the RCP first could reduce the ability to control RCS pressure.

D. The reactor is tripped first to ensure an ATWS does not occur when the RCP trips.

Proposed Answer: B

Explanation: Answer A is generally a true statement except for a major seal failure but is not the reason for tripping the reactor before tripping the RCP. Answer B is a true statement and the reason for ensuring the reactor is tripped first to avoid exceeding the design power to flow ratio. Answer C is a true statement if the RCP provides spray flow but is not the reason for tripping the reactor first. Answer D is incorrect but is a condition that would lead to exceeding the Safety Limit but is only one of the ways that the safety limit could be exceeded.

Technical Reference(s): T.S. 2.1.1 and Fig. 2.1.1-1 for 4 loops in service
OP-AP-28, Rev. 4

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: The safety limit curve is for all loops in service. Curves have not been analyzed or generated for less than 4 loops in service as this configuration is not allowed by T.S.

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 Pump Makeup: Speed demand controller and running indicators (positive displacement pump)

Proposed 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 scale.

Which of the following actions should the crew take?

A. Trip the PDP.

B. Direct the local operator to open the PDP breaker.

C. Adjust speed control to stabilize charging flow.

D. Align the PDP suction to the RWST.

Proposed 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.

Proposed Question: 06

The Unit is 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 and amps are stable.

Which of the following actions should be performed first to maintain core cooling?

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

B. Align the standby RHR pump suction to the RWST and start the pump to supply makeup.

C. Increase RHR flow rate to provide additional core cooling.

D. Decrease RHR flow rate to prevent cavitation as level decreases.

Proposed 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 the first action, however the second pump will likely be started after the running pump is checked for signs or conditions of 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 for mitigating actions such as aligning one or both 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.

Proposed Question: 07

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

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

B. CIB limits the chances for fission product release by closing additional CNMT isolation valves.

C. All CCW flow is needed to limit containment pressure & temperature and provide cooling for ESF equipment.

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

Proposed 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 adequate CCW flow would still exist even if flow to the RCPs remained but could be considered reasonable by someone that is weak on the purpose and design of the system. 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 31
LP E-0 page 16, Rev. 8

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.

Proposed Question: 08

The Unit has received a reactor trip signal and the reactor failed to trip. The crew has entered EOP-E-0, Reactor Trip or Safety Injection, and transitioned to EOP-FR-S.1, Response to Nuclear Power Generation/ATWS. The reactor has still failed to trip, and the BOP operator takes the immediate action to trip the Main Turbine. What indication confirms that the Main Turbine trip signal is attempting to open the Trip Block Dump valve to trip the main turbine.

A. A Turbine Trip alarm actuates when SV-37 is energized by the Turbine Trip switch.

B. A Turbine Trip alarm actuates when SV-37 is de-energized by the tripper bar.

C. The trip switch will cause a Main Generator Lockout even if the turbine fails to trip.

D. Once the trip switch is placed in the trip position, the main turbine will start to slow down.

Proposed Answer: A

Explanation: Answer A is correct as the turbine trip switch sends a signal to energize SV-37 which in turn will send an alarm that the turbine is tripped, which may or may not be true depending on the rest of the trip system. Answer B is incorrect as the SV-37 is energize to actuate. Answer C is incorrect as this switch does not send a signal to the Generator Lockout. Answer D is a true statement if the trip is successful but, not if it is not successful so is not a valid indication of the switch working.

Technical Reference(s): STG C3B page 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:

REACTOR OPERATOR EXAM

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.

Proposed Question: 09

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

A. Isolate feedwater flow to the ruptured steam generator as soon as possible.

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.

Proposed Answer: C

Explanation: Answer A is only correct after the S/G level has increased to the point of covering the tubes. 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 PORV setpoint high is a good way to reduce the release rate, too high could be detrimental to plant 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 X
- Comprehension or Analysis ______

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

Proposed Question: 10

Following a reactor trip, the 1st safety valve on S/G 1-1 lifts and will not reseat. The crew enters EOP E-2, Faulted Steam Generator Isolation and isolates the faulted S/G. Then the crew transitions to EOP E-1.1, SI Termination. The crew is terminating SI when the safety valve closes and the following conditions exist:

- S/G 1-1 W/R level = 25%.
- S/G 1-1 pressure = 500 psig.
- RCS temperature = 510°F.
- RCS pressure = 1800 psig.

What should the crew do concerning S/G 1-1?

A. Maintain steam pressure at 500 psig until the other S/Gs reach that pressure.

B. Commence feeding S/G 1-1 at the maximum rate to restore level to greater than 6% narrow range.

C. Commence feeding S/G 1-1 at 25 gpm until level is greater than 6% narrow range.

D. Maintain S/G 1-1 isolated until the plant cooldown is complete.

Proposed Answer: D

Explanation: Answer A is incorrect as nothing in the EOP tells the operator to steam the faulted S/G once it is isolated. The operator may think this is a way to prevent the safety valve from lifting again and that would be incorrect as the safety initially lifted at somewhere near its normal setpoint and then stuck open. Allowing pressure to increase will not aggravate the situation. Answer B is incorrect as nothing in the EOP says to start feeding this S/G if it becomes isolated. Usually, the EOP desires normal NR level but not in this case. Answer C is incorrect as this feed rate is only done when all S/Gs are faulted to keep the tube sheet wet. The tube sheet in this case is wet and no guidance is provided in this case to feed the S/G at any rate. Answer D is correct as this is the guidance given in the EOP.

Technical Reference(s): EOP E-2 rev. 16 EOP ECA-2.1 Rev. 21

Proposed references to be provided to applicants during examination: None

Learning Objective: LPE-2 Obj. 5429 (As available)

Question Source Bank # ________

REACTOR OPERATOR EXAM

	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 #	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.

Proposed 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 Mode Selector switch in the MANUAL position.

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

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

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

Proposed 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. The switch is not in the circuit when operated from the control room. Answer D is incorrect but is a design used by some EDG suppliers.

Technical Reference(s): _OP J-6B:IV Rev 23_______

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).

Proposed Question: 12

Following a reactor trip, all Off-Site power has been lost. The unit is stable on the Emergency Diesel Generators and a cooldown using EOP E-0.2, Natural Circulation Cooldown has been initiated. The Turbine Driven AFW pump is inoperable. The following conditions exist:

- S/G 1 NR level 25% decreasing. AFW flow 40 gpm.
- S/G 2 NR level 25% stable. AFW flow 50 gpm.
- S/G 3 NR level 40% increasing AFW flow 80 gpm.
- S/G 4 NR level 40% decreasing AFW flow 40 gpm.
- RCS temperature 480°F decreasing
- Cooldown rate 24°F/hr.

Which of the following actions should the crew take?

A. Increase AFW flow to S/G 2.

B. Increase AFW flow to S/G 4.

C. Decrease AFW flow to S/G 3.

D. Decrease AFW flow to S/G 1.

Proposed Answer: C

Explanation: Answer A is incorrect as this would increase the cooldown rate which is essentially at the limit. The level is in band and stable so is not a problem. Answer B is incorrect as this would increase the cooldown rate which is essentially at the limit and this S/G is near the top end of the operating band. Answer C is correct as this level is near the top of the band and will move even higher when flow is decreased and will reduce the cooldown rate when flow is decreased allowing increases in other S/Gs as needed. Answer D is incorrect as the level is already starting to decrease. Further reduction is not needed at present.

Technical Reference(s): EOP E-0.2 Rev. 20

Proposed references to be provided to applicants during examination: None

Learning Objective: LPE-0.2 Obj. 8905 (As available)

REACTOR OPERATOR EXAM

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 #	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.

Proposed Question: 13

The Unit is at Hot Shutdown when power to Vital Instrument Bus PY-11 is lost. What action does the crew need to take to control pressurizer level with the least amount of overfill while bus PY-11 is de-energized?

Shift Level control to LT 460/LT 461 and

A. Place/verify HC-459D in auto.

B. Place/verify HC-459D in manual and restore normal charging flow.

C. Place/verify FCV-128 in auto.

D. Place/verify FCV-128 in manual and minimize charging to RCP seals only.

Proposed Answer: D

Explanation: Answer A is incorrect as the automatic controller will be de-energized requiring manual control. Answer B is in since letdown will remain isolated. Answer C is incorrect since PZR level will rise and eventually reduce charging flow, but not until level has risen considerably. Answer D is correct since this action can promptly minimize the mismatch between charging/seal injection and letdown/seal leakoff.

Technical Reference(s): OP AP-4 section A Rev.16A
OIM page A-4-3, Rev. 27

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 X
Comprehension or Analysis

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.

Proposed Question: 14

Unit 1 is in Mode 5 when the running Auxiliary Salt Water pump trips. The crew enters OP AP-SD-3, Loss of Auxiliary Salt Water (ASW) and is attempting to start the standby pump.

Which of the following conditions would require that the crew initiate Containment closure?

A. RCS pressure is stable at 350 psig.

B. RCS temperature is 140°F and increasing at 2°F/min.

C. The standby ASW pump cannot be started.

D. CCW temperature is currently 122°F and increasing at 1°F/min.

Proposed Answer: __B____

Explanation: Answer A is incorrect as the requirement to close containment is that RCS pressure is increasing specifically due to the loss of decay heat removal and it is not. Answer B is correct as the foldout for this procedure requires containment closure if the RCS will exceed 200°F in less than one hour. Answer C is incorrect as unit 2 standby pump can be used for cooling if the unit 1 pumps become unavailable. Answer D is incorrect although the procedure does require a transition to OP AP-SD-4 under this set of conditions.

Technical Reference(s): _OP AP SD-3 Foldout. Rev. 10

Proposed references to be provided to applicants during examination: OP AP SD-3 Foldout. Rev. 10

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: OPEN REFERENCE

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.

Proposed Question: 15

The unit is stable at 100% power when a slow loss of Instrument Air pressure occurs. All available Instrument Air compressors have been started and pressure is now 85 psig and still decreasing very slowly. The decision is made to use Service Air to supply the Instrument Air system.

Which of the following criteria must be met?

