Facility: Hope Creek

Vendor: GE

Exam Date: 2018

Exam Type: RO

| Examination Outline Cross-reference: | Level | RO | SRO |
|---|---|---|---|
| | Tier # | 2 | |
| | Group # | 1 | |
| | K/A # | 218000 K1.01 | |
| | Importance Rating | 4.0 | 4.1 |

K/A Statement: Knowledge of the physical connections and/or cause- effect relationships between AUTOMATIC DEPRESSURIZATION SYSTEM and the following: RHR/LPCI: Plant-Specific

Question: RO #1

Given:

T= 0 seconds:

- Drywell pressure 3.0 psig.
- Reactor water level -135 inches.
- ADS has NOT been inhibited.

T= 210 seconds: (The above parameters have NOT changed in this time frame)

- The Plant Operator secures all the ECCS pumps.

Which of the following describes the response of ADS?

A. ADS blowdown stops, but will resume when the 105 second timer times out.

B. ADS blowdown continues.

C. ADS blowdown stops, but will resume when the 5 minute timer times out.

D. ADS blowdown stops.

Proposed Answer: B

Explanation (Optional): See attached HC.OP-SO.SN-0001 Section 3.3.1

A: **Incorrect-** Continues. **Stopping ECCS will not close the ADS valves**

B: **Correct-** ADS blowdown continues. After 105 second ADS initiates. **Stopping ECCS will not close the ADS valves** once the ADS logic is initiated. The only way to close the valves with initiation signals still present is to press the LOGIC INIT RESET PBs. These buttons are NOT depressed in this situation. ADS(see attached)

C: **Incorrect-** Continues. **Stopping ECCS will not close the ADS valves**

D: **incorrect-** Continues. **Stopping ECCS will not close the ADS valves**

Technical Reference(s): HC.OP-SO.SN-0001 (3.3.1) (Attach if not previously provided)

NUCLEAR PRESSURE RELIEF
AND AUTOMATIC
DEPRESSURIZATION

Proposed References to be provided to applicants during examination: none

Learning Objective: From memory, list/identify the five (5) signals (including setpoints) which will cause the Automatic Depressurization System to automatically initiate.

Question Source: Bank #70491

Modified Bank # (Note changes or attach parent)

New

Question History:

Question Cognitive Level: Memory or Fundamental Knowledge

10 CFR Part 55 Content: 55.41 (7)

Comments:

Facility: Hope Creek

Vendor: GE

Exam Date: 2018

Exam Type: RO

Examination Outline Cross-reference:

| Level | RO | SRO |
|---|---|---|
| Tier # | 2 | |
| Group # | 1 | |
| K/A # | 239002 K1.04 | |
| Importance Rating | 3.6 | 3.7 |

K/A Statement: Knowledge of the physical connections and/or cause- effect relationships between RELIEF/SAFETY VALVES and the following: Main steam

Question: RO #2

Given:

- The Plant is at 100% rated power.

Then:

A SRV fails full open:

- The operators are monitoring the main steam line flow indicators (FI-R603A-D).
- OHA C1-A3 ADS/SAFETY RELIEF VLV NOT CLOSED is in alarm.
- HC.OP-AB.RPV-0006, "Safety Relief Valve" abnormal has been entered, but NO operator actions have been taken.

Which of the following describes the indicated steam flow response (FI-R603A-D) with the open Safety Relief Valve (SRV) and the reason for that response?

A. Indicated steam flow will remain steady, because SRV steam flow is seen as additional steam flow over what is going to the main turbine.

B. Indicated steam flow goes up, because the Turbine Control Valves and Intercept Valves throttle open to maintain a steady MWe output.

C. Indicated steam flow goes down, because the SRV steam flow is not monitored by the main steam system flow detectors.

D. Indicated steam flow will remain steady, because the Turbine Control Valves throttle closed to maintain a steady reactor pressure.

Proposed Answer: **C**

Explanation (Optional):

A: **Incorrect-** When the SRV open, steam which would have gone down the steam lines through the flow venturies, to the turbine is routed to the torus. Since it does not flow past the flow venturies, it is not monitored. Steam flow indication would change.

B: **Incorrect-** The intercept valves will not throttle for pressure control and the TCV's do not control reactor power by throttling, but rather reactor pressure.

C: **Correct-** When the SRV open, steam which would have gone down the steam lines through the flow venturies, to the turbine is routed to the torus. Since it does not flow past the flow venturies, it is not monitored.

D: **Incorrect-** TCV will throttle to maintain reactor pressure which would change steam flow indication.

Technical Reference(s): HC.OP-AB.RPV-0006

SAFETY RELIEF VALVE

NOH01MSTEAMC- Main Steam lesson plan

Proposed References to be provided to applicants during examination: None

Learning Objective: Concerning the safety relief valves; summarize, list or identify the following.
The number and type of SRV's at Hope Creek.
Which SRV's have an ADS function.
Power supplies to the SRV solenoids.
Which SRV's can be operated remotely and the location from which each of these valves can be operated.
Purpose of the low-low set function and determine which SRV's are used for this function.
Determine the sequence of operation of the low-low set SRV's including arming setpoints, lift points and reclose setpoints.
**The indications in the control room that determine if an SRV is open.**

Question Source: Bank #

Modified Bank #

New X

Question History:

Question Cognitive Level: Analysis

10 CFR Part 55 Content: 55.41 (10)

Comments:

| | |
|---|---|
| Facility: | Hope Creek |
| Vendor: | GE |
| Exam Date: | 2018 |
| Exam Type: | RO |

| Examination Outline Cross-reference: | Level | RO | SRO |
|---|---|---|---|
| | Tier # | 2 | |
| | Group # | 1 | |
| | K/A # | 206000 K2.04 | |
| | Importance Rating | 2.5 | 2.7 |

K/A Statement: Knowledge of electrical power supplies to the following: Turbine control circuits: HPCI BWR-2,3,4

Question: RO #3

HPCI is unavailable for manual or automatic initiation with __________ unavailable?

A. 125 VDC 10D410

B. 125 VDC 10D420

C. 120 VAC 1AD482

D. 120 VAC 1CD482

Proposed Answer: A

Explanation (Optional): HPCI would NOT initiate. The Initiation Logic will NOT seal-in, and HPCI is unavailable for manual or automatic initiation until 10D410 is restored. (see attached print E-0009 sheet 1)

A: **Correct:** 125 VDC is required for the logic circuits and control power to HPCI valves, therefore HPCI will not initiate.

B: **Incorrect:** 125 VDC 'B' channel RCIC logic circuits

C: Incorrect: 120 VAC inverter 1AD482 Division 1 components of HPCI, RHR and Core Spray will lose status indication only. All Manual and **Automatic Signals remain functional**.

D: Incorrect: 120 VAC inverter 1CD482 Division 3 components of HPCI, RHR and Core Spray will lose status indication only. All Manual and **Automatic Signals remain functional.**

Technical Reference(s): E-0009 sheet 1 (Attach if not previously provided)

1E 125 VDC Channel A

HC.OP-SO.PK-0001 Power Distribution Attachment 2

HC.OP-AB.ZZ-0136 Loss of 120 VAC Inverter

Proposed References to be provided to applicants during examination: none

Learning Objective: Given plant conditions, determine the HPCI System response to any of the following: (As available)
Low CST level (HPCI in operation)
High Suppression Pool level (HPCI in operation)
Loss of 250 VDC
Loss of 480 VAC
Loss of 125 VDC

Question Source: Bank #

Modified Bank # (Note changes or attach parent)

New X

Question History:

Question Cognitive Level:

Memory or Fundamental Knowledge

10 CFR Part 55 Content: 55.41 (7)

Comments:

Facility: Hope Creek

Vendor: GE

Exam Date: 2018

Exam Type: RO

Examination Outline Cross-reference:

| Level | RO | SRO |
|---|---|---|
| Tier # | 2 | |
| Group # | 1 | |
| K/A # | 203000 K2.03 | |
| Importance Rating | 2.7 | 2.9 |

K/A Statement: Knowledge of electrical power supplies to the following: Initiation logic: RHR/LPCI: Injection Mode

Question: RO #4

Given:

- The plant is operating at 100% rated power.

Then:

- A high drywell pressure condition where drywell pressure rises to 2.0 psig.

A Loss of power to which of the following will prevent initiation of RHR Pump 'A' in the injection mode?

A. 120 VAC 1AD482

B. 125 VDC 1AD417

C. 125 VDC 1AD318

D. 120 VAC 1AD483

Proposed Answer: B

Explanation (Optional): 125 VDC 1E Distribution - provides logic power to RHR System actuation logics and breaker control power to associated pump and valve motor breakers. Without Logic power the system **will not respond to an initiation signal.** Div 1 - 1AD417, Div 2 - 1BD417, Div 3 - 1CD417, Div 4 - 1DD417.

A: **Incorrect-** 125 VDC for control power to pump and valve breakers not 120 VAC. The loss of 1AD482 would cause the following: Division 1 components of HPCI, **RHR** and Core Spray will lose status indication only. All Manual and **Automatic Signals remain functional.**

B: **Correct-** See above explanation and the attached drawing.

C: **Incorrect-** AD318 is 125VDC NON-1E Distribution for breaker control power of Balance Of Plant equipment.

D: **Incorrect-** 125 VDC for control power to pump and valve breakers not 120 VAC. The loss of 1AD483 would cause the following: Loss of "A" RFPT Woodward Speed Controller resulting in "A" RFPT trip. No effect on the RHR system.

Technical Reference(s): NOH01RHRSYSC RHR lesson plan (Attach if not previously provided)

HC.OP-SO.BC-0001 Initiation Logic drawing

HC.OP-AB.ZZ-0136 Loss of 120 VAC Inverter

Proposed References to be provided to applicants during examination: none

Learning Objective: Given a system which physically connects to or is required to support the operation of the RHR System or components therein, explain the function of the supporting system. (As available)

Question Source: Bank #

Modified Bank # (Note changes or attach parent)

New X

Question History:

Question Cognitive Level: Memory or Fundamental Knowledge

10 CFR Part 55 Content: 55.41 (7)

**Comments:** Question matches K/A because 125 VDC 1E Distribution - provides logic power to RHR System actuation logics and breaker control power to associated pump and valve motor breakers. Without Logic power the system will not respond to an initiation signal.

Facility: Hope Creek

Vendor: GE

Exam Date: 2018

Exam Type: RO

| Examination Outline Cross-reference: | Level | RO | SRO |
|---|---|---|---|
| | Tier # | 2 | |
| | Group # | 1 | |
| | K/A # | 261000 K4.01 | |
| | Importance Rating | 3.7 | 3.8 |

K/A Statement: Knowledge of STANDBY GAS TREATMENT SYSTEM design feature(s) and/or interlocks which provide for the following: Automatic system initiation.

Question: RO #5

Given:

- Refuel operations are in progress.
- All RBVS and RBVE fans are running.
- FRVS is in a normal standby configuration.

Then:

- A radiological incident on the Refuel Floor causes Refuel Floor Exhaust Radiation to exceed $3x10^{-3}$ µCi/cc.

T= 1 minute

Assuming NO operator actions, what is:

- The total FRVS Recirculation flow?
- The status of the FRVS Vent Fans?

A. 120,000 cfm; One FRVS Vent Fan running.

B. 180,000 cfm; Both FRVS Vent Fans running.

C. 120,000 cfm; Both FRVS Vent Fans running.

D. 180,000 cfm; One FRVS Vent Fan running.

Proposed Answer: D

Explanation (Optional): IAW HC.OP-SO.GU-0001 Interlocks 3.3.1 (see attached)
FRVS Recirculation Fans AV213 through FV213 in AUTO and
FRVS Vent Fan in AUTO LEAD will automatically start under any
of the following conditions: ____
- High Drywell Pressure (1.68 psig).
- Low RPV Water Level (Level 2, - 38").
- **Refueling Floor Exhaust Duct High Radiation (≥ 2x10 -3 micro Ci/cc).**
- Reactor Building Exhaust Air High Radiation (≥ 1x10 -3 micro Ci/cc).

All six FRVS fans **(30,000 cfm/fan)** will automatically start on the high Refuel Floor Exhaust radiation signal. The **FRVS Vent Fan in AUTO LEAD** will automatically start.

The FRVS vent fan selected for Auto Lead operation will auto start on the same signals that start the FRVS recirc fans. 2) The LOCA Sequencers will start the Auto Lead fan 19 seconds after initiation. 3) The vent fan selected for Auto operation will auto start under the following conditions:a) Automatic start signal present as described in 1 and 2 above and b) A low flow condition, (6950 scfm), exists on the Auto Lead fan for more than 45 seconds.

A: **Incorrect-** six recircs and one vent. (180,000 cfm)

B: **Incorrect-** Only one vent. Auto starts on low flow on the Auto lead.

C: **Incorrect-** six recircs and one vent. (180,000 cfm). Only one vent. Auto starts on low flow on the Auto lead

D: **Correct-**. See above explanation

Technical Reference(s): HC.OP-SO.GU-0001 Interlocks 3.3.1 (Attach if not previously provided)

Proposed References to be provided to applicants during examination: none

Learning Objective: Concerning the Filtration Recirculation Ventilation System (FRVS): Distinguish between the automatic starts and stops associated with the FRVS Vent and Recirc Fans (As available)

Question Source: Bank #151608

Modified Bank # (Note changes or attach parent)

New

Question History: NRC 2010

Question Cognitive Level: Memory

10 CFR Part 55 Content: 55.41 (7)

Comments:

Facility: Hope Creek

Vendor: GE

Exam Date: 2018

Exam Type: RO

| Examination Outline Cross-reference: | Level | RO | | SRO |
|---|---|---|---|---|
| | Tier # | 2 | | |
| | Group # | 1 | | |
| | K/A # | 259002 | K3.02 | |
| | Importance Rating | 3.7 | | 3.7 |

K/A Statement: Knowledge of the effect that a loss or malfunction of the REACTOR WATER LEVEL CONTROL SYSTEM will have on following: Reactor feedwater system

Question: RO #6

Given:

- The Reactor is operating at 100% rated power.

Then:

- A transient occurs causing a valid high pressure RRCS Feedwater Pump runback.
- Concurrent with the runback, the "B" Feedwater Pump experiences a control signal failure.

What will be the final status of the Feedwater Pumps (RFP)? (assume NO operator actions)

A. All three RFP will receive a continuous lower speed signal.

B. RFP "A" and "C" will be running at approximately 2500 rpm and RFP "B" will remain at its pre-transient speed.

C. All three RFP will be running at approximately 2500 rpm.

D. RFP "A" and "C" will be running at approximately 2500 rpm and RFP "B" will be running at approximately 650 rpm.

Proposed Answer: **D**

Explanation (Optional):

A: Incorrect- The “B” pump has a control signal failure

B: Incorrect- The “B” pump has a control signal failure.

C: Incorrect- The “B” pump has a control signal failure

D: Correct- A RRCS signal will lower RFP speed to 2500 RPM. If a Control Signal Failure exists at the time of a RRCS Runback, the RFP will receive a continuous lower speed signal.

Technical Reference(s): HC.OP-SO.SA-0001 (Attach if not previously provided)

REDUNDANT REACTIVITY CONTROL SYSTEM OPERATION

NOH04FWCONTC FEEDWATER CONTROL SYSTEM

Proposed References to be provided to applicants during examination: none

Learning Objective: From memory, describe the three possible RFP runback signals including conditions, setpoints and time delays if applicable. (As available)

From memory, describe the response of the respective RFPT if it senses a Control Signal Failure.

Question Source: Bank #33897

Modified Bank # (Note changes or attach parent)

New

Question History:

Question Cognitive Level: Memory or Fundamental Knowledge

10 CFR Part 55 Content: 55.41 (7)

**Comments: A Control Signal Failure is initiated whenever the control signal out of the DFCS downstream of the respective RFP controller goes out of band. For example, the normal signal is 1-5 VDC, if the signals fails somewhere below 1 VDC or goes somewhere above 5 VDC the overhead alarm RFP TURBINE AUTO XFR TO MANUAL will annunciate. Also, the TURB A (B, C) CONT SIG FAIL PUSH TO RESET and the INC SPEED and DEC SPEED lights will illuminate on the RFP Controller.**

***If all three RFPTs are in AUTO and the A RFPT experiences a control signal failure in a way such that the signal increases slowly to a fail high condition, the following will occur:***

**The A RFPT speed will rise, the rate of change will depend on the failure mode (i.e. - signal fails instantaneously or drifts up slowly).**

**Depending on the response of the other two RFPTs, reactor level should rise and a high level alarm (level 7 at 39") may occur.**

**As soon as the A RFPT signal reaches its loss of signal lockup (>5 VDC), the A RFPT will lockup at its last position. The other two RFPTs that are in-service will (if level has risen) lower their flow demand and attempt to maintain level at the original setpoint.**

The reverse is true if the control signal fails low.

| | |
|---|---|
| Facility: | Hope Creek |
| Vendor: | GE |
| Exam Date: | 2018 |
| Exam Type: | RO |

| Examination Outline Cross-reference: | Level | RO | | SRO |
|---|---|---|---|---|
| | Tier # | 2 | | |
| | Group # | 1 | | |
| | K/A # | 212000 | K4.08 | |
| | Importance Rating | 4.2 | | 4.2 |

K/A Statement: Knowledge of REACTOR PROTECTION SYSTEM design feature(s) and/or interlocks which provide for the following: Complete control rod insertion following SCRAM signal generation

Question: RO #7

Given:

- The plant is conducting a startup IAW HC.OP-IO.ZZ-0003, “Startup from Cold Shutdown to Rated Power”.
- Reactor Pressure is at 920 psig on the bypass valves.
- Rod 02-39 is at position 48.
- Rod 02-39 scram pilot solenoid valves are stuck as is (fused).

Then:

- A Neutron Monitoring System full scram signal occurred while ranging IRMs.

How will rod 02-39 respond and what action, if any, will be required to insert the rod?

A. Rod 02-39 will automatically insert when the Backup scram valves vent the scram air header. No action will be required.

B. Rod 02-39 will automatically insert with the ARI initiation. No action will be required.

C. Rod 02-39 will NOT automatically insert. Implementation of EOP-303, individual Control Rod Scrams, will be required to insert the rod.

D. Rod 02-39 will NOT automatically insert. Manual control rod insertion from RMCS will be required to insert the rod.

Proposed Answer: **A**

Explanation (Optional):

A: Correct. Normally, the repositioning of the scram pilot solenoid valves blocks the scram air header supply to the scram inlet and outlet valves and vents the valves to atmosphere. The failure of the scram pilot solenoid valves to reposition leaves the scram inlet and outlet valve diaphragms aligned to the scram air header. The **Backup scram valves** block the supply to the scram air header and vent the header to atmosphere. This will vent pressure off of the scram inlet and outlet valves and rod 02-39 will automatically insert after a brief delay.

B: Incorrect. Although ARI *would* insert the rod, ARI will NOT automatically initiate. A scram from 5% power would not cause level to drop to -38" or pressure to rise to 1071 psig. This is why it is important to identify the scram as coming from a source (NEUTRON MONITORING) that would NOT immediately initiate ARI automatically.

C: Incorrect. The Backup Scram valves will insert the rod. Since the scram pilot solenoids are **already de-energized and stuck**, EOP-303 would NOT be a success path.

D: Incorrect. The Backup Scram valves will insert the rod. Manual control rod insertion will NOT be required.

Technical Reference(s): M-47-1 CRDH (Back-up Scram Valves) (Attach if not previously provided)

HC.OP-SO.SB-0001

Reactor Protection System

NOH01RPS00C Reactor Protection System

Proposed References to be provided to applicants during examination: none

Learning Objective: Given plant conditions, evaluate the response of RPS to an electrical failure. (As available)

Question Source: Bank #62512

Modified Bank # (Note changes or attach parent)

New

Question History:

Question Cognitive Level: Comprehension or Analysis

10 CFR Part 55 Content: 55.41 (7)

Comments:

Facility: Hope Creek

Vendor: GE

Exam Date: 2018

Exam Type: RO

Examination Outline Cross-reference:

| Level | RO | | SRO |
|---|---|---|---|
| Tier # | 2 | | |
| Group # | 1 | | |
| K/A # | 262002 | K4.01 | |
| Importance Rating | 3.1 | | 3.4 |

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

Question: RO #8

Given:

- A refueling outage is in progress.
- 10A401 4kv 1E bus is de-energized for pre-planned maintenance.

The operator places the 1AD481 inverter Manual Bypass Control Switch from "NORM" to the "BYPASS TO ALTERNATE" position.

How will this affect the power supply to the load (1AJ481)?
**[Reference attached]**

A. Normal power 480 VAC will supply power to the load.

B. NO power will be supplied to the load.

C. Alternate power 125 VDC will supply power to the load.

D. Backup power 480 VAC will supply power to the load.

Proposed Answer: **B**

Explanation (Optional):

A: Incorrect- Normal 480 VAC is not available because 10A401 is de-energized and contact 4 is open.

B: Correct- (see attached figure) In **BYPASS to Alternate** the contacts 1, 2, and 5 are closed, however with 10A401 out 10B411-33, Backup 480 for AJ481 is de-energized. No power is available to the AJ-481 loads.

C: Incorrect- . Contact 4 is open no output from the inverter section.

D: Incorrect- 10A401 bus is de-energized which is the source of Back-up AC from 10B411.

Technical Reference(s): HC.OP-SO.PN-0001 (Attach if not previously provided)

120 VAC Electrical Distribution

Proposed References to be provided to applicants during examination: Attachment 5 of HC.OP-SO.PN-0001 (attached)

| | | |
|---|---|---|
| Learning Objective: | From memory, summarize/identify the purpose of the UPS system and the following components:<br>Rectifier Cabinet<br>Static Inverter Cabinet<br>Static Switch Cabinet<br>Given a Drawing of UPS describe the functions of switches, breakers, meters, indicating lights, and alarms<br>Differentiate between the power source interrupted by breakers located on the front panels.<br>Predict the response caused by operating the auctioneer bypass switch.<br>**Predict the response caused by operating the manual bypass switch.**<br>Summarize/identify the systems/components supplied by the Uninterruptible Power Supplies System.<br><br>Analyze the power flowpath for a given 1E UPS inverter and determine the affect on the loads if malfunctions occur. | (As available) |

Question Source: Bank #

Modified Bank # 134954 (Note changes or attach parent)

New

Question History:

Question Cognitive Level: Comprehension or Analysis

10 CFR Part 55 Content: 55.41 (7)

Comments:

Facility: Hope Creek

Vendor: GE

Exam Date: 2018

Exam Type: RO

| Examination Outline Cross-reference: | Level | RO | | SRO |
|---|---|---|---|---|
| | Tier # | 2 | | |
| | Group # | 1 | | |
| | K/A # | 215004 | K5.03 | |
| | Importance Rating | 2.8 | | 2.8 |

K/A Statement: Knowledge of the operational implications of the following concepts as they apply to SOURCE RANGE MONITOR (SRM) SYSTEM : Changing detector position.

Question: RO #9

Given:

- The plant is performing control rod withdrawals for a reactor startup.
- Reactor power is 75 counts per second in the source range.

Which of the following will occur if the "B" Source Range Monitoring detector is selected and it's "Drive Out" pushbutton is pressed and held?

A. The Retract Permit light will be illuminated and the SRM Detector Removal Not Permitted alarm will be received.

B. The SRM detector will NOT withdraw due to the current power level.

C. Control rod withdrawals will NOT be permitted.

D. The SRM Downscale causes a 'B' RPS half-scram.

Proposed Answer: **C**

Explanation (Optional):

A: Incorrect- Detector can be withdrawn (nothing preventing it), will receive the rod block as soon as it is <100 CPS

B: Incorrect- Detector can be withdrawn (nothing preventing it), will receive the rod block as soon as it is <100 CPS

C: Correct- Rod Blocks from the SRM's
* **SRM wrong position with <100 CPS**
* SRM downscale <3 CPS
* SRM upscale >1E105 CPS
* SRM INOP

D: Incorrect- SRM downscale setpoint of 3 cps. Power is at 75 cps. .

Technical Reference(s): HC.OP-SO.SE-0001 (Attach if not previously provided)

Nuclear Instrument System

Proposed References to be provided to applicants during examination: none

Learning Objective: From memory, choose the parameter, setpoint, and bypass conditions for each SRM signal which will initiate a rod block and/or reactor scram (As available)

Question Source: Bank #35855

Modified Bank # (Note changes or attach parent)

New

Question History:

Question Cognitive Level: Memory or Fundamental Knowledge

10 CFR Part 55 Content: 55.41 (7)

Comments:

Facility: Hope Creek

Vendor: GE

Exam Date: 2018

Exam Type: RO

| Examination Outline Cross-reference: | Level | RO | SRO |
|---|---|---|---|
| | Tier # | 2 | |
| | Group # | 1 | |
| | K/A # | 262001 K5.02 | |
| | Importance Rating | 2.6 | 2.9 |

K/A Statement: Knowledge of the operational implications of the following concepts as they apply to A.C. ELECTRICAL DISTRIBUTION: Breaker control.

Question: RO #10

Given:

- The Reactor is at 100% rated power.
- The crew is shifting Class 1E bus 10A403 to the Alternate Feeder Breaker IAW HC.OP-SO.PB-0001, 4.16 KV System Operations.
- The TRIP pushbutton is mistakenly pressed for breaker 52-40301, Normal Feeder Breaker for 10A403 on Control Room panel 10C651E.

Which choice below describes breaker response of the 10A403 Bus and "C" EDG?

A. The Alternate Feed Breaker, 52-40308 does NOT close. The "C" EDG does NOT start.

B. The Alternate Feed Breaker, 52-40308 will close. The "C" EDG does NOT start.

C. The Alternate Feed Breaker, 52-40308 does NOT close. The "C" EDG will start and its output breaker does close.

D. The Alternate Feed Breaker, 52-40308 will close. The "C" EDG will start and its output breaker does NOT close.

Proposed Answer: **A**

Explanation (Optional):

A: **Correct -** The automatic transfer to the alternate feed and the start of the Diesel will not occur if the normal breaker is manually tripped.

B: **Incorrect -"C"** EDG Lockout will prevent the EDG start and output breaker closure. The automatic transfer to the alternate feed will not occur if the normal breaker is manually tripped.

C: **Incorrect -** The automatic start of the Diesel will not occur if the normal breaker is manually tripped. EDG is locked out.

D: **Incorrect -** The automatic start of the Diesel will not occur if the normal breaker is manually opened. EDG is locked out.

Technical Reference(s): HC.OP-SO.PB-0001 (Attach if not previously provided)

4.16 KV System Operation

NOH01EAC00
Class 1E Power Distribution

Proposed References to be provided to applicants during examination: none

Learning Objective: (As available)

Predict the effect of each control switch on the 1E AC Power System. Assess the plant conditions or permissives required for the control switches to perform their intended function.

Given a set of conditions and a drawing of the controls, instrumentation, and/or alarms located in the main control room, assess the status of the 1E AC Power Distribution by evaluation of the controls/instrumentation/alarms

Choose the signals that Auto start the Emergency Diesels or if given plant conditions, evaluate those conditions and determine if the diesels should have Auto started.

Question Source: Bank #

Modified Bank # (Note changes or attach parent)

New X

Question History:

Question Cognitive Level: Comprehension or Analysis

10 CFR Part 55 Content: 55.41 (7)

Comments:

Facility: Hope Creek

Vendor: GE

Exam Date: 2018

Exam Type: RO

Examination Outline Cross-reference:

| Level | RO | SRO |
|---|---|---|
| Tier # | 2 | |
| Group # | 1 | |
| K/A # | 400000 K6.05 | |
| Importance Rating | 2.8 | 2.9 |

K/A Statement: Knowledge of the effect that a loss or malfunction of the following will have on the CCWS: Motors

Question: RO #11

Given:

- The plant is at 100% rated power.
- The “A” loop of SACS is supplying TACS.

Then:

- A motor overload on the “A” SACS pump occurs and the pump trips.
- Assume NO operator action and STACS responds as designed.

Which one the following describes the DESIGNED effect of the pump trip?

A. TACS associated systems will lose cooling flow. “B” loop SACS loads will continue to be supplied with cooling.

B. TACS will automatically swap to the “B” loop of SACS and continue to supply cooling to TACS loads. “B” loop SACS loads will continue to be supplied with cooling.

C. TACS associated systems will lose cooling flow. ALL SACS loads on the “A” loop of SACS will lose their cooling water supply.

D. TACS will automatically swap to the “B” loop of SACS and continue to supply cooling to TACS loads. ALL SACS loads on the “A” loop of SACS will lose their cooling water supply.

Proposed Answer: **B**

Explanation (Optional):

A: Incorrect – TACS will auto swap to the “B” SACS loop.

B: Correct- The ”in-service” loop is the loop supplying TACS. Low flow to TACS from the operating SACS loop (9,000 GPM) will start the opposite loop pumps if in AUTO

C: Incorrect - TACS will auto swap to the “B” SACS loop. There will still be another pump operating in the “A” SACS loop to supply cooling to loads.

D: Incorrect - There will still be another pump operating in the “A” SACS loop to supply cooling to loads.

Technical Reference(s): HC.OP-SO.EG-0001 (Attach if not previously provided)

Safety and Auxiliaries Cooling Water System

HC.OP-AB.COOL-0002
Safety/Turbine Auxiliaries Cooling System

Proposed References to be provided to applicants during examination: none

Learning Objective: Given a set of conditions and/or a drawing of access to the controls, instrumentation and/or alarms located in the Main Control Room; assess the status of the SACS or its components by evaluation of the controls/instrumentation/alarms. (As available)

Question Source: Bank #120347

Modified Bank # (Note changes or attach parent)

New

Question History: NRC 2010

Question Cognitive Level: Comprehension or Analysis

10 CFR Part 55 Content: 55.41 (7)

Comments:

Facility: Hope Creek

Vendor: GE

Exam Date: 2018

Exam Type: RO

| Examination Outline Cross-reference: | Level | RO | | SRO |
|---|---|---|---|---|
| | Tier # | 2 | | |
| | Group # | 1 | | |
| | K/A # | 300000 | K5.01 | |
| | Importance Rating | 2.5 | | 2.5 |

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

Question: RO #12

Given:

- A loss of coolant accident has occurred causing a valid high drywell pressure signal.