A. Use PAC 0-8 compressor to limit the amount of contamination of the Instrument Air System.

B. Terminate Service Air as a breathing source to provide the maximum volume to the Instrument Air System.

C. Use PAC 0-9 compressor to maximize the volume of air to the Instrument Air System.

D. Service Air cannot be cross connected until service air pressure is greater than 108 psig.

Proposed Answer: C

Explanation: Answer A is incorrect as PAC 0-8 is the low volume service air compressor and a note in the AOP specifically states to not use it due to the low volume. Answer B is incorrect but partially true as breathing air use must be terminated but it is because nitrogen could be supplied by instrument air to service air during the cross tie and be unhealthy for the breathers. Answer C is correct. Answer D is incorrect and is the upper limit for the service air, not the lower limit; although 115 psig is the instrument air pressure relief valve setpoint.

Technical Reference(s): OP AP-9, step 11 rev. 23

Proposed references to be provided to applicants during examination: OP AP-9, Rev. 23

Learning Objective: LPA-9 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: OPEN REFERENCE

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.

Proposed Question: 16

The crew has transitioned to EOP ECA-1.2, LOCA Outside Containment. Which of the following indications is used to determine that the LOCA Outside Containment has been isolated?

A. RCS pressure increasing.

B. Pressurizer level increasing.

C. RCS subcooling increasing.

D. RVLIS level increasing.

Proposed Answer: A

Explanation: Answer A is correct. The procedure uses RCS pressure as the sole determinant that the LOCA has been isolated; uses stable or increasing pressure for the individual component isolations and increasing pressure to exit the procedure. Answer B would also probably occur but is not used in this procedure. Answer C would likely occur following the isolation of a LOCA but is not used in this procedure. Answer D is also likely to occur if level got that low, but is not used in the ECA-1.2 procedure to determine success.

Technical Reference(s): EOP ECA-1.2 Rev. 6A

Proposed references to be provided to applicants during examination: None

Learning Objective: LPE-1A Obj. 5433 (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.

Proposed 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 bistable PC456B and 457B.

Which of the following actions should be taken?

A. When either PC456B or 457B light, block the Low Steamline Pressure SI.

B. When both PC456B and 457B light, 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.

Proposed Answer: C

Explanation: Answer A is incorrect as this alarm comes in as the bistables de-energize so the permissive is met. 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 it although one bistable thinks it is still above the pressure setpoint.

Technical Reference(s): EOP ECA-1.1 step 10-11, rev. 19; 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.

Proposed Question: 18

EOP FR-H.1, "Response to Loss of Secondary Heat Sink," directs the operators to initiate RCS bleed and feed if certain conditions are reached.

Why is it vital that the operators not delay performance of these steps?

A. To minimize core uncovery and prevent an inadequate core cooling condition.

B. To prevent a tube rupture due to excessive primary to secondary differential pressure if the S/Gs boil dry.

C. To prevent lifting pressurizer safeties.

D. To prevent caustic stress corrosion from chemical precipitation on uncovered (dry) tubes.

Proposed Answer: A

Explanation: A is correct and is addressed by the background document. B, C & D are potential concerns, but not as severe as a loss of core cooling.

Technical Reference(s): FR H.1 background document
EOP FR-H.1 steps 1-11, FO page, rev. 22

Proposed references to be provided to applicants during examination: None

Learning Objective: LPE-H Obj. 5801 (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 #	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.

Proposed 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, C-11 actuation, and T-ref greater than T-avg

B. DRPI Urgent Failure LEDs, C-3/C-4 actuation, and T-avg greater than T-ref

C. DRPI Rod Position LEDs, C-11 actuation and T-avg greater than T-ref

D. DRPI General Warning LEDs (for CBD rods), C-3/C-4 actuation, and T-ref greater than T-avg

Proposed Answer: ___C___

Explanation: Selection A is incorrect since there will be no DRPI Rod Deviation (all 8 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 __X___
Comprehension or Analysis ______

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.

Proposed 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.

B. A high level trip 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 N-31 which occurs on the loss of detector voltage circuit.

D. The high level trip is inhibited on channel N-31 due to the bypass; the reactor will remain critical.

Proposed 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

Proposed Question: 21

The unit is at 90%, and ramping up with the MW feedback in. Control Bank D rods are at 210 steps. All equipment operable and in the proper alignment for power operations. Due to a 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 C-11 actuation will prevent rod withdrawal.

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

Proposed 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 reactor 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.

Proposed Question: 22

A leak of several gpm develops on a lower tank weld in the aligned Liquid Hold-Up Tank (LHUT). After selecting "VCT" position on letdown divert valve, LCV-112A, which of the following actions should be performed next in response the leaking LHUT?

A. Isolate letdown by closing all orifice isolation valves, 8149A, B, & C.

B. Gag all relief valves which discharge to the LHUT.

C. Initiate a manual makeup to the VCT.

D. Place both RCDT pumps in OFF.

Proposed Answer: D

Explanation: Distracter A would prevent any letdown input to the LHUT, but closing the 8149 valves would needlessly isolate letdown flow. B is incorrect since the relief valves are designed for protection and should never be gagged except for maintenance. C is incorrect; if all letdown is aligned to the VCT, then there will be no lost coolant and no need for makeup to the VCT. Should a VCT makeup be needed for normal inventory loss, ten auto makeup will provide sufficient flow. D is the correct answer as stopping RCDT pumps eliminates another major input to the LHUT.

Technical Reference(s): OP-AP-14, rev. 12, step 7, page 5

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 #	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.

Proposed Question: 23

A fire detector in the Auxiliary Building goes into alarm. Operators identify the alarming detector, but find no evidence of fire or other condition which would cause the detector go into alarm. What action should be taken next concerning this detector?

A. Declare the detector inoperable. Initiate an AR and direct maintenance to investigate.

B. Perform a smoke detection test. If the detector passes the test, no further action is required.

C. Reset the alarm. If the detector alarms again within 7 days for no apparent reason, declare it inoperable.

D. Reset the alarm, and disable any automatic features initiated by the detector. If no unexplained alarms occur within 7 days, restore the automatic feature.

Proposed Answer: C

Explanation: Answer A is incorrect. The AR should be written and maintenance should investigate, but it is unnecessary to declare the detector inoperable unless it spuriously alarms again. B is incorrect; there is no provision in procedure OP K-2C to perform such a test. C is correct. D is incorrect as this action is not part of the procedure.

Technical Reference(s): OP K-2C, Rev. 21, page 5

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 #	2	
	K/A #	076 2.2.22	
	Importance rating	3.4	

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

Proposed Question: 24

Which of the following sets of conditions exceeds the Technical Specification Limiting Condition for Operation (LCO) for RCS specific activity? (D.E. = Dose Equivalent)

	Mode	D.E. I-131	D.E. XE-133
A.	2	0.22 µCi/gm	522.0 µCi/gm
B.	1	58.1 µCi/gm	106.4 µCi/gm
C.	3	0.12 µCi/gm	492.8 µCi/gm
D.	5	63.2 µCi/gm	767.7 µCi/gm

Proposed Answer: B

Explanation: The LCO limits are 1.0 µCi/gm for I-131 and 600 µCi/gm XE-133 and apply in modes 1-4. The only set of parameters that exceeds this limit is answer B (correct answer).

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

Proposed references to be provided to applicants during examination: T/S 3.4.16

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: OPEN REFERENCE

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).

Proposed Question: 25

What is the basis for performing EOP FR-Z.3, Response to High Containment Radiation Level, if a yellow path condition occurs due to elevated containment radiation levels?

Containment radiation levels that are high enough to result in a critical safety function (CSF) yellow path….

A. might impact operation of critical instruments needed for event mitigation.

B. will prohibit personnel access to CNMT to assess system and equipment damage.

C. could result in radiolysis of water leading to potentially explosive quantities of hydrogen.

D. may be needed by ERO personnel in order to determine potential offsite releases.

Proposed Answer: D

Explanation: Answer A is incorrect. Adverse CNMT results from activity levels that are several orders of magnitude higher. B is incorrect since personnel access to CNMT is a long-term recovery issue. C is incorrect since radiolysis of water occurs at extremely high activity levels such as coolant near the fuel core. D is correct as described in the basis document.

Technical Reference(s): EOP FR-Z.3, Response to High Containment Radiation Level, Bkg.Doc. Rev. 2 page 3

Proposed references to be provided to applicants during examination: EOP F-0.5

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: OPEN REFERENCE

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	1	____
	Group #	2	____
	K/A #	W/E03 EK1.3	
	Importance rating	3.0	____

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.

Proposed Question: 26

The plant is recovering from a small break LOCA (SBLOCA) and the crew is performing EOP E-1.2, Post LOCA Cooldown and Depressurization. Which of the following describes how the RCS is cooled and depressurized?

A. Continuous fixed-rate RCS cooldown and continuous depressurization until normal charging and letdown can be placed in service.

B. Stepwise RCS cooldown and stepwise depressurization to refill the PZR and then minimize break flow.

C. Continuous fixed-rate RCS cooldown and stepwise depressurization to refill the PZR and then minimize break flow.

D. Stepwise RCS cooldown and continuous depressurization until normal charging and letdown can be placed in service.

Proposed Answer: C

Explanation: Answer A is incorrect. Depressurization is done in stages (with ECCS reduction and establishment of normal charging in between). B is incorrect since cooldown is continuous at < 100°F. C is correct. D is incorrect since depressurization is not continuous and letdown will not be placed into service.

Technical Reference(s): EOP E-1.2, Post LOCA Cooldown and Depressurization, Rev. 18

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:

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.

Proposed 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?

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

Proposed 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: ____________________ (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:

REACTOR OPERATOR EXAM

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.

Proposed 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

Proposed 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

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.

Proposed 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.

Proposed 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)

Proposed references to be provided to applicants during examination: None

Learning Objective: LA 6-RCP objs. 3 & 6 OIM page A-6-1

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.

Proposed 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.

Proposed 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.

Proposed Question: 31

The Residual Heat Removal (RHR) system has been prepared for placement into service to continue a plant cooldown from mode 3 (350°F) to mode 5 (200°F). CCW is aligned to shell side of both RHR heat exchangers and auxiliary sea water (ASW) is properly aligned to the CCW heat exchangers. The control room operator responsible for RHR operation, properly establishes a 20°/hour RCS cooldown rate following procedure OP B-2:V, RHR: Place in Service During Plant Cooldown. This procedure also established 115 gpm of letdown flow through letdown hand control valve, HCV-133. RHR heat exchanger bypass valve, HCV-670 is 30% open when the 20°/hour RCS cooldown rate is obtained.

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

A. RHR to letdown valve, HCV-133 is isolated thus reducing CVCS letdown flow to 0 gpm.

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. Valve 8741, RHR Return to the RWST valve is inadvertently opened.

Proposed Answer: A

Explanation: A is correct. Reducing letdown flow will create back pressure at the outlet of the RHR heat exchangers, thus reducing flow through the HX and increasing flow through the bypass valve. 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 discharge valve promotes more flow through the HX's. D is incorrect since the effect will be less head loss, thus more flow through the RHR HX and perhaps through the bypass as well. Ultimately, this action will not reduce RCS cooldown rate.

Technical Reference(s): OP B-2:V Rev. 25, section 6; LB2-RHRS, Rev. 13, page 6 of 40

Proposed references to be provided to applicants during examination: None

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:

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.

Proposed Question: 32

With the plant at normal, full power conditions, a full safety injection signal (SIS) actuates. An operator is tasked with determining if all Emergency Core Cooling System (ECCS) equipment and systems are aligned in their safeguards position. The RUN status light is burned out for (intermediate head) safety injection pump 1-1. Assuming that the burned out light cannot be immediately replaced, which of the following, if any, would provide the best means to remotely (from the control room) verify that safety injection pump 1-1 is running?

A. Check safety injection pump 1-1 flow rate indicator, FI-918.

B. Check amperage on safety injection pump 1-1 motor.

C. Verify all valves are open in the safety injection pump 1-1 to RCS loop flowpath.

D. Remote determination of safety injection pump 1-1 run status cannot be done.

Proposed 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, due to the miniflow back to the RWST. C is wrong for the same reason as A – no flow if pump is deadheaded. D is incorrect since pump motor current or pump discharge pressure could be used.

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.

Proposed Question: 33

The plant is being shutdown to mode 5 for maintenance purposes. Currently, the RCS is at 500°F and 2000 psig with a cooldown rate of 40°F/hour. In order to maximize RCS turnover, excess letdown has been placed into service along with normal letdown with all three orifice isolation valves, CVCS-8149A, B, & C, open. A main steamline break (MSLB) occurs inside containment resulting in a high-negative steamline rate generated safety injection signal (SIS). All ESF equipment operated as designed and the control room crew has promptly isolated the faulted SG. The crew has just entered EOP E-1.1, SI Termination, and is performing step 1. At the present time, what systems or components are directing coolant to the Pressurizer Relief tank (PRT)?

A. Normal letdown (RV-8117), RCP seal return, and excess letdown (RV-8121)

B. RCP seal return and excess letdown (RV-8121)

C. Normal letdown (RV-8117), excess letdown (RV-8121), and primary water (RCS-8029)

D. RCP seal return (RV-8121) and primary water (RCS-8029)

Proposed Answer: ___B____

Explanation: If SIS actuates, then CIS-phase A (CIA) will actuate and isolate letdown, excess letdown, and seal return containment penetrations. For normal letdown, the relief valve is isolated from CVCS by the upstream orifice isolation valves. For seal return and excess letdown (which share a common relief valve, RV-8121) the relief valve is upstream of the containment isolation valve which causes the system to hydrostatically attempt to match RCS pressure. Primary water supply to the PRT is also isolated at CTMT on a CIA, upstream of the relief valve. A is incorrect since normal letdown (NLD) relief will be isolated on the CIA. B is correct. C is incorrect because of NLD and Rx M/U relief's being isolated from high pressure fluid by the CIA. D is incorrect since primary M/U water relief is isolated at containment.

Technical Reference(s): OVID-106708 sh. 2, Rev 123,
(E-27), sh. 3, Rev. 116 (C-32); OIM B-6-7, Rev 19

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: The PZR pressure control circuit may be cycling a PORV depending on the amount of time required to terminate SI.

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.

Proposed Question: 34

The plant is at 100% steady-state power, beginning of life (BOL) conditions with all equipment operable and in its proper alignment for normal full power operations. CCW heat exchanger #1 is in service and heat exchanger #2 is isolated on the CCW side, but fully aligned on the auxiliary saltwater (ASW) side. Two CCW pumps are running to provide flow to the A, B, & C cooling water headers. A decision is made to start the standby CCW pump and align CCW heat exchanger #2 by opening its outlet valve, FCV-431. Assuming that both CCW cooling trains remain in parallel operation, which of the following could result in an operational limit being exceeded?

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

B. Spent fuel pool over-cooling is a positive reactivity addition which could challenge the minimum K_{eff} requirement.

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

D. RCP bearing oil could become too viscous resulting in excessive current which could lead to an RCP over-current trip.

Proposed 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. For answer D, while viscosity of the bearing oil may increase, there exists no procedural standard for tripping the RCPs. Current increase should be minimal.

Technical Reference(s): Reactor Theory; Components (demineralizers) GFE program

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).

Proposed 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. 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. Spray valve PCV-455B will lose control power and fail closed; PCV-455A is unaffected.

C. Both spray valves fail as-is 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.

Proposed 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. 11, page 14, Appendix C

Proposed references to be provided to applicants during examination: None

Learning Objective: STG J9-DC Power Rev. 15 Obj. 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 A3.01	
	Importance rating	3.0	

Pressurizer Pressure Control: Ability to monitor automatic operation of the PZR PCS, including: PRT temperature and pressure during PORV testing.

Proposed Question: 36

What is the purpose/basis for stroke testing the pressurizer PORVs and what parameters would confirm that the PORV is open? The test verifies that the PORVs…

A. are capable of depressurizing the RCS when mitigating a SGTR event. The operator uses position indication lights which confirm the proper operation of valve stem limit switches.

B. can be quickly closed after being opened by the PZR pressure controller. The operator uses a stop watch to ensure that the valve can be isolated within the analyzed time.

C. can be determined to be closed during a LOCA response. The operator uses position indication lights which confirm the proper operation of valve stem limit switches.

D. can be opened to prevent lifting of the PZR code safeties. The operator uses PORV/safety tailpipe temperature, corrected for pressure, to confirm that the valve opened.

Proposed Answer: A

Explanation: Answer A is correct. The PORV will be cycled open, then closed which is verified by limit switch fed valve position indicating lights. B is incorrect. Each PORV is equipped with a blocking isolation valve which is stroke-time tested on a regular frequency. C is not true for the same reason as answer B (block valve will isolate an open PORV if necessary). While D is true, it is not a Tech Spec operability issue, therefore testing is not mandatory for this function.

Technical Reference(s): Technical specifications and bases for section 3.4.11

Proposed references to be provided to applicants during examination: None

Learning Objective: STG A4B-PRT Obj 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 #	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.

Proposed Question: 37

Unit 1 is at 80% power during a plant startup. All equipment is operable and properly aligned with flux distribution and RCS parameters at the expected values for 80% plant power. 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

Proposed 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): Technical Specifications Table 3.3.1-1, pages 6-7

Proposed references to be provided to applicants during examination: __None___________

Learning Objective: ________STG B6A-SSPS Objective 10________

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 #	013 K2.01	
	Importance rating	3.6	____

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

Proposed 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 (PY-11) becomes and stays de-energized?

A. Most solid state channel 1 input bay relays for both trains will trip; All train “A” ESF equipment is inoperable due to loss of train “A” SSPS slave relay power.

B. Most solid state channel 1 input bay relays for train “A” only will trip; All train “A” ESF equipment is inoperable due to loss of SSPS train “A” logic cabinet DC control circuit power.

C. None of the solid state input relays on either train will actuate due to redundant power for the input relays. All train “A” ESF equipment is fully functional and will auto-actuate if input relay coincidence is satisfied.

D. Most solid state channel 1 input bay relays for train “A” will trip; All affected train “A” ESF equipment will start and/or align to its safeguard position.

Proposed Answer: A

Explanation: A is correct. 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. 9 Obj. 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 #	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.

Proposed Question: 39

Unit 2 is operating at steady-state, 100% power with all equipment operable and aligned for normal full power conditions. Due to a spurious closure of the 2-1 steam generator feed regulating valve, FCV-510, a legitimate reactor trip signal is generated, however the reactor fails to trip. Operators attempt a manual trip, but that, too is unsuccessful. The crew enters and performs EOP FR-S.1, Response to Nuclear Power Generation / ATWS.

Unknown to the operating crew, 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. If the ESFAS / SSPS malfunctions persist during the performance of EOP FR-S.1, 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; trip the turbine

B. Trip the turbine; start the turbine-driven AFW pump

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

D. Open the reactor trip breakers / insert control rods

Proposed 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. 24; EOP FR-S.1, Rev. 16A, steps 1-3

Proposed references to be provided to applicants during examination: None

Learning Objective: STG B6D-AMSAC, Rev 5 Obj 1,14

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

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

**Comments: Note: Control rods may automatically insert after the turbine trips, but after the power mismatch circuit signal decays, the demand may shift to outward as nuclear power drops which will offset temperature mismatch to slow insertion or perhaps cause auto withdrawal.

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.

Proposed Question: 40

Unit 1 is operating at steady-state, 100% power with all equipment operable and aligned for normal full power conditions. Due to a significant flow restriction within the Auxiliary Salt Water (ASW) system, the heat removed from the component cooling water (CCW) system is reduced, causing a gradual rise in CCW temperature. 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 (SFP) heat exchanger.

C. Secure from a containment ventilation (for pressure reduction) operation.

D. Turn off all containment fan cooler units (CFCU).

Proposed Answer: B

Explanation: A is incorrect since a 5% power reduction will reduce T-avg by slightly more than 1°F. B is correct as raising the 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, Malf. of CCW System, Rev. 23, App. B (discussion item 2.b)

Proposed references to be provided to applicants during examination: None

Learning Objective: STG E5 Aux Saltwater, Rev. 12 Obj 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 #	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: CSS

Proposed Question: 41

Abbreviations used in the following question:

- SI = Safety Injection
- MSLI = Main Steam Line Isolation
- CSS/CIB = Containment Spray System/Containment Isolation Phase B

Unit 1 is at full power with all equipment operable and properly aligned except for the following. All SSPS bistables associated with channel II containment pressure instrument, PC-935, have been placed in trip or bypass in accordance with Technical Specification 3.3.2 due to a surveillance failure during a recent channel II analog channel test.