Then:

- With the LOCA condition cleared and the Reactor Auxiliaries Cooling System (RACS) restored.

Which of the following describes the availability and the response of the Emergency Instrument Air Compressor (EIAC) should instrument air header pressure begin lowering?

A. The EIAC is NOT available until the LOCA signal is cleared, PCIS reset, and the Non-1E breaker is closed. The EIAC will automatically start on instrument air receiver pressure less than 85 psig.

B. The EIAC is NOT available until the LOCA signal is cleared and the 1E breaker is closed. The EIAC will automatically start on instrument air receiver pressure less than 85 psig.

C. The EIAC is NOT available until the LOCA signal is cleared, PCIS reset, and the 1E breaker is closed. The EIAC will automatically start on instrument air receiver pressure less than 85.

D. The EIAC is NOT available until the LOCA signal is cleared and the Non-1E breaker is closed. The EIAC will automatically start on instrument air receiver pressure less than 85 psig.

Proposed Answer: C

Explanation (Optional): See attached EIAC Interlocks

A: Incorrect- 1E breaker must be closed. The EIAC cycles on and off with the NON-1E breaker.

B: Incorrect- With the LOCA signal cleared PCIS must be Reset.

C: Correct – See attached

D: Incorrect- 1E breaker must be closed and PCIS reset. The EIAC cycles on and off with the NON-1E breaker.

Technical Reference(s): HC.OP-SO.KB-0001 3.3 Interlocks (Attach if not previously provided)

HC.OP-SO.SM-0001 Table SM-019

Proposed References to be provided to applicants during examination: none

Learning Objective: From memory, determine the response of the emergency instrument air compressor to the following conditions. (As available)
Loss of Offsite Power (LOP)
Loss of Coolant Accident (LOCA)

Question Source: Bank #36066

Modified Bank # (Note changes or attach parent)

New

Question History: NRC 2003/2010

Question Cognitive Level: Memory or Fundamental Knowledge

10 CFR Part 55 Content: 55.41 (7)

Comments:

Facility: Hope Creek

Vendor: GE

Exam Date: 2018

Exam Type: RO

Examination Outline Cross-reference:

| Level | RO | SRO |
|---|---|---|
| Tier # | 2 | |
| Group # | 1 | |
| K/A # | 209001 A1.08 | |
| Importance Rating | 3.3 | 3.2 |

K/A Statement: Ability to predict and/or monitor changes in parameters associated with operating the LOW PRESSURE CORE SPRAY SYSTEM controls including: System lineup

Question: RO #13

Given:

- The "B" Core Spray loop is running in the full flow test mode for a scheduled surveillance test.

Then:

- A major leak develops in one loop of the reactor recirculation system.

T= 0 minutes:

- Reactor pressure is at 450 psig and lowering at 5 psig/min.
- Drywell pressure is at 6 psig and rising at .5 psig/min.
- Reactor water level is at -100 inches and lowering at 2 inches/min.
- All Core Spray Pump Motor Amps indicate 80 amps.
- Assume NO operator actions.

T= 1 minute,

How will the "B" Core Spray system be aligned?

A. Inboard Injection valve (F005B) is closed, the Test Bypass valve (F015B) is closed, and the Minimum Flow valve (F031B) is open and returning flow back to the Torus.

B. Inboard Injection valve (F005B) is open and injecting through the Core Spray Spargers, the Test Bypass valve (F015B) is closed, and the Minimum Flow valve (F031B) is closed.

C. Inboard Injection valve (F005B) is open and not injecting, the Test Bypass valve (F015B) is closed, and the Minimum Flow valve (F031B) is open and returning flow back to the Torus.

D. Inboard Injection valve (F005B) is closed, the Test Bypass valve (F015B) is open and returning flow back to the Torus, and the Minimum Flow valve (F031B) is closed.

Proposed Answer: **C**

Explanation (Optional):

A: Incorrect- With given conditions, F005B would be open (<461 psig).

B: Incorrect- With the given conditions, there would be no injection with flow <775 gpm the F031B would be open and directing flow back to the torus. 450 psig is above the shutoff head of a Core Spray pump (approx... 385 psi).

C: Correct- F005B would be open without injection (<461 psig and above shutoff head 385 psi), F015B would receive an Auto Closed signal on the initiation signal, F031B would be open with flow back to the torus (flow <775 gpm).

D: Incorrect- F005B would be open without injection (<461 psig and above shutoff head 385 psi), F015B would receive an Auto Closed signal on the initiation signal, F031B would be open with flow back to the torus (flow <775 gpm).

Technical Reference(s): HC.OP-SO.BE-0001 (Attach if not previously provided)

Core Spray System Operation

NOH01CSSYS0C

Core Spray Lesson Plan

Proposed References to be provided to applicants during examination: none

Learning Objective: (As available)

Summarize/identify the sequence of events following receipt of an automatic or manual Core Spray System initiation signal.

Given a set of conditions and a drawing of the controls, instrumentation and/or alarms located in the Control Room, assess the status of the Core Spray System or its components by evaluation of the controls/instrumentation/alarms.

Question Source: Bank #

Modified Bank # (Note changes or attach parent)

New X

Question History:

Question Cognitive Level: Comprehension or Analysis

10 CFR Part 55 Content: 55.41 (7)

Comments:

Facility: Hope Creek

Vendor: GE

Exam Date: 2018

Exam Type: RO

Examination Outline Cross-reference:

| Level | RO | SRO |
|---|---|---|
| Tier # | 2 | |
| Group # | 1 | |
| K/A # | 264000 A1.03 | |
| Importance Rating | 2.8 | 2.9 |

K/A Statement: Ability to predict and/or monitor changes in parameters associated with operating the EMERGENCY GENERATORS (DIESEL/JET) controls including: Operating voltages, currents, and temperatures.

Question: RO #14

Given:

- "C" Emergency Diesel Generator (EDG) is supplying its vital bus in parallel with offsite power.

Then:

- The PO (plant operator) adjusts EDG governor (DIESEL ENG GOV INCR) pushbutton.
- EDG Auxiliary system pressures and temperatures are stable.
- Assume EDG terminal voltage and bus frequency do not change.

Based on this, EDG KVAR will indicate ________ and D/G amps will indicate ________.

A. higher; no change

B. no change; no change

C. higher; higher

D. no change; higher

Proposed Answer: D

Explanation (Optional):

A: **Incorrect** – governors adjust speed and when the unit is synchronized to the grid it picks up load.

B: **Incorrect** – The voltage regulator has not been changed therefore the VAR loading of the generator has not changed. As the speed of the diesel increases, the diesel picks up load from the grid. The load is watts and since the voltage does not change the change is seen as a rise in amperage.

C: **Incorrect** – governors adjust speed and when the unit is synchronized to the grid it picks up load.

D: **CORRECT** – The voltage regulator has not changed therefore the VAR loading of the generator has not changed. As the voltage and bus frequency did not change the diesel did pick up some real load so amps will have to go up.

Technical Reference(s): HC.OP-SO.KJ-0001 (Attach if not previously provided)

EDG System Operations

Proposed References to be provided to applicants during examination: none

Learning Objective: Given a set of conditions and a drawing of the controls, instrumentation, and/or alarms located in the main control room, determine the status of the Emergency Diesel Generators by evaluation of the controls/instrumentation/alarms in the main control room. (As available)

Question Source: Bank #110707

Modified Bank # (Note changes or attach parent)

New

Question History:

Question Cognitive Level: Memory or Fundamental Knowledge

10 CFR Part 55 Content: 55.41 (7)

Comments:

Facility: Hope Creek

Vendor: GE

Exam Date: 2018

Exam Type: RO

Examination Outline Cross-reference:

| Level | RO | SRO |
|---|---|---|
| Tier # | 2 | |
| Group # | 1 | |
| K/A # | 215003 A2.01 | |
| Importance Rating | 2.8 | 3.2 |

K/A Statement: Ability to (a) predict the impacts of the following on the INTERMEDIATE RANGE MONITOR (IRM) SYSTEM ; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations: Power supply degraded.

Question: RO #15

Given:

- The plant is conducting a startup IAW HC.OP-IO.ZZ-0003, "Startup from Cold Shutdown to Rated Power".
- Shorting links are installed.

Then:

- An IRM +24 VDC power supply fuse blows securing power to the "A" IRM drawer.

Which one of the following describes the effect of this loss on the IRMs and what plant procedure provides guidance to bypass the "A" IRM?

A. IRM INOP Rod Block Only; HC.OP-AB.ZZ-0151 "+24 VDC Malfunction".

B. IRM INOP Rod Block and a Half Scram; HC.OP-AB.IC-0004 "Neutron Monitoring".

C. IRM INOP Rod Block Only; HC.OP-AB.IC-0004 "Neutron Monitoring".

D. IRM INOP Rod Block and a Half Scram; HC.OP-AB.ZZ-0151 "+24 VDC Malfunction".

Proposed Answer: B

Explanation (Optional):

A: Incorrect- With the mode switch in STARTUP/HOT STANDBY IRM trips into RPS are not bypassed (MS in Run), therefore there would also be a Half Scram due to the loss of the "A" channel +24VDC (INOP).

B: Correct- With the mode switch in STARTUP/HOT STANDBY IRM trips into RPS are not bypassed (MS in Run), therefore there would also be a Half Scram due to a Low Voltage INOP. Bypass the "A" IRM INOP IAW HC.OP-AB.IC-0004 "Neutron Monitoring".

C: Incorrect- With the mode switch in STARTUP/HOT STANDBY IRM trips into RPS are not bypassed (MS in Run), therefore there would also be a Half Scram due to the loss of the "A" channel +24VDC (INOP).

D: Incorrect- HC.OP-AB.IC-0004 will give guidance on resetting RPS and bypassing the "A" IRM.

Technical Reference(s): HC.OP-SO.SE-0001 (Attach if not previously provided)

HC.OP-AB.IC-0004
Neutron Monitoring

HC.OP-AB.ZZ-0151
+24VDC Malfunction

Proposed References to be provided to applicants during examination: none

Learning Objective: Given plant conditions, evaluate the IRM response to a loss of operating supply voltage (As available)

Discuss the operational implications of the abnormal indications/alarms for system operating parameters related to 24 VDC Malfunction, Abnormal Operating Procedure.

Question Source: Bank #

Modified Bank # (Note changes or attach parent)

New X

Question History:

Question Cognitive Level: Comprehension or Analysis

10 CFR Part 55 Content: 55.41 (7)

Comments: Question meets K/A because each 24 VDC subsystem consist of a 48 volt battery which is center tapped to create two, 24 volt batteries, (-24 VDC and +24 VDC). The 24 VDC systems are in a degraded status not completely lost. The loss of the +24 VDC side will give a Low Voltage INOP trip.

| | |
|---|---|
| Facility: | Hope Creek |
| Vendor: | GE |
| Exam Date: | 2018 |
| Exam Type: | RO |

| Examination Outline Cross-reference: | Level | RO | SRO |
|---|---|---|---|
| | Tier # | 2 | |
| | Group # | 1 | |
| | K/A # | 211000 | A2.01 |
| | Importance Rating | 3.5 | 3.8 |

K/A Statement: Ability to (a) predict the impacts of the following on the STANDBY LIQUID CONTROL SYSTEM ; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations: Pump trip

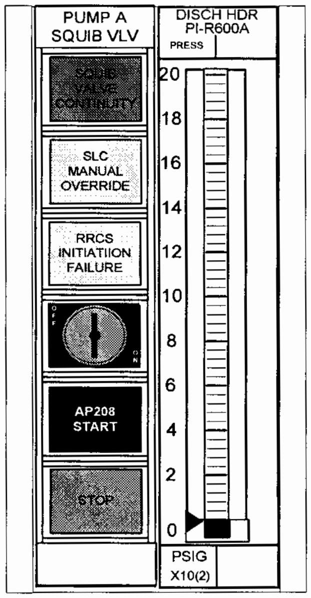
Question: RO #16

Given:

- HC.OP-EO.ZZ-0101A, “ATWS RPV Control” is being implemented.
- SLC was manually initiated.

Then:

- SLC pump AP208 breaker trips.
- Inspection of pump and breaker is completed and the breaker has been reclosed.




Which one of the following actions, if any, would be required to restart SLC pump AP208?

A. Ensure the ‘SLC MANUAL OVERRIDE’ light is illuminated and press the START PB.

B. Ensure the KEY-LOCK switch is ON and press the START PB.

C. No actions required due to the pump starting once the breaker was reclosed.

D. Ensure the KEY-LOCK switch is OFF and press the START PB.

Proposed Answer: B

Explanation (Optional):IAW HC.OP-SO.BH-0001 Section 5.3 (see attached) Place both PUMP & SQUIB VLV - OFF/ON keylock switches to ON. Press both PUMP & SQUIB VLV - AP208 AND BP208 START push buttons. These steps will initiate the SLC system immediately.

A: **Incorrect-** SLC MANUAL OVERRIDE light is based on a RRCS initiation. The SLC system was manually initiated.

B: **Correct-**. See above explanation.

C: **Incorrect-**.The SLC pump will NOT start at the local breaker.

D: **Incorrect-**. KEY-LOCK switch has to be in the ON position.

Technical Reference(s): HC.OP-SO.BH-0001 (Attach if not previously provided)

SLC System Operation

HC.OP-EO.ZZ-0101A FC
ATWS RPV Control
NOH01SLCSYSC
SLC Lesson Plan

Proposed References to be provided to applicants during examination: none

Learning Objective: Provided access to control room references, assess plant conditions to determine when the SLC System is to be manually initiated, IAW HC.OP-EO.ZZ-0101A. (As available)
From memory, summarize/identify the locations from which the Standby Liquid Control System pumps may be manually started/stopped and summarize the effect that operating the pumps from each location will have on Standby Liquid Control System response.

Question Source: Bank #

Modified Bank # (Note changes or attach parent)

New X

Question History:

Question Cognitive Level: Memory or Fundamental Knowledge

10 CFR Part 55 Content: 55.41 (10)

Comments:

Facility: Hope Creek

Vendor: GE

Exam Date: 2018

Exam Type: RO

Examination Outline Cross-reference:

| Level | RO | SRO |
|---|---|---|
| Tier # | 2 | |
| Group # | 1 | |
| K/A # | 215005 A3.01 | |
| Importance Rating | 3.5 | 3.5 |

K/A Statement: Ability to monitor automatic operations of the AVERAGE POWER RANGE MONITOR/LOCAL POWER RANGE MONITOR SYSTEM including: Four rod display: Plant-Specific.

Question: RO #17

Given:

- The four BYPASS lamps, in the lower right-hand corner of the Four-Rod Display, are illuminated with the LEVEL A, B, C, D indicators reading zero.
- The Control Rod Position Four Rod Display, for the lower right-hand corner rod position, is blank.
- All other Four-Rod Display indications are as expected for the current rod pattern.
- All other plant systems / components are functioning normally.

Which of the following would cause the above indications?
**[Reference attached]**

A. Rod 50-15 is selected.

B. RBM Channel 'A' is bypassed.

C. At least one RPIS 'DATA FAULT' exists.

D. Rod 02-43 is selected.

Proposed Answer: A

Explanation (Optional): IAW HC.OP-SO.SE-0001 Nuclear Instrumentation System Operation (attached)
All LPRM's show "Bypass" when a Peripheral Control Rod is selected.
All "A" and "C" LPRM's show "Bypass" on the Four Rod Display if the "A" RBM is bypassed.
All "B" and "D" LPRM's show "Bypass" on the Four Rod Display if the "B" RBM is bypassed.

A: **Correct-** Using the Rod Select Matrix figure the student will determine that Rod 50-15 is selected and therefore the indications on the four rod display would show the LPRMs bypassed along with the blank position indication in the lower right-hand corner due to no rod there IAW Rod Select Matrix..

B: **Incorrect-** An 'A' RBM bypass condition would <u>not</u> affect the B or D LPRM ribbon indicators. This bypass <u>would</u> affect all 'A' and 'C' level LPRM inputs to the 4-Rod (i.e., ribbons downscale, and BYPASS lamps lit). There are no Bypass lamps illuminated for the selected control rods.

C: **Incorrect-** RPIS 'Data Fault' Indicates two or more even reed switches are closed on any control rod in the Four Rod Display and would display 'XX' on the 4-Rod Display. No indications on the Four Rod Display of 'XX'.

D: **Incorrect-** Using the Rod Select Matrix figure the student will determine that Rod 02-43 is a peripheral control rod and therefore the indications on the four rod display would show **all LPRMs** bypassed on the Four Rod Display.

Technical Reference(s): HC.OP-SO.SE-0001 Nuclear Instrumentation System Operation NOH04MANCONC-08 REACTOR MANUAL CONTROL SYSTEM (Four Rod Display indications) (Attach if not previously provided)

Proposed References to be provided to applicants during examination: IAW the question stem: Four Rod Display and Rod Select Matrix.

Learning Objective: Given a set of conditions and a drawing of the controls, instrumentation, and/or alarms located in the Control Room , determine the status of the Local Power Range Monitoring (LPRM) System by observing the controls/instrumentation/alarms. (As available)

Question Source: Bank #36043

Modified Bank # (Note changes or attach parent)

New

Question History:

Question Cognitive Level: Comprehension or Analysis

10 CFR Part 55 Content: 55.41 (7)

Comments: The Four Rod Display provides information regarding control rod position and reactor power in a localized region surrounding the selected control rod. The indication background color for the selected control rod is a blue tint. All other background tints remain non-illuminated. There are four possible indications for a control rod on the Four Rod Display:

***1) Even Number (00-48): Rod is at an even numbered notch position.***

***2) Double Dash (--): Rod is passing through an odd numbered position.***

***3) Double X (XX): Two even reed switches closed Data Fault light will be lit.***

***4) Blank: No 00-48 even or odd position reed switch closed.***

Facility: Hope Creek

Vendor: GE

Exam Date: 2018

Exam Type: RO

| Examination Outline Cross-reference: | Level | RO | SRO |
|---|---|---|---|
| | Tier # | 2 | |
| | Group # | 1 | |
| | K/A # | 205000 A3.02 | |
| | Importance Rating | 3.2 | 3.2 |

K/A Statement: Ability to monitor automatic operations of the SHUTDOWN COOLING SYSTEM (RHR SHUTDOWN COOLING MODE) including: Pump trips

Question: RO #18

Given:

- The plant is in Operational Condition 5 with reactor coolant temperature at 140°F.
- 'B' RHR pump is in Shutdown Cooling.
- HC.OP-GP-SM-0001 Section 5.1 "RHR Shutdown Cooling Isolation Defeat in Mode 5 with RPV Head Removed" has been implemented.

Then due to an electrical transient:

- 'B' RHR pump trips and CAN NOT be restored.
- 'B' RPS Bus trips and CAN NOT be restored.

Select the current status of the Shutdown Cooling System for the above conditions.

A. Shutdown Cooling Outboard Isolation valve (HV-F008) will be full closed.
Shutdown Cooling Inboard Isolation valve (HV-F009) will be full closed.
RHR pump 'B' suction from Recirc (HV-F006B) will be full closed.
'B' RHR Loop return to Recirc (HV-F015B) will be full closed.

B. Shutdown Cooling Outboard Isolation valve (HV-F008) will be full open.
Shutdown Cooling Inboard Isolation valve (HV-F009) will be full open.
RHR pump 'B' suction from Recirc (HV-F006B) will be full closed.
'B' RHR Loop return to Recirc (HV-F015B) will be open.

C. Shutdown Cooling Outboard Isolation valve (HV-F008) will be full open.
Shutdown Cooling Inboard Isolation valve (HV-F009) will be full open.
RHR pump 'B' suction from Recirc (HV-F006B) will be full open.
'B' RHR Loop return to Recirc (HV-F015B) will be open.

D. Shutdown Cooling Outboard Isolation valve (HV-F008) will be full closed.
Shutdown Cooling Inboard Isolation valve (HV-F009) will be full closed.
RHR pump 'B' suction from Recirc (HV-F006B) will be full open.
'B' RHR Loop return to Recirc (HV-F015B) will be full closed.

Proposed Answer: C

Explanation (Optional):

A: **INCORRECT-** The HV-F008/9 valves along with the F015B will remain open due to the isolation override of GP.SM-0001. F006B has no auto isolations.

B: **INCORRECT-** The HV-F008/9 valves will remain open due to the isolation override of GP.SM-0001. F006B has no auto isolations.

C: **CORRECT-** The HV-F008/9/15 valves will remain open due to the isolation override of GP.SM-0001. F006B has no auto isolations. Even with a loss of RPS, the isolation interlocks are bypassed with GP-SM-0001.

D: **INCORRECT-** The HV-F008/9/15 valves will remain open due to the isolation override of GP.SM-0001. F006B has no auto isolations.

Technical Reference(s): HC.OP-GP.SM-0001 (Attach if not previously provided)

Defeating Isolation Signals During Refuel Operations
HC.OP-SO.SB-0001
RPS Operation

HC.OP-AB.RPV-0009
Shutdown Cooling

Proposed References to be provided to applicants during examination: none

Learning Objective: Given plant conditions involving a Loss of Shutdown Cooling, summarize required actions to mitigate the condition. (As available)

Question Source: Bank #

Modified Bank # (Note changes or attach parent)

New X

Question History:

Question Cognitive Level: Comprehension or Analysis

10 CFR Part 55 Content: 55.41 (7)

Comments:

Facility: Hope Creek

Vendor: GE

Exam Date: 2018

Exam Type: RO

| Examination Outline Cross-reference: | Level | RO | SRO |
|---|---|---|---|
| | Tier # | 2 | |
| | Group # | 1 | |
| | K/A # | 217000 A4.06 | |
| | Importance Rating | 3.6 | 3.7 |

K/A Statement: Ability to manually operate and/or monitor RCIC in the control room: Suppression pool level.

Question: RO #19

Given:

- The plant was at 100% rated power when the reactor scrammed.
- HPCI and RCIC both started and are injecting in response to a valid low reactor water level.

Current plant conditions:

- Reactor water level is +25 inches and steady.
- Reactor pressure is 845 psig and rising slowly.
- Drywell pressure is 1.1 psig and steady.
- RCIC is aligned to Full Flow Recirc operation for pressure control.
- The CST is at normal operating level.

T=10 minutes:

- Suppression pool level reaches 78.5 inches.

Which of the following would be the expected response of RCIC for the given conditions?

A. RCIC will operate on minimum flow.

B. RCIC will remain in Full Flow Recirculation.

C. RCIC will trip on high turbine exhaust pressure.

D. RCIC will trip on low suction pressure.

Proposed Answer: A

Explanation (Optional):

A: **Correct-** The AP-HV-F011 (CST to CST Full flow return) closes on the HPCI Suppression Pool Suction Valve (F042) opening on the high suppression pool level (≥78.5 inches) RCIC Suppression Pool Suction Valve (F031) and RCIC Suction Valve from CST (F010) are interlocked on low CST level (< 68,000 gallons). RCIC will still have a suction path from the CST (F031 remains open); however RCIC has no discharge path (F011 isolates), and therefore the Min. flow opens.

B: **Incorrect-** The AP-HV-F011 (CST to CST Full flow return) closes on the HPCI Suppression Pool Suction Valve (F042) opening on the high suppression pool level (>or = to 78.5 inches).

C: **Incorrect-** There are no indications of a rising turbine exhaust pressure and therefore no trip at > or = to 50 psig.

D: **Incorrect-** RCIC will still have a suction path from the CST (F031 remains open).

Technical Reference(s): HC.OP-SO.BJ-0001 (Attach if not previously provided)

HPCI System Operation

HC.OP-SO.BD-0001
RCIC System Operation

Proposed References to be provided to applicants during examination: none

Learning Objective: Given any of the following evaluate and determine the effect on the RCIC system: (As available)

a. **A given valve opening or closure**
b. RCIC turbine control system failures
c. Loss of DC or AC power supply
d. Inadequate system flow
e. An oil system malfunction
f. Failure of the RCIC Gland Seal Condenser Vacuum Pump
g. Loss of room cooling
h. Rupture disc failure on the RCIC exhaust
i. Steam line break
j. Low condensate storage tank level

Question Source: Bank #36068

Modified Bank # (Note changes or attach parent)

New

Question History: NRC 10/99

Question Cognitive Level: Comprehension or Analysis

10 CFR Part 55 Content: 55.41 (7)

Comments:

Facility: Hope Creek

Vendor: GE

Exam Date: 2018

Exam Type: RO

| Examination Outline Cross-reference: | Level | RO | | SRO |
|---|---|---|---|---|
| | Tier # | 2 | | |
| | Group # | 1 | | |
| | K/A # | 263000 | A1.01 | |
| | Importance Rating | 2.5 | | 2.8 |

K/A Statement: Ability to predict and/or monitor changes in parameters associated with operating the D.C. ELECTRICAL DISTRIBUTION controls including: Battery charging/discharging rate.

Question: RO #20

Given:

- The 1AD413 125 Volt 1E Battery Charger is in service and providing a normal charge on its battery.
- The 1AD414 125 Volt 1E Battery Charger is tagged for maintenance.

When:

- The plant experiences a Loss of Offsite Power (LOP).

Then:

- All EDGs start and load onto their respective busses.

Which of the following describes the response of this battery charger?

The 1AD413 Battery Charger will ____________________.

A. return to the "float" mode to recharge the battery.

B. trip and is interlocked "off " with the diesel generator powering the bus.

C. reset to the "equalize" mode to recharge the battery.

D. trip and must be manually restored as permitted by diesel generator loading.>>

Proposed Answer: A

Explanation (Optional): IAW HC.OP-SO.PK-0001 Normal system operation of an 125VDC Electrical System has all associated battery chargers on-line supplying the 125VDC System with the battery operating in a **float condition**.

A: **Correct.** Although the charging rate will be higher than prior to the charger loss, the charger will remain in the Float mode.

B: **Incorrect.** The charger does not trip. The charger is restored when the bus power is restored.

C: **Incorrect.** Equalize mode must be manually initiated (Section 5.3 of HC.OP-SO.PK-0001) using the timer control on the charger.

D: **Incorrect.** Returns when the AC bus is repowered.

Technical Reference(s): HC.OP-SO.PK-0001 Normal Operations status of a battery charger (Attach if not previously provided)

Proposed References to be provided to applicants during examination: none

Learning Objective: Concerning the 24VDC, 125VDC 1E and N1E and the 250VDC 1E and N1E battery Chargers: (As available)
The function of each indicator
The condition which will cause each indicator to light or extinguish
The effect of each control on its associated panel
The condition or permissives required for the control switches to perform their intended function
Describe how to initiate a given battery charger equalizing mode.
Describe the indications on a battery charger when one of two chargers are in the equalizing mode
List the condition which will cause a given battery charger to trip.

Question Source: Bank #35474

Modified Bank # (Note changes or attach parent)

New

Question History: NRC 2003/2016

Question Cognitive Level: Memory or Fundamental Knowledge

10 CFR Part 55 Content: 55.41 (7)

Comments:

Facility: Hope Creek

Vendor: GE

Exam Date: 2018

Exam Type: RO

| Examination Outline Cross-reference: | Level | RO | | SRO |
|---|---|---|---|---|
| | Tier # | 2 | | |
| | Group # | 1 | | |
| | K/A # | 223002 | G2.1.31 | |
| | Importance Rating | 4.6 | | 4.3 |

K/A Statement: Ability to locate control room switches, controls, and indications, and to determine that they correctly reflect the desired plant lineup. PCIS/Nuclear Steam Supply Shutoff

Question: RO #21

Given:

- The plant is at 100% rated power.

If the "A" PCIS MANUAL pushbutton were armed and depressed what would be the response of the Station Service Water (SSW) and the Safety Auxiliary Cooling System (SACS) pumps?

A. 'A' and 'C' SSW pumps and 'A' and 'C' SACS pumps start immediately if they were NOT running.

B. 'A' and 'C' SACS pumps start immediately if NOT running, and 'A' and 'C' SSW pumps start after a time delay.

C. 'A' SSW pump and 'A' SACS pump start immediately if they were NOT running.

D. 'A' SACS pump starts immediately if NOT running, and 'A' SSW pump starts after a time delay.

Proposed Answer: C

Explanation (Optional): HC.OP-SO.SM-0001, Table SM 019 (attached) the components that are affected from a MANUAL initiation of the "A" Channel PCIS are the 'A' SSW and 'A' SACS pumps. These components will receive an AUTO START without any time delay.

A: **Incorrect**- HC.OP-SO.SM-0001, Table SM-019 the 'C' SSW pump auto starts on a "C" Channel PCIS manual imitation. No auto start for 'C' SACS pump.

B: **Incorrect**- HC.OP-SO.SM-0001, Table SM-019 the 'C' SSW pump auto starts on a "C" Channel PCIS manual imitation. No auto start for 'C' SACS pump.

C: **Correct-** HC.OP-SO.SM-0001, Table SM 019 (attached) the components that are affected from a MANUAL initiation of the "A" Channel PCIS are the 'A' SSW and 'A' SACS pumps. These components will receive an AUTO START without any time delay.

D: **Incorrect**- HC.OP-SO.SM-0001, Table SM-019 These components will receive an AUTO START without any time delay.

Technical Reference(s): HC.OP-SO.SM-0001 Isolation Systems Operation Table SM-019 (Attach if not previously provided)

Proposed References to be provided to applicants during examination: none

Learning Objective: Given a labeled diagram/drawing of the Primary Containment Isolation System controls/indication bezels located in the main control room, identify/explain: (As available)

a. The function of each indicator.
b. The conditions that will cause the indicators to light or extinguish
c. The effect of each control switch on the Primary Containment Isolation System
d. The conditions or permissives required for the control switches to perform their intended function IAW HC.OP-SO.SM-0001, and applicable logic prints.