Subsequently, 120 VAC vital instrument bus, PY-13 becomes deenergized. Which of the following is the expected ESF system response to bus PY-13?

A. SI, MSLI, and CSS/CIB all actuate on both trains.

B. SI, MSLI, and CSS/CIB all actuate on train B only.

C. SI and MSLI both actuate on both trains; CSS/CIB actuates on train B only.

D. SI and MSLI both actuate on both trains; CSS/CIB does not actuate.

Proposed Answer: D

Explanation: A & B are incorrect. SI and MSLI will actuate on both trains of SSPS due to signal coincidence being met (2/3 – one from the failed channel II instrument and the second from channel 3 power supply failure). CSS/CIB will not actuate since the relays are energize-to-actuate. C is incorrect because CSS/CIB will not actuate since their ESF signal relays are energize to actuate. D is correct.

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

Proposed references to be provided to applicants during examination: None

Learning Objective: STG B6B-Eagle 21 & SSPS, Rev. 14, Obj 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:

REACTOR OPERATOR EXAM

Examination Outline Cross-reference:

Level	RO	SRO
Tier #	2	
Group #	1	
K/A #	039 A4.03	
Importance rating	2.8	

Main and Reheat Steam: Ability to manually operate and/or monitor in the control room: MFW pump turbine.

Proposed Question: 42

Unit 1 is at stable 75% power with all equipment operable and properly aligned for the present power level, except for Digital EH (DEH) Programmed Ramps which are presently disabled.

Main Feed Water (MFW) Pump 1-1 unexpectedly trips due to low-low lube oil reservoir level. What immediate action should be performed by the operating crew at this time?

A. Monitor DEH MW Feedback circuit to ensure that Programmed Ramp auto-enables and quickly reduces turbine load to 650 MW.

B. Manually enter the load ramp in service with DEH impulse and MW feedback to reduce load to 650 MW at a rate of 225 MW/min.

C. Manually trip the reactor; enter and perform the actions of EOP E-0, Reactor Trip or Safety Injection.

D. Start or verify auto start of all Auxiliary Feedwater Pumps.

Proposed Answer: B

Explanation: A is incorrect since the programmed ramps when disabled by operator command do not auto-enable. B is correct as this is the RNO for immediate action #2 in the loss of FW AOP. C is incorrect since power is below 80% and D is incorrect since at 75% power, the AFW pumps would provide inadequate flow to compensate for the lost MFW pump.

Technical Reference(s): STG C3C, Digital EHC, Rev. 13, page 2-55; OP AP-15, Loss of Feedwater Flow, Rev. 18, Section A

Proposed references to be provided to applicants during examination: None

Learning Objective: STG C3C, Digital EHC, Rev. 13, objective 2

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 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.

Proposed 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 starts on the expected SG low-low water level.

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

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

Proposed Answer: B

Explanation: A is incorrect since trip of both MFWPs will only start the MDAFPs; AMSAC would generate a 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

Proposed references to be provided to applicants during examination: None

Learning Objective: LD-1-AFW, objectives 9, 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:

REACTOR OPERATOR EXAM

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.

Proposed Question: 44

The plant is at 100% power with all equipment operable and configured for normal full power operation. What are all the specific changes which will occur in the main feed water (MFW) pump and the MFW steam turbine flow system alignment when a MFW pump trips? (Note: LP = Low Pressure, HP = High Pressure, and GV = Governor Valve)

A. The LP and HP steam stops close; the LP GV closes and the normally closed HP GV receives a signal to close; the pump recirculation valve to the condenser closes.

B. The LP and HP steam stops close; the HP GV closes and the normally closed LP GV receives a signal to close; the pump recirculation valve to the condenser opens.

C. The LP and HP steam stops close and the pump recirculation valve to the condenser fully opens.

D. The LP and HP GV's close and the pump recirculation valve to the condenser fully opens.

Proposed 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 and the recirc valve opens on low flow at the pump discharge. C is incorrect since the LP & HP GV's also close. D is incorrect since the LP & HP steam stops also close and the recirc valve will 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 #	1	
	K/A #	061 K1.03	
	Importance rating	3.5	

Auxiliary/Emergency Feedwater: Knowledge of the physical connections and/or cause-effect relationships between the AFW and the following systems: Main steam System.

Proposed Question: 45

Unit 1 was operating at steady-state 100% power when a spurious reactor trip occurred. All equipment functioned as designed except for the auxiliary feed water (AFW) system in which both motor driven pumps tripped. SG flows from the turbine driven AFW pump (TDAFW pump) were observed to rise from 0 gpm to full scale flow over about 10 seconds, after which flow suddenly returned to 0 gpm for all SG's. (Note: MSL = Main Steam Line)

What is the probable cause for the TDAFW pump feed flow indication and what corrective action is needed to restore feed flow from the TDAFW pump to the steam generators?

A. TDAFW pump discharge check valve failed to open. Major maintenance will be needed to repair the failed check valve and restore the TDAFW pump back to operation.

B. MSL 1-2 or 1-3 has faulted causing steam from the intact SG to short-cycle to the faulted SG via the pump turbine steam supply valve (FCV-37 or FCV-38). The steam supply valve from the faulted SG (FCV-37 or 38) will need to be closed to restore motive steam to the TDAFW pump.

C. There is inadequate net positive suction head (NPSH) for the TDAFW pump. Actions will need to be taken to add inventory to the CST or realign the TDAFW pump suction to the Firewater tank or Raw Water reservoir.

D. The TDAFW pump tripped due to overspeed. An operator will need to locally reset the throttle-trip valve; the operator must then locally open and throttle AFW flow using the throttle-trip valve.

Proposed Answer: D

Explanation: A is incorrect since the check valve is upstream of the SG flow elements which would have indicated 0 gpm for the duration had the check valve failed. B is incorrect since if one of the supplying MSL's (1-2 or 1-3) faults, check valves in the loop supply lines prevent short-circuiting steam back to the faulted SG, therefore, AFW flow may have reduced, but would not have gone to 0 gpm. C is incorrect since a loss of NPSH would have been more erratic as slug flow would have preceded loss of flow. D is correct. Many things can cause a TDAFW pump O/S trip. A likely cause is failure of the Woodward governor.

Technical Reference(s): OVID 106704 sheet 4, Rev. 88; OP D-1:IV, Rev. 16, step 6.1

Proposed references to be provided to applicants during examination: None

Learning Objective: LD-1-AFW, Rev. 10, 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:

REACTOR OPERATOR EXAM

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.

Proposed 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

Proposed 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. 10, objs. 10, 14, 19

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.

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

A. Vital bus is presently energized via rectifier of UPS; if the rectifier or its input MCC fails, then the vital bus will de-energize and remain de-energized until the UPS is restored.

B. Bus is presently energized via rectifier of UPS; if the rectifier or its input bus de-energize, the static switch will throw over to the TRY which can be fed by an alternate MCC.

C. Bus is momentarily de-energized; bus will re-energize via TRY input to affected vital bus static switch from either a normal or alternate MCC.

D. Bus is presently de-energized; bus will remain de-energized until the UPS is restored.

Proposed Answer: B

Explanation: A is incorrect since the static switch is still available which can be supplied from the TRY with dual MCC inputs. 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.

Proposed Question: 48

Unit 1 is ramping offline operating at normal full power conditions with CCW pumps 1-2 (bus G) and 1-3 (bus H) running. The operating crew is directed to transfer 4 KV bus H feed from the auxiliary transformer to the startup transformer. Following the appropriate procedure, 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 next be performed 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.

Proposed 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. 22; OP J-6A:II, Rev. 10, Section 6.2.50

Proposed references to be provided to applicants during examination: None

Learning Objective: LJ-15, Electric Power Transfer, Rev. 3 Obj. 6s & 7

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.

Proposed Question: 49

Unit 1 was operating at 100% power when a storm disabled all offsite power feeds to the plant. The reactor tripped, however, all vital 4 KV buses are de-energized due to a common mode failure of the Unit 1 emergency diesel generators. The operators are performing ECA-0.0, “Loss of All Vital AC Power,” when the SFM directs the following actions to be performed:

- Break condenser vacuum
- Perform an emergency purge of the main generator
- Stop the air side generator seal oil backup pump
- Stop MFP emergency DC oil pumps (after the pumps stop)
- Stop the main turbine DC bearing oil pump (after the turbine stops)

What is the reason for performing these actions involving non-safety related equipment while responding to a complete loss of power to all 4 KV vital buses?

A. The SFM recognizes the future importance of turbine building equipment and is permitted by ECA-0.0 to take protective actions if they don’t delay steps involving safety-related systems.

B. With no power, there is a greater risk of main turbine and main feed pump overspeed which could cause extensive damage and complicate event recovery actions.

C. The actions involve shutting down non-essential DC powered equipment as soon as possible in an effort to prolong DC bus battery life.

D. The uninterruptible power supply (UPS) bus loads need to be minimized to facilitate re-energization of the rectifier input to the UPS.

Proposed Answer: C

Explanation: A is incorrect since the basis of the EOP network is to prevent and mitigate core damage to minimize offsite radiation dose. Restoration of vital power is a considerably higher priority (in this guideline) than the concern for future power operations. B is incorrect since there is no higher risk of overspeed with no vital bus power. C is correct. D is incorrect since the bus could be energized from the batteries when the rectifier input is restored. If necessary, supply breakers on the rectifier could be opened to minimize load on the 480 VAC vital buses when they are re-energized.

Technical Reference(s): EOP ECA-0.0, Loss of All Vital AC Power, Rev. 21, Appendix DC

Proposed references to be provided to applicants during examination: None

REACTOR OPERATOR EXAM

Learning Objective: ________STG J9, DC Power, Rev. 15 Objectives 12 & 18__________

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 #	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

Proposed 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 buses as designed. Assuming that safety injection does actuate prior to the EDGs energizing their respective buses, which of the following groups lists all the ESF pumps which will be started directly by the diesel generator sequence circuits?

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

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

C. ASW (2), MDAFWP (2), CCP (2), CCW (2), SIP (2), CSS (2)

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

Proposed Answer: B

Explanation: B is correct. A is incorrect since the TDAFWP is not sequenced on and CSS 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. C is also missing RHR pumps

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

Proposed references to be provided to applicants during examination: None

Learning Objective: STG J15 objective 2

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.

Proposed 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. RCP Thermal Barrier common return line will isolate.

B. CCW Surge Tank vent valve, RCV-16 will isolate.

C. RCP Thermal Barrier common return line and CCW Surge Tank vent valve, RCV-16 will isolate.

D. CCW Surge Tank make-up valves, LCV-69 and/or LCV-70 will open to replenish CCW inventory.

Proposed 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 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.

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

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

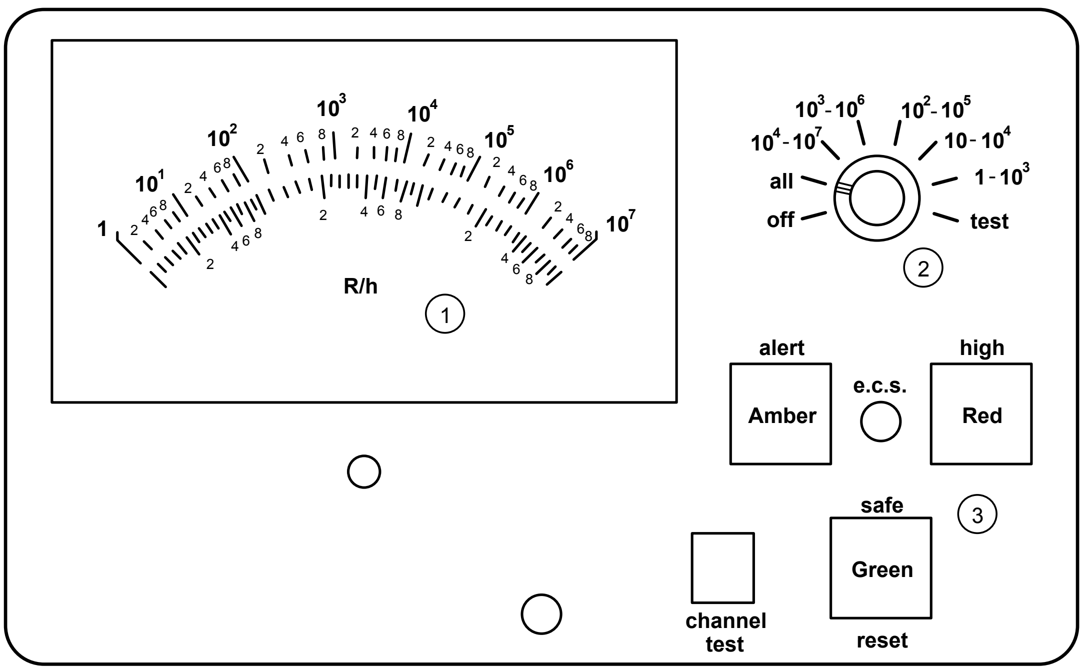
Comments:

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.

Proposed Question: 52

Containment High Radiation Area Monitors, RM-30 and 31 can be remotely tested two ways from the Control Room. One method involves depressing the "e.c.s." (electronic check source) button on the display unit in the control room. What physically occurs at the detector and what instrument range will be tested if the e.c.s. button is depressed while range select knob is in "all" (see #2 on figure below)?



A. A sealed source is moved from its lead shield storage to near the detector; the indicated range is 1 to 10^3 R/h.

B. A sealed source is moved from its lead shield storage to near the detector; the indicated range is 10^4 to 10^7 R/h.

C. A small electric current is applied to the detector circuit which causes the indicated R/h value to be full scale in any range.

D. A small electric current is applied to the detector circuit which causes the amber "alert" alarm to actuate which will activate multiple control room annunciators.

Proposed Answer: ___A____

Explanation: A is correct. B is incorrect since to display the range 10^4 to 10^7 R/h, then that range should be selected. C and D are incorrect since an actual source is used.

Technical Reference(s): STG G4A, Radiation Monitoring Rev.8, pp 2.2-10 to 2.2-12

Proposed references to be provided to applicants during examination: None

Learning Objective: STG G4A, Radiation Monitoring, Rev. 8, obj 7, 8

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

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

Comments:

REACTOR OPERATOR EXAM

Examination Outline Cross-reference:

Level	RO	SRO
Tier #	2	
Group #	1	
K/A #	076 A2.02	
Importance rating	3.5	

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.

Proposed Question: 53

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

A. If possible, operate 2 ASW pumps through one CCW HX to minimize local erosion-corrosion.

B. Strictly follow an ASW chemical treatment plan to help neutralize the salinity in the system.

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

D. Swap in-service CCW heat exchangers at least once per week.

Proposed Answer: C

Explanation: A is incorrect as additional flow would increase erosion-corrosion it may, in fact reduce biological deposits, however, system procedures recommend 2 ASW pumps and 2 CCW HX's. B is incorrect since there is no chemical treatment used that neutralizes salinity. Chlorine is used as a biocide and cathodic protection is used to reduce corrosion. 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, although it could be beneficial, it is not a current practice at DCPP.

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:

REACTOR OPERATOR EXAM

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.

Proposed Question: 54

Which of the following best describes the supply of service/instrument air at DCPP?

A. Nine total compressors and five air dryers supply all the compressed air needs of both units; power supplies for the compressors and dryers are diverse but non-vital.

B. Seven total compressors and five air dryers supply all the compressed air needs of both units; power supplies for the compressors and dryers are diverse and some are vital.

C. Four total compressors and three air dryers supply all the instrument air needs of both units; each unit has its own service air system; power for all compressors and dryers is diverse but non-vital.

D. Seven instrument air and two service air compressors supply all the compressed air needs both units; each unit is equipped with its own air dryers, and component power is vital and non-vital.

Proposed Answer: A

Explanation: A is correct. B is incorrect since it only describes the instrument air subsystem. C is incorrect since there are 9 compressors total. This answer is plausible since there are 4 reciprocating instrument air compressors. D is incorrect since there is also common unit air drying and all power is non-vital.

Technical Reference(s): OIM K-1-1, Rev.19

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.

Proposed 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…

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

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

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

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

Proposed 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

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.

Proposed Question: 56

Which of the following conditions is needed to cause a Letdown Isolation?

A. Cold calibration, LT-462, and any 1 of 3 Pressurizer hot calibration level channels below 17%.

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

C. Both LT-459 and LT-461 Pressurizer hot calibration level channels below 17%.

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

Proposed Answer: D

Explanation: Answer A would result in a letdown isolation but is not needed to cause a letdown isolation as either control channel will do the job. Answer B is incorrect as the channel not selected as control or backup will not cause a letdown isolation. Answer C is incorrect although in the normal alignment would cause the isolation. This one is incorrect as 460 could be either the control or the backup and then it this arrangement would not cause isolation. Answer D is correct.

Technical Reference(s): STG A4A page 91 of 125 rev. 14

Proposed references to be provided to applicants during examination: None

Learning Objective: STG A4A Obj. 11 (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.

REACTOR OPERATOR EXAM

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.

Proposed 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.

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.

Proposed 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 13 of 200 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.

Proposed Question: 58

Following a Major Loss of Coolant Accident, one hydrogen recombiner is placed in service with a containment hydrogen concentration of 3.4%. 24 hours after the recombiner is placed in service the following conditions exist:

Containment hydrogen concentration increased by 0.7%.
Containment pressure has decreased 5 psig.

Which of the following actions should the crew take?

A. Place the standby hydrogen recombiner in service.

B. Increase the output of the in service hydrogen recombiner by 4 KW.

C. Recalculate the power setting for the hydrogen recombiner.

D. Shutdown the hydrogen recombiner.

Proposed Answer: D

Explanation: Answer A is incorrect although if the hydrogen concentration was less than 4.0% the standby recombiner would be started up to a standby condition. Answer B is incorrect although if the hydrogen concentration was below 4% this action would be directed by the procedure. Answer C is incorrect although if the recombiner were to remain in service this action would be directed by the OP. Answer D is correct as the hydrogen concentration exceeds 4% requiring the recombiner to be shutdown to avoid a potentially explosive atmosphere.

Technical Reference(s): OP H-9 rev 10

Proposed references to be provided to applicants during examination: None

Learning Objective: STG H9 Obj. 16 (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 #	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.

Proposed Question: 59

While off loading fuel from the reactor, RE-12, Containment Gaseous rad monitor, goes into high alarm. Once all in-transit fuel assemblies are placed in a safe location, which of the following actions are required to be performed?

A. Evacuate non-refueling personnel from CNMT and activate CNMT closure.

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 CNMT evacuation alarm and ensure all personnel promptly exit CNMT.

Proposed 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. 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:

REACTOR OPERATOR EXAM

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.

Proposed Question: 60

The reactor is at 12% power increasing. Preparations are underway to bring the second Main Feed Pump up to idle speed and latching has not been performed. Unexpectedly, the operating Main Feed Pump trips. Which of the following actions should the crew take?

A. Continue to startup the second Main Feed pump to feed the S/Gs.

B. Trip the Main Turbine.

C. Adjust AFW flow to maintain at least one S/G level greater than 33%.

D. Attempt to restart the tripped Main Feed water pump.

Proposed Answer: B

Explanation: Answer A is incorrect as the pump is not yet idling so cannot be placed in service. Answer B is correct as this will reduce the steaming rate of the S/Gs. Answer C is incorrect as the goal is to have all S/Gs greater than 33%, not just one. Answer D is incorrect as the pump should not be restarted until a determination is made as to why it tripped although this might be the quickest way to regain normal feed flow.

Technical Reference(s): OP AP-15 Section B Rev. 18

Proposed references to be provided to applicants during examination: None

Learning Objective: LPA-15 Obj. 9693 (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.

Proposed 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

Proposed 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 53/80 Rev. 13

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.

Proposed Question: 62

The unit is stable at 100% power when Condensate/Booster pump set 1-1 trips. Which of the following conditions would cause the operator to actuate the Load Transient Bypass?

A. Main Feed Water pump suction pressure is between 260 psig and 300 psig.

B. Main Feed Water pump suction pressure is between 190 psig and 260 psig.

C. Main Feed Water pump suction pressure is less than 190 psig.

D. Either Main Feed Water pump speed control transfers to manual control.

Proposed Answer: _B___

Explanation: Answer A is incorrect as this band would not require any action. Answer B is correct per the procedure. Answer C is incorrect as this level requires a reactor trip. Answer D is incorrect but would complicate recovery and probably lead to a trip.