Question Source: Bank #33889

Modified Bank # (Note changes or attach parent)

New

Question History:

Question Cognitive Level: Memory or Fundamental Knowledge

10 CFR Part 55 Content: 55.41 (7)

Comments:

Facility: Hope Creek

Vendor: GE

Exam Date: 2018

Exam Type: RO

| Examination Outline Cross-reference: | Level | RO | SRO |
|---|---|---|---|
| | Tier # | 2 | |
| | Group # | 1 | |
| | K/A # | 215005 G2.4.34 | |
| | Importance Rating | 4.2 | 4.1 |

K/A Statement: Emergency Procedures / Plan: Knowledge of RO tasks performed outside the main control room during an emergency and the resultant operational effects: APRM/LPRM.

Question: RO #22

Given:

- The plant was at 100% power when the Control Room was abandoned due to smoke overtaking the main control room from a fire in the main control room cable area.
- The Mode Switch was locked in SHUTDOWN, but the scram was NOT verified prior to evacuation.
- HC.OP-IO.ZZ-0008, "Shutdown From Outside Control Room" is being implemented.
- An ALERT is declared due to the fire in a Vital Area.

Determine the reactor shutdown status using the indications in the attached pictures of the RMCS Activity Control Cards.
**[Reference attached]**

A. Reactor power AND shutdown status are unknown.

B. APRMs are downscale, all rods are fully inserted.

C. APRMs are NOT downscale, all rods are NOT fully inserted.

D. APRMs are downscale, all rods are NOT fully inserted.

Proposed Answer: B

Explanation (Optional):

A: **Incorrect.** Both Activity Control Cards show Power Range Monitors downscale (PRM DNSC illuminated). Additionally, both Activity Control Cards show all rods fully inserted (RODS NOT FULL-IN extinguished).

B: **Correct**. Both Activity Control Cards show Power Range Monitors downscale (PRM DNSC illuminated). Additionally, both Activity Control Cards show all rods fully inserted (RODS NOT FULL-IN extinguished).

C: **Incorrect.** Both Activity Control Cards show Power Range Monitors downscale (PRM DNSC illuminated). Additionally, both Activity Control Cards show all rods fully inserted (RODS NOT FULL-IN extinguished).

D: **Incorrect.** Both Activity Control Cards show all rods fully inserted (RODS NOT FULL-IN extinguished).

Technical Reference(s): HC.OP-IO.ZZ-0008 (Attach if not previously provided)

Shutdown From Outside Control Room

Proposed References to be provided to applicants during examination: Attached RMCS Activity Control Cards pictures

Learning Objective: Analyze plant conditions and parameters to determine if plant operation is in accordance with the SHUTDOWN FROM OUTSIDE THE CONTROL ROOM Integrated Operating Procedure, supporting System Operating Procedures and Technical Specifications. (As available)

Question Source: Bank #33247

Modified Bank # (Note changes or attach parent)

New

Question History:

Question Cognitive Level: Comprehension or Analysis

10 CFR Part 55 Content: 55.41 (10)

Comments:

Facility: Hope Creek

Vendor: GE

Exam Date: 2018

Exam Type: RO

Examination Outline Cross-reference:

| Level | RO | SRO |
|---|---|---|
| Tier # | 2 | |
| Group # | 1 | |
| K/A # | 209001 K2.01 | |
| Importance Rating | 3.0 | 3.1 |

K/A Statement: Knowledge of electrical power supplies to the following: Pump power

Question: RO #23

Given:

- Plant was operating at 100% rated power.

Then,

At T= 0 seconds:

- A LOCA resulted in drywell pressure reaching the high drywell pressure alarm setpoint.
- A Loss of Offsite Power (LOP) occurs.

At T= 10 seconds:

- All EDG have started and their output breakers have closed onto their respective busses.

At T= 14 seconds,

By design which of the following describes the status of the core spray systems pumps?

A. ONLY Core Spray pumps "A" and "C" are running.

B. ALL Core Spray pumps are running.

C. ONLY Core Spray pumps "B" and "D" are running.

D. NO Core Spray pumps are running.

Proposed Answer: D

Explanation (Optional): IAW HC.OP-SO.BE-0001 (see attached)
3.3.1. Core Spray System auto starts upon the receipt of the following signals:

Low-Low Reactor water level (Level 1, -129" wide range)
High Drywell pressure **(1.68 psig)**

5.3 Core Spray System Automatic Initiation/Observation

5.3.1. When A(B,C,D) Initiation and Sealed-In is on, observe the following:
Core Spray Pumps start after a 10 second time delay, **(6 seconds after Diesel Generator breaker closes following LOP).**

**EDG breakers will by design close at T=10 seconds. The Core Spray pumps will start 6 seconds after the EDG breakers are closed by design. All pumps will be running at T=16 seconds by design. The question asks for T= 14 seconds, therefore there will be NO Core Spray pumps running by design.**

A: **Incorrect -** NO Core Spray pumps will be running.

B: **Incorrect –** NO Core Spray pumps will be running.

C: **Incorrect -** NO Core Spray pumps will be running.

D: **Correct –** see above explanation

Technical Reference(s): HC.OP-SO.BE-0001 (Attach if not previously provided)

Core Spray System Operation

Proposed References to be provided to applicants during examination: none

Learning Objective: (As available)

For a given set of plant conditions, from memory, summarize/identify the interrelationship between the Core Spray System and any of the following,:

a. Residual Heat Removal (RHR) System
b. Torus Compartment
c. 4160 VAC Class 1E Distribution System
d. 480 VAC Class 1E Distribution System

Question Source: Bank #

Modified Bank # 35543 ( attached parent)

New

Question History: NRC 2009

Question Cognitive Level: Memory or Fundamental Knowledge

10 CFR Part 55 Content: 55.41 (7)

Comments:

Facility: Hope Creek

Vendor: GE

Exam Date: 2018

Exam Type: RO

Examination Outline Cross-reference:

| Level | RO | SRO |
|---|---|---|
| Tier # | 2 | |
| Group # | 1 | |
| K/A # | 218000 A3.04 | |
| Importance Rating | 3.7 | 3.8 |

K/A Statement: Ability to monitor automatic operations of the AUTOMATIC DEPRESSURIZATION SYSTEM including: Primary containment pressure.

Question: RO #24

Given:

- The plant was at 100% rated power.

Then:

- The plant experienced a transient.

Current plant conditions:

- Drywell pressure is at 2.5 psig.
- Reactor level is at -140 inches and lowering slowly.
- All systems responded as designed.

T= 90 seconds:

- Drywell pressure has been reduced to 1.6 psig.
- RPV level is -145 inches and steady.

Assuming no operator action, which of the following states the response of the Automatic Depressurization System (ADS) to these plant conditions?

A. ADS will not auto-actuate.

B. ADS will auto-actuate in approximately 15 seconds.

C. ADS will auto-actuate in approximately 210 seconds.

D. ADS will auto-actuate in approximately 300 seconds.

Proposed Answer: B

Explanation (Optional): IAW HC.OP-SO.SN-0001 section 3.3.1 (see attached)- The high drywell pressure signal **(seal-in)** must be manually reset even though the condition has cleared. ADS will initiate in 105-90=15 sec.

A: **Incorrect**- The high drywell pressure signal must be manually reset even though the condition has cleared. The high drywell pressure seals in. ADS will automatically actuate after the 105 second timer times out.

B: **Correct-** The high drywell pressure seals in. ADS will automatically actuate after the 105 second timer times out. 105 – 90 = 15 seconds.

C: **Incorrect-** Based on remaining time on 5 minute timer. 300 -90 = 210 seconds. The high drywell pressure seal in will bypass the 5 minute timer.

D: **Incorrect-** Based on 5 minute timer starting at T=0 seconds. The high drywell pressure seal in will bypass the 5 minute timer. ADS will automatically actuate after the 105 second timer times out. 105 – 90 = 15 seconds.

Technical Reference(s): HC.OP-SO.SN-0001 section 3.3.1 (Attach if not previously provided)

ADS Interlocks

Proposed References to be provided to applicants during examination: none

Learning Objective: From memory, list/identify the five (5) signals (including setpoints) which will cause the Automatic Depressurization System to automatically initiate. IAW available Control Room references. (As available)

Question Source: Bank #36235

Modified Bank # (Note changes or attach parent)

New

Question History:

Question Cognitive Level:

Comprehension or Analysis

10 CFR Part 55 Content: 55.41 (7)

Comments:

Facility: Hope Creek

Vendor: GE

Exam Date: 2018

Exam Type: RO

Examination Outline Cross-reference:

| Level | RO | | SRO |
|---|---|---|---|
| Tier # | 2 | | |
| Group # | 1 | | |
| K/A # | 259002 | K1.03 | |
| Importance Rating | 3.8 | | 3.9 |

K/A Statement: Knowledge of the physical connections and/or cause- effect relationships between REACTOR WATER LEVEL CONTROL SYSTEM and the following: Reactor water level

Question: RO #25

Given:

- The Reactor is at 85% power.
- All three Reactor Feed Pumps are in "Auto".
- RPV Narrow Range Level instruments indicate:
  - N004A = 34 inches
  - N004B = 35 inches
  - N004C = 35.5 inches

Which of the following describes the expected response of ACTUAL Reactor water level if a slow leak developed through the N004B detector equalizing valve eventually causing a gross failure of N004B?

Actual Reactor water level would:

A. rise 0.5 inch, then lower 1.5 inches.

B. lower 1 inch, then rise 0.5 inches.

C. rise 1 inch, then lower 0.5 inches.

D. lower 0.5 inch, then rise 1.5 inches.

Proposed Answer: D

Explanation (Optional): Initially N004B is selected since DFCS selects the **MEDIAN RPV level signal** when three good signals are available. With a leak through the N004B equalizing valve, N004B INDICATED level would begin to rise, resulting in a **lowering of ACTUAL RPV level.** As soon as N004B exceeded **35.5 inches INDICATED**, N004C would become the **MEDIAN RPV level signal**. **ACTUAL RPV level would have lowered 1/2 inch during this transition.** When N004B gross fails, N004A (the **lowest of the two remaining signals**) will become the controlling level signal. RPV water **level will then rise** since INDICATED level on N004A is **34 inches**. This is a **1.5 inch rise from the previous level.**

A: **Incorrect-** Initially lowers 0.5 inches, then rises 1.5 inches

B: **Incorrect-** Initially lowers 0.5 inches, then rises 1.5 inches

C: **Incorrect-** Initially lowers 0.5 inches, then rises 1.5 inches

D: **Correct-** lower 0.5 inch, then rise 1.5 inches.(see above).

Technical Reference(s): NOH04FWCONTC (Attach if not previously provided)

Feedwater Control

H-1-AE-ECS-0128, 03C
Digital Feedwater Reactor Level

Proposed References to be provided to applicants during examination: none

Learning Objective: From memory, describe the response of the FWLC system if a system transmitter were to fail, IAW Available Control Room References. (As available)

Question Source: Bank #35827

Modified Bank # (Note changes or attach parent)

New

Question History: NRC 2009

Question Cognitive Level:

Comprehension or Analysis

10 CFR Part 55 Content: 55.41 (7)

Comments:

Facility: Hope Creek

Vendor: GE

Exam Date: 2018

Exam Type: RO

Examination Outline Cross-reference:

| Level | RO | SRO |
|---|---|---|
| Tier # | 2 | |
| Group # | 1 | |
| K/A # | 262001 K3.01 | |
| Importance Rating | 3.5 | 3.7 |

K/A Statement: . Knowledge of the effect that a loss or malfunction of the A.C. ELECTRICAL DISTRIBUTION will have on following: Major system loads

Question: RO #26

Given:

- Plant is operating at 100% rated power.
- All Circulating Water pumps are running with their discharge valves full open.

Then, power is lost to the Circ Water 4.16 KV Bus, 10A501:

- It has been sixty (60) seconds since the loss of power to the 10A501 bus.
- NO operator actions have been performed on the circulating water system.

What is the current Circulating Water system configuration with the above conditions?

A. AP501 and CP501 are tripped
BP501 and DP501 are running
HV-2152A and HV-2152C are in the CLOSED position
HV-2152B and HV-2152D remain as-is

B. AP501 and CP501 are tripped
BP501 and DP501 are running
Circ Water Pump Discharge Valves HV-2152A,B,C & D are in the OPEN position

C. BP501 and DP501 are tripped
AP501 and CP501 are running
HV-2152B and HV-2152D are in the CLOSED position
HV-2152A and HV-2152C remain as-is

D. BP501 and DP501 are tripped
AP501 and CP501 are running
Circ Water Pump Discharge Valves HV-2152A,B,C & D are in the OPEN position

Proposed Answer: A

Explanation (Optional): IAW HC.OP-SO.DA-0001 Section 3.3.8- In the event of a Bus Power Failure:
• In the event of a **10A501** bus power failure, the **"A" and "C" Pumps will trip** with their respective **valves closing** within 30 seconds. The **discharge valves for "B" and "D" Pumps will fail as is** with **loss of position indication.**
• In the event of a 10A502 bus power failure, the "B" and "D" Pumps will trip with the respective valves closing within 30 seconds. The Discharge Valves for "A" and "C" Pumps will remain as is with loss of position indication.

A: **Correct-** see above explanation.

B: **Incorrect-** 2152A and C will be closed.

C: **Incorrect-** AP501 and CP501 will be tripped.

D: **Incorrect-** 2152A and C will be closed and. AP501 and CP501 will be tripped.

Technical Reference(s): HC.OP-SO.DA-0001 Section 3.3.8 interlocks (Attach if not previously provided)

Proposed References to be provided to applicants during examination: none

Learning Objective: Given a set of conditions and a drawing of the controls, instrumentation, and/or alarms located in the Main Control Room, assess the status of the Circulating Water System by evaluation of the controls, instrumentation, and alarms. (As available)

Question Source: Bank #

Modified Bank # (Note changes or attach parent)

New X

Question History:

Question Cognitive Level: Memory or Fundamental Knowledge

10 CFR Part 55 Content: 55.41 (7)

Comments:

Facility: Hope Creek

Vendor: GE

Exam Date: 2018

Exam Type: RO

| Examination Outline Cross-reference: | Level | RO | | SRO |
|---|---|---|---|---|
| | Tier # | 2 | | |
| | Group # | 2 | | |
| | K/A # | 288000 | K1.04 | |
| | Importance Rating | 2.6 | | 2.6 |

K/A Statement: Knowledge of the physical connections and/or cause- effect relationships between PLANT VENTILATION SYSTEMS and the following: Applicable component cooling water system: Plant-Specific

Question: RO #27

Given:

- The Reactor Building Ventilation System is in service.
- Panel 1A (B, C, D) C281 hand switches are positioned as follows:
  - 'A' SACS room cooler (AVH214) handswitch in 'AUTO'
  - 'B' SACS room cooler (BVH214) handswitch in 'AUTO'
  - 'C' SACS room cooler (CVH214) handswitch in 'AULD'
  - 'D' SACS room cooler (DVH214) handswitch in 'AULD'

Then, a report from the field is called into the main control room:

- 'A' and 'B' SACS room coolers are running.
- 'C' and 'D' SACS room coolers are NOT running.
- No alarms are in on the 1EC281 Cooler Switch Status Alarm Panel.

Which of the following would cause the above indications?

A. 'A' Control Area Ventilation System (CAVS) tripped and the 'B' Control Area Chilled Water Train received an auto start.

B. 'A' and 'B' SACS room temperatures are greater than 100°F.

C. 'B' Control Area Ventilation System (CAVS) tripped and the 'A' Control Area Chilled Water Train received an auto start.

D. 'C' and 'D' SACS room coolers experienced a loss of breaker control power.

Proposed Answer: C

Explanation (Optional): SACS Pump Room Unit Coolers **AVH214 AND BVH214** are interlocked to operate in **AUTO** only if Chilled Water Pump **AP400 is in service**. SACS Pump Room Unit Coolers **CVH214 AND DVH214** are interlocked to operate in **AUTO** only if Chilled Water Pump **BP400 is in service**. **AUTO LEAD** - Fans start on room temp **100°F** regardless of Chilled Water Pump operation.

A: **INCORRECT – CVH214 AND DVH214** are interlocked to operate in **AUTO** only if Chilled Water Pump **BP400 is in service**.

B: **INCORRECT – 'AULD'** fans only cycle on temperature. Fans start on room temp **100°F** regardless of Chilled Water Pump operation. AVH214 AND BVH214 are in 'AUTO'.

C: **CORRECT- 'AUTO'** fans only run when the associated control area chillwater loop is in service. **AVH214 AND BVH214** are interlocked to operate in **AUTO** only if Chilled Water Pump **AP400** ('A' Control Area Chilled Water Train) **is in service**.

D: **INCORRECT** - no automatic actions are associated with loss of control power to 'C' and 'D' fans. These fans would normally be secured.

Technical Reference(s): HC.OP-SO.GR-0001 RBVS (Attach if not previously provided)
Operation Interlocks section 3.3.1

Proposed References to be provided to applicants during examination: none

Learning Objective: Given plant conditions, summarize/identify the interrelationship between: The Safety Auxiliary Cooling System (SACS) Room Cooler and the Control Area Chilled Water System. (As available)

Question Source: Bank #107717

Modified Bank # (Note changes or attach parent)

New

Question History:

Question Cognitive Level:

Comprehension or Analysis

10 CFR Part 55 Content: 55.41 (7)

Comments:

Facility: Hope Creek

Vendor: GE

Exam Date: 2018

Exam Type: RO

Examination Outline Cross-reference:

| Level | RO | SRO |
|---|---|---|
| Tier # | 2 | |
| Group # | 2 | |
| K/A # | 233000 K3.01 | |
| Importance Rating | 3.2 | 3.4 |

K/A Statement: Knowledge of the effect that a loss or malfunction of the FUEL POOL COOLING AND CLEAN-UP will have on the following: Fuel pool temperature

Question: RO #28

Given:

- The plant is in Operational Condition 1, two weeks after a refueling outage.
- The Fuel Pool Cooling system is operating with one pump and heat exchanger in service.
- The Fuel Pool to Reactor Cavity Gates are installed.

Assuming NO makeup water sources available AND NO evaporative losses;

What would be the effect on Spent Fuel Pool water level and temperature if a leak developed on the common FPCC Pump Suction?

A. Fuel pool water level will continuously lower and temperature will remain stable.

B. Fuel pool water level will lower slightly and stabilize and temperature will rise.

C. Fuel pool water level will lower slightly and stabilize and temperature will remain stable.

D. Fuel pool water level will continuously lower and temperature will rise.

Proposed Answer: B

Explanation (Optional): The skimmer surge tank will drain and the FPCC pumps will trip. Fuel pool level will drain to the bottom of the weir overflow pipe then stop. Water temp will increase because FPCC is lost. (see attached skimmer surge tank and pump sections of P&ID).

A: **Incorrect-** FPCC is lost, temp will rise and level will lower then stop.

B: **Correct-** See above.

C: **Incorrect-** FPCC is lost, temp will rise.

D: **Incorrect-** Level will lower then stop.

Technical Reference(s): M-53-01 Sheet 1 (Attach if not previously provided)

Proposed References to be provided to applicants during examination: none

Learning Objective: Given a list of plant conditions, identify the process conditions which will cause an automatic trip of the FPCCS pumps. (As available)

Question Source: Bank #107779

Modified Bank # (Note changes or attach parent)

New

Question History:

Question Cognitive Level:

Comprehension or Analysis

10 CFR Part 55 Content: 55.41 (7)

Comments: The **LSLL- 4661A or B** for skimmer surge tank level feeds into the Fuel pool cooling pumps as a trip of the pumps:

Facility: Hope Creek

Vendor: GE

Exam Date: 2018

Exam Type: RO

| Examination Outline Cross-reference: | Level | RO | | SRO |
|---|---|---|---|---|
| | Tier # | 2 | | |
| | Group # | 2 | | |
| | K/A # | 245000 | K3.03 | |
| | Importance Rating | 3.9 | | 4.0 |

K/A Statement: Knowledge of the effect that a loss or malfunction of the MAIN TURBINE GENERATOR AND AUXILIARY SYSTEMS will have on following: Reactor power

Question: RO #29

Given:

- The plant is operating at 16% power.

Then:

- The Main Turbine Lube Oil Bearing Header Relief Valve fails open and bearing oil header pressure lowers to 7 psig (as measured at the Front Standard).

How will the MTLO pumps respond automatically and the effects on the plant?

The _______________ starts. The Main Turbine trips and the Reactor _______________.

A. Turning Gear Oil Pump; scrams

B. Emergency Bearing Oil Pump; does NOT scram

C. Turning Gear Oil Pump; does NOT scram

D. Emergency Bearing Oil Pump; scrams

Proposed Answer: C

Explanation (Optional): HC.OP-SO.AC-0001, 3.3 Interlocks (attached)
3.3.5. The Turning Gear Oil Pump (TGOP) will auto start on either of the following:
- Operating oil pressure low (190 psig)
- **Bearing Header oil pressure low (15 psig)**

3.3.6. Any of the following conditions will cause a Turbine trip:
- Lo Shaft Oil Pump Discharge Pressure 105 psig above 1350 rpm
- **Low Bearing Oil Pressure (8 psig)**

3.3.8. The Emergency Bearing Oil Pump (EBOP) will auto start on the following conditions:
- Low operating oil pressure (180 psig)
- TGOP low pressure (10 psig).

A: **Incorrect** - The reactor will not scram at <24% power.

B: **Incorrect** - The EBOP does not start unless the TGOP is not running (all equipment functions as designed) therefore the TGOP would be running.

C: **Correct** – The TGOP starts at 15 psig bearing header pressure. The Main Turbine trips at 8 psig bearing header pressure. The reactor does not scram unless power is >24%.

D: **Incorrect**- The EBOP does not start unless the TGOP is not running (all equipment functions as designed) therefore the TGOP would be running. The reactor will not scram at <24% power.

Technical Reference(s): HC.OP-SO.AC-0001 (Attach if not previously provided)
3.3 Interlocks

Proposed References to be provided to applicants during examination: none

Learning Objective: Given a labeled diagram of the Main Turbine Lube Oil System controls/indication bezel on 10C651C (NCO and Above): (As available)

a. Explain the function of each indicator,
b. Summarize the plant conditions which will cause the indicator to light or extinguish,
c. Explain the effect of each control on the MTLO System,.
d. Summarize plant conditions or permissives required for the control switches to perform their intended function, IAW available control room references.

Question Source: Bank #120287

Modified Bank # (Note changes or attach parent)

New

Question History:

Question Cognitive Level:

Comprehension or Analysis

10 CFR Part 55 Content: 55.41 (7)

Comments:

Facility: Hope Creek

Vendor: GE

Exam Date: 2018

Exam Type: RO

Examination Outline Cross-reference:

| Level | RO | SRO |
|---|---|---|
| Tier # | 2 | |
| Group # | 2 | |
| K/A # | 215002 K4.01 | |
| Importance Rating | 3.4 | 3.5 |

K/A Statement: Knowledge of ROD BLOCK MONITOR SYSTEM design feature(s) and/or interlocks which provide for the following: Prevent control rod withdrawal: BWR-3,4,5

Question: RO #30

Given:

- The Reactor is at 40% rated power.
- Recirculation flow unit “A” - 50%.
- Recirculation flow unit “C” - 55%.
- Control rod 22-27 is withdrawn.
- The ALARM REF SET LOW is displayed on 10C651C.

The Rod Block Monitor "A" will block rod withdrawal at __________.

A. 85% RBM Power

B. 94% RBM Power

C. 82% RBM Power

D. 90% RBM Power

Proposed Answer: C

Explanation (Optional): The Rod Block Monitor "A" will block rod withdrawal at: low value gate will select "A" channel or 50%. Then calculate using 66 W + 49% = 82% (see attached) LOW- .66W + 49%; INTMD- .66W +57%; HIGH- .66W + 65%

A: Incorrect- 66 W + 49% = 82%

B: Incorrect- 66 W + 49% = 82%

C: Correct-

D: Incorrect- 66 W + 49% = 82%

Technical Reference(s): HC.OP-SO.SF-0002 (Attach if not previously provided)

Rod Block Monitor Operation

Proposed References to be provided to applicants during examination: none

Learning Objective: Given the formula, define the equation (As available) used to determine each of the four (4) Rod Block Monitor (RBM) System flow-biased upscale trip setpoints.

Question Source: Bank #33833

Modified Bank # (Note changes or attach parent)

New

Question History:

Question Cognitive Level:

Comprehension or Analysis

10 CFR Part 55 Content: 55.41 (7)

Comments:

Facility: Hope Creek

Vendor: GE

Exam Date: 2018

Exam Type: RO

| Examination Outline Cross-reference: | Level | RO | | SRO |
|---|---|---|---|---|
| | Tier # | 2 | | |
| | Group # | 2 | | |
| | K/A # | 234000 | K5.01 | |
| | Importance Rating | 2.9 | | 3.4 |

K/A Statement: Knowledge of the operational implications of the following concepts as they apply to FUEL HANDLING EQUIPMENT : Crane/hoist operation

Question: RO #31

Given:

- A fuel assembly has just been raised from an in-core location until the Main Hoist is full up.

Then:

- There is a loss of control air to the Main Hoist.

The Main Hoist will ________________.

A. lower the assembly back into the core.

B. lower until the "STOP" push button is depressed on the Start/Stop Station.

C. lower until the "HOIST OVERRIDE" push button is depressed and held.

D. stay in the full up position.

Proposed Answer: D

Explanation (Optional): Should an emergency stop occur during the lowering of the Main Hoist, the hoist **safety brake** will set without delay and take the hoist load.

A: **Inorrect:** The safety brake will engage without delay. The hoist will not be able to be moved until the brake is released.

B: **Incorrect:** This push button removes power from the control system, however the safety brake automatically engages without delay.

C: **Incorrect:** This push button, while pressed and held, allows the main hoist to be raised above the Normal Up Limit. The safety brake will automatically engage and the hoist will not be able to be moved until the brake is released.

D: **Correct:** The safety brake will engage without delay.

Technical Reference(s): HC.OP-SE.KE-0001 Refuel Operations
3.1.16 Main Hoist safety brake (Attach if not previously provided)

Proposed References to be provided to applicants during examination: none

Learning Objective: Given normal Control Room references, explain the operation of a safety break and how to release it. (As available)

Question Source: Bank #33659

Modified Bank # (Note changes or attach parent)

New

Question History:

Question Cognitive Level:

Comprehension or Analysis

10 CFR Part 55 Content: 55.41 (7)

Comments:

Facility: Hope Creek

Vendor: GE

Exam Date: 2018

Exam Type: RO

Examination Outline Cross-reference:

| Level | RO | SRO |
|---|---|---|
| Tier # | 2 | |
| Group # | 2 | |
| K/A # | 223001 K6.11 | |
| Importance Rating | 3.0 | 3.2 |

K/A Statement: Knowledge of the effect that a loss or malfunction of the following will have on the PRIMARY CONTAINMENT SYSTEM AND AUXILIARIES : A.C. electrical distribution.

Question: RO #32

Given:

- The plant is at 100% rated power.
- All drywell fan cooler units are in normal operation with all fans running in each unit.

Then:

- A loss of off-site power (LOP) occurs.
- All four Emergency Diesel Generators start and their associated breakers close supplying their respective 4.16 KV Bus.

T= 2 minutes

What is the status of the drywell ventilation fans?

A. Eight drywell ventilation fans running in high speed and the other eight drywell ventilation fans stopped.

B. All drywell ventilation fans running in low speed.

C. Eight drywell ventilation fans running in low speed and the other eight drywell ventilation fans stopped.

D. All drywell ventilation fans running in high speed.

Proposed Answer: D

**Explanation (Optional):** IAW HC.OP-SO.GT-0001 Drywell Ventilation (see attached) the drywell cooling fans are placed in **fast speed** for normal operations. In order to maintain DW temperatures as required, any combination of cooling coils and fans may be placed in service in each Drywell Unit Cooler. Fans must be run in **fast speed**. For a LOP, the running DW fans trip on undervoltage until sequenced on by the LOP sequencer (HC.OP-AB.ZZ-0135 Table 1 attached). 13 seconds after the sensed LOP, EDGs will supply electrical power to the MCCs, the unit cooler fans and controls are automatically re-energized and all 16 fans will start in **fast speed.**

A: **Incorrect-** For a LOP**,** EDGs will supply electrical power to the MCCs, the unit cooler fan's controls are automatically re-energized and will start **all fans** in **fast speed.**

B: **Incorrect-** There is a slow speed switch position for the drywell cooling fans, however IAW the normal alignment the fans will be in fast speed (see attached). For a LOP**,** EDGs will supply electrical power to the MCCs, the unit cooler fan's controls are automatically re-energized and will start **all fans** in **fast speed.**

C: **Incorrect-** All fans will be running in fast speed.

D: **Correct-** See above explanation.

Technical Reference(s): HC.OP-SO.GT-0001 Drywell Ventilation System Section 5.1 HC.OP-AB.ZZ-0135 LOP Table 1 (Attach if not previously provided)

Proposed References to be provided to applicants during examination: none

Learning Objective: From memory, predict the response of the Drywell Ventilation System to the following conditions IAW available Control Room References. (As available)
a. Loss of Offsite Power (LOP)

Question Source: Bank #

Modified Bank # (Note changes or attach parent)

New X

Question History:

Question Cognitive Level: Memory or Fundamental Knowledge

10 CFR Part 55 Content: 55.41 (7)

Comments:

Facility: Hope Creek

Vendor: GE

Exam Date: 2018

Exam Type: RO

Examination Outline Cross-reference:

| Level | RO | SRO |
|---|---|---|
| Tier # | 2 | |
| Group # | 2 | |
| K/A # | 256000 | A1.08 |
| Importance Rating | 2.7 | 2.9 |

K/A Statement: Ability to predict and/or monitor changes in parameters associated with operating the REACTOR CONDENSATE SYSTEM controls including: System water quality

Question: RO #33

Given:

- The Reactor is at 100% rated power.

Then, OHA A4-B4 CONDENSATE DM AND PREFILTER PNL 10C122/1122 was received:

- CDI conductivity is 0.5 uS/cm.
- Reactor Coolant Conductivity is .059 uS/cm.
- HC.OP-AB.RPV-0007, "Reactor Coolant Conductivity" has been entered.
- Indications on CRIDS Page 19:

| Drip Trays | Cond A | Cond B | Cond C |
|---|---|---|---|
| N | .11 | .07 | 2.13 |
| N | .09 | .12 | 2.13 |
| S | .19 | .06 | .21 |
| S | .16 | .12 | .13 |
| | Hotwell | Hotwell | Hotwell |
| N | .14 | .09 | 2.13 |
| S | .10 | .11 | .16 |

Which of the following actions is required for the above conditions?
**(answer chosen assumes Chemistry Management concurrence)**

A. Initiate an orderly shutdown within 6 hours.

B. NO Waterbox isolation or shutdown required. Continue to monitor CDI and Reactor coolant conductivity.

C. Isolate and drain the 'C' North Waterbox. NO shutdown required.

D. Initiate an orderly shutdown within 24 hours.

Proposed Answer: C

Explanation (Optional): IAW HC.OP-AB.RPV-0007 (see attached)subsequent action 'A' steps A.5a-c and IAW HC.CH-GP.ZZ-0009 (see attached) thresholds for Mode 1 operation for waterbox isolation and draining at > 0.20 uS/cm the 'C' North waterbox needs to isolated and drained. The Reactor orderly shutdown is referenced in HC.OP-AB.RPV-0007 subsequent action 'B' step B.5 and subsequent section 'C' step C.1 for reactor coolant conductivity $\geq$ 1.0 uS/cm over a 24 hour period and $\geq$ 5.0 uS/cm over a six hour period.

A: **Incorrect.** This action is for reactor coolant conductivity $\geq$ 5 uS/cm.

B: **Incorrect.** CDI conductivity has exceeded the threshold for isolating the affected waterbox.

C: **Correct.** CDI conductivity has exceeded the threshold for isolating the affected waterbox. Indications given are for a condenser tube leak in the 'C' North Waterbox.

D: **Incorrect.** This action is for reactor coolant conductivity $\geq$ 1 uS/cm.

Technical Reference(s): HC.OP-AB.RPV-0007 Reactor Coolant Conductivity (Attach if not previously provided)

Proposed References to be provided to applicants during examination: none.

Learning Objective: Given plant conditions and plant procedures, determine required actions of the retainment override(s) and subsequent operator actions in accordance with Reactor Coolant Conductivity. (As available)

Question Source: Bank #64631

Modified Bank # (Note changes or attach parent)

New

Question History:

Question Cognitive Level:

Comprehension or Analysis

10 CFR Part 55 Content: 55.41 (10)

Comments:

Facility: Hope Creek

Vendor: GE

Exam Date: 2012

Exam Type: RO

Examination Outline Cross-reference:

| Level | RO | | SRO |
|---|---|---|---|
| Tier # | 2 | | |
| Group # | 2 | | |
| K/A # | 202002 | A2.06 | |
| Importance Rating | 3.3 | | 3.3 |

K/A Statement: Ability to (a) predict the impacts of the following on the RECIRCULATION FLOW CONTROL SYSTEM ; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations: Low reactor water level: Plant-Specific

Question: RO #34

Given:

- The Reactor is at 100% power, when a scram occurs due to an I&C test malfunction.
- Reactor water level reaches (-41) inches before being restored.

The Reactor Recirculation System Pumps will Runback to ______________. The Crew should secure the Reactor Recirculation MG Sets due to ______________.

A. 30% speed. the loss of MG Set ventilation.

B. 45% speed. the RPT breakers tripping.

C. 30% speed. the RPT breakers tripping.

D. 45% speed. the loss of MG Set ventilation.

Proposed Answer: C

Explanation (Optional): See attached HC.OP-SO.BB-0002 Reactor Recirculation System **Section 3.3** Interlocks for Full and Intermediate runbacks. **Step 3.1.22** states IF RPT Brkr A(B,C,D) N205 for a Recirc Pump trips, the Drive Motor breaker will not trip. The Recirc MG Set should be secured. IAW HC.OP-SO.SA-0001 RRCS Operations the RPT breakers will trip at -38" (see attached). MG Set ventilation does not have any automatic trips due to low RPV level and would still be in service.

A: **Incorrect-** The RPT breakers would be tripped (-38") and IAW Step 3.1.22 of SO.BB-0002 the MG Sets should be secured.

B: **Incorrect-** +12.5" RPV Level is a Full (30% Speed) Reactor Recirculation System runback.

C: **Correct-** +12.5" RPV Level is a Full (30% Speed) Reactor Recirculation System runback and the MG Sets should be secured IAW HC.OP-SO.BB-0002 (see attached).

D: **Incorrect-** +12.5" RPV Level is a Full (30% Speed) Reactor Recirculation System runback.

Technical Reference(s): HC.OP-SO.BB-0002 Reactor Recirculation System Section 3.3 Interlocks. (Attach if not previously provided)

HC.OP-AB.RPV-0001 Reactor Power Subsequent action B.

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 X

Question History:

Question Cognitive Level:

Comprehension or Analysis

10 CFR Part 55 Content: 55.41 (7)

Comments:

Facility: Hope Creek

Vendor: GE

Exam Date: 2018

Exam Type: RO

Examination Outline Cross-reference:

| Level | RO | SRO |
|---|---|---|
| Tier # | 2 | |
| Group # | 2 | |
| K/A # | 201001 A3.08 | |
| Importance Rating | 3.0 | 2.9 |

K/A Statement: Ability to monitor automatic operations of the CONTROL ROD DRIVE HYDRAULIC SYSTEM including: Drive water flow.

Question: RO #35

Given:

- The plant is operating at 25% power performing a shutdown.
- Control rod 18-23 needs to be inserted to position '00' from position '08'.

Then:

- While attempting to insert the control rod (18-23) from position '08', indicated drive water flow is reading "0" gpm.

Which of the following would be a cause of this indication?

A. Hydraulic Control Unit Directional Control Valve (123) has failed to reposition.

B. The 4 gpm Stabilizing Valve has failed to reposition.

C. Hydraulic Control Unit Directional Control Valve (122) has failed to reposition.

D. The Drive Water Header Pressure Control Valve has failed closed.

Proposed Answer: A

Explanation (Optional):

A: **Correct**- IAW M-47-1 SV-123 is the insert solenoid and SV-121 is the exhaust solenoid.

B: **Incorrect** - this would affect total system flow not insert (drive) flow.

C: **Incorrect** - This is the withdraw solenoid which is closed and remains closed while INSERT PB is pressed.

D: **Incorrect** - Drive water flow to the HCUs taps off upstream of the Drive Water Pressure Control Valve. Closing the F003 would not cause the DW Flow to read 0.

Technical Reference(s): M-46-1 CRDH (Attach if not previously provided)

M-47-1 CRDH

Proposed References to be provided to applicants during examination: none

Learning Objective: Given P&ID's M-46-1 and M-47-1, determine the flowpath of the Control Rod Drive Hydraulic System, including the following flowpaths: (As available)

a. **Drive Water**
b. Cooling Water
c. Exhaust Water
d. Charging Water
e. Scram
f. Seal Purge for Recirculation Pumps
g. RPV Level Reference Leg Backfill
h. Cooling Purge for RWCU Pumps

Question Source: Bank #36199

Modified Bank # (Note changes or attach parent)

New

Question History: NRC Exam 2003

Question Cognitive Level: Comprehension or Analysis

10 CFR Part 55 Content: 55.41 (7)

Comments:

Facility: Hope Creek

Vendor: GE

Exam Date: 2012

Exam Type: RO

| Examination Outline Cross-reference: | Level | RO | SRO |
|---|---|---|---|
| | Tier # | 2 | |
| | Group # | 2 | |
| | K/A # | 230000 A4.02 | |
| | Importance Rating | 3.8 | 3.6 |

K/A Statement: Ability to manually operate and/or monitor in the control room: Spray valves- RHR/LPCI: CTMT Spray Mode

Question: RO #36

Given:

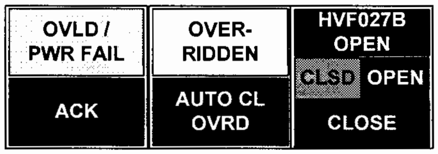
- Suppression Chamber pressure is elevated.
- The CRS orders Suppression Chamber Sprays placed in service.

While opening HV-F027B, RHR Loop B Suppression Chamber Spray Header Isolation Valve:

- A7-B1 'RHR LOOP B TROUBLE' alarm is received.

The operator observes the following indications for HV-F027B:

- Red OPEN light is LIT
- Green CLSD light is EXTINGUISHED
- Yellow OVLD/PWR FAIL light is FLASHING




Which one of the following describes the valve status?

A. The valve breaker is tripped open. The valve is closed.

B. The valve breaker is tripped open. The valve is open with spray flow.

C. The valve overloads have tripped. The valve is closed.

D. The valve overloads have tripped. The valve is open with spray flow.

Proposed Answer: D

Explanation (Optional):

A: **Incorrect -** Red OPEN light Lit means the MOV still has power, therefore the breaker is not tripped. The red open light still shows proper position.

B: **Incorrect** - Red OPEN light Lit means the MOV still has power, therefore the breaker is not tripped.

C: **Incorrect -** The Red OPEN light still shows proper position.

D: **Correct** - Valve motor **overloads** have tripped causing the **yellow flashing light**. Red OPEN light Lit means the MOV **still has power**; therefore the breaker is not tripped.

Technical Reference(s): HC.OP-AR.ZZ-0005 Attachment B1 (Attach if not previously provided)

Proposed References to be provided to applicants during examination: none

Learning Objective: Given a labeled drawing of, or access to the Residual Heat Removal System controls/indication on 10C650: (NCO and Above) (As available)
Explain the function of each indicator.
Assess plant conditions which will cause the indicators to light or extinguish.

Determine the effect of each control on the RHR System.
Assess plant conditions or permissives required for the control switches/pushbuttons to perform their intended functions.

Question Source: Bank #34319

Modified Bank # (Note changes or attach parent)

New

Question History: NRC 2002

Question Cognitive Level:

Comprehension or Analysis

10 CFR Part 55 Content: 55.41 (7)

Comments:

Facility: Hope Creek

Vendor: GE

Exam Date: 2012

Exam Type: RO

Examination Outline Cross-reference:

| Level | RO | | SRO |
|---|---|---|---|
| Tier # | 2 | | |
| Group # | 2 | | |
| K/A # | 268000 | 2.3.11 | |
| Importance Rating | 3.8 | | 4.3 |

K/A Statement: Ability to control radiation releases.

Question: RO #37

Given:

- A discharge of the Waste Sample Tank is in progress to the River.
- The Liquid Radwaste Discharge Isolation Valve to the Cooling Tower Blowdown automatically closes.

Which one of the following conditions would cause this discharge termination?

A. The Cooling Tower Blowdown RMS radiation HI setpoint is reached

B. Liquid Radwaste Effluent radiation HI setpoint is reached.

C. Liquid Radwaste Effluent sample flow rate HI setpoint is reached.

D. The Cooling Tower Blowdown weir flow rate HI setpoint is reached.

Proposed Answer: B

Explanation (Optional): Of choices given, only Radwaste Effluent Radiation HI setpoint will cause release isolation and termination. Other answer choices cause alarms but not isolation. IAW HC.OP-AR.SP-0001 attachment 5:

**AUTOMATIC ACTION**

Isolation of HV-5377A&B due to any one of the following:

- High radiation (HIGH LED on 0SP-RI-4861)
- High Disch Flow (setpoint determined by Liquid Effluent Permit )
- Low Dilution Flow (setpoint determined by Liquid Effluent Permit )
- Low Sample Flow (0HBFIS-4861)
- Monitor Failure

And IAW HC.RW-AR.HB-0007 attachment 19 the following are isolations for HV-5377A/B:

- Liquid Radwaste effluent high rad
- Liquid Radwaste effluent high flow
- Cooling Tower Blowdown Low Flow
- Loss of Sample Flow
- Loss of operate/liquid Radwaste effluent radiation monitor downscale.

A: Incorrect

B: Correct

C: Incorrect

D: Incorrect

Technical Reference(s): HC.OP-AR.SP-0001attachment 5 (Attach if not previously provided)

HC.RW-AR.HB-0007 attachment 19

Proposed References to be provided to applicants during examination: none

Learning Objective: From memory list/identify the five conditions that will cause a liquid release to be automatically terminated. (As available)

Question Source: Bank #36150

Modified Bank # (Note changes or attach parent)

New

Question History: NRC 2002

Question Cognitive Level: Memory or Fundamental Knowledge

10 CFR Part 55 Content: 55.41 (7)

Comments:

Facility: Hope Creek

Vendor: GE

Exam Date: 2018

Exam Type: RO

Examination Outline Cross-reference:

| Level | RO | SRO |
|---|---|---|
| Tier # | 2 | |
| Group # | 2 | |
| K/A # | 226001 A1.10 | |
| Importance Rating | 3.0 | 3.2 |

K/A Statement: Ability to predict and/or monitor changes in parameters associated with operating the RHR/LPCI: CONTAINMENT SPRAY SYSTEM MODE controls including: Emergency generator loading

Question: RO #38

Given:

- Reactor Level is -100 inches and slowly rising.
- Drywell Pressure is 9.8 psig and slowly rising.
- RHR Pump "A" is in Drywell Spray Mode.
- RHR Pump "C" is injecting in the LPCI (Low Pressure Coolant Injection) Mode.

Then, a loss of offsite power (LOP) occurs.

Which one of the following describes the status of the RHR pumps once the EDGs (Emergency Diesel Generators) power the vital buses?

A. Both RHR pumps start immediately upon the respective bus EDG output breaker closing. Both RHR loops will be injecting to the RPV in the LPCI Mode

B. "A" RHR pump starts immediately upon its respective bus EDG output breaker closing. "C" RHR pump starts 5 seconds later. Both RHR pumps will be injecting to the RPV in the LPCI Mode.

C. "A" RHR pump starts immediately upon its respective bus EDG output breaker closing. "C" RHR pump starts 5 seconds later. "A" RHR pump will be in Drywell Spray Mode and "C" RHR pump will be injecting in the LPCI Mode.

D. Both RHR pumps start immediately upon the respective bus EDG output breaker closing. "A" RHR pump will be in Drywell Spray Mode and "C" RHR pump will be injecting in the LPCI Mode.

Proposed Answer: D

Explanation (Optional):

A: **Incorrect -** The 'A' pump will stay in Containment Spray Mode because the LPCI injecting valves had to be previously closed to allow for spray injection. These valves would have remained in their pre-loss of power position.

B: **Incorrect –** There is no time delay on the pump start once the EDG output breaker closes to power up the bus. "A" RHR would be in the Containment Spray Mode.

C: **Incorrect -** There is no time delay on the pump start once the EDG output breaker closes to power up the bus.

D: **Correct –** With offsite power NOT available and a LOCA signal present Hi Drywell Pressure in this case), each RHR pump will start as soon as its respective DG output breaker closes. The 'A' pump will stay in Containment Spray Mode because the LPCI injecting valves had to be previously closed to allow for spray injection. These valves would have remained in their pre-loss of power position.

Technical Reference(s): HC.OP-SO.BC-0001 (Attach if not previously provided)

RHR System Operations

Proposed References to be provided to applicants during examination: none

Learning Objective: (As available)

From memory, state the two automatic initiation signals and setpoints for LPCI initiation,
Determine the pump starting sequence for the LPCI pumps with and without off-site power available,
Determine the actions required to override the LPCI initiation and stop the LPCI pump,
Determine the actions required to override the LPCI initiation and close the LPCI injection valve HV-F017,
Determine the operator actions required to initiate suppression pool cooling during LPCI mode of operation,
Determine the operator actions required to initiate Torus/containment spray during LPCI mode of operation.

Question Source: Bank #120356

Modified Bank # (Note changes or attach parent)

New

Question History: NRC Exam 2010

Question Cognitive Level: Comprehension or Analysis

10 CFR Part 55 Content: 55.41 (7)

Comments:

Facility: Hope Creek

Vendor: GE

Exam Date: 2018

Exam Type: RO

| Examination Outline Cross-reference: | Level | RO | | SRO |
|---|---|---|---|---|
| | Tier # | 1 | | |
| | Group # | 1 | | |
| | K/A # | 295004 | AK1.04 | |
| | Importance Rating | 2.8 | | 2.9 |

K/A Statement: Knowledge of the operational implications of the following concepts as they apply to PARTIAL OR COMPLETE LOSS OF D.C. POWER : Effect of battery discharge rate on capacity

Question: RO #39

Given:

- The plant is at 100% rated power.
- A failure has disabled the charger 10D423 to Channel 'A' 250 VDC batteries 10D421.

Then:

- The plant experiences a loss of coolant accident (LOCA) with a loss of offsite power (LOP).
- HPCI and RCIC are injecting into the RPV.

Which of the following describes the DESIGN effect on HPCI and RCIC?

A. In one hour, RCIC will NOT be available for injection into the RPV.

B. In four hours, HPCI will NOT be available for injection into the RPV.

C. In one hour, HPCI will NOT be available for injection into the RPV.

D. In four hours, RCIC will NOT be available for injection into the RPV.

Proposed Answer: **B**

**Explanation (Optional):** All batteries are designed to supply all loads for **4 hours** without the chargers. However, the 250 VDC Non-1E is designed for **one hour.** HPCI and RCIC chargers are supplying the 250 VDC 1E distribution systems and are rated for **four hours** of capacity.

**10D423** charger and **10D421** batteries supply the 10D450 **HPCI** switchgear. **10D433** charger and **10D431** batteries supply the 10D460 **RCIC** switchgear. With a loss of offsite power, the EDGs will be supplying the chargers for HPCI and RCIC, however due to the 10D423 being out of service the 10D450 HPCI switchgear would be on the **10D421 batteries** and would discharge without any recharging of the batteries from the 10D423 charger.

A: **Incorrect-** RCIC would not be affected due to the charger being energized. The 250 VDC 1E batteries have a capacity of four hours.

B: **Correct-** HPCI charger is de-energized and the battery capacity is at four hours. See above explanation.

C: **Incorrect-** The 250 VDC 1E batteries have a capacity of four hours.

D: **Incorrect-** RCIC would not be affected due to the charger being energized.

Technical Reference(s): HC.OP-AB.ZZ-0149 (Attach if not previously provided)

250 VDC System Malfunction

NOH01DCELEC
DC Electrical Distribution

Proposed References to be provided to applicants during examination: none

Learning Objective: Given various plant conditions/malfunctions associated with the A.C. Electrical Distribution Systems, determine the effect that the malfunction will have on the D.C. Distribution System. (As available)

Question Source: Bank #

Modified Bank # (Note changes or attach parent)

New X

Question History:

Question Cognitive Level: Analysis

10 CFR Part 55 Content: 55.41 (10)

Comments:

Facility: Hope Creek

Vendor: GE

Exam Date: 2018

Exam Type: RO

| Examination Outline Cross-reference: | Level | RO | SRO |
|---|---|---|---|
| | Tier # | 1 | |
| | Group # | 1 | |
| | K/A # | 295026 EK1.02 | |
| | Importance Rating | 3.5 | 3.8 |

K/A Statement: Knowledge of the operational implications of the following concepts as they apply to SUPPRESSION POOL HIGH WATER TEMPERATURE : Steam condensation

Question: RO #40

Given:

- A LOCA has occurred.

Current plant conditions:

- Reactor Pressure is at 500 psig.
- Suppression Chamber pressure is 8.5 psig.
- Suppression Pool temperature is at 240°F.
- HC.OP-EO.ZZ-0102, "Primary Containment Control" has been entered.
- Emergency Depressurization has been implemented.

The action to Emergency Depressurize for the given conditions is to:

A. Prevent exceeding the Primary Containment Pressure limit or exceeding the Suppression Chamber design temperature.

B. Prevent exceeding the design maximum differential temperature between the Drywell and Suppression Chamber.

C. Assist the injection of sodium pentaborate into the RPV by SLC by lowering RPV pressure.

D. Prevent exceeding the capacity of the Suppression Chamber to Drywell vacuum breakers.

Proposed Answer: **A**

Explanation (Optional):

A: **CORRECT - To prevent exceeding the Primary Containment pressure limit or exceeding the Suppression Chamber design temperature.** Per the bases for steps SP/T-7 thru SP/T-10.

B: **INCORRECT - To prevent exceeding the design maximum differential temperature between the Drywell and Suppression Chamber following Emergency Depressurization.** The temperature of concern is the Suppression Chamber.

C: **INCORRECT - To assist the injection of sodium pentaborate into the RPV by SLC by lowering RPV pressure.** This is not a reason for ED for the conditions given.

D: **INCORRECT- Prevent exceeding the capacity of the Suppression Chamber to Drywell vacuum breakers**. This is not a reason for ED for the conditions given.

Technical Reference(s): HC.OP-EO.ZZ-0102- BASES t (Attach if not previously provided)

Proposed References to be provided (none)

Learning Objective: Given plant conditions and access to the Heat Capacity Temperature Limit curve, determine the region of acceptable operation and explain the bases for the curve (As available)

Question Source: Bank #

Modified Bank #

New **X**

Question History:

Question Cognitive Level: Memory

10 CFR Part 55 Content: 55.41 (10)

Comments: Question meets K/A because HC.OP-EO.ZZ-0102-BASES: Depressurizing the RPV when suppression pool temperature and RPV pressure cannot be maintained below the HCTL thus avoids failure of the containment (adequate steam condensation capabilities for the suppression pool) and equipment necessary for the safe shutdown of the plant.

Facility: Hope Creek

Vendor: GE

Exam Date: 2018

Exam Type: RO

Examination Outline Cross-reference:

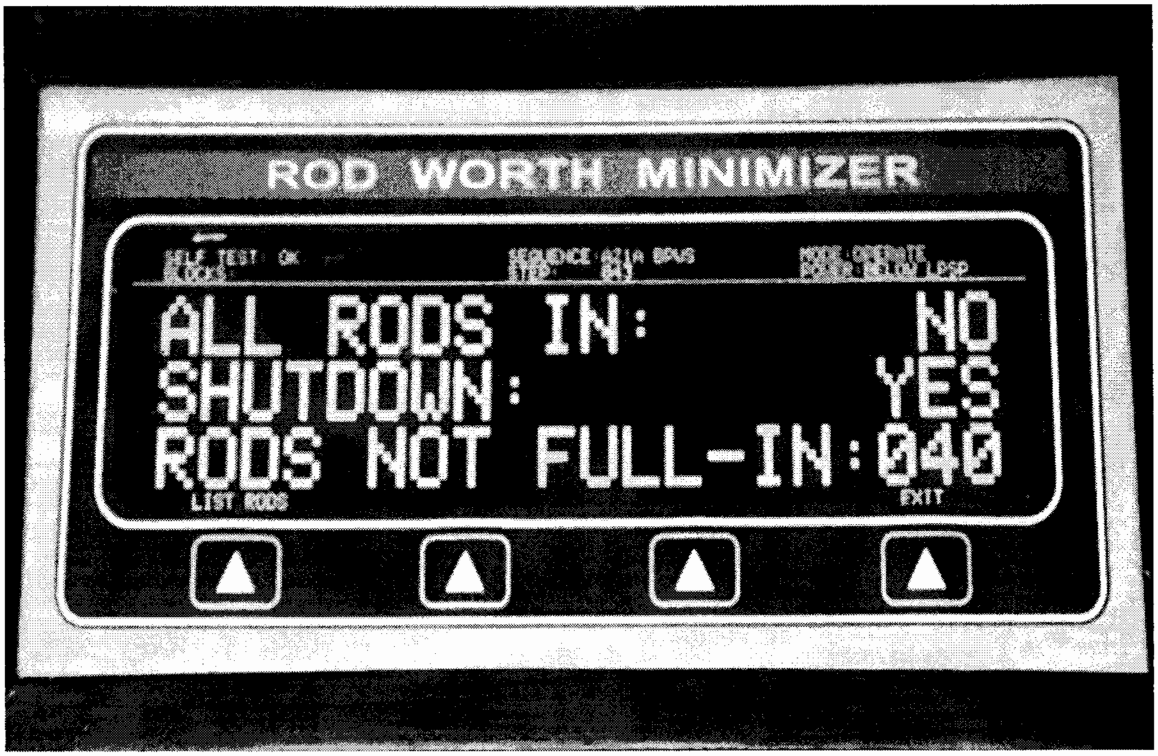
| Level | RO | SRO |
|---|---|---|
| Tier # | 1 | |
| Group # | 1 | |
| K/A # | 295006 | AK1.02 |
| Importance Rating | 3.4 | 3.7 |

K/A Statement: Knowledge of the operational implications of the following concepts as they apply to SCRAM : Reactivity control

Question: RO #41

Given:

- The plant was operating at 100% power when the reactor scrammed.
- Reactor pressure is 900 psig.
- ALL scram valves are open.




Based on the above conditions, the reactor is ____________________________.

A. only shutdown under hot conditions without boron, with forty control rods at position 02.

B. shutdown under all conditions without boron, with forty control rods out further than 02.

C. only shutdown under hot conditions without boron, with forty control rods out further than 02.

D. shutdown under all conditions without boron, with forty control rods at position 02.

Proposed Answer: **D**

Explanation (Optional): HC.OP-EO.ZZ-0101 (see attached) defines shutdown under all conditions without boron as either:
All rods inserted to the Maximum Subcritical Banked Withdrawal Position 02 or
All but one control rod fully inserted.
HC.OP-SO.SF-0003 Section 5.4 (see attached) states:
The ALL RODS IN indication will indicate NO if one or more rods is NOT at 00 or beyond.
The SHUTDOWN indication indicates YES IF the Shutdown Confirmation has been satisfied. The criteria is set to all rods inserted to position 02 OR beyond.

A: **Incorrect.** HC.OP-EO.ZZ-0101 defines shutdown under all conditions without boron as All rods inserted to the **Maximum Subcritical Banked Withdrawal Position – 02**. Hot shutdown conditions are only defined in terms of boron injected.

B: **Incorrect.** The reactor would NOT be shutdown under all conditions without boron if 40 rods were out further than 02 unless evaluated by RE. The **SHUTDOWN** indication indicates **YES** IF the Shutdown Confirmation has been satisfied. The criterion is set to all rods inserted to position **02 OR beyond**. (HC.OP-SO.SF-0003 Section 5.4)

C: **Incorrect.** Hot shutdown conditions are only defined in terms of boron injected. The reactor would NOT be shutdown under all conditions without boron if 40 rods were out further than 02 unless evaluated by RE. The **SHUTDOWN** indication indicates **YES** IF the Shutdown Confirmation has been satisfied. The criterion is set to all rods inserted to position **02 OR beyond**. (HC.OP-SO.SF-0003 Section 5.4)

D: **Correct- see above explanation.**

Technical Reference(s): HC.OP-EO.ZZ-0101-CONV, HC.OP-EO.ZZ-LIMITS-CONV, and HC.OP-EO.ZZ-0101-BASES Definition of "shutdown under all conditions without born" HC.OP-SO.SF-0003 Rod worth Minimizer Operation Section 5.4 (Attach if not previously provided)

Proposed References to be provided to applicants during examination: none

Learning Objective: Given a labeled drawing of, or access to, the RWM Operator Display on 10C651, or the RWM Computer Display (in the Computer Room) (NCO and Above): (As available)
a. Explain the function of each indicator.
b. Assess plant conditions, which will cause the indicator to light or extinguish.
c. Determine the effect of each control on the Rod Worth Minimizer.
d. Assess plant conditions or permissives required for the control switches/pushbuttons to perform their intended functions.

Define the term "Maximum Subcritical Banked Withdrawal Position" and state its value and explain it's significance.

Question Source: Bank #36201

Modified Bank # (Note changes or attach parent)

New

Question History: NRC Exam 2003

Question Cognitive Level: Comprehension or Analysis

10 CFR Part 55 Content: 55.41 (10)

Comments:

Facility: Hope Creek

Vendor: GE

Exam Date: 2018

Exam Type: RO

Examination Outline Cross-reference:

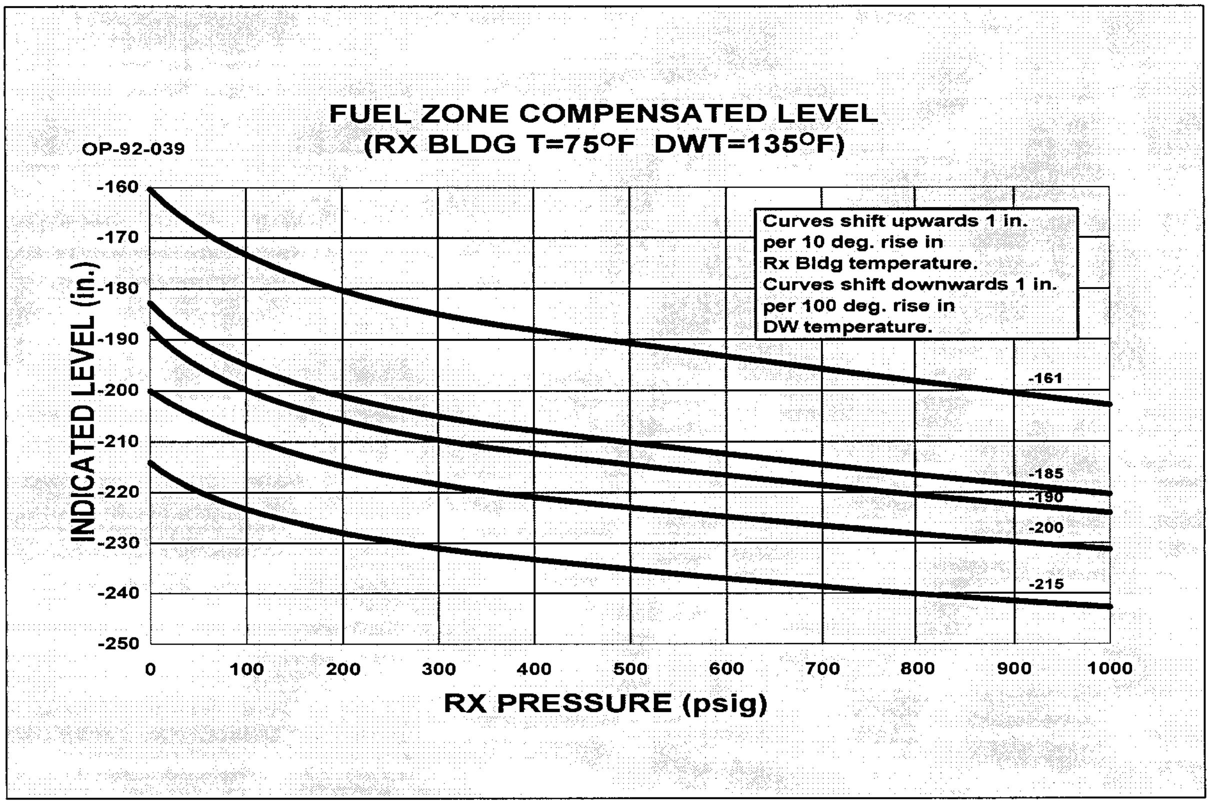
| Level | RO | SRO |
|---|---|---|
| Tier # | 1 | |
| Group # | 1 | |
| K/A # | 295031 | EK2.01 |
| Importance Rating | 4.4 | 4.4 |

K/A Statement: Knowledge of the interrelations between REACTOR LOW WATER LEVEL and the following: Reactor water level indication

Question: RO #42

Given:

- A LOCA concurrent with a Station Blackout has occurred.
- Fire water is being injected into the RPV.
- Reactor Pressure is steady at 100 psig.
- Reactor Building Temperature is steady at 105°F.
- Drywell Temperature is rising slowly at 285°F.
- Fuel Zone indicators LR-R615 and LI-R610 are reading -168 inches and steady.