Technical Reference(s): _OP AP-15 section D rev 18
_STG C7a pages 1 – 16 rev. 15

Proposed references to be provided to applicants during examination: _OP AP-15 section D _

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: OPEN REFERENCE

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.

Proposed Question: 63

A unit 1 auto transfer of 4kV bus F to the associated diesel generator, with no SI present, will result in an automatic start which of the following pumps:

1. Auxiliary Salt Water pump
2. Component Cooling Water pump
3. Safety Injection Pump
4. Centrifugal Charging Pump
5. Containment Spray Pump
6. Auxiliary Feed Water Pump

A. 1, 2, 3, & 6 only

B. 1, 3, 4, & 6 only

C. 2, 3, 4, & 5 only

D. 1, 2, 4, & 6 only

Proposed Answer: __D____

Explanation: No ECCS loads are started on a diesel sequencer except the CCP. CSS pump is not started on a diesel sequencer as well. The ASW, AFW, CCW,, along with the CCP are the sequenced auto start pumps when the EDG energizes the bus as sole source (D: 1,2,3,&6)

Technical Reference(s): _STG J15 page 2.2-35, rev. 6__

Proposed references to be provided to applicants during examination: __None________

Learning Objective: _ STG J15 , obj. 6___________ (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:

REACTOR OPERATOR EXAM

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.

Proposed Question: 64

Which of the following is most often the source of compressed air (gas) that is supplied to the unit 1/unit 2 service air system?

A. High pressure nitrogen gas

B. Dedicated Service Air compressors and dryers

C. Manual cross-connect valve

D. Automatic cross-connect valve, PCV-114

Proposed Answer: __B___

Explanation: Answer A is incorrect; nitrogen can supply certain components served by service air, but N2 is not aligned as a supply to SA. B is correct. C and D are incorrect. Although these valves exist, they are seldom used.

Technical Reference(s): _STG K1 page section 2.2, rev. 12

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.

Proposed Question: 65

While testing the 1-1 Diesel Generator, a leak develops in the CARDOX supply to the 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.

Proposed Answer: B

Explanation: Answer A sounds pretty good 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 became aware of the problem.

Technical Reference(s): STG K2B rev. 13

Proposed references to be provided to applicants during examination: None

Learning Objective: STG K2B Obj. 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:

REACTOR OPERATOR EXAM

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.

Proposed 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. Immediately restore at least two AFW pumps and be in Mode 3 within 1 hour.

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.

Proposed Answer: C

Explanation: Answer A is incorrect as this action involves mode changes and would put the plant in jeopardy. 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.

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

Proposed references to be provided to applicants during examination: None

Learning Objective: None identified (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.

Proposed Question: 67

The crew is in the EOP network and the Shift Foreman has requested 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. Which of the following should the operator due in response to the Shift Foreman's request?

A. State "No, starting RHR pump 1-2" and then start the pump.

B. State "No, the pump did not start" and await instruction to start the pump.

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

D. Start the pump and state "No the pump did not start, started RHR pump 1-2".

Proposed Answer: __C___

Explanation: Answer A is incorrect as it is not a proper 3 way communication. Answer B is incorrect as the step is a verify so the operator should complete the statement by stating the required action. 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. 11A________

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.

Proposed 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 Tavg= 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 Tavg.

C. Pressurizer level.

D. SG level.

Proposed 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 not a technical specification item.

Technical Reference(s): T.S. 3.4.2 Amendment 135

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	
	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.

Proposed Question: 69

Unit 2 was originally designed to burn plutonium (Pu) 239 which was to be reprocessed from spent uranium (U) fuel whereas, Unit 1 was designed for the more traditional U-235 enriched fuel. As a result of this potential fuel type difference, and the fact that Pu-239 is slightly more reactive than U-235, how is the physical core design different between the two units?

A. The control rods at 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 an individual rod cluster control assembly (RCCA) is different.

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

Proposed 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	3.1	

Equipment Control: Knowledge of surveillance procedures.

Proposed Question: 70

The Shift Foreman has directed that STP R-10, Reactor Coolant System Leakage Evaluation, be performed because of the following conditions in containment:

- Containment humidity increasing.
- Containment sump flow rate increasing.
- Containment sump analysis – nothing unusual
- Air particulate and radiogas – no change
- Containment temperature increasing

Which of the following could be the cause of the problem?

A. RCS leak to atmosphere.

B. Feedwater leak.

C. CCW leak.

D. Primary water leak.

Proposed Answer: B

Explanation: Answer A is incorrect per the STP because radio particulate and/or gas would be increasing. Answer B is correct as this would cause all of the indications provided. Answer C is incorrect because no molybdates in the sump water. Answer D is incorrect as it would not cause an increase in temperature or humidity.

Technical Reference(s): STP R-10 rev. 12

Proposed references to be provided to applicants during examination: None

Learning Objective: None available (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.

Proposed Question: 71

Which of the following tasks is performed by the Control Room Operator who is responsible for activities associated with fuel movements?

A. Ensures the correct fuel assembly selected prior to latching via 3 way communication.

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

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

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

Proposed Answer: A

Explanation: Answer A is correct per the procedure. Answer B is not the responsibility of the Control room operator. Answer C is also not the responsibility of the CRO, 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-SDS1, Step 3.6 rev. 36

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 #	2.3.9	
	Importance rating	2.5	

Radiation Control: Knowledge of the process for performing a containment purge.

Proposed Question: 72

The Unit is in Mode 6 with fuel handling in progress. Chemistry has just delivered a new discharge permit for the containment purge, which is in progress. The new permit replaces the current permit to continue to purge containment.

Which of the following actions should the crew take to shift permits?

A. Stop the containment purge, redo the Containment Purge Checklist and restart the purge.

B. Continue the purge and attach the new permit to the current Containment Purge checklist.

C. Stop the containment purge, leak test the purge valves and start a new containment purge.

D. Continue the purge, perform a new Containment Purge Checklist and test the radiation monitors.

Proposed Answer: D

Explanation: Answer A is incorrect as you do not want to stop the purge while moving fuel in Mode 6. Answer B is incorrect as you are required to do a new checklist and test the rad. Monitors when a new permit arrives. Answer C is incorrect as stopping the purge is not desired. Answer D is correct and is the action taken per the procedure.

Technical Reference(s): OP H-4:1 Attachment 9.3 Rev. 30

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
- 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.

Proposed Question: 73

A liquid Radwaste release of a Laundry and Hot Shower tank is in progress when radiation monitor RE-18, Liquid Radwaste Discharge monitor, high alarm actuates. Which of the following should the Unit 1 operator do?

A. If the radiation level spiked and has decreased, reset the alarm.

B. Report that the monitor is inoperable as it has no reason to alarm at present.

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.

Proposed 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 as a Laundry tank can cause a high alarm just as any other release point can. Answer C is incorrect although this may happen later in the investigation. Answer D is the correct action to take.

Technical Reference(s): OP G-1:II step 6.17 rev. 34

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.

Proposed Question: 74

Following a control room evacuation the crew determines that the auxiliary spray valve will need to be used to establish RCS pressure control. An operator is dispatched to containment to align the Auxiliary Spray valve. Which of the following will occur?

A. The operator will manually open and close CVCS-8145, Aux. Spray valve to control RCS pressure as directed by the Control Operator.

B. The operator will install air jumpers on CVCS-8145, 8146 and 8147 to align charging for Aux. Spray and then cycle CVCS-8145 to control pressure.

C. The operator will install air jumpers on CVCS-8145, 8146 and 8147 to align charging for Aux. Spray and then the Control Operator will operate spray valves as needed for pressure control.

D. The operator will install air jumpers on CVCS-8145 and HCV-142, Charging header back-pressure control valve to permit the Control Operator will regulate charging line and seal flow as needed for pressure control.

Proposed Answer: C

Explanation: Answer A is incorrect as opening and closing 8145 will not affect pressure unless the normal charging line is isolated and the spray valves are closed; and 8145 does not have a manual control. Answer B is incorrect as the operator in containment is to align the system and then the Control Operator at the HSDP will cycle spray valves to maintain pressure control as the HSDP has then necessary instruments and controls to do the job. Answer C is correct; the operator in containment is to align the system using jumpers and is not there to do the actual pressure control. Answer D is incorrect for the same reason as A.

Technical Reference(s): OP AP-8A Appendix E Rev 21

Proposed references to be provided to applicants during examination: OP AP-8A Appendix E Rev 21

Learning Objective: 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 ____
- Comprehension or Analysis X

Comments: OPEN REFERENCE

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.

Proposed Question: 75

Following a control room evacuation, control is established at the Hot Shutdown Panel. Steam Generator level has increased to the narrow range equivalent of 45% on S/G 1 and is still below 6% narrow range on the other S/Gs. The decision is made to place the S/G level control valves, LCV-110, 111, 115 and 113 in manual to control S/G levels. What must the operator monitor closely after shifting level control to manual?

A. Flow may spike to greater than 435 gpm on the AFW pump discharge causing runout.

B. The LCV control will be erratic using the manual control causing wide swings in AFW flow.

C. The AFW pump runout protection is now up to the operator due to manual control.

D. If the AFW pump trips, the LCVs will have to be returned to automatic prior to a pump start.

Proposed Answer: C

Explanation: Answer A may be true but runout does not occur until flow exceeds 490 gpm. Answer B could be a true statement as these controls are rarely used but is not a concern of the procedure. Answer C is true as the runout protection afforded by the LCV automatic control is lost. Answer D is incorrect and is not addressed by the procedure.

Technical Reference(s): OP AP-8A step 20 notes rev. 21

Proposed references to be provided to applicants during examination: None

Learning Objective: 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.

Proposed 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, spurious annunciator, PK04-14, "Reactor Trip Actuated" goes into alarm (red). The reactor trip breakers both indicate closed. There are no other annunciators in alarm nor any quickly identifiable adverse values or trends. Which of the following applies?