Based on the above current conditions:

A. actual level is between Top of Active Fuel and -200 inches. Adequate core cooling is NOT assured.

B. actual level is above Top of Active Fuel. Adequate core cooling is assured.

C. actual level is between Top of Active Fuel and -200 inches. Adequate core cooling is assured.

D. actual level is below -200 inches. Adequate core cooling in NOT assured.

Proposed Answer: B

Explanation (Optional): This question is based on the interpretation and calculation of indicated level IAW the give graph "Fuel Zone Compensated Level".

- Uncompensated level is -168".
- RB Temp Correction: 105° - 75° = 30°
- DW Temp Correction: 285° - 135° = 150°
- TAF curves shift upwards 3" for a 30° F increase in RX Bldg temp
- TAF curves shift down 1.5" for a 150°F increase in Drywell Temp
- The resulting TAF curve at 100 psig is shifted upwards 1.5".
- The TAF Curve at 100 psig is -173".
- Shifting upwards 1.5" places the Curve at –171.5".
- Indicated level of -168" is 3.5" above the TAF Curve.

A: **Incorrect.** Actual compensated level is above TAF. Students may choose this distractor if they fail to compensate the indicated fuel zone water level and are not aware that under these conditions steam cooling would ensure adequate core cooling.

B: **Correct.** Actual compensated level is above TAF (-161") and therefore Adequate Core Cooling is assured.

C: **Incorrect.** Actual compensated level is above TAF (-161). Students may choose this distractor if they fail to compensate the indicated fuel zone water level.

D: **Incorrect.** Actual compensated level is above TAF (-161). Students may choose this distractor if they fail to compensate the indicated fuel zone water level.

Technical Reference(s): Contro Room Operator Aid OP-92- 039

Proposed References to be provided to applicants during examination: Stem of question

Learning Objective: Given a set of plant conditions, evaluate the capability of existing emergency core cooling systems to maintain adequate core cooling (As available)

Question Source: Bank #109457

Modified Bank # (Note changes or attach parent)

New

Question History:

Question Cognitive Level: Comprehension or Analysis

10 CFR Part 55 Content: 55.41 (7)

Comments:

Facility: Hope Creek

Vendor: GE

Exam Date: 2018

Exam Type: RO

| Examination Outline Cross-reference: | Level | RO | SRO |
|---|---|---|---|
| | Tier # | 1 | |
| | Group # | 1 | |
| | K/A # | 295037 EK2.02 | |
| | Importance Rating | 4.0 | 4.2 |

K/A Statement: Knowledge of the interrelations between SCRAM CONDITION PRESENT AND REACTOR POWER ABOVE APRM DOWNSCALE OR UNKNOWN and the following: RRCS: Plant-Specific

Question: RO #43

Given:

- The plant was at 100% power when a failure-to-scram with Main Steam Isolation Valve (MSIV) closure occurred.
- The pressure spike on the MSIV closure peaked at 1120 psig.

When the 3.9 minute timer times out for the Redundant Reactivity Control System:

- Reactor power is 16%.
- Reactor water level is -25 inches.
- Only CHANNEL B of the Redundant Reactivity Control System automatically initiates.
- No operator actions are taken.

Which of the following is the plant response for the given conditions?

A. Both SLC Pumps start, both Squib Valves fire and both the RWCU Isolation Valves (Inboard - F001 & Outboard - F004) close.

B. The "B" SLC Pump starts, the "B" Squib Valve fires and both the RWCU Isolation Valves (Inboard - F001 & Outboard - F004) close.

C. Both SLC Pumps start, both Squib Valves fire and only the RWCU Outboard Isolation Valve (F004) closes.

D. The "B" SLC Pump starts, the "B" Squib Valve fires and only the RWCU Outboard Isolation Valve (F004) closes.

Proposed Answer: **A**

Explanation (Optional):

A: **Correct.** IAW SO.SA-0001 3.3.4, the given conditions will result in SLC initiation signal from RRCS. IAW SO.BH-0001 3.3.2, either RRCS Channel will start both SLC pumps. IAW SO.BH-0001 3.1.4, if a SLC pump is started from any location other than local, the squib valve will fire. IAW SO.BG-0001 3.3.1, initiation of 'A' SLC will isolate the HV-F001 and initiation of 'B' SLC will isolate the HV-F004. Additionally, actuation of either RRCS Channel A or B SLC initiation will isolate both the HV-F001 and HV-F004.

B: **Incorrect.** One Channel of RRCS SLC actuation will initiate both SLC pumps and isolate both the HV-F001 and HV-F004. This distractor may be chosen if the student believes the SLC initiation is channel specific.

C: **Incorrect.** One Channel of RRCS SLC actuation will isolate both the HV-F001 and HV-F004. Also, initiation of 'B' SLC will isolate the HV-F004 independently. This distractor may be chosen if the student believes the RWCU isolation is channel specific.

D: **Incorrect.** One Channel of RRCS SLC actuation will initiate both SLC pumps and isolate both the HV-F001 and HV-F004. This distractor may be chosen if the student believes both the SLC initiation and RWCU isolation are channel specific.

Technical Reference(s): HC.OP-SO.SA-0001 (Attach if not previously provided)
HC.OP-SO.BH-0001
HC.OP-SO.BG-0001

Proposed References to be provided to applicants during examination: none

Learning Objective: From memory, predict the sequence of events which occur within the Redundant Reactivity Control System upon: (As available)
a. Automatic initiation in response to a high reactor vessel pressure condition with or without the APRM permissive.
b. Automatic initiation in response to a low reactor vessel water level condition with or without the APRM permissive.
c. Manual initiation with or without the APRM permissive. IAW available control room references.

Question Source: Bank # 34194

Modified Bank # (Note changes or attach parent)

New

Question History:

Question Cognitive Level: Analysis

10 CFR Part 55 Content: 55.41 (6)

Comments:

| | |
|---|---|
| Facility: | Hope Creek |
| Vendor: | GE |
| Exam Date: | 2018 |
| Exam Type: | RO |

Examination Outline Cross-reference:

| Level | RO | SRO |
|---|---|---|
| Tier # | 1 | |
| Group # | 1 | |
| K/A # | 295001 | AK2.01 |
| Importance Rating | 3.6 | 3.7 |

K/A Statement: Knowledge of the interrelations between PARTIAL OR COMPLETE LOSS OF FORCED CORE FLOW CIRCULATION and the following: Recirculation system

Question: RO #44

Given:

- The Reactor was operating at 100% rated power.

Then:

- RPT breakers AN205 and BN205 are tripped open as indicated by digital alarm point D2155.

Which of the following immediate actions are required IAW HC.OP-AB.RPV-0003, "Recirculation System" abnormal?

A. Insert Control Rods to clear APRM Upscale Alarms.

B. Determine actual core flow for "B" Reactor Recirculation Pump in single loop operation.

C. Lock the Reactor Mode Switch in the Shutdown position.

D. Ensure the A Recirculation MG Drive Motor Breaker has tripped.

Proposed Answer: C

Explanation (Optional): HC.OP-AB.RPV-0003 Immediate Actions
Condition: - No Recirc. Pumps running AND Operational Condition 1
Action - LOCK the Mode Switch in SHUTDOWN.

This question requires that the student recognize that there are no Recirculation Pumps running. The distracters employ subsequent actions of HC.OP-AB.RPV-0003 and HC.OP-AR.ZZ-0008 Attachment D3. (see attached)

Also, the student will have to be aware of the RPT breaker arrangement with AN205 and CN205 in series for the "A" Reactor Recirc. Pump. BN205 and DN205 in series for the "B" Reactor Recirc. Pump. (see attached MCR bezel indication for RPT breakers)

A: **Incorrect-** subsequent action steps for a tripped Recirc pump see HC.OP-AB.RPV-0003 Immediate Actions - no pumps running

B: **Incorrect-** subsequent action steps for a tripped Recirc pump see HC.OP-AB.RPV-0003 Immediate Actions - no pumps running

C: **Correct-** With AN205 and BN205 open there are no recirculation pumps running

D: **Incorrect-** subsequent action steps for a tripped Recirc pump see HC.OP-AB.RPV-0003 Immediate Actions - no pumps running

Technical Reference(s): HC.OP-AR.ZZ-0008 Attachment D3 (Attach if not previously provided)
HC.OP-AB.RPV-0003 Immediate operator actions and subsequent action steps for a tripped Reactor Recirc Pump.
Lesson Plan figure for the MCR Bezel indications for the Reactor Recirc. Pump RPT Breakers.

Proposed References to be provided to applicants during examination: none

Learning Objective: From memory, recall the Immediate Operator Actions for Recirculation System/Power Oscillations. (As available)

Question Source: Bank #33306

Modified Bank # (Note changes or attach parent)

New

Question History:

Question Cognitive Level: Memory or Fundamental Knowledge

10 CFR Part 55 Content: 55.41 (10)

Comments:

Facility: Hope Creek
Vendor: GE
Exam Date: 2018
Exam Type: RO

Examination Outline Cross-reference:

| Level | RO | SRO |
|---|---|---|
| Tier # | 1 | |
| Group # | 1 | |
| K/A # | 295016 AK3.03 | |
| Importance Rating | 3.5 | 3.7 |

K/A Statement: Knowledge of the reasons for the following responses as they apply to CONTROL ROOM ABANDONMENT : Disabling control room controls

Question: RO #45

HC.OP-IO.ZZ-0008, "SHUTDOWN FROM OUTSIDE CONTROL ROOM", Step 5.1.5 states, "ENSURE the following RSP Switches have been PLACED in EMER:"

Step E states, CHANNEL "NON-1E" TRANSFER, AND OBSERVE HV-F031B, Reactor Recirculation Pump BP201's Discharge Valve has Closed.

The purpose of Step E is to ______________________.

A. prevent shutdown cooling flow from bypassing the core.

B. ensure the "B" recirculation pump discharge valve can be reopened from the RSP.

C. allow for total core flow determination.

D. prevent a potential coolant leak due to a recirculation pump seal failure.

Proposed Answer: **A**

Explanation (Optional):

A: **Correct** - prevent shutdown cooling flow from bypassing the core. -The NON 1E TRANSFER SWITCH, when positioned to EMER will initiate closure of the B reactor recirculation pump discharge valve, HV-F031B. **This action prevents "short cycling" OR BYPASSING of shutdown cooling flow when established. Placing RSP switch in Emergency disables controls in the MCR.**

B: **Incorrect** - ensure the "B" recirc pump discharge valve can be reopened from the RSP. - SDC will be started on the "B" Loop, so the valve will remain closed.

C: **Incorrect** - allow for total core flow determination. - Total core flow determination does not require the discharge valve closed.

D: **Incorrect** - prevent a potential coolant leak due to a recirc seal failure. - No direction to close the suction valve.

Technical Reference(s): HC.OP-IO.ZZ-0008 - SHUTDOWN FROM OUTSIDE CONTROL ROOM (Attach if not previously provided)

Proposed References to be provided to applicants during examination: none

Learning Objective: Explain the basis for all Precautions, Limitations and Notes listed in the SHUTDOWN FROM OUTSIDE THE CONTROL ROOM Integrated Operating Procedure (As available)

Question Source: Bank #110929

Modified Bank # (Note changes or attach parent)

New

Question History:

Question Cognitive Level: Memory

10 CFR Part 55 Content: 55.41 (10)

Comments:

| | |
|---|---|
| Facility: | Hope Creek |
| Vendor: | GE |
| Exam Date: | 2018 |
| Exam Type: | RO |

| Examination Outline Cross-reference: | Level | RO | SRO |
|---|---|---|---|
| | Tier # | 1 | |
| | Group # | 1 | |
| | K/A # | 295025 EK3.06 | |
| | Importance Rating | 4.2 | 4.4 |

K/A Statement: Knowledge of the reasons for the following responses as they apply to HIGH REACTOR PRESSURE : Alternate rod insertion: Plant-Specific

Question: RO #46

Given:

- Reactor power is at 28%.

Then:

- The Main Turbine trips due to an EHC failure.
- Reactor pressure peaked at 1040 psig.
- The Mode Switch is locked in the Shut Down position.
- There is no control rod motion.
- The Scram Air header pressure is at 72 psig.

Manually initiate ARI (Alternate Rod Insertion) because ____________.

A. it failed to automatically initiate on High Reactor Pressure.

B. venting of the scram air header is required.

C. the Back-up Scram valves failed to de-energize.

D. the Scram Discharge Volume is full.

Proposed Answer: B

Explanation:

A: **Incorrect –** Setpoint for RRCS to initiate ARI is >1071 psig.

B: **Correct** – With the Mode Switch in SD and all rods not in the crew must transition to EOP-101A (see attached), where the verification of the scram air header is depressurized (ARI initiated) is the next step (the Turbine has already tripped).

C: **Incorrect –** RPS setpoint of 1037 psig will de-energize the scram air header vent valves except for the Back-up scram valves will actually **energize not de-energize** on a RPS trip through a 1E 125 VDC optical isolator.

D: **Incorrect** – Scram air header pressure has not depressurized therefore the SDV Vents and Drains are open, there is no confirmation in the question stem that the Scram Discharge Volume is full.

Technical Reference(s): HC.OP-EO.ZZ-0101A "ATWS-RPV Control
HC.OP-EO.ZZ-0101 "RPV Control"
HC.OP-SO.SA-0001

(Attach if not previously provided)

Proposed References to be provided to applicants during examination: none

Learning Objective: State the conditions for the ATWS - RPV Control Emergency Operating Procedure Entry. (As available)

Question Source: Bank #

Modified Bank # 36060 (Significant change to distractors and actual question)

New

Question History:

Question Cognitive Level:

Comprehension or Analysis

10 CFR Part 55 Content: 55.41 (10)

Comments:

Facility: Hope Creek

Vendor: GE

Exam Date: 2018

Exam Type: RO

| Examination Outline Cross-reference: | Level | RO | SRO |
|---|---|---|---|
| | Tier # | 1 | |
| | Group # | 1 | |
| | K/A # | 295038 K3.02 | |
| | Importance Rating | 3.9 | 4.2 |

K/A Statement: Knowledge of the reasons for the following responses as they apply to HIGH OFF-SITE RELEASE RATE: System isolations

Question: RO #47

Given:

Following a reactor scram from 100% power, the following procedures have been entered:

- HC.OP-AB.CONT-0004, "Radioactive Gaseous Release"
- HC.OP-EO.ZZ-0103/4," Reactor Building Control"
- HC.OP-EO.ZZ-0101, "RPV Control"
- Reactor water level reached -20 inches and is recovering.
- Drywell pressure peaked at 1.5 psig and is lowering.

Reactor Building Ventilation has isolated and FRVS has automatically initiated.

The Refuel Floor HVAC radiation level has peaked at 1.5 x $10^{-3}$ µCi/cc.

SELECT the reason why the Hydrogen/Oxygen Analyzer System has isolated.

A. reactor building vent exhaust high-high radiation.

B. high drywell pressure.

C. low reactor vessel water level.

D. refuel floor HVAC high-high radiation.

Proposed Answer: A

Explanation (Optional):

A: **Correct-** Isolation of the H2 O2 analyzers occurs on the RB Exh Hi rad exceeding 1 x $10^{-3}$ µCi/cc, not Refuel floor Hi rad. With FRVS in service as stated in the stem, the RBVS Exh Rad setpoint was exceeded.

B: **Incorrect-** Isolation of the H2 O2 analyzer system would not occur for the given conditions.

C: **Incorrect-** There is no indications of a reactor low level 2 which would isolate H2 O2 analyzers along with starting FRVS with the above procedures being implemented. Level is maintained between +12.5 inches and +54 inches IAW HC.OP-AB.ZZ-0000. No indication of a LOCA.

D: **Incorrect-** Isolation of the H2 O2 analyzers occurs on the RB Exh Hi rad exceeding 1 x $10^{-3}$ µCi/cc, not Refuel floor Hi rad.

Technical Reference(s): HC.OP-AB.CONT-0004 Radioactive Gaseous Release (Attach if not previously provided)
HC.OP-EO.ZZ-0103/4 Reactor Building Control
HC.OP-SO.GS-0002 Hydrogen/Oxygen Analyzer System Operation

Proposed References to be provided to applicants during examination: none

Learning Objective: Select the three parameters, including setpoints, which will automatically isolate the HOAS and predict the required operator action to: (As available)
a. Reset the isolation signal and restore the HOAS to service IAW control room references
b. Manually override the isolation signal and restore the HOAS to service IAW control room references

Question Source: Bank # 29978
Modified Bank # (Note changes or attach parent)
New

Question History:

Question Cognitive Level: Memory

10 CFR Part 55 Content: 55.41 (12)

Comments:

Facility: Hope Creek

Vendor: GE

Exam Date: 2018

Exam Type: RO

Examination Outline Cross-reference:

| Level | RO | SRO |
|---|---|---|
| Tier # | 1 | |
| Group # | 1 | |
| K/A # | 295005 AA1.03 | |
| Importance Rating | 2.7 | 2.8 |

K/A Statement: Ability to operate and/or monitor the following as they apply to MAIN TURBINE GENERATOR TRIP : Reactor manual control/Rod control and information system

Question: RO #48

Given:

- Reactor Power is 23%.
- First stage turbine pressure is 91.8 psig.
- Control rod 30-31 is selected at position 12.
- Assume NO operator actions.

Which one of the following describes the response of RMCS (Reactor Manual Control System) if the Main Turbine were to trip?

Reactor Manual Control System will ____________.

A. continue to bypass all RWM blocks due to the initial power and the effects of colder feedwater.

B. block all control rod movement because the reactor has scrammed.

C. allow control rod withdrawal using the Continuous Withdraw PB only.

D. enforce control rod blocks due to loss of First Stage Turbine pressure.

Proposed Answer: **A**

Explanation (Optional):

A: **CORRECT.** 23 percent power is above the upper limit of RWM Low Power Set Point or the power level that RWM enforces rod blocks. Above 20 percent, the blocks are bypassed and are indicated only. A turbine trip will cause reactor power to increase due to the positive reactivity effects of the loss of feedwater heating following the turbine trip.

B: **INCORRECT.** Reactor will not automatically scram. $\leq$ 98.1 psig first stage pressure is an Auto Bypass for Turbine Stop Valve Closure and Turbine Control Valve Fast Closure RPS Trips.

C: **INCORRECT.** Continuous Withdrawal requires both push buttons depressed simultaneously. CONTINUOUS WITHDRAWAL pushbutton when continuously depressed, in conjunction with the WITHDRAWAL pushbutton, the selected control rod will move in the withdrawal direction until one of the two pushbuttons is released.

D: **INCORRECT** First stage turbine pressure is not an input to cause rod blocks. It is an Auto Bypass for Turbine Stop Valve Closure and Turbine Control Valve Fast Closure RPS Trips. ($\leq$ 98.1 psig)

Technical Reference(s): HC.OP-SO.SF-0003 ROD WORTH MINIMIZER OPERATION
HC.OP-SO.SB-0001 REACTOR PROTECTION SYSTEM OPERATION
(Attach if not previously provided)

Proposed References to be provided to applicants during examination: none

Learning Objective: Given a control rod block signal, choose the setpoint for the control rod block and explain the conditions which bypass the control rod block. IAW available control room references. (As available)

Question Source: Bank #35507

Modified Bank # (Note changes or attach parent)

New

Question History: NRC Exam 2003

Question Cognitive Level: Comprehension or Analysis

10 CFR Part 55 Content: 55.41 (6)

Comments:

Facility: Hope Creek

Vendor: GE

Exam Date: 2018

Exam Type: RO

Examination Outline Cross-reference:

| Level | RO | SRO |
|---|---|---|
| Tier # | 1 | |
| Group # | 1 | |
| K/A # | 295018 | AA1.03 |
| Importance Rating | 3.3 | 3.4 |

K/A Statement: Ability to operate and/or monitor the following as they apply to PARTIAL OR COMPLETE LOSS OF COMPONENT COOLING WATER : Affected systems so as to isolate damaged portions

Question: RO #49

Given:

The plant was operating at 100% rated power. When the following indications were received:

- OHA A2-E2 RACS TROUBLE.
- RACS HEAD TANK 10T213 HI-HI- LEVEL alarm on 10C202.
- RM11 9RX500 RACS RMS Alarming at the Alert level.
- RWCU Differential Flow on 10C609/611 NUMACS is at 30 gpm and rising.

Based on these indications, which of the following actions is appropriate IAW HC.OP-AB.COOL-0003, "Reactor Auxiliary Cooling"?

A. Ensure the AP-HV-2041 is closed and the ED-HV-2616 is open.

B. Trip the RWCU pumps and close the BG-HV-F001, BG-HV-F004, and AE-HV-F039.

C. Close the EA-HV-2203, EA-HV-2204, EA-HV-2207, and EA-HV-2346.

D. Reduce Recirc Pump speed to minimum, lock the Mode Switch in SHUTDOWN, and trip both Reactor Recirc pumps.

Proposed Answer: **B**

Explanation (Optional):

A: **Incorrect-** These are actions for a lowering RACS head tank level, NOT a rising RACS head tank level.

B: **Correct-** Indications are of a leak from RWCU to RACS. HC.OP-AB.COOL-0003 directs tripping and isolating RWCU under these conditions. Conditions E2 and E3

C: **Incorrect-** These are actions for radioactive in-leakage into RACS that cannot be isolated and will ultimately require scramming the plant due to loss of RACS cooling. Isolation has not yet been attempted, so this action is not yet appropriate. HC.OP-AB.COOL-0003 condition E6.

D: **Incorrect-** These are actions for a loss of RACS cooling to recirc. This has not yet occurred.

Technical Reference(s): HC.OP-AB.COOL-0003 Reactor Auxiliary Cooling (Attach if not previously provided)

Proposed References to be provided to applicants during examination: none

Learning Objective: Given plant conditions and plant procedures, determine required actions of the retainment override(s) and subsequent operator actions in accordance with Reactor Auxillaries Cooling System. (As available)

Question Source: Bank # 64624

Modified Bank # (Note changes or attach parent)

New

Question History:

Question Cognitive Level: Comprehension or Analysis

10 CFR Part 55 Content: 55.41 (10)

Comments:

Facility: Hope Creek

Vendor: GE

Exam Date: 2018

Exam Type: RO

Examination Outline Cross-reference:

| Level | RO | SRO |
|---|---|---|
| Tier # | 1 | |
| Group # | 1 | |
| K/A # | 295024 EA1.16 | |
| Importance Rating | 3.4 | 3.4 |

K/A Statement: Ability to operate and/or monitor the following as they apply to HIGH DRYWELL PRESSURE: Containment/drywell vacuum breakers

Question: RO #50

Given:

- The plant is at 100% rated power

Then:

- A large break loss of coolant accident occurs.
- Drywell pressure reached a maximum of 22 psig.

Current plant conditions:

- Suppression chamber sprays have NOT been placed in service.
- Drywell sprays are in service.
- Drywell pressure is 4 psig and slowly lowering.
- Torus pressure is 5 psig and slowly lowering.
- FRVS is controlling Reactor Building pressure in the normal band.

Which of the following is the expected position of the Torus-to-Drywell Vacuum Breakers and the Reactor Building-to-Torus Vacuum Breakers for the given conditions?

A. The Torus-to-Drywell Vacuum Breakers are closed.
The Reactor Building-to-Torus Vacuum Breakers are closed.

B. The Torus-to-Drywell Vacuum Breakers are open.
The Reactor Building-to-Torus Vacuum Breakers are open.

C. The Torus-to-Drywell Vacuum Breakers are open.
The Reactor Building-to-Torus Vacuum Breakers are closed.

D. The Torus-to-Drywell Vacuum Breakers are closed.
The Reactor Building-to-Torus Vacuum Breakers are open.

Proposed Answer: C

Explanation (Optional):

A: **Incorrect.** With drywell sprays in service condensing the LOCA energy, drywell pressure should be decreasing at a faster rate than suppression chamber pressure. Torus-to-Drywell vacuum breakers will open when Drywell pressure is 0.5 psi below SC pressure.

B: **Incorrect.** RB-to-Torus vacuum Breakers open when Torus Pressure is 0.5 psi below RB pressure. With Torus pressure above 4 psi, RB-to-Torus vacuum Breakers will be closed.

C: **Correct.** With drywell sprays in service condensing the LOCA energy, drywell pressure should be decreasing at a faster rate than suppression chamber pressure. Torus-to-Drywell vacuum breakers will open when Drywell pressure is 0.5 psi below the SC pressure. RB-to-Torus vacuum Breakers open when Torus Pressure is 0.5 psi below RB pressure. With Torus pressure above 4 psi, they will be closed.

D: **Incorrect -** RB-to-Torus vacuum Breakers open when Torus Pressure is 0.5 psi below RB pressure. With Torus pressure above 4 psi, they will be closed.

Technical Reference(s): Primary Containment Structure NOH01PRICONC (Attach if not previously provided)

Proposed References to be provided to applicants during examination: none

Learning Objective: Given different initial primary containment parameters, analyze their effect on peak containment pressure and temperature during a LOCA. (As available)

Question Source: Bank #34301

Modified Bank # (Note changes or attach parent)

New

Question History: NRC 1999

Question Cognitive Level:

Comprehension or Analysis

10 CFR Part 55 Content: 55.41 (3)

Comments:

Facility: Hope Creek

Vendor: GE

Exam Date: 2018

Exam Type: RO

Examination Outline Cross-reference:

| Level | RO | SRO |
|---|---|---|
| Tier # | 1 | |
| Group # | 1 | |
| K/A # | 295030 EA2.01 | |
| Importance Rating | 4.1 | 4.2 |

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

Question: RO #51

Given:

- The plant is at 100% power when the Suppression pool level starts lowering.

If Suppression Pool level lowers to 50 inches ___________.

A. Torus vent header drain lines become uncovered.

B. Downcomer openings become uncovered.

C. SRV T-Quenchers become uncovered.

D. HPCI/RCIC exhaust lines become uncovered.

Proposed Answer: A

Explanation (Optional):
These Torus vent header drain pipes open into the torus at an indicated level of **50 IN**; this level is between the low level LCO and the level at which the downcomers become uncovered. It is prudent to take the anticipatory actions to shutdown the reactor prior to the uncovery of these drain pipes; therefore, a suppression pool water level of **55 inches** is conservatively used as the action limit. This is performed so that the reactor is shut down in anticipation of emergency RPV depressurization if suppression pool level cannot be maintained above **38.5 inches**. Downcomer vent legs become uncovered at **38.5 inches** (See attached EOP-102 BASES and RPV and Containment Information in HC.OP-AM.ZZ-0001).

A: **CORRECT-** See above explanation and attached EOP-102 BASES

B: **INCORRECT-** Downcomer vent legs become uncovered at **38.5 inches**.

C: **INCORRECT-** HPCI exhaust lines would be uncovered at **26 inches** see attached RPV & Containment diagram.

D: **INCORRECT-** HPCI exhaust lines would be uncovered at **26 inches** see attached RPV & Containment diagram.

Technical Reference(s): HC.OP-EO.ZZ-0102 Containment Control Suppression Pool Level (SP/L) leg and BASES HC.OP-AM.ZZ-0001 RPV and Containment Information. (Attach if not previously provided)

Proposed References to be provided to applicants during examination: none

Learning Objective: Given any step of the procedure, determine the reason for performance of that step and/or predict expected system response to control manipulations prescribed by that step IAW available control room references. (As available)

Question Source: Bank #

Modified Bank # (Note changes or attach parent)

New X

Question History:

Question Cognitive Level: Memory

10 CFR Part 55 Content: 55.41 (10)

Comments:

Facility: Hope Creek

Vendor: GE

Exam Date: 2018

Exam Type: RO

| Examination Outline Cross-reference: | Level | RO | | SRO |
|---|---|---|---|---|
| | Tier # | 1 | | |
| | Group # | 1 | | |
| | K/A # | 600000 | AA2.17 | |
| | Importance Rating | 3.1 | | 3.6 |

K/A Statement: Ability to determine and interpret the following as they apply to PLANT FIRE ON SITE: Systems that may be affected by the fire.

Question: RO #52

Given:

- The Plant is at 100% power.

Then:

- Overhead alarm A2-A5 "FIRE PROT PANEL 10C671" is received.
- The Fire Computer screen shows a fire in room 4208.
- The crew recognizes that HPCI has spuriously initiated.
- NO other control room overhead alarms are in.

**ATTACHMENT 2**
**FIRE LOCATION BY ROOM NUMBER**

| Room Number | LPCI/RHR | | | | Core Spray | | | | HPCI | RCIC | PCIG |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | A | B | C | D | A | B | C | D | | | |
| 4208 | | | | | | | | | ● | | |

Which one of the following actions is required, IAW HC.OP-AB.FIRE-0001 "Fire- Spurious Operations", for the above conditions?

A. Place HPCI flow controller in MANUAL and control speed > 2150 RPM IAW HC.OP-SO.BJ-0001 "HPCI Operation".

B. Place 'A' RHR in torus cooling due to HPCI being in-service IAW HC.OP-AB.ZZ-0001 "Transient Plant Conditions".

C. Terminate and prevent HPCI operation IAW HC.OP-AB.ZZ-0001 "Transient Plant Conditions".

D. Maintain reactor water level between level 4 and level 7 with HPCI in MANUAL IAW HC.OP-AB.RPV-0004 "Reactor Level Control".

Proposed Answer: C

Explanation (Optional): IAW HC.OP-AB.FIRE-0001 Condition B.4 (attached), IF HPCI is running due to a spurious signal, OR HPCI components are affected, THEN PERFORM the following: **TERMINATE AND PREVENT** HPCI IAW AB.ZZ-0001.

A: **INCORRECT**, Room 4208 houses cabling for 'A' channel ECCS components (see attached table) and it would not be prudent to keep HPCI in service. Also HPCI will be terminated and prevented IAW AB.FIRE-0001. Per the HPCI SOP, To prevent possible bearing damage or exhaust check valve "chatter" HPCI Turbine speed should be maintained > 2150 rpm. Normal operating speed is between 2150 rpm and 4150 rpm.

B: **INCORRECT**, Room 4208 houses cabling for 'A' channel ECCS components and it would not be prudent to place 'A' RHR in service. Also HPCI will be terminated and prevented IAW AB.FIRE-0001.

C: **CORRECT**, IAW AB.FIRE-0001 condition B.4, IF HPCI is running due to a spurious signal, OR HPCI components are affected, THEN PERFORM the following: **TERMINATE AND PREVENT** HPCI IAW AB.ZZ-0001.

D: **INCORRECT**, This action is for a reactor level control issue (Immediate Operator Action—AB.RPV-0004), which does not exist as evidenced by having no other OHA alarms annunciated. Room 4208 houses cabling for 'A' channel ECCS components and it would not be prudent to keep HPCI in service. Also HPCI will be terminated and prevented IAW AB.FIRE-0001.

Technical Reference(s): HC.OP-AB.FIRE-0001 Condition B.4 And Attachment 2 (Attach if not previously provided)

Proposed References to be provided to applicants during examination: none

Learning Objective: Given plant conditions and plant procedures, determine required actions of the retainment override(s) and subsequent operator actions in accordance with the Fire - Spurious Operations. (As available)

Question Source: Bank #136571

Modified Bank # (Note changes or attach parent)

New

Question History:

Question Cognitive Level: Comprehension or Analysis

10 CFR Part 55 Content: 55.41 (10)

Comments:

Facility: Hope Creek

Vendor: GE

Exam Date: 2018

Exam Type: RO

Examination Outline Cross-reference:

| Level | RO | SRO |
|---|---|---|
| Tier # | 1 | |
| Group # | 1 | |
| K/A # | 295021 AA2.03 | |
| Importance Rating | 3.5 | 3.5 |

K/A Statement: Ability to determine and/or interpret the following as they apply to LOSS OF SHUTDOWN COOLING : Reactor water level

Question: RO #53

Given:

- Shutdown Cooling has just been established with 'B' RHR following a forced shutdown IAW HC.OP-IO.ZZ-0004 ,"Shutdown From Rated Power to Cold Shutdown":
- Both recirculation pumps are secured.
- RPV pressure is 64 psig.
- Cooldown is continuing with steam flow to the Bypass Valves.

Then:

- A loss of shutdown cooling occurs and cannot be re-established.
- Current RPV level is at +97 inches on Shutdown Range indications.
- HC.OP-AB.RPV-0009, "Shutdown Cooling" and HC.OP-AB.RPV-0004, "Reactor Level Control" have been entered.

IAW HC.OP-AB.RPV-0009 and HC.OP-AB.RPV-0004, the MSIVs __________ and natural circulation has _____________.

A. must be closed; NOT been established.

B. can remain open; NOT been established.

C. must be closed; been established.

D. can remain open; been established.

Proposed Answer: **C**

Explanation (Optional):

A: **Incorrect** - Natural Circulation will occur >80" IAW HC.OP-IO.ZZ-0004.

B: **Incorrect** - Level is below the MSIVs but the MSIVs should have been closed at 90". IAW HC.OP-AB.RPV-0004/9. Natural Circulation will occur >80" IAW HC.OP-IO.ZZ-0004.

C: **Correct** - action E.3 states that 90" requires the MSIVs be closed and the MSLs flood at 118" IAW HC.OP-AB.RPV-0009 and action L IAW HC.OP-AB.RPV-0004. Natural Circulation will occur >80" IAW HC.OP-IO.ZZ-0004.

D: **Incorrect** -MSIVs should have been closed at 90". IAW HC.OP-AB.RPV-0004/9

Technical Reference(s): HC.OP-IO.ZZ-0004 ,"Shutdown From Rated Power to Cold Shutdown" (Attach if not previously provided)
HC.OP-AB.RPV-0009, "Shutdown Cooling"
HC.OP-AB.RPV-0004, "Reactor Level Control"

Proposed References to be provided to applicants during examination: none

Learning Objective: Explain the reasons for how plant/system parameters respond when implementing Shutdown Cooling (As available)

Question Source: Bank #

Modified Bank # 34078 (Significant changes to the answer and distractors in a two part question)

New

Question History:

Question Cognitive Level: Comprehension or Analysis

10 CFR Part 55 Content: 55.41 (10)

Comments:

Facility: Hope Creek

Vendor: GE

Exam Date: 2018

Exam Type: RO

| Examination Outline Cross-reference: | Level | RO | SRO |
|---|---|---|---|
| | Tier # | 1 | |
| | Group # | 1 | |
| | K/A # | 295019 | G2.4.18 |
| | Importance Rating | 3.3 | 4.0 |

K/A Statement: Emergency Procedures / Plan: Knowledge of the specific bases for EOPs. - Partial or Total Loss of Inst. Air.

Question: RO #54

Given:

- A reactor scram and MSIV isolation has occurred after an extended period of full power operation.
- All control rods fully inserted.

Then:

- A loss of PCIG and Instrument air supply for the Safety Relief Valves (SRV) occurs.
- A reactor depressurization / cooldown per HC.OP-EO.ZZ-0101,"Reactor Pressure Vessel Control" has been initiated.
- SRV's are being used for depressurization.

What operator action is required during the cooldown and what is the basis for the action?

A. The Lo - Lo Set SRV control switches should be placed in "AUTO" to maximize cooldown rate, including exceeding 100°F/hr. before valve operation is lost.

B. Sustained SRV opening should be utilized to conserve nitrogen in case an Emergency Depressurization is required by changing plant conditions.

C. The Lo - Lo Set SRV control switches should be placed in "AUTO" to conserve nitrogen for an Emergency Depressurization if required by changing plant conditions.

D. Sustained SRV opening should be utilized to maximize cooldown rate, including exceeding 100°F/hr. before valve operation is lost.

Proposed Answer: **B**

Explanation (Optional):

A: **INCORRECT -** This is similar to the actions specified for stabilizing pressure with SRVs when a loss of either Instrument Gas OR Instrument Air, but this is not the basis for sustained SRV operation due to loss of **all pneumatic controls** SRVs are operated so that the Cooldown Rate LCO (100°F/hr.) is NOT exceeded

B: **CORRECT -** Sustained opening conserves accumulator pressure when the source of pressure to the SRV pneumatic supply is isolated or otherwise out of service. Such action to reduce the number of cycles on the SRV prolongs SRV availability. HC.OP-EO.ZZ-0101-BASES, Step RC/P-6 Bases

C: **INCORRECT -** This is similar to the actions specified for stabilizing pressure with SRVs when a loss of either Instrument Gas OR Instrument Air, but this is not the basis for sustained SRV operation due to loss of **all pneumatic controls**.

D: **INCORRECT -** SRVs are operated so that the Cooldown Rate LCO (100°F/hr.) is NOT exceeded.

Technical Reference(s): HC.OP-EO.ZZ-0101-BASES, Step (Attach if not previously provided)
RC/P-6 Bases and RC/P-3 Bases

Proposed References to be provided to applicants during examination: none

Learning Objective: Given any step of the procedure, describe the reason for performance of that step and/or expected system response to control manipulations prescribed by that step. (As available)

Question Source: Bank #34379

Modified Bank # (Note changes or attach parent)

New

Question History:

Question Cognitive Level: Memory

10 CFR Part 55 Content: 55.41 (10)

Comments:

Facility: Hope Creek

Vendor: GE

Exam Date: 2018

Exam Type: RO

Examination Outline Cross-reference:

| Level | RO | SRO |
|---|---|---|
| Tier # | 1 | |
| Group # | 1 | |
| K/A # | 700000 G2.4.50 | |
| Importance Rating | 4.2 | 4.0 |

K/A Statement: Emergency Procedures / Plan: Ability to verify system alarm setpoints and operate controls identified in the alarm response manual: Generator Voltage and Electric Grid Disturbances

Question: RO #55

Given:

- The plant is at 100% rated power.

Then:

- SMD Alert of K7.
- ESOC Excess MVARS is in alarm.
- Salem Control Room calls to inform you that the Hope Creek DC ground current is elevated.
- A small marsh fire is observed burning 1 mile away from the 5015 Red Lion line.
- The fire department is monitoring the fire.

"B" Main Power Transformer (BX500) current conditions:

- Oil Temperature (Local) is 106°C.
- Winding Temperature (High Voltage) is 117°C.

Which of the following describes the plant status after action(s) is (are) complete? **[Reference attached]**

A. Main Generator online at a lower power level. All 500 Kv lines available.

B. Reactor scrammed, turbine tripped. All 500 Kv lines available.

C. Reactor scrammed, turbine tripped. 5015 line removed from service.

D. Main Gen online at a lower power level. 5015 line removed from service.

Proposed Answer: **A**

Explanation (Optional):

A: **Correct.** The given value of oil temperature for the BX500 Main Power Transformer is above the Alarm Setpoint but below the Maximum Value listed in Table 1 of HC.OP-AB.BOP-0004. Guidance in Condition C of the AOP is to reduce Generator Load to maintain this temperature below the Alarm Setpoint. A fire one mile from the 5015 line and burning away with the fire department monitoring does NOT represent an IMMEDIATE threat to the line. Line removal is not required under these conditions. Condition D and E of HC.OP-AB.BOP-0004.

B: **Incorrect.** A scram and turbine trip is not warranted for these conditions. The given value of oil temperature for the BX500 Main Power Transformer is above the Alarm Setpoint but below the Maximum Value listed in Table 1 of HC.OP-AB.BOP-0004.

C: **Incorrect.** A scram and turbine trip are not warranted for these conditions. Additionally, A fire one mile from the 5015 line and burning away with the fire department monitoring does NOT represent an IMMEDIATE threat to the line. Line removal is not required under these conditions.

D: **Incorrect**. A fire one mile from the 5015 line and burning away with the fire department monitoring does NOT represent an IMMEDIATE threat to the line. Line removal is not required under these conditions.

Technical Reference(s): HC.OP-AB.BOP-0004 GRID Disturbance (Attach if not previously provided)

Proposed References to be provided to applicants during examination: Pages 10-13 of HC.OP-AB.BOP-0004 (attached)

Learning Objective: Given plant conditions and plant procedures, determine required actions of the retainment override(s) and subsequent operator actions in accordance with Grid Disturbances (As available)

Question Source: Bank #56081

Modified Bank #

New

Question History:

Question Cognitive Level: Analysis

10 CFR Part 55 Content: 55.41 (10)

Comments:

Facility: Hope Creek

Vendor: GE

Exam Date: 2018

Exam Type: RO

Examination Outline Cross-reference:

| Level | RO | SRO |
|---|---|---|
| Tier # | 1 | |
| Group # | 1 | |
| K/A # | 295023 G2.4.9 | |
| Importance Rating | 3.8 | 4.2 |

K/A Statement: Emergency Procedures / Plan: Knowledge of low power / shutdown implications in accident (e.g., loss of coolant accident or loss of residual heat removal) mitigation strategies.

Question: RO #56

Given:

- The plant is shutdown.
- "B" SSW Pump is C/T.
- "B" RHR Loop is in Shutdown Cooling.

Then:

- "D" SSW Pump trips on overcurrent.
- HC.OP-AB.RPV-0009, "Shutdown Cooling" is entered.
- "A" RHR pump trips when attempting to place "A" RHR loop in Shutdown Cooling mode.
- The estimated time to recover the "B" SSW loop and/or the "A" and "B" RHR pumps is three hours.

Based on the current plant conditions, which one of following would be the **preferred** method to restore core circulation IAW HC.OP-AB.RPV-0009, "Shutdown Cooling"?

A. Place RWCU in alternate decay heat removal.

B. Start a Reactor Recirc pump to restore forced core flow.

C. Maintain RPV LVL ≥ 80 inches, BUT < 90 inches.

D. Place "C" RHR in alternate decay heat removal.

Proposed Answer: B

Explanation (Optional): IAW HC.OP-AB.RPV-0009 subsequent action C- RHR S/D Cooling CANNOT be established within 1 hour. The action is to **ENSURE** forced circulation in the core utilizing Reactor Recirc IAW SO.BB-0002 or an alternate method. **Reactor Recirc is preferred** as stated in subsequent action E- Forced Circulation CANNOT be established using **preferred RHR loops or Reactor Recirculation.** Then the action is to use the other modes of alternate decay heat removal that are given as the distractors (see attached).

A: **Incorrect-** Reactor Recirc is the preferred IAW subsequent operator action C (see attached). RWCU is a alternate decay heat removal however is not the preferred given that reactor Recirc is available.

B: **Correct-** see above explanation and the attached HC.OP-AB.RPV-0009.

C: **Incorrect-** Reactor Recirc is the preferred IAW subsequent operator action C (see attached). Natural circulation is a alternate decay heat removal however is not the preferred given that Reactor Recirc is available.

D: **Incorrect-** Reactor Recirc is the preferred IAW subsequent operator action C (see attached). 'C' RHR is an alternate decay heat removal however is not the preferred given that Reactor Recirc is available.

Technical Reference(s): HC.OP-AB.RPV-0009 Loss of Shutdown Cooling Subsequent actions C and E (Attach if not previously provided)

Proposed References to be provided to applicants during examination: none

Learning Objective: Given plant conditions and plant procedures, determine required actions of the retainment override(s) and subsequent operator actions in accordance with Shutdown Cooling. (As available)

Question Source: Bank #

Modified Bank # (Note changes or attach parent)

New X

Question History:

Question Cognitive Level:

Comprehension or Analysis

10 CFR Part 55 Content: 55.41 (10)

Comments:

Facility: Hope Creek

Vendor: GE

Exam Date: 2018

Exam Type: RO

| Examination Outline Cross-reference: | Level | RO | SRO |
|---|---|---|---|
| | Tier # | 1 | |
| | Group # | 1 | |
| | K/A # | 295003 AK3.05 | |
| | Importance Rating | 3.7 | 3.7 |

K/A Statement: Knowledge of the reasons for the following responses as they apply to PARTIAL OR COMPLETE LOSS OF A.C. POWER : Reactor SCRAM.

Question: RO #57

Given:

- The plant is performing a startup following a refuel outage.
- Rx Power is at 16%.
- The "A" Reactor Protection System (RPS) MG set is being returned to service following maintenance.
- RPS MG Set Transfer Switch is currently in "**ALT A**" position.

When the Reactor Operator places the RPS Bus transfer switch back to **"NORMAL"** under these conditions, which of the following would be the reason a Full Reactor Scram occurs?

A. APRM Channel "E" was full upscale

B. IRM Channel "F" was full upscale

C. IRM Channel "E" was full upscale

D. APRM Channel "F" was full upscale

Proposed Answer: D

Explanation (Optional):

A: **Incorrect:** APRM Channel **"E"** was full upscale, with an "E" APRM upscale, on the **A RPS logic**, would have had an input to a **A side RPS** Half-Scram. With the RPS Transfer switch taken back to Normal for the A RPS MG set would have been a **"break-before-make" (loss of A.C. power)** contact arrangement and would have inputted an **A side RPS** logic Half-Scram. With a A side Half-Scram already present would have only resulted in a **Half Scram signal**.(A1-A2).

B: **Incorrect:** IRM Channel **"F"** was full upscale, **with the mode switch in run (16% power) IRMs are bypassed** and no input to RPS trip logic.

C: **Incorrect:** IRM Channel **"E"** was full upscale, **with the mode switch in run (16% power) IRMs are bypassed** and no input to RPS trip logic.

D: **Correct:** APRM Channel **"F"** was full upscale, with an "F" APRM upscale, on the **B RPS logic**, would have had an input to a **B side RPS** Half-Scram. With the RPS Transfer switch taken back to Normal for the A RPS MG set would have been a **"break-before-make" (loss of A.C. Power)** contact arrangement and would have inputted an **A side RPS** logic Half-Scram. With a B side Half-Scram already present would have caused a **full reactor scram** signal.

Technical Reference(s): HC.OP-SO.SB-0001 RPS setpoints (Attach if not previously provided)

RPS Lesson Plan IRM and APRM channels

Proposed References to be provided to applicants during examination: none

Learning Objective: From memory, identify the parameters which initiate a Reactor Scram, list the scram initiation setpoints for each identified parameter, and determine when the parameter is bypassed. (As available)

Given the appropriate system operating procedure explain the effects on the reactor protection system when the power source is transferred from normal to alternate, and vice versa

Question Source: Bank #72694

Modified Bank # (Note changes or attach parent)

New

Question History:

Question Cognitive Level: Memory or Fundamental Knowledge

10 CFR Part 55 Content: 55.41 (7)

***Comments:***

IRM channels **A, C, E & G** input to **RPS "A"**; Channels **B, D, F & H** input to **RPS "B".**
APRM channels **A, C, E** input to **RPS "A"**; Channels **B, D, F** input to **RPS "B".**

Facility: Hope Creek

Vendor: GE

Exam Date: 2018

Exam Type: RO

| Examination Outline Cross-reference: | Level | RO | | SRO |
|---|---|---|---|---|
| | Tier # | 1 | | |
| | Group # | 1 | | |
| | K/A # | 295028 | EK1.02 | |
| | Importance Rating | 2.9 | | 3.1 |

K/A Statement: Knowledge of the operational implications of the following concepts as they apply to HIGH DRYWELL TEMPERATURE : Equipment environmental qualification

Question: RO #58

The design basis high drywell temperature limit takes into account the environmental qualification of which of these components?

(1) ADS
(2) Inboard MSIVs
(3) Torus to Drywell Vacuum Breakers
(4) Reactor Building to Torus Vacuum Breakers

A. (2) and (4) ONLY

B. (1) and (3) ONLY

C. (2) and (3) ONLY

D. (1) and (4) ONLY

Proposed Answer: B

Explanation (Optional):IAW HC.OP-EO.ZZ-0102BASES, **drywell spray** is required before both the maximum temperature at which **ADS** is qualified (UFSAR Table 5.2-6) and the drywell design temperature (UFSAR Table 1.3-4) limits are reached at 340°F. The suppression pool 124 inch maximum water level restriction on **drywell spray** applies to Hope Creek as the **suppression chamber-to-drywell vacuum breaker** penetrations are significantly below the top of the suppression chamber and as a result a significant volume of non-condensibles could be trapped if the suppression chamber is flooded. If the penetrations are submerged, the vacuum breakers cannot function as designed to relieve non-condensibles into the drywell and equalize drywell and suppression chamber pressures. Spray initiation is therefore permitted only when suppression pool water level is below the bottom of the vacuum breaker openings.

A: **INCORRECT-** see above explanation

B: **CORRECT**, IAW EOP-102 and UFSAR

C: **INCORRECT-** see above explanation

D: **INCORRECT-** see above explanation

Technical Reference(s): HC.OP-EO.ZZ-0102 BASES (Attach if not previously provided)

DW/T section discussion and basis.

Proposed References to be provided to applicants during examination: none

Learning Objective: From memory, explain the purpose of the Automatic Depressurization System (ADS). IAW available Control Room references.

Question Source: Bank #122249

Modified Bank # (Note changes or attach parent)

New

Question History:

Question Cognitive Level: Memory or Fundamental Knowledge

10 CFR Part 55 Content: 55.41 (6)

Comments:

Facility: Hope Creek

Vendor: GE

Exam Date: 2018

Exam Type: RO

| Examination Outline Cross-reference: | Level | RO | SRO |
|---|---|---|---|
| | Tier # | 1 | |
| | Group # | 2 | |
| | K/A # | 295032 | K1.03 |
| | Importance Rating | 3.5 | 3.9 |

K/A Statement: Knowledge of the operational implications of the following concepts as they apply to HIGH SECONDARY CONTAINMENT AREA TEMPERATURE: Secondary containment leakage detection: Plant Specific.

Question: RO #59

Given:

- The plant is at 100% power when the Main Steam Tunnel Temperature starts to rise.

Which of the following indicates a leak requiring entry into HC.OP-AB.BOP-0005, "Main Steam Tunnel Temperature" abnormal?

A. B1-A5 HPCI STEAM LINE DIFF PRESSURE HI alarm.

B. Rise in Steam flow indication.

C. Rising North Plant Vent radiation levels.

D. Lowering reactor feed pump speed.

Proposed Answer: B

Explanation (Optional): HC.OP-AB.BOP-0005, Indications: (attached)

1. Rising temperatures in the Main Steam Tunnel Area
2. Elevated Feedwater Flow
3. Elevated Main Steam Line Flow

A: **INCORRECT -** This is an indication of a HPCI leak, which would be in the HPCI Pipe Chase, not the Main Steam tunnel. This steam leak would not cause the steam tunnel temperature rise.

B: **CORRECT -** A steam leak in the MSL area could cause a noticeable rise in indicated steam flow, and rising steam flow is listed as an indication per BOP-0005.

C: **INCORRECT -** Main steam tunnel exhausts to the South Plant vent.See indications AB.BOP-005.

D: **INCORRECT -**A steam leak in the MSL area could cause a noticeable drop in reactor level feed pumps will speed up to maintain level at setpoint. Rising feedwater flow is indication listed in AB.BOP-0005.

Technical Reference(s): HC.OP-AB.BOP-0005 Main Steam Tunnel Temperature (Attach if not previously provided)

Proposed References to be provided to applicants during examination: none

Learning Objective: Recognize abnormal indications/alarms and/or procedural requirements for implementing Main Steam Tunnel Temperature. (As available)

Question Source: Bank #157292

Modified Bank # (Note changes or attach parent)

New

Question History:

Question Cognitive Level:

Memory

10 CFR Part 55 Content: 55.41 (10)

Comments:

Facility: Hope Creek

Vendor: GE

Exam Date: 2018

Exam Type: RO

| Examination Outline Cross-reference: | Level | RO | SRO |
|---|---|---|---|
| | Tier # | 1 | |
| | Group # | 2 | |
| | K/A # | 295008 AK2.08 | |
| | Importance Rating | 3.4 | 3.5 |

K/A Statement: Knowledge of the interrelations between HIGH REACTOR WATER LEVEL and the following: Main turbine: Plant-Specific.

Question: RO #60

Given:

- The plant is operating at 100% rated power.

When:

- Annunciators A7-B5 "RPV LEVEL 7" and A7-A5 "RPV LEVEL 8" alarm.

Current plant conditions:

- All Reactor Narrow Range Level indicate +58 inches.
- The Main Turbine did NOT trip.

Which of the following actions is required?

A. Lock the Mode Switch in Shutdown and enter HC.OP-EO.ZZ-0101A, "ATWS".

B. Take manual control of Feedwater flow and lower reactor water level within the normal band.

C. Trip the Main Turbine and enter HC.OP-EO.ZZ-0101A, "ATWS".

D. Lock the Mode Switch in Shutdown, Trip the Main Turbine AND enter HC.OP-EO.ZZ-0101, "RPV Control" and/or HC.OP-AB.ZZ-0000, "Reactor Scram".

Proposed Answer: D

Explanation (Optional):

A: **INCORRECT**: Not a failure to scram condition. RPS is not challenged if the Main Turbine has not tripped. **+12.5 inches** RPV level is a RPS Scram setpoint. RPV level is high not low.

B: **INCORRECT**:. Retainment override of AB.RPV -0004 (attached) requires Locking the Mode Switch in Shutdown **>+50 inches** RPV Level. Taking manual control of feedwater level and maintaining level between **+30 inches** and **+39 inches** RPV level is the immediate operator actions for AB.RPV-0004 (attached). However, since level is **>+50 inches**, the retainment override action applies.

C: **INCORRECT**:. Not a failure to scram condition.. RPS is not challenged if the turbine has not tripped. **+12.5 inches** RPV level is a RPS Scram setpoint. RPV level is high not low. Automatic Main turbine trip did not occur, trip the main turbine upon failure of the automatic action. However the reactor must be scrammed first as directed by AB-RPV-0004 at **>+50 inches** RPV level. Since level is above this value, the retainment override action applies.

D: **CORRECT**: Retainment override of AB.RPV -0004 (attached) requires Locking the Mode Switch in Shutdown **>+50 inches** RPV Level. Since level is above this value, the retainment override action applies. After the scram EOP-101 (attached) entry may be expected on +12.5" entry and if not then entry into AB-0000 (attached) Reactor Scram will be required, and then take actions to trip the Main Turbine.

Technical Reference(s): HC.OP-AB.RPV-0004 Reactor Level Control Immediate Operator actions and Retainment Overrides (Attach if not previously provided)

HC.OP-EO.ZZ-0101 RPV Control Entry conditions

HC.OP-AB.ZZ-0000 Reactor Scram direction to Trip the Main Turbine.

Proposed References to be provided to applicants during examination: none

Learning Objective: Recognize abnormal indications/alarms and/or procedural requirements for implementing Main Turbine. (As available)

Recognize abnormal indications/alarms and/or procedural requirements for implementing Reactor Level Control.

Question Source: Bank #35696

Modified Bank # (Note changes or attach parent)

New

Question History:

Question Cognitive Level:

Comprehension or Analysis

10 CFR Part 55 Content: 55.41 (10)

Comments:

Facility: Hope Creek

Vendor: GE

Exam Date: 2018

Exam Type: RO

| Examination Outline Cross-reference: | Level | RO | SRO |
|---|---|---|---|
| | Tier # | 1 | |
| | Group # | 2 | |
| | K/A # | 295036 EK3.01 | |
| | Importance Rating | 2.6 | 2.8 |

K/A Statement: Knowledge of the reasons for the following responses as they apply to SECONDARY CONTAINMENT HIGH SUMP/AREA WATER LEVEL : Emergency Depressurization.

Question: RO #61

Given:

- The reactor was operating at 100% rated power.

Current plant conditions:

- The crew is implementing HC.OP-EO.ZZ-0103/4 “Reactor Building & Rad Release Control”.
- The CRS has directed the crew to Emergency Depressurize the reactor.

Which of the following would be a condition and the reason for the Emergency Depressurization?

A. Two Reactor Building rooms at Max Normal Op Floor Level; to reduce the primary system pressure to its lowest possible energy state by rejecting heat to the suppression pool.

B. Two Reactor Building rooms at Max Safe Op Floor Level; to reduce the primary system pressure to maintain HPCI and RCIC available for injection.

C. Two Reactor Building rooms at Max Safe Op Floor Level; to reduce the primary system pressure to its lowest possible energy state by rejecting heat to the suppression pool.

D. Two Reactor Building rooms at Max Normal Op Floor Level; to reduce primary system pressure to maintain HPCI and RCIC available for injection.

Proposed Answer: C

Explanation: IAW HC.OP-EO.ZZ-0103/4 BASES (see attached) RB-18 WHEN the same parameter exceeds its **Max Safe Op Limit in 2 OR more areas** then Emergency Depressurize.
RPV depressurization places the primary system in its **lowest possible energy state**, **rejects heat to the suppression pool** in preference to outside the containment, and reduces the driving head and flow of primary systems that are un-isolated and discharging into the reactor building.

**Rapid Depressurization**- In cases where only HPCI/RCIC are available for RPV injection, reactor pressure is required to maintain RPV injection. Therefore, **full depressurization of the reactor is prohibited since it will result in a loss of the only available RPV injection sources.**

A: **Incorrect-** Max Safe Op Limit versus Max Normal Op Limit.

B: **Incorrect-** Bases for Rapid Depressurization.

C: **Correct-** See above explanation.

D: **Incorrect-** Max Safe Op Limit versus Max Normal Op Limit. Bases for Rapid Depressurization.

Technical Reference(s): .HC.OP-EO.ZZ-0103/4 BASES (Attach if not previously provided)

Proposed References to be provided to applicants during examination: none

Learning Objective: Given a set of plant conditions, analyze and determine if entry conditions into HC.OP-EO.ZZ-0103/4 exists. (As available)

Define the term "Maximum Safe Floor Level".

Given any step in the procedure, describe the reason for performance of that step and/or expected system response to control manipulations prescribed by the step.

Question Source: Bank #

Modified Bank # (Note changes or attach parent)

New X

Question History:

Question Cognitive Level: Memory

10 CFR Part 55 Content: 55.41 (10)

Comments:

Facility: Hope Creek

Vendor: GE

Exam Date: 2018

Exam Type: RO

| Examination Outline Cross-reference: | Level | RO | SRO |
|---|---|---|---|
| | Tier # | 1 | |
| | Group # | 2 | |
| | K/A # | 295015 | AA1.01 |
| | Importance Rating | 3.8 | 3.9 |

K/A Statement: Ability to operate and/or monitor the following as they apply to INCOMPLETE SCRAM : CRD Hydraulics

Question: RO #62

Given:

- The plant scrammed from 100 percent power.
- 3 control rods remain at position 48.
- The scram has not been reset.