A. The SFM must always direct that a manual reactor trip be performed, regardless of plant conditions.

B. No action may be taken until the annunciator procedure, AR PK04-14, is reviewed.

C. The SFM shall first confer with the Shift Manager anytime a potential ATWS situation occurs.

D. The SFM shall decide, based on plant indications, whether or not to trip the reactor.

Proposed Answer: D

Explanation: A is incorrect since there is no requirement to trip the reactor if an RPS setpoint is not exceeded or being rapidly approached. B is incorrect since there is no requirement to review the AR, although in this case it might be appropriate. C is incorrect since time constraints may not allow a conference with the SM before making a decision whether or not to trip the reactor. D is correct. It is ultimately the sound operational judgment of the SFM that will be the basis for whether or not to trip.

Technical Reference(s): Ops. Section Policy, B-8, Rev. 1
AR PK04-14 Rev. 8

Proposed references to be provided to applicants during examination: None provided

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.

Proposed Question: 02

The Unit has tripped and Safety Injection has actuated. As the crew completes EOP-E-0 and prepares to transition out of the procedure at step 22, the STA reports the following Critical Safety Functions:

- Subcriticality is green
- Core Cooling is Magenta
- Heat Sink is Red
- Containment is Red
- Integrity was Magenta and is now Green
- Inventory is Yellow

Which of the following procedures should the crew enter?

A. EOP FR-C.2, Response to Degraded Core Cooling.

B. EOP FR-H.1, Response to Loss of Secondary Heat Sink.

C. EOP FR-P.1, Response to Imminent Pressurized Thermal Shock Condition.

D. EOP FR-Z.1, Response to High Containment Pressure.

Proposed Answer: __B___

Explanation: Answer A is incorrect although this status tree is higher than Heat Sink, the Red path trumps the Magenta. Answer B is correct as this is the highest priority Red path condition. Although when the procedure is entered the crew will likely be kicked out due to low RCS pressure. Answer C is incorrect as the condition is clear, no need to go to P.1 and in all likely hood pressure is not a problem. Answer D is incorrect but will probably be the first procedure performed as Heat Sink may not be needed under these conditions.

Technical Reference(s): _EOP F-0 Rev. 13A________

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)

SENIOR REACTOR OPERATOR EXAM

	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.

Proposed 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 single 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

Proposed 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

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.

Proposed 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 W/R 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.

Proposed 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)

SENIOR REACTOR OPERATOR EXAM

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.

Proposed Question: 05

The Unit is in Hot Shutdown making preparations for a reactor startup when a loss of Off-Site Power occurs de-energizing both the 230 KV and 500 KV feeds. Only DG 1-1 starts up and energizes its bus. Shortly after the Diesel Generator energizes the H Bus, 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.

Proposed Answer: __D___

Explanation: Answer A is incorrect as now you have a loss of all AC power and the EOP takes precedence. It was the procedure to be in when the event first started. Answer B is incorrect although it would have been a procedure in use when the DG failed; it is no longer the procedure to be involved with. 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.

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.

Proposed Question: 06

125 VDC bus, SD11 was declared inoperable per Technical Specifications due to degraded voltage. The battery charger is suspected of producing insufficient voltage to provide for all the loads on the DC bus and to maintain normal charge on the battery. One hour later, bus SD11 charger has been replaced with a spare and the charger is set to "float." Within the next 30 minutes, battery voltage on SD11 is above the minimum required by Tech. Specs., thus satisfying the 2 hour action.

There is concern that the battery may have been damaged, so the 12 hour LCO action for battery and charger operability is not closed. What is the requirement for charger current to declare the battery operable and what is the basis for this requirement?

A. Charger float current must be ≥ 2 amps to ensure that the batteries are properly exercised.

B. Charger float current must be ≤ 2 amps to ensure that the battery is sufficiently charged.

C. Charger float current must be = 0 amps indicating that the charger is "carrying" the bus.

D. With the charger off, the battery carries the bus for 4 hours while maintaining minimum volts.

Proposed Answer: __B___

Explanation: A is incorrect as a high current (after 12 hours) may indicate that the battery is not holding sufficient charge. B is correct. C is incorrect. On a parallel float, there should be some current flow. D is wrong as the battery rating is 2 hours.

Technical Reference(s): _T/S 3.8.4 and bases;________________________

Proposed references to be provided to applicants during examination: _T/S 3.8.4_______

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.

Proposed Question: 07

The control room crew is performing a normal power reduction from 100% to 50% for Main Feedwater Pump maintenance. With Rod Control in automatic, annunciator PK03-25, RX ALM AXIAL FLUX/ROD POS actuates. The Reactor Operator reports that 2 Control Bank D (CBD) rods on Digital Rod Position Indication (DRPI) indicate 222 steps and CBD demand counters indicate 208 steps. The Reactor Operator places Rod Control in Manual and rod motion stops. Rod Control Urgent Failure alarm (PK03-17) is clear. What action(s) should the crew take at this time?

A. Maintain current power and perform a core flux map within one hour using the movable in-core detectors.

B. Continue load reduction to 50% power using boration only, and evaluate DRPI and demand counters for failures.

C. Within one hour, perform a shutdown margin calculation and commence a 6-hour plant shutdown to mode 3.

D. Trip the reactor and initiate emergency boration while performing E-0, Reactor Trip or Safety Injection.

Proposed Answer: C

Explanation: Selection A is incorrect since the plant is required to shutdown to mode 3 and a core flux map is not required. B is incorrect for the same reasons. C is correct. Tech Spec action 3.1.4.D specifically addresses multiple misaligned rods (DRPI vs. Demand) and requires SDM calc. w/i 1 hour and S/D to mode 3 in 6 hours. D is incorrect since a trip is not required.

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 #	_____	
	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

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): Adherence to the appropriate procedures and operation within the limitations in the facility's license and amendments.

Proposed Question: 08

A reactor trip and safety injection occurred with the plant at power. The crew has just entered EOP E-1.2, Post LOCA Cooldown and Depressurization, when the BOP operator reports that S/G "1-1" pressure is 1125 psig and slowly rising (Heat Sink Critical Safety Function (CSF) yellow-path condition). Water level in S/G "1-1" is 93% and slowly rising (also a CSF Heat Sink yellow path condition). All other CSF status trees are satisfied. How should the crew proceed?

A. Enter and perform EOP FR-H.2, Response to Steam Generator Overpressure, in its entirety. Upon completion of FR-H.2, enter and perform all of EOP FR-H.3, Response to Steam Generator High Level.

B. Enter EOP FR-H.2, Response to Steam Generator Overpressure, at the discretion of the SFM, however, once entered, the procedure must be performed to completion unless a red or magenta path condition occurs on another CSF status tree.

C. Enter EOP FR-H.2, Response to Steam Generator Overpressure, at the discretion of the SFM; there is a transition to EOP FR-H.3, Response to Steam Generator High Level which may help to lower SG "1-1" level and thus reduce pressure.

D. Do not enter either EOP FR-H.2, Response to Steam Generator Overpressure or EOP FR-H.3, Response to Steam Generator High Level. Since there has been a transition to a recovery guideline (EOP E-1.2), CSF status trees are monitored for information only.

Proposed Answer: C

Explanation: A and B are incorrect since there is no requirement to perform a yellow path FR procedure in its entirety. C is correct. D is incorrect since the only time CSFSTs are monitored for info only is during loss of all vital AC power (ECA-0.0).

Technical Reference(s): EOP F-0, Critical Safety Function Status Trees, Rev. 13A
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.

Proposed Question: 09

What is the minimum collection of water volumes, which if completely discharged or drained into containment, would result in containment flood level being exceeded (CNMT critical safety function for flooding – magenta path)?

A. RCS, RWST

B. RCS, RWST, SI Accumulators

C. RCS, RWST, SI Accumulators, CST

D. RCS, RWST, SI Accumulators, CST, CCW system

Proposed Answer: D

Explanation: CNMT flood level is based on a complete discharge of the systems associated with and designed to mitigate an RCS LOCA concurrent with a faulted SG. Therefore, it would take an additional source dumping into CNMT such as Fire Water or CCW to result in important safety equipment being compromised by high water level, which if it occurred would be a magenta path CSF response.. Therefore D is correct. A, B, & C are incorrect since every source in answer C plus something else is required for CNMT flooding to occur.

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.

Proposed 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.

Proposed 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:
Comments: 10 CFR 55.43 (b) item #5

Examination Outline Cross-reference:	Level	RO	SRO
	Tier #	____	2
	Group #	____	1
	K/A #		003 A2.04
	Importance rating	______	2.8

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: Effects of fluctuation of VCT pressure on RCP seal leakoff flows.

Proposed Question: 11

The plant is at normal operating pressure when RCP 1-3, #1 seal leakoff flow suddenly goes to 0 gpm even though the seal return valve, 8141C and the CNMT isolation valves for the seal return header, 8112 & 8100 are all open. Over the next several minutes, VCT level begins to decrease slowly, however auto makeup is maintaining the control band for VCT level. RCDT level is slowly increasing and the following alarm actuates:

PK05-03 for RCP SEAL WTR STANDPIPE LVL HI, and RCP SEAL NO. 2 LKOFF FLO HI

What has failed? What is the status of RCS leakage? What control action will affect RCS leakage?

A. #2 seal on RCP 1-3 has failed; the #1 seal leakage (≈5 gpm) is classified as identified leakage which is within the Tech. Spec. limit of 10 gpm. Lowering VCT pressure may reduce leakage.

B. #3 seal on RCP 1-3 has failed; the #2 seal leakage (≈5 gpm) is classified as identified leakage which is within the Tech. Spec. limit of 10 gpm. Lowering standpipe level may reduce leakage.

C. #2 seal on RCP 1-3 has failed; the #1 seal leakage (≈5 gpm) is classified as identified leakage which is above the Tech. Spec. limit of 1 gpm. Lowering VCT pressure may reduce leakage.

D. #2 seal on RCP 1-3 has failed; the #1 seal leakage (≈5 gpm) is classified as identified leakage which is within the Tech. Spec. limit of 1 gpm. Raising VCT pressure may reduce leakage.

Proposed Answer: ___A____

Explanation: A is correct as these are classic symptoms of a #2 seal failure. T/S leakage limits are not violated and the plant may keep operating (until the #1 seal were to fail). Lowering VCT pressure reduces the dP across the #2 seal and may reduce flow through the #2, however, lower VCT pressure could promote higher #1 seal leakage.

Technical Reference(s): Unit 1 & 2 OP AP-28, Rev. 4, Section C
OP A-6:1, Rev. 36, page 14 (RCP seal LO vs. #1 seal dP)

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 # _________

SENIOR REACTOR OPERATOR EXAM

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

Proposed 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 plan 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 condition?