What CRD System lineup is required for the above conditions?

A. Two pump operation with the Flow Control Valve in Manual.

B. One pump operation with the Flow Control Valve in Automatic.

C. One pump operation with the Flow Control Valve in Manual.

D. Two pump operation with the Flow Control Valve in Automatic.

Proposed Answer: **C**

Explanation (Optional):

A: **Incorrect:** Two pump operation with the Flow Control Valve in Manual. Lineup for LOCA RPV emergency makeup two pump operation Section 5.4. The plant is in a ATWS condition with 3 rods at position 48.

B: **Incorrect:** One pump operation with the Flow Control Valve in Automatic. Lineup for normal operations. The plant is in a ATWS condition with 3 rods at position 48.

C: **Correct:** One pump operation with the Flow Control Valve in Manual. IAW Section 5.10 ATWS CRD Operation of HC.OP-SO.BF-0001 CRD Hydraulic Operation. The plant is in a ATWS condition with 3 rods at position 48.

D: **Incorrect:** Two pump operation with the Flow Control Valve in Automatic. No procedure supports this line up. The plant is in a ATWS condition with 3 rods at position 48.

Technical Reference(s): HC.OP-SO.BF-0001 CRD Hydraulic System Operations (Attach if not previously provided)

Proposed References to be provided to applicants during examination: none

Learning Objective: Given plant problems/industry events associated with the Control Rod Drive Hydraulic System: (As available)

a. Discuss the cause/root cause of the plant problem/industry event.

b. Discuss the HCGS design and/or procedural guidelines that mitigate/reduce the likelihood of the plant problem/industry event at HCGS.

c. Discuss the "lessons learned" from the plant problem/industry event.

Question Source: Bank #54093

Modified Bank # (Note changes or attach parent)

New

Question History:

Question Cognitive Level: Comprehension

10 CFR Part 55 Content: 55.41 (10)

Comments:

Facility: Hope Creek

Vendor: GE

Exam Date: 2018

Exam Type: RO

Examination Outline Cross-reference:

| Level | RO | SRO |
|---|---|---|
| Tier # | 1 | |
| Group # | 2 | |
| K/A # | 295022 AA2.03 | |
| Importance Rating | 3.1 | 3.2 |

K/A Statement: Ability to determine and/or interpret the following as they apply to LOSS OF CRD PUMPS : CRD mechanism temperatures

Question: RO #63

Given:

- The plant is at 100% rated power.

Then:

- The "A" CRD pump trips and the "B" CRD pump will NOT start.

Which one of the following describes the initial effect on the plant due to the loss of the CRD pumps?

A. Control Rod Drive mechanism temperatures will begin to rise.

B. Multiple Control Rods will immediately begin to drift.

C. The Control Rods can still be SCRAMMED, but the insertion time will be significantly longer.

D. The Control Rods will NOT fully SCRAM with RPV pressure alone due to pressure equalization across the drive piston.

Proposed Answer: **A**

Explanation (Optional):

A: **Correct.** Loss of flow will decrease cooling water header pressure leading to rising CRD mechanism temperatures. HC.OP-AR.ZZ-0011 C6-C3 - CRD HYDR UNIT TEMP HI Setpoint 250°F. Operator Action: CHECK Cooling Water Flow at 63 gpm if not adjust FIC-R600 as necessary. (Pumps tripped will cause cooling water flow to be 0 gpm).

B: **Incorrect.** Control Rod drifts will not occur immediately.

C: **Incorrect**. Insertion times will remain approximately the same with HCUs operable.

D: **Incorrect.** The HCU is charged with N2 to provide sufficient pressure for a full scram. Loss of pumps will not affect the scram ability with RPV pressure.

Technical Reference(s): (Attach if not previously provided)

HC.OP-AR.ZZ-0011

OVERHEAD ANNUNCIATOR WINDOW BOX C6

Proposed References to be provided to applicants during examination: none

Learning Objective: From memory, explain the adverse effects of a partial/full loss of cooling water flow to the CRD Mechanisms with the reactor operating at rated temperature and pressure conditions. (As available)

Question Source: Bank #119574

Modified Bank # (Note changes or attach parent)

New

Question History:

Question Cognitive Level: Comprehension or Analysis

10 CFR Part 55 Content: 55.41 (6)

Comments:

Facility: Hope Creek

Vendor: GE

Exam Date: 2018

Exam Type: RO

| Examination Outline Cross-reference: | Level | RO | | SRO |
|---|---|---|---|---|
| | Tier # | 1 | | |
| | Group # | 2 | | |
| | K/A # | 295035 | 2.4.11 | |
| | Importance Rating | 4.0 | | 4.2 |

K/A Statement: Knowledge of abnormal condition procedures: Secondary Containment High Differential Pressure.

Question: RO #64

Given:

- The plant is at 100% rated power.

When:

- Reactor Building ΔP (vacuum) can NOT be maintained > 0.30 inches WG.

Current plant conditions:

- Overhead alarm E6-B5 RB PRESSURE HI/LO is in alarm.
- NO release is in progress.

Which is the correct order of actions to be taken IAW HC.OP-AB.CONT-0003, “Reactor Building” to maintain a negative Secondary Containment ΔP?

A. Start four FRVS Recirculation Fans
Direct the RBVS System to be removed from service
Start an FRVS Vent Fan

B. Direct the RBVS System to be removed from service
Start an FRVS Vent Fan
Start four FRVS Recirculation Fans

C. Start an FRVS Vent Fan
Start four FRVS Recirculation Fans
Direct the RBVS System to be removed from service

D. Start an FRVS Vent Fan
Direct the RBVS System to be removed from service
Start four FRVS Recirculation Fans

Proposed Answer: D

Explanation (Optional): IAW HC.OP-AB.CONT-0003 Reactor Building (attached) Condition A: RBVS CANNOT maintain a Reactor Building vacuum of at least 0.30 inches WG. A.2 If RBVS cannot maintain Rx Bldg vacuum > 0.30 inches WG, Then **place FRVS in service** IAW HC.OP-AB.ZZ-0001 Transient Plant Conditions Attachment 20 **The FRVS vent fan is first action taken in the sequence. This will ensure a negative pressure in the RB when the RBVS System is removed from service. (see attached)**

A: **Incorrect-** FRVS Vent Fan must be started first to maintain a negative Secondary Containment D/P.

B: **Incorrect-** FRVS Vent Fan must be started first to maintain a negative Secondary Containment D/P.

C: **Incorrect-** RBVS System is remove before placing four FRVS Recirculation fans in service IAW HC.OP-AB.ZZ-0001 Attachment 20.

D: **Correct-** The FRVS vent fan is first action taken in the sequence. This will ensure a negative pressure in the RB when the RBVS System is removed from service. Then IAW HC.OP-AB.ZZ-0001 Attachment 20 Four FRVS Recirculation Fans are placed in service.

Technical Reference(s): HC.OP-AB.CONT-0003 Condition A

HC.OP-AB.ZZ-0001 Attachment 20

Proposed References to be provided to applicants during examination: none

Learning Objective: Recognize abnormal indications/alarms and/or procedural requirements for implementing Reactor Building Integrity. (As available)

Question Source: Bank #

Modified Bank # 117106 (see attached: changed stem of the actual question and the answer to reflect the actual order of the RO to the field operator)

New

Question History: NRC 2009/2016

Question Cognitive Level: Memory or Fundamental Knowledge

10 CFR Part 55 Content: 55.41 (10)

Comments:

Facility: Hope Creek

Vendor: GE

Exam Date: 2018

Exam Type: RO

Examination Outline Cross-reference:

| Level | RO | SRO |
|---|---|---|
| Tier # | 1 | |
| Group # | 2 | |
| K/A # | 295010 AA1.02 | |
| Importance Rating | 3.6 | 3.6 |

K/A Statement: Knowledge of the reasons for the following responses as they apply to HIGH DRYWELL PRESSURE: Drywell floor and equipment drain sumps.

Question: RO #65

Given:

- The reactor has scrammed on High Drywell pressure.
- Drywell Floor Drain Sump pumps (CP267/DP267) have stopped running.
- Drywell pressure continues to rise.
- No operator actions have been taken.

Under these conditions, which ONE of the following caused the Drywell Floor Drain Sump pumps to stop running?

A. The power source to the pumps is load shed.

B. The HB-HV-5258 DRYWELL FLOOR DRN PMPS DSCH VLV has failed closed.

C. The Drywell Leak Detection (DLD) Sump Monitoring System has failed.

D. The Reactor Recirc Seal Staging flow is isolated.

Proposed Answer: **A**

Explanation (Optional):

A: **Correct-** The power supplies to the CP267 and DP267 are 252064 and 262064, respectively. These MCCs are **load shed** on High Drywell Pressure.

B: **Incorrect-** The HV-5258 is interlocked to open on a start of either CP267 or DP267; however, it is NOT a permissive for the pumps to run. If it failed shut it would prevent the pumps from pumping, but it would NOT prevent them from running.

C: **Incorrect-** The DLD SMS does not control operation of the drywell sump pumps.

D: **incorrect-** Reactor Recirc Seal Staging flow is directed to the Drywell Equipment Drain Sump. Loss of this flow input would have no effect on the DWFDS.

Technical Reference(s): HC.OP-SO.SM-0001 Table SM-20 (Attach if not previously provided)

Proposed References to be provided to applicants during examination: none

Learning Objective: Function of each indicator (As available)
The conditions that will cause the indicator to light or extinguish Effect of each control switch on the Radwaste System Conditions or permissive required for the control to perform their intended function

Question Source: Bank #33498

Modified Bank # (Note changes or attach parent)

New

Question History:

Question Cognitive Level: Analysis

10 CFR Part 55 Content: 55.41 (7)

Comments:

Facility: Hope Creek

Vendor: GE

Exam Date: 2018

Exam Type: RO

Examination Outline Cross-reference:

| Level | RO | SRO |
|---|---|---|
| Tier # | 3 | |
| Group # | 3 | |
| K/A # | 2.1.8 | |
| Importance Rating | 3.4 | 4.1 |

K/A Statement: Ability to coordinate personnel activities outside the control room.

Question: RO #66

Given:

- The plant is at 80% power with power ascension in progress.

Then:

- 'A' Reactor Recirculation Pump scoop tube is tripped.
- Local adjustment (from the MG set) of Reactor Recirculation Pump 'A' speed is required.

Which of the following describes the MINIMUM requirements to perform this evolution IAW plant procedure and processes?

A. Communications with the operator at the scoop tube ONLY prior to and after making the scoop tube adjustments; the operator must be Licensed.

B. Constant communications with the operator moving the scoop tube; the operator may be a Non-Licensed Operator under the cognizance of a Licensed Operator.

C. Communications with the operator at the scoop tube ONLY prior to and after making the scoop tube adjustments; the operator may be a Non-Licensed Operator under the cognizance of a Licensed Operator.

D. Constant communication with the operator moving the scoop tube; the operator must be Licensed.

Proposed Answer: D

Explanation (Optional): (see attached requirements for local scoop tube operation)

A: **Incorrect.** Must maintain constant communication

B: **Incorrect.** An RO license required.

C: **Incorrect.** An RO license required.

D: **Correct.** Must maintain constant communication RO license is minimum requirement since moving the scoop tube directly changes reactivity. (see attached procedures)

Technical Reference(s): HC.OP-SO.BB-0002 (Attach if not previously provided)

Reactor Recirculation System Operation

OP-AA-103-102
Watchstanding Practices

Proposed References to be provided to applicants during examination: none

Learning Objective: Given procedure HC.OP-SO.BB-0002, (As available) Reactor Recirculation System Operation, explain the bases for listed precautions and limitations.

From Memory Determine who is permitted (including conditions) to manipulate controls which directly or indirectly affect reactivity or power level, IAW OP-AA-103-102

Question Source: Bank #

Modified Bank # (Note changes or attach parent)

New X

Question History:

Question Cognitive Level: Memory or Fundamental Knowledge

10 CFR Part 55 Content: 55.41 (10)

Comments:

Facility: Hope Creek

Vendor: GE

Exam Date: 2018

Exam Type: RO

| Examination Outline Cross-reference: | Level | RO | SRO |
|---|---|---|---|
| | Tier # | 3 | |
| | Group # | 3 | |
| | K/A # | 2.1.23 | |
| | Importance Rating | 4.3 | |

K/A Statement: Ability to perform specific system and integrated plant procedures during all modes of plant operation.

Question: RO #67

Given:

T=0

- A plant startup is in progress IAW HC.OP-IO.ZZ-0003, "Startup from Cold Shutdown to Rated Power".
- The reactor is critical with all IRMs operable on range 7.
- Reactor pressure is at 60 psig.
- Heat up is in progress using DEHC when the Main Turbine Bypass valves fail closed.

T=20 minutes

- Reactor pressure is 75 psig.
- All IRMs are on range 4.
- SRM period indicators are reading infinity.
- Estimated time to repair DEHC (Digital Electro Hydraulic Controls) is 1 hour from now.

Which one of the following actions is required for the current conditions?

A. Select all SRMS and insert to full in simultaneously.

B. Lock the Mode Switch in Shutdown.

C. Insert control rods IAW the shutdown sequence.

D. Withdraw control rods using Single Notch.

Proposed Answer: C

Explanation (Optional): From the given information the student has to recognize that the plant is at "Sustained Subcritical Conditions" and IAW section 5.2.19 of HC.OP-IO.ZZ-0003 that the crew needs to INSERT all control rods IAW the Shutdown Sequence (see attached).

A: **Incorrect** - Required to select 1 SRM at a time and insert it to 100 - 10,000 cps. IRM range 4 would be too high for full insertion. .(see attached section 5.2.19).

B: **Incorrect** - At least 6 IRMs are operable on Range 2 or higher. .(see attached section 5.2.19).

C: **Correct** - Critical conditions will not commence in the next 30 minutes.(see attached section 5.2.19).

D: **Incorrect** - Would be correct after DEHC is repaired.

Technical Reference(s): HC.OP-IO.ZZ-0003 (Attach if not previously provided)

Startup from Cold Shutdown to Rated Power

Proposed References to be provided to applicants during examination: none

Learning Objective: (As available)

Question Source: Bank #67138

Modified Bank # (Note changes or attach parent)

New

Question History:

Question Cognitive Level:

Comprehension or Analysis

10 CFR Part 55 Content: 55.41 (10)

Comments:

Facility: Hope Creek

Vendor: GE

Exam Date: 2018

Exam Type: RO

Examination Outline Cross-reference:

| Level | RO | SRO |
|---|---|---|
| Tier # | 3 | |
| Group # | 2 | |
| K/A # | 2.2.1 | |
| Importance Rating | 4.5 | 4.4 |

K/A Statement: Ability to perform pre-startup procedures for the facility, including operating those controls associated with plant equipment that could affect reactivity.

Question: RO #68

Given:

- The plant is shutdown with 'B' RHR in shutdown cooling.
- Stroke time testing must be performed on the discharge valve (BB-HV-F031A) of the 'A' Reactor Recirculation Pump prior to commencing the plant startup.

What actions (if any) can be taken to allow this evolution to take place and why must this action be taken?

A. Secure 'B' RHR. As long as RPV vessel level is offscale high on all Narrow Range instruments, shutdown cooling may be secured and the recirculation discharge valve stroked without potential problem of loss of decay heat removal and vessel stratification.

B. This evolution can only be performed after the 'B' Recirc pump is placed in service and establishment of forced circulation through the vessel is established. System configuration does NOT permit valve stroking with shutdown cooling in service.

C. NO actions can be taken. System Operating procedures for both Recirculation system and RHR system prohibit the opening of Recirculation pump discharge valves while RHR is in shutdown cooling, to prevent potential core bypass flow and vessel stratification.

D. Prior to stroking the discharge valve on 'A' Recirculation pump, the suction valve must be verified closed, and the suction valve's power supply breaker open. This prevents potential core bypass flow and vessel stratification.

Proposed Answer: D

Explanation (Optional): IAW HC.OP-IO.ZZ-0002 section 3.2.5
The discharge valve of any Reactor Recirculation Pump which is NOT in operation should remain closed throughout Shutdown Cooling operations. IF it is required to stroke the discharge valve of an out-of-service Reactor Recirculation Pump, the pump's **suction valve should be verified to be closed** and the suction **valve's power supply breaker open.**

A: **Incorrect** The 'RPV vessel level' is wrong because minimum level for natural circulation is +80" which is well above the Narrow Range detector capability to read, and does not assure the appropriate level.

B: **Incorrect** The 'can only' distractor is wrong because the word "only " is used, along with the combination of RHR and Recirc pump combinations would still require the suction valve closed while stoking the valve
.

C: **Incorrect** This condition is allowed provided there is no bypass Flowpath (i.e. suction and discharge valve closed).
.

D: **Correct-** see above explanation.

Technical Reference(s): HC.OP-IO.ZZ-0002 section 3.2.5 (Attach if not previously provided)

Proposed References to be provided to applicants during examination: none

Learning Objective: Analyze plant conditions and parameters to determine if plant operation is in accordance with the PREPARATION FOR PLANT STARTUP Integrated Operating Procedure, supporting System Operating Procedures and Technical Specifications. (As available)

Question Source: Bank #116614

Modified Bank # (Note changes or attach parent)

New

Question History:

Question Cognitive Level:

Memory or Fundamental Knowledge

10 CFR Part 55 Content: 55.41 (10)

Comments:

| | |
|---|---|
| Facility: | Hope Creek |
| Vendor: | GE |
| Exam Date: | 2018 |
| Exam Type: | RO |

Examination Outline Cross-reference:

| Level | RO | SRO |
|---|---|---|
| Tier # | 3 | |
| Group # | 2 | |
| K/A # | 2.2.39 | |
| Importance Rating | 3.9 | 4.5 |

K/A Statement: Knowledge of less than or equal to one hour Technical Specification action statements for systems.

Question: RO #69

Given:

The plant is operating at 75% power and you note the following readings while taking logs at the start of your shift:

- Drywell average temperature is 137°F.
- Drywell Pressure is 1.2 psig.
- Suppression Pool water level is 74 inches.

Which of the following must be restored to within Technical Specifications limits within ONE hour to preclude further actions?

A. Drywell Average Temperature AND Suppression Pool Level AND Drywell Pressure.

B. Suppression Pool Level AND Drywell Pressure ONLY.

C. Drywell Average Temperature AND Suppression Pool Level ONLY.

D. Suppression Pool Level ONLY.

Proposed Answer: D

Explanation (Optional): IAW TS 3.6.2.1(see attached) - The suppression chamber shall be OPERABLE: With an indicated water level between 74.5" and 78.5".
Per Action a) With the suppression chamber water level outside the above limits, restore the water level to **within the limits within 1 hour** or be in at least HOT SHUTDOWN within the next 12 hours and in COLD SHUTDOWN within the following 24 hours.

A: **Incorrect**. – Action is required in 8 hours for exceeding Drywell average temperature limits (3.6.1.7) and within 1 hour if DW pressure exceeds 1.5 psig (3.6.1.6).

B: **Incorrect.** - Action is required within 1 hour if DW pressure exceeds 1.5 psig (3.6.1.6).

C: **Incorrect**. – Action is required in 8 hours for exceeding Drywell average temperature limits (3.6.1.7).

D: **Correct-** The suppression chamber shall be OPERABLE: With an indicated water level between 74.5" and 78.5". Restore the water level to **within the limits within 1 hour (3.6.2.1).**

Technical Reference(s): T.S. 3.6.2.1 Suppression Chamber (Attach if not previously provided)

Proposed References to be provided to applicants during examination: none

Learning Objective: Given specific plant operating conditions which require operator actions within 1 hour From Memory select the correct Technical Specification action(s) for the following:
Depressurization Systems - Suppression Chamber, TS 3.6.2.1.- OpCon 1, 2, 3 (As available)

Question Source: Bank #119942

Modified Bank # (Note changes or attach parent)

New

Question History: NRC 2009

Question Cognitive Level: Memory or Fundamental Knowledge

10 CFR Part 55 Content: 55.41 (10)

Comments:

Facility: Hope Creek

Vendor: GE

Exam Date: 2018

Exam Type: RO

Examination Outline Cross-reference:

| Level | RO | SRO |
|---|---|---|
| Tier # | 3 | |
| Group # | | |
| K/A # | 2.2.22 | |
| Importance Rating | 4.0 | 4.7 |

K/A Statement: Knowledge of limiting conditions for operations and safety limits.

Question: RO #70

Given:

- Reactor power is at 50% rated power.

Then:

- ALL Turbine Bypass Valves fail OPEN.
- The MSIVs FAIL to automatically close.
- The MSIVs are closed manually.

Prior to MSIV closure, which of the following combinations of reactor power and reactor pressure would indicate that a safety limit violation had occurred?

| | Reactor Power | RPV Pressure |
|---|---|---|
| A. | 28% | 770 psig |
| B. | 40% | 800 psig |
| C. | 32% | 790 psig |
| D. | 22% | 760 psig |

Proposed Answer: A

Explanation (Optional):

A: **Correct-** Power is greater than 24% with pressure less than 785 psig.

B: **Incorrect-** Pressure is greater than 785 psig so no indication of a safety limit violation.

C: **Incorrect-** Pressure is greater than 785 psig so no indication of a safety limit violation.

D: **Incorrect-** Power is less than 24% with pressure less than 785 psig.

Technical Reference(s): HCGS Tech Specs- 2.1.1 (Attach if not previously provided)

Proposed References to be provided to applicants during examination: none

Learning Objective: State the four (4) Safety Limits in terms of conditions. (As available)

Question Source: Bank #34237

Modified Bank # (Note changes or attach parent)

New

Question History:

Question Cognitive Level: Memory or Fundamental Knowledge

10 CFR Part 55 Content: 55.41 (5)

Comments:

Facility: Hope Creek

Vendor: GE

Exam Date: 2018

Exam Type: RO

Examination Outline Cross-reference:

| Level | RO | SRO |
|---|---|---|
| Tier # | 3 | |
| Group # | | |
| K/A # | 2.3.4 | |
| Importance Rating | 3.2 | 3.7 |

K/A Statement: Knowledge of radiation exposure limits under normal or emergency conditions.

Question: RO #71

Given:

- An operator's current year exposure at Hope Creek is 125 mrem for the calendar year.
- In that same calendar year the operator received:
  - 400 mrem documented dose while working in an international nuclear power plant as part of an exchange program.
  - A non-occupational X-ray, which would be the equivalent of 250 mrem.
- With NO exposure limit extensions authorized for this operator.

Which of the following, list the MAXIMUM additional non-emergency Total Effective Dose Equivalent (TEDE) IAW RP-AA-203 “Exposure Control and Authorization”, that this individual can receive at Hope Creek for the remainder of the year?

A. 1225 mrem

B. 1475 mrem

C. 1725 mrem

D. 1975 mrem

Proposed Answer: B

Explanation (Optional): The student has to know that the TEDE limit for Hope Creek is 2000 mrem/year and that the TEDE is calculated using occupational dose and NOT non-occupational dose (X-ray). The 400 mrem from the international plant with documentation will be added into the total for TEDE. **400 + 125 = 525 mrem, 2000 - 525 = 1475 mrem.** Also, if there was an dose extension then the extension goes in **500 mrem** increments (RP-AA-203). So the distractors would be calculated using **2500 mrem** for yearly dose.

A: **Incorrect-** The X-ray is an non-occupational dose and would not be included in the TEDE calculation **400 + 125 = 525 mrem, 2000 - 525 = 1475 mrem.**

B: **Correct- 400 + 125 = 525 mrem, 2000 - 525 = 1475 mrem.**

C: **Incorrect-** There are no dose extensions (2500 mrem/year) and the TEDE limit is 2000 mrem/year. The X-ray is an non-occupational dose and would not be included in the TEDE calculation. **400 + 125 = 525 mrem, 2000 - 525 = 1475 mrem.**

D: **Incorrect-** There are no dose extensions (2500 mrem/year) and the TEDE limit is 2000 mrem/year. **400 + 125 = 525 mrem, 2000 - 525 = 1475 mrem.**

Technical Reference(s): RP-AA-203 Exposure Control and Documentation Section 4.1.2 and 4.2.2 (Attach if not previously provided)

Proposed References to be provided to applicants during examination: none

Learning Objective: (As available)

Question Source: Bank #85318

Modified Bank # (Note changes or attach parent)

New

Question History:

Question Cognitive Level: Memory or Fundamental Knowledge

10 CFR Part 55 Content: 55.41 (12)

Comments:

Facility: Hope Creek

Vendor: GE

Exam Date: 2018

Exam Type: RO

Examination Outline Cross-reference:

| Level | RO | SRO |
|---|---|---|
| Tier # | 3 | |
| Group # | | |
| K/A # | 2.4.25 | |
| Importance Rating | 3.3 | 3.7 |

K/A Statement: Knowledge of fire protection procedures.

Question: RO #72

Given:

- A fire has occurred on the refuel floor.

Which of the following describes actions required to pressurize a hose reel on the refuel floor?

A. Valves must be opened from the control room to pressurize the reactor building fire header.

B. Withdrawing the hose from the reel will automatically pressurize the hose.

C. Stand Pipe and Water Hose Station Isolation valves must be manually opened.

D. The control room must manually start the fire pump.

Proposed Answer: C

Explanation (Optional): IAW HC.OP-AR.QK-0002 Fire Protection Status Panel 10C671 Alarm Response, for a fire in the Reactor Building, Stand Pipes and Water Hose Isolation Valves need to be **manually** opened. (see attached Actions from HC.OP-AR.QK-0002)

A: **Incorrect:** The valves are **manually** opened locally IAW HC.OP-AR.QK-0002.

B: **Incorrect:** The header is not maintained pressurized. Manual valves normally closed.

C: **Correct:** For a fire in the Reactor Building, Stand Pipes and Water Hose Isolation Valves need to be **manually** opened. (see attached Actions from HC.OP-AR.QK-0002)

D: **Incorrect:** The pumps **automatically** operate on pressure switches. The valves would have to be manually opened to pressurize the header for the Reactor Building.

Technical Reference(s): HC.OP-AR.QK-0002 (Attach if not previously provided)

Fire Protection Status Panel 10C671
Alarm Response

Proposed References to be provided to applicants during examination: none

Learning Objective: Identify actions that would be required to effectively utilize fire hoses for firefighting in the Reactor Building. (As available)

Question Source: Bank #34145

Modified Bank # (Note changes or attach parent)

New

Question History: NRC 2015

Question Cognitive Level: Memory or Fundamental Knowledge

10 CFR Part 55 Content: 55.41 (10)

Comments:

| | |
|---|---|
| Facility: | Hope Creek |
| Vendor: | GE |
| Exam Date: | 2018 |
| Exam Type: | RO |

Examination Outline Cross-reference:

| Level | RO | SRO |
|---|---|---|
| Tier # | 3 | |
| Group # | | |
| K/A # | 2.4.21 | |
| Importance Rating | 4.0 | 4.6 |

K/A Statement: Knowledge of the parameters and logic used to assess the status of safety functions, such as reactivity control, core cooling and heat removal, reactor coolant system integrity, containment conditions, radioactivity release control, etc.

Question: RO #73

Given:

- An event has occurred.
- "B" RHR loop is operating in Suppression Pool Cooling and Spray Mode.
- Suppression Chamber pressure is approaching "0" psig.

Which one of the following is required and why is that action taken?

A. BEFORE Suppression Chamber pressure reaches "0" psig, Terminate Suppression Chamber Sprays. This will preclude drawing air in from the Reactor Building via the Rx Building to Torus vacuum breakers.

B. WHEN Suppression Chamber pressure reaches "0" psig, Terminate Suppression Chamber Sprays. This will ensure a negative pressure in the drywell to torus Downcomers is maintained.

C. BEFORE Suppression Chamber pressure reaches "0" psig, Terminate Suppression Chamber Sprays. This will ensure a negative pressure in the drywell to torus Downcomers is maintained.

D. WHEN Suppression Chamber pressure reaches "0" psig, Terminate Suppression Chamber Sprays. This will preclude drawing air in from the Reactor Building via the Rx Building to Torus vacuum breakers.

Proposed Answer: A

Explanation (Optional): Suppression pool spray operation must be terminated by the time suppression chamber pressure decreases to 0 psig to ensure that primary containment pressure is not reduced below atmospheric. Maintaining a positive pressure precludes air intake through the vacuum relief system to de-inert the primary containment and also provides a positive margin to the negative design pressure of the primary containment. Terminating sprays **"before...0 psig"** permits use of the sprays for fission product scrubbing at low pressures or if the containment has failed, yet still avoids negative containment pressures. (see attached HC.OP-EO.ZZ-0102 BASES for EOP-102 PCC-1 Overrides step)

A: **Correct** – IAW EOP 102 step PCC-1 and EOP bases above.

B: **Incorrect –** BEFORE – not WHEN and reason not IAW EOP bases above.

C: **Incorrect** – reason not IAW EOP bases above.

D: **Incorrect** - BEFORE – not WHEN.

Technical Reference(s): HC.OP-EO.ZZ-0102-BASES (Attach if not previously provided)

EOP Bases Document

Proposed References to be provided to applicants during examination: none

Learning Objective: Given any step of the procedure, determine the reason for performance of that step and/or predict expected system response to control manipulations prescribed by that step. (As available)

Question Source: Bank #120294

Modified Bank # (Note changes or attach parent)

New

Question History:

Question Cognitive Level: Memory or Fundamental Knowledge

10 CFR Part 55 Content: 55.41 (10)

Comments:

Facility: Hope Creek

Vendor: GE

Exam Date: 2018

Exam Type: RO

Examination Outline Cross-reference:

| Level | RO | SRO |
|---|---|---|
| Tier # | 3 | |
| Group # | | |
| K/A # | 2.3.14 | |
| Importance Rating | 3.4 | 3.8 |

K/A Statement: Knowledge of radiation or containment hazards that may arise during normal, abnormal, or emergency conditions or activities.