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, will improve PRT conditions.

C. The PRT disk will definitely rupture; assemble a team to enter CNMT and replace the rupture disk once it ruptures.

D. Block/isolate the PZR PORVs to prevent adding more inventory to the PRT; drain the PRT to the RCDT when directed by E-1.1.

Proposed 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. A ruptured PRT may create unknown radiological hazards. There is no advantage to replacing the disk early. 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___________

SENIOR REACTOR OPERATOR EXAM

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.

Proposed 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, an I & C technician inadvertently shorts out the control power on the other IR channel (N36). What Technical Specification required actions, if any, 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 immediately commence a shutdown to below P-6 power where the IR operability requirements no longer apply.

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.

Proposed 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, 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 Tabs 3.0 & 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

SENIOR REACTOR OPERATOR EXAM

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.

Proposed Question: 14

A single vital DC bus battery cell will be replaced with an identical battery cell due to a crack in the casing. Neither the DC bus nor battery feed to the uninterruptible power supply (UPS) will need to be taken out of service. Work instructions have been prepared and an independent verification will be required during the cell replacement. What is the least restrictive work maintenance process that is permitted to be used for this task?

A. Tool pouch work – minor maintenance

B. Action Request – minor maintenance

C. Minor Maintenance Work Order

D. Full Scope Work Order

Proposed Answer: D

Explanation: A, B, and C are incorrect since they are all classified as minor maintenance, although they are plausible since the replacement battery is identical. Station administrative guidelines require a full scope work order if work instructions are used or independent verifications are required. Therefore D is the correct answer.

Technical Reference(s): AD7.DC8, Rev. 25, page 7, 18, & 75

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.

Proposed 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 positions would apply if emergency diesel generator (EDG) 1-1 were to be declared inoperable?

A. No impact since SIP 1-1 is on the same bus that could be powered by EDG 1-1.

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 EDG 1-1 is made operable during that time.

Proposed Answer: D

Explanation: A is incorrect since SIP 1-1 is on bus F and EDG 1-1 supplies bus H. 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.

Proposed Question: 16

Unit 1 is performing a reactor startup. Control Bank D (CBD) rods are being withdrawn and current CBD position is 60 steps which is 40 steps below the expected critical rod height of 100 steps on CBD. Subcritical source range count rate has just been established and 1/M plot predicts criticality at 100 steps on CBD. The Reactor Operator commences a 20 step withdrawal and receives indications of control rod misalignment. The RO stops the rod withdrawal and reports that two control bank D rods have failed to move and indicate 14 steps below the rest of the bank.

Which of the following procedures (actions) is the crew required to perform?

A. Stabilize the reactor at current subcritical conditions and have I & C investigate.

B. Open the lift coil disconnects on the two stuck rods and realign the bank.

C. Fully insert all control bank rods and refer to OP L-5 if mode 5 entry will be required.

D. Trip the reactor and proceed to EOP E-0, Reactor Trip or Safety Injection.

Proposed Answer: C

Explanation: Answer A is not addressed by procedure but would seem to be a reasonable thing to do, if allowed. Answer B is incorrect as the OP AP-12B requires all control bank rods to be inserted. Answer C is correct per the AOP, a trip is not required under these conditions. Answer D is not correct as the reactor can be safely shutdown and does not need to be tripped.

Technical Reference(s): OP AP-12B step 3 rev. 12
OP L2 rev. 37

Proposed references to be provided to applicants during examination: None

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: 10 CFR 55.43 (b) item #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.

Proposed Question: 17

Unit power is being reduced due to a confirmed tube leak in the condenser. At what minimum level of Condensate Cation Activity will the SRO decide to take the unit off line to Mode 2 at a ramp rate in excess of 25 MW/min?

A. When conductivity exceeds 4.0 μS/cm.

B. When conductivity exceeds 15.0 μS/cm

C. When conductivity exceeds 150 μS/cm.

D. When conductivity exceeds 200 μS/cm.

Proposed Answer: __C____

Explanation: Answer A is incorrect as it requires a load reduction to 50% at 5 MW/min with a return to full power. Answer B is incorrect as it requires a load reduction to 50% at 25 MW/min but may require further load reduction to Mode 2 at 50 MW/min if cleanup is unsuccessful. Answer C is correct. Answer D is incorrect and requires a load reduction to Mode 2 at 100 MW/min.

Technical Reference(s): _OP AP-20 Attachment 4.1 Rev. 11___

Proposed references to be provided to applicants during examination: _OP AP-20_____

Learning Objective: _LPA-20 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: 10 CFR 55.43 (b) item #5 OPEN REFERENCE

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.

Proposed Question: 18

Equipment Control Guidelines (ECGs) limit the total quantity of radioactive gas to 10^5 curies (Ci) in any single Gas Decay Tank (GDT). What is the basis for limiting the activity contained in a single GDT

A. If there is an uncontrolled release of the tank's contents, an individual at the site boundary would receive a whole body dose less than 0.5 rems.

B. If there is an uncontrolled release of the tank's contents, an individual at the site boundary would receive a whole body dose less than 25 rems or a thyroid dose less than 300 rems.

C. Maintains offsite source terms within 10CFR limits for a loss of GDT integrity concurrent with a DBA event.

D. Limits the background radiation at the plant site, especially in rooms or buildings that house the Gas Decay Tanks.

Proposed Answer: A

Explanation: Answer A is correct and is found in the ECG bases for GDT activity limit. B is incorrect and is the site boundary limit for a DBA event, C is incorrect and is not considered for the source term calculation (don't expect a DBA event concurrent with a GDT rupture). D is incorrect. Even though it might be a practical benefit of restricting GDT activity, it is not mentioned in the ECG bases.

Technical Reference(s): ECG 24.3 and bases

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 #1 & 4

SENIOR REACTOR OPERATOR EXAM

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.

Proposed Question: 19

Unit 1 is responding to an emergency event and is currently in the EOP network. The SFM directs an action to be taken that is contrary to the EOP presently in use, but this action may significantly reduce offsite radiation dose. Who, if anyone, must concur with this action before it is taken?

A. Shift Manager if available, otherwise a licensed SRO

B. Operations Manager

C. Emergency Plan Site Emergency Coordinator

D. No one; as a licensed SRO the SFM has the authority to direct such an action.

Proposed Answer: A

Explanation: A is correct and is consistent with 10CFR50.54(x) & (y). B is incorrect – Ops. Manager may not be on site. C is incorrect since the individual may be in transit and may not be a licensed SRO. D is incorrect since the SM or other SRO must concur.

Technical Reference(s): OP1.DC10, Rev. 11A

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.

Proposed Question: 20

The plant has been at steady-state 100% power for 7 days. Chemistry has just provided the following Steam Generator sample analytical results:

- Dose Equivalent Iodine (DEI)-131 = 0.015 μCi/gm.
- Sulfate concentration = 12 ppb
- Chlorides = 76 ppb
- Sodium = 26 ppb

Which of the following actions, if any, should the crew take?

A. Place the unit in Mode 3 within 6 hours, based on secondary activity.

B. Place the unit in Mode 3 within 6 hours, based on secondary chemistry parameters.

C. Reduce power to 30% within the next 8 hours based on sodium and chloride concentrations.

D. Restore chemistry parameters within 24 hours, or reduce power within the following 8 hours.

Proposed Answer: __C__

Explanation: Answer A is incorrect as the Tech Spec DEI limit is 0.10 μCi/gm. Answer B is incorrect. There are no tech Spec or ECGs which address secondary chemistry parameters. Per OP F-5:II, due to [Na] & [Cl_2] the unit is in Action Level 2 which requires a power reduction to 30% w/i the next 8 hours. (Answer C is correct). Answer D is incorrect as this is the response for Action Level 1

Technical Reference(s): _T/S 3.7.18, OP F-5:II, Rev. 33

Proposed references to be provided to applicants during examination: __T/S Section 3.7 & OP F-5:II

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 #	2.2.29	
	Importance rating	____	3.8

Equipment Control: Knowledge of SRO fuel handling responsibilities.

Proposed Question: 21

Which of the following individuals is responsible to delegate supervisory responsibilities in the Fuel Handling Building during refueling?

A. The Senior power production engineer (operations)

B. The on duty unit Shift Foreman.

C. The Refueling SRO.

D. The Shift Manager.

Proposed Answer: C

Explanation: Answer A is incorrect as this individual is available for procedural guidance only. Answer B would seem a likely candidate but is not charged with this task. Answer C is correct. Answer D would seem a likely candidate but is not charged with this task.

Technical Reference(s): OP B-8SDS1 rev. 36 step 3

Proposed references to be provided to applicants during examination: None

Learning Objective: None provided. (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 #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.

Proposed 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 and they wear respirators with a protection factor (PF) of 20.

Proposed 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. Since contamination is fixed, respirator will have no effect.

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

SENIOR REACTOR OPERATOR EXAM

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).

Proposed Question: 23

A liquid waste release was in progress when a high alarm actuated on monitor RE-18. RCV-18, Liquid Waste Release Discharge valve, received an auto-close signal but failed to fully close. An operator at the valve was able to fully close RCV-18. What action is required in response to this event?

A. The SFM shall initiate an AR as this is a 10 CFR 50, 8 hour reportable event.

B. The SFM shall initiate an AR as this is a 10 CFR 50, 30 day reportable event.

C. The SFM shall notify the Shift Manager; this event is classifiable as an NUE.

D. The SFM shall notify the Shift Manager; this event is classifiable as an Alert for an unmonitored release.

Proposed Answer: C

Explanation: Answers A and B are incorrect as this event is both reportable and an E-Plan notification of Unusual Event. Answer C is correct as an E-Plan NUE is required by EP G-1. Answer D is incorrect since the event would not be classified as an alert..

Technical Reference(s): OP G-1:II step 6.18 rev. 34; 10CFR50.72; EP G-1, Rev 35, Attach. 7.1 (item IV) page 7; XI1.ID2, Rev 24, Attach. 8.5

Proposed references to be provided to applicants during examination: OPG-1, ; XI1.ID2

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 #1

SENIOR REACTOR OPERATOR EXAM

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.

Proposed Question: 24

The plant 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, could 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.

Proposed 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.

Proposed 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 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.

Proposed 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