Question: RO #74

Given:

- The plant is at 100% rated power.
- Maintenance is being performed adjacent to the Main Steam Lines.
- The maintenance is scheduled to be completed at the end of the shift (12 hour shift).

Which of the following describes the direction provided in HC.OP-IO.ZZ-0006 "Power Changes During Operation", regarding the Hydrogen Water Chemistry (HWCI) System operations?

The Hydrogen Water Chemistry (HWCI) System may be ________________.

A. removed from service due to ALARA conditions and remain out of service for as short a time period as possible with continuous monitoring of reactor coolant conductivity and/or Offgas RMS.

B. removed from service 2 days prior to the start of the maintenance due to ALARA conditions with continuous monitoring of reactor coolant conductivity and/or Offgas RMS and return to service at the completion of the maintenance.

C. left in service due to no ALARA conditions present for the maintenance being performed and the importance of preventing Intergrannular stress corrosion crack (IGSCC) growth.

D. removed from service due to ALARA conditions and remain out of service for a maximum of 10 days with continuous monitoring of reactor coolant conductivity and/or Offgas RMS.

Proposed Answer: A

Explanation (Optional): (See attached Precaution of HC.OP-IO.ZZ-0006)

A: **Correct-** Intergrannular stress corrosion crack (IGSCC) may reinitiate after about 8 hours without HWCI.

B: **Incorrect-** The HWCI outages should be infrequent, and as short as possible, and preferably shorter than 8 hours. The maintenance is scheduled to completion in 12 hours.

C: **Incorrect**- If ALARA conditions warrant, the HWCI System **may be shutdown** to perform maintenance or operations. The maintemenace is being performed by the Main Steam Lines. This is an ALARA condition.

D: **Incorrect-** The HWCI outages should be infrequent, and as short as possible, and preferably shorter than 8 hours. The maintenance is scheduled to completion in 12 hours. Samples are not required.

Technical Reference(s): HC.OP-IO.ZZ-0006 (Attach if not previously provided)
Power Changes During Operations
HC.CH-SO.AX-0001
Hydrogen/Air Injection System Operation

Proposed References to be provided to applicants during examination: none

Learning Objective: Explain the Precautions, Limitations and Notes listed in the POWER CHANGES DURING OPERATION Integrated Operating Procedure. (As available)

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

Question History:

Question Cognitive Level:
Memory or Fundamental Knowledge

10 CFR Part 55 Content: 55.41 (10)

Comments:

Facility: Hope Creek

Vendor: GE

Exam Date: 2018

Exam Type: RO

Examination Outline Cross-reference:

| Level | RO | SRO |
|---|---|---|
| Tier # | 3 | |
| Group # | | |
| K/A # | 2.4.42 | |
| Importance Rating | 2.6 | 3.8 |

K/A Statement: Knowledge of emergency response facilities.

Question: RO #75

Given:

- There was an Unusual Event declared due to a fire in the Auxiliary Building.
- The Unusual Event has been upgraded to an Alert.

The activation of the Operations Support Center (OSC) **is required** due to declaring _____ (1) _____.

On-Site Assembly **is required** due to declaring _____ (2) _____.

A. (1) the Unusual Event
(2) the Alert

B. (1) the Alert
(2) the Alert

C. (1) the Alert
(2) the Unusual Event

D. (1) the Unusual Event
(2) the Unusual Event

Proposed Answer: B

Explanation (Optional): (See attached) The OSC is not required at the U.E. level unless it is due to a Security event, since there is no Security event the OSC is required along with the TSC at the Alert level and the on-site assembly is required at the Alert level. EOF and accountability is at the S.A.E. level.

A: **Incorrect-** On-Site Assembly is required for the Alert Level. The OSC activation is required at the Alert level.

B: **Correct-** On-Site Assembly is required for the Alert Level. The OSC activation would also be required at the Alert level. (No Security Event)

C: **Incorrect-** On-Site Assembly is required for the Alert Level. The OSC activation is required at the Alert Level.

D: **Incorrect-**. On-Site Assembly and OSC activation is required for the Alert Level with no Security Event in progress..

Technical Reference(s): NEPOVERVIEWC (Attach if not previously provided)

Emergency Preparedness Overview
NC.EP-EP.ZZ-0102 Tables and Attachments

Proposed References to be provided to applicants during examination: none

Learning Objective: List the four emergency classifications and what happens during the classification including: (As available)

- Facilities activated
- Facilities staffed

Question Source: Bank #

Modified Bank # (Note changes or attach parent)

New X

Question History:

Question Cognitive Level: Memory or Fundamental Knowledge

10 CFR Part 55 Content: 55.41 (10)

Comments:

Facility: Hope Creek

Vendor: GE

Exam Date: 2018

Exam Type: SRO

Examination Outline Cross-reference:

| Level | RO | SRO |
|---|---|---|
| Tier # | | 1 |
| Group # | | 1 |
| K/A # | | 295006/2.4.30 |
| Importance Rating | | 4.1 |

K/A Statement: Knowledge of events related to system operation/status that must be reported to internal organizations or external agencies, such as the State, the NRC, or the transmission system operator.

Question: SRO #76

Given:

- A reactor scram occurred due to a level transient where RPV level reached -68 inches.
- HPCI Aux Oil Pump failed to start for an unknown reason.
- RCIC automatically initiated and restored level.

With the above conditions and IAW 10 CFR 50.72, what is the earliest reporting requirement?

A. 1 hour report.

B. 4 Hour report.

C. 8 Hour report.

D. 24 Hour report.

Proposed Answer: B

Explanation (Optional):

A: **INCORRECT-** Would be correct if RPV Level Safety Limit reached or Emergency Classification of UE, Alert, SAE, or GE reached.

B: **CORRECT** - valid ECCS actuation has or should have occurred and a scram occurred and Actuation of RPS unplanned IAW RAL 11.3.1 and 11.3.2

C: **INCORRECT-** Would be correct if malfunctioning Aux Oil Pump was found prior to the event. 11.2.2.b

D: **INCORRECT-** 4 Hour report is shorter reporting requirement. 24 hour is IAW 11.11.1 for transmission line loss.

Technical Reference(s): RAL 11.3.1 (Attach if not previously provided)

Proposed References to be provided to applicants during examination: EALs and RALs

Learning Objective: ECG/E-Plan/Fire & Medical Questions: Knowledge of the reasons for the following responses as they apply to the implementation of site emergency plan. (As available)

Question Source: Bank #35520

Modified Bank # (Note changes or attach parent)

New

Question History:

Question Cognitive Level: Analysis

10 CFR Part 55 Content:

55.43 (5)

Comments:

Facility: Hope Creek

Vendor: GE

Exam Date: 2018

Exam Type: SRO

| Examination Outline Cross-reference: | Level | RO | SRO |
|---|---|---|---|
| | Tier # | | 1 |
| | Group # | | 1 |
| | K/A # | | 295037/EA2.02 |
| | Importance Rating | | 4.2 |

K/A Statement: Ability to determine and/or interpret the following as they apply to SCRAM CONDITION PRESENT AND REACTOR POWER ABOVE APRM DOWNSCALE OR UNKNOWN : Reactor water level

Question: SRO #77

Given:

- The plant was operating at rated conditions and a manual scram was inserted due to a sudden degradation in condenser vacuum.
- The Mode Switch was LOCKED in SHUTDOWN.

Current plant conditions:

- Two rods remain FULL OUT.
- Drywell pressure at 0.9 psig and stable.
- RPV Level is +15 inches and stable.
- Suppression Pool temperature is 106°F and stable.
- ALL APRM DOWNSCALE lights are illuminated.

Based on the above conditions, the required RPV level band IAW EOPs is _________.

A. +12.5" and +54" IAW EOP-101, "RPV Control".

B. -129" to -185" IAW EOP-101A, "ATWS RPV Control".

C. -129" and +54" IAW EOP-101, "RPV Control".

D. -185" to +54" IAW EOP-101A, "ATWS RPV Control".

Proposed Answer: **D**

Explanation (Optional):

A: +12.5" and +54" IAW EOP-101, RPV Control. **INCORRECT** - EOP-101A is implemented because the reactor is NOT considered Shutdown under all conditions without boron. The level band is incorrect IAW EOP-101A

B: -129" to -185" IAW EOP-101A, ATWS RPV Control. **INCORRECT** - The level band is incorrect IAW EOP-101A.

C: -129" and +54" IAW EOP-101, RPV Control. **INCORRECT** - EOP-101A is implemented because the reactor is NOT considered Shutdown under all conditions without boron. The level band is incorrect IAW EOP-101A.

D: -185" to +54" IAW EOP-101A, ATWS RPV Control. **CORRECT** - Downscale lights on APRMs indicate power is ≤ 4%. The level band required is -185" to +54" IAW EOP-101A step LP-15.

Technical Reference(s): EOP-101A (Attach if not previously provided)

Proposed References to be provided to applicants during examination: none

| | | |
|---|---|---|
| Learning Objective: | Given any step of the procedure, explain the reason for performance of that step and/or evaluate the expected system response to control manipulations prescribed by that step. | (As available) |

| | | |
|---|---|---|
| Question Source: | Bank # 125071 | |
| | Modified Bank # | (Note changes or attach parent) |
| | New | |

Question History:

Question Cognitive Level: Comprehension or Analysis

10 CFR Part 55 Content: 55.43(5)

Comments:

Facility: Hope Creek

Vendor: GE

Exam Date: 2018

Exam Type: SRO

| Examination Outline Cross-reference: | Level | RO | SRO |
|---|---|---|---|
| | Tier # | | 1 |
| | Group # | | 1 |
| | K/A # | 295018 | AA2.04 |
| | Importance Rating | | 2.9 |

K/A Statement: Ability to determine and/or interpret the following as they apply to PARTIAL OR COMPLETE LOSS OF COMPONENET COOLING WATER: System flow

Question: SRO #78

Given:

- The plant is at 100% rated power.

Then:

- The plant experiences a grassing event.
- HC.OP-AB.COOL-0001, "Station Service Water" has been entered.
- All actions to clear the SSWS Strainer Hi Hi differential pressure alarm have failed.
- "A" SSWS Strainer dP is 6 psid.
- The "A" SSW Pump is in service at 3500 gpm on the loop supplying TACS.
- SSW Temperature is 53°F.

"A" SSWS Strainer operation is considered ___ (1) ___. Additional actions include ___ (2) ___.
**[Reference attached]**

A. (1) degraded
(2) ensuring the standby SSW pump is in Manual.

B. (1) inoperable
(2) ensuring the standby SSW pump is in Manual.

C. (1) degraded
(2) placing the standby SSW pump in service.

D. (1) inoperable
(2) placing the standby SSW pump in service.

Proposed Answer: A

Explanation (Optional): NOTE 9:
IF the strainer D/P remains above 5 PSID, the available flow provided by the associated Service Water Pump through that strainer in a normal lineup will be reviewed using Attachment 4, using the current Service Water Supply temperature.

Step C.2 - IF only one SSW Pump is in service, THEN **ENSURE** the Standby SSW pump in MAN.

A: **Correct-** IAW HC.OP-AB.COOL-0001 Att.4 (see attached)

B: **Incorrect-** the strainer is considered degraded if in the acceptable region of the graph.

C: **Incorrect-** the strainer is considered degraded if in the acceptable region of the graph. Would not start any standby pump.

D: **Incorrect-** would not start any standby pump.

Technical Reference(s): HC.OP-AB.COOL-0001 Station Service Water
Condition C and attachment 4
(Attach if not previously provided)

Proposed References to be provided to applicants during examination: HC.OP-AB.COOL-0001 Attachment 4

Learning Objective: (As available)

Question Source: Bank #73176

Modified Bank # (Note changes or attach parent)

New

Question History:

Question Cognitive Level:

Comprehension or Analysis

10 CFR Part 55 Content:

55.43 (5)

Comments:

Facility: Hope Creek

Vendor: GE

Exam Date: 2018

Exam Type: SRO

Examination Outline Cross-reference:

| Level | RO | SRO |
|---|---|---|
| Tier # | | 1 |
| Group # | | 1 |
| K/A # | 295016 | G 2.1.32 |
| Importance Rating | | 4.0 |

K/A Statement: Conduct of Operations: Ability to explain and apply all system limits and precautions- Control Room Abandonment

Question: SRO #79

Given:

- The plant was operating at 20% power.
- All systems were aligned for normal operations.

Then:

- A fire started under Control Room console 10C651 causing a reactor scram.
- The Control Room has been evacuated because of extreme smoke conditions.
- The reactor has been depressurized to less than 80 psig with SRV's and RCIC.
- "B" RHR is in Suppression Pool Cooling from the Remote Shutdown Panel.

Which one of the following describes the Remote Shutdown System initially designated to be used to achieve Cold Shutdown, and what is the maximum cooldown rate permitted IAW HC.OP-IO.ZZ-0008, "SHUTDOWN FROM OUTSIDE CONTROL ROOM"?

A. "A" RHR in Shutdown Cooling at less than 100 °F/hr.

B. "A" RHR in Shutdown Cooling at less than 90 °F/hr.

C. "B" RHR in Shutdown Cooling at less than 90 °F/hr.

D. "B" RHR in Shutdown Cooling at less than 100 °F/hr.

Proposed Answer: **C**

Explanation (Optional):

A: "A" RHR in Shutdown Cooling at less than 100 °F/hr.-**Incorrect.** "B" Loop is designated by procedure at less than 90 degrees per hour

B: "A" RHR in Shutdown Cooling at less than 90 °F/hr.-**Incorrect.** "B" Loop is designated by procedure

C: "B" RHR in Shutdown Cooling at less than 90 °F/hr.-**Correct**. Steps 5.10.7.c.and Att.5

D: "B" RHR in Shutdown Cooling at less than 100 °F/hr.-**Incorrect.** less than 90 degrees per hour is the limit stated by procedure

Technical Reference(s): HC.OP-IO.ZZ-0008 SHUTDOWN FROM OUTSIDE CONTROL ROOM (Attach if not previously provided)

Proposed References to be provided to applicants during examination: none

Learning Objective: (As available)

Question Source: Bank # 119579

Modified Bank # (Note changes or attach parent)

New

Question History:

Question Cognitive Level: Memory

10 CFR Part 55 Content: 55.43(5)

Comments:

Facility: Hope Creek

Vendor: GE

Exam Date: 2018

Exam Type: SRO

Examination Outline Cross-reference:

| Level | RO | SRO |
|---|---|---|
| Tier # | | 1 |
| Group # | | 1 |
| K/A # | 295038 | G2.4.45 |
| Importance Rating | | 4.3 |

K/A Statement: Emergency Procedures / Plan: Ability to prioritize and interpret the significance of each annunciator or alarm.- High Off-site Release Rate

Question: SRO #80

Given:

- North Plant Vent Rad monitor is in alarm, indicating 1.6 E+04 μc / sec Noble Gas effluent.
- FRVS Rad monitor is indicating 8.0E+03 μc / sec Noble Gas effluent.
- This release rate has existed for 90 minutes.

Which of the below additional alarms / conditions would require entry into the Emergency Plan and what would be the ECG call?

A. South Plant Vent Rad monitor is indicating 8.1E+3 μc / sec Noble Gas effluent; Unusual Event.

B. A valid CONTROL ROOM VENT RAD ALARM/TROUBLE alarm in with a start of the Control Room Emergency Filtration (CREF) system; Alert.

C. South Plant Vent Rad monitor is indicating 8.1E+3 μc / sec Noble Gas effluent; Alert.

D. A valid CONTROL ROOM VENT RAD ALARM/TROUBLE alarm in with a start of the Control Room Emergency Filtration (CREF) system; Unusual Event.

Proposed Answer: **A**

Explanation (Optional):

A: **Correct**-NPV is in alarm and Total of all plant vents (NPV 1.6E+4, FRVS 8.0E+3, SPV 8.1E+3 = 3.1 E+4 ) exceeds 3.21 E+04 μc / sec Noble Gas effluent. Unusual Event IAW RU 1.1 (see attached).

B: **Incorrect-** A valid CONTROL ROOM VENT RAD ALARM/TROUBLE alarm in with a start of the Control Room Emergency Filtration (CREF) system. There is no entry into the ECG plan for the OHA and start of the CREF System. Unusual Event IAW RU 1.1 (see attached).

C: **Incorrect-** Unusual Event IAW RU 1.1 (see attached).

D: **Incorrect-** A valid CONTROL ROOM VENT RAD ALARM/TROUBLE alarm in with a start of the Control Room Emergency Filtration (CREF) system. There is no entry into the ECG plan for the OHA and start of the CREF System.

Technical Reference(s): EP-HC-111-103 Section R-Abnormal Rad Levels/Rad Effluent R1- Offsite Radiological Conditions (Attach if not previously provided)

Proposed References to be provided to applicants during examination: EALs and RALs

Learning Objective: ECG/E-Plan/Fire & Medical Questions: Knowledge of the reasons for the following responses as they apply to HIGH OFF-SITE RELEASE RATE: Implementation of site emergency plan. (As available)

Question Source: Bank #

Modified Bank # 55872 (**Note changes**: Revised the release rates to conform with the current ECG limits IAW EP-HC-111-103 Section R Abnormal Rad Levels/Rad Effluent R1-Offsite Radiological Conditions)

New

Question History:

Question Cognitive Level: Analysis

10 CFR Part 55 Content: 55.43 (5)

Comments:

Facility: Hope Creek

Vendor: GE

Exam Date: 2018

Exam Type: SRO

Examination Outline Cross-reference:

| Level | RO | SRO |
|---|---|---|
| Tier # | | 1 |
| Group # | | 1 |
| K/A # | 295024 | 2.4.1 |
| Importance Rating | | 4.8 |

K/A Statement: Knowledge of EOP entry conditions and immediate action steps- High Drywell Pressure.

Question: SRO #81

Given:

- The plant was operating at rated power.

Then:

- A Design Bases Accident LOCA occurred.

Current plant conditions:

- Drywell pressure is 32 psig and rising at 1.5 psig/min.
- Drywell Temperature is 240°F and rising at 1°F/min.
- Suppression Pool Level is 90 inches and rising at .5 inches/min.
- Suppression Chamber pressure is 30 psig and rising at 1psig/min.
- RPV level is at -134 inches and lowering at 2 inches/min.
- RPV Pressure is 40 psig and lowering at .5 psig/min.

What is the next action required IAW EOPs?
**[Reference attached]**

A. IAW OP-EO.ZZ-318, “Containment Venting”, Vent the Drywell.

B. IAW EOP-202, “Emergency Depressurization”, open 5 ADS valves.

C. IAW EOP-102, “Primary Containment Control”, initiate one loop of Drywell Spray at rated flow.

D. IAW OP-EO.ZZ-318, “Containment Venting”, Vent the Suppression Chamber.

Proposed Answer: B

Explanation (Optional):

A: **Incorrect** – with suppression pool level below 180” you would vent the suppression pool first, AFTER the ED

B: **Correct** – The PSP curve has been exceeded, per steps EOP-102 DW/P-11/12, Emergency Depressurization (ED) is required IAW EOP-202 (entry condition).

C: **Incorrect** – with RPV level at -134 “and lowering, all available ECCS is required for level control.

D: **Incorrect** – with suppression pool level below 180” you would vent the suppression pool first, AFTER the ED

Technical Reference(s): HC.OP-EO.ZZ-0102FC (Attach if not previously provided)

Primary Containment

Proposed References to be provided to applicants during examination: EOP-102 DW/P 3-21

Learning Objective: Given any step of the procedure, determine the reason for performance of that step and/or predict expected system response to control manipulations prescribed by that step IAW available control room references. (As available)

Question Source: Bank #120323

Modified Bank # (Note changes or attach parent)

New

Question History:

Question Cognitive Level:

Comprehension or Analysis

10 CFR Part 55 Content: 55.43 (5)

Comments:

Facility: Hope Creek

Vendor: GE

Exam Date: 2018

Exam Type: SRO

Examination Outline Cross-reference:

| Level | RO | SRO |
|---|---|---|
| Tier # | | 1 |
| Group # | | 1 |
| K/A # | 295004 | AA2.02 |
| Importance Rating | | 4.4 |

K/A Statement: Ability to determine and/or interpret the following as they apply to PARTIAL OR COMPLETE LOSS OF D.C. POWER: Extent of partial or complete loss of D.C. power.

Question: SRO #82

Given:

- The plant is at 100% rated power.

Then:

T=0:

- The plant experiences a Station Blackout.
- All vital 125 VDC bus readings are at 0 VDC.

T=20 minutes:

What is the highest Emergency Classification that has been met?

A. Alert

B. Site Area Emergency

C. Unusual Event

D. General Emergency

Proposed Answer: B

Explanation (Optional): IAW EP-HC-111-114 Loss of DC Power (see attached)

A: **INCORRECT** – Loss of DC Power (125 VDC vital busses) for greater than or equal to 15 minutes is a ECG call of Site Area Emergency.

B: **CORRECT see attached.**

C: **INCORRECT** - Loss of DC Power (125 VDC vital busses) for greater than or equal to 15 minutes is a ECG call of Site Area Emergency.

D: **INCORRECT** - Loss of DC Power (125 VDC vital busses) for greater than or equal to 15 minutes is a ECG call of Site Area Emergency.

Technical Reference(s): EP-HC-111-114 Section S- System Malfunction S2- Loss of DC Power (Attach if not previously provided)

Proposed References to be provided to applicants during examination: EALs and RALs

Learning Objective: Discuss the operational implications of the abnormal indications/alarms for system operating parameters related to 125 VDC System Malfunction, (As available)

Question Source: Bank #

Modified Bank # (Note changes or attach parent)

New X

Question History:

Question Cognitive Level:

Comprehension or Analysis

10 CFR Part 55 Content:

55.43 (5)

Comments:

Facility: Hope Creek

Vendor: GE

Exam Date: 2018

Exam Type: SRO

Examination Outline Cross-reference:

| Level | RO | SRO |
|---|---|---|
| Tier # | | 1 |
| Group # | | 2 |
| K/A # | | 295029/EA2.03 |
| Importance Rating | | 3.5 |

K/A Statement: Ability to determine and/or interpret the following as they apply to HIGH SUPPRESSION POOL WATER LEVEL : Drywell/containment water level

Question: SRO #83

Given:

- The plant was at 100% rated power.

Then:

- A LOCA occurs.
- HPCI automatically initiated and then subsequently tripped on low oil pressure.

Current plant conditions:

- Drywell pressure is 46 psig and slowly rising.
- RPV level is -201 inches and slowly lowering.
- HPCI Pump suction to the Suppression Pool is open.
- HPCI Pump suction pressure is 84 psig.
- Suppression Pool level indication is off scale high.
- Suppression Pool temperature is 195°F.
- Condensate System is available for injection.
- Emergency Depressurization has been completed.

| Cntmt Lvl (ft) = [(HPCI pump suction press - Drywell press) 2.3 ft/psi] + 2.2 ft |
|---|

For the given conditions, what is the next required directed action IAW EOPs"?
**[Reference attached]**

A. TERMINATE injection to the RPV from sources outside of containment IAW EOP-101 "RPV Control".

B. BEFORE Drywell pressure reaches 65 psig, vent the Suppression Chamber IAW EOP-102 "Primary Containment Control".

C. TERMINATE injection to the RPV from sources outside of containment IAW EOP-102 "Primary Containment Control".

D. Continue injection to the RPV with all available sources IAW EOP-101 "RPV Control".

Proposed Answer: **D**

Explanation (Optional):

A: **INCORRECT -** TERMINATE injection to the RPV from sources outside of containment. Adequate core cooling is not assured continue to inject with all available sources IAW EOP-101.

B: **INCORRECT –** IAW EOP-102 Venting of the Drywell due to Supp Chamber level "off scale high" and the rising drywell pressure, not the venting of the Suppression Chamber (see attached).

C: **INCORRECT -** TERMINATE injection to the RPV from sources outside of containment. Adequate core cooling is not assured continue to inject with all available sources IAW EOP-101.

D: **CORRECT -** Continue injection to the RPV with all available sources IAW EOP-101

Technical Reference(s): HC.OP-EO.ZZ-0102, Step SP/L-12 & EOP 101 retainment override RC/L-2 - Terminate injection from sources outside of containment NOT required for **adequate core cooling** if containment level cannot be maintained below 67 feet. (Attach if not previously provided)

Proposed References to be provided to applicants during examination: EOP-102 DW/P 3-21

Learning Objective: Given the formula for calculating containment water level and corresponding values, calculate containment water level IAW available control room references. (As available)

Question Source: Bank #

Modified Bank # 147121 (attach parent)

New

Question History:

Question Cognitive Level: Memory or Fundamental Knowledge

10 CFR Part 55 Content: 55.43 (5)

Comments:

| | |
|---|---|
| Facility: | Hope Creek |
| Vendor: | GE |
| Exam Date: | 2018 |
| Exam Type: | SRO |

Examination Outline Cross-reference:

| Level | RO | SRO |
|---|---|---|
| Tier # | | 1 |
| Group # | | 2 |
| K/A # | | 295034/2.4.41 |
| Importance Rating | | 4.6 |

K/A Statement: Emergency Procedures / Plan: Knowledge of the emergency action level thresholds and classifications: Secondary Containment Ventilation High Radiation

Question: SRO #84

Given:

- Core off-load is in progress.
- An Operation with the Potential to Drain the Reactor Vessel (OPDRV) is in progress.

Then:

- The RM-11 alarms.
- The PO reports Reactor Building Exhaust RMS is reading 5.5E-4 μCi/ml and rising slowly.
- The Spent Fuel Storage Pool Area (9RX707) is in alarm.
- The Refueling SRO reports that the reactor cavity level is lowering.

Based on the above conditions, declare an ___ (1) ____ and direct ___ (2) ____ IAW HC.OP-EO.ZZ-0103/4 “Reactor Building & RAD Release Control”.

A. (1) Unusual Event
(2) monitoring of reactor building floor levels

B. (1) Alert
(2) restoring release rates below the Alert level

C. (1) Unusual Event
(2) starting CREF

D. (1) Alert
(2) isolating RBVS

Proposed Answer: **A**

Explanation (Optional): IAW EP-HC-111-104 RU 2.1 with the visual observation from the Refueling SRO of the reactor cavity lowering and the Spent Fuel Storage Pool Area (9RX707) in alarm the Unusual Event would be declared.

A: **Correct** – Unusual Event (see attached EAL); reactor building floor levels monitored. - Action in EOP 103, which has an entry condition. **5.0E-4 μCi/ml is an entry condition into HC.OP-EO.ZZ-0103**

B: **Incorrect** – Alert; release rates restored below the Alert level. - Action for **HC.OP-EO.ZZ-0104 there are no indications of an offsite release rate above the Alert level.**

C: **Incorrect** - Unusual Event (see attached EAL); CREFS started. - Hi Rad start is not monitored at the Reactor Building Exhaust RMS. The radiation detectors are located in the Control Room air intake ducting. CREF will NOT start.

D: **Incorrect** – Alert; RBVS isolated. - **Below the isolation setpoint of 1.0E-3 μCi/ml for the RBVS dampers to isolate.**

Technical Reference(s): HC.OP-EO.ZZ-0103/4 FC Reactor Building & RAD Release Control Flow Chart (Attach if not previously provided)

EP-HC-111-104 Section R R2- Onsite Rad Conditions- Fuel Pool Events

Proposed References to be provided to applicants during examination: EALs and RALs.

Learning Objective: Given a set of plant conditions, analyze and determine if entry conditions into HC.OP-EO.ZZ-0103/4 exists (As available)

Question Source: Bank #

Modified Bank # (Note changes or attach parent)

New X

Question History:

Question Cognitive Level: Analysis

10 CFR Part 55 Content: 55.43 (5)

Comments:

| | |
|---|---|
| Facility: | Hope Creek |
| Vendor: | GE |
| Exam Date: | 2018 |
| Exam Type: | SRO |

Examination Outline Cross-reference:

| Level | RO | SRO |
|---|---|---|
| Tier # | | 1 |
| Group # | | 2 |
| K/A # | 295014 | 2.1.7 |
| Importance Rating | | 4.7 |

K/A Statement: Conduct of Operations: Ability to evaluate plant performance and make operational judgements based on operating characteristics, reactor behavior, and instrument interpretation: Inadvertent Reactivity Addition

Question: SRO #85

Given:

- A normal reactor startup is in progress with the reactor critical.
- Reactor period is 200 seconds.
- The Reactor Operator withdraws control rod 18-11 one notch.
- Power rises from 25 on IRM range 2 to 50 on IRM range 2 in 20 seconds.
- C3-D1 "SRM PERIOD" alarm is received.
- Power continues to rise with a reactor period of 25 seconds.

An action required to be directed is to ___________.

A. Contact Reactor Engineering to determine reactivity anomaly while continuing the startup.

B. Monitor Reactor period and continue startup.

C. Insert rod 18-11 to establish a reactor period of approximately 100 seconds.

D. Insert a full scram due to a failure of RPS.

Proposed Answer: C

Explanation (Optional):
The RO withdraws control rod one notch and observes a rise in power from 25 on IRM range 2 to 50 on IRM range 2 in 20 seconds. Doubling Time(D.T.) = 20 seconds. **25 second** period would cause the <u>Short period alarm C3-D1</u> **(setpoint of 50 seconds)**.

IAW HC.OP-IO.ZZ-0003, step 3.2.3 **"If a stable period of 30 seconds or less is encountered then reactivity conditions that caused the short period should be determined PRIOR to further withdrawal".**

HC.OP-AR.ZZ-0009 (C3-D1 OHA) and HC.OP-AR.ZZ-0020 (A2160, A2162, A2164, A2166 digital alarms) <u>"SRM PERIOD" **directs inserting rod to slow period to approximately 100 seconds**</u>

A: **Incorrect-** "If a stable period of 30 seconds or less is encountered then reactivity conditions that caused the short period should be determined **PRIOR to further withdrawal**".

B: **Incorrect-** directs inserting rod to slow period to **approximately 100 seconds.**

C: **Correct-** directs inserting rod to slow period to **approximately 100 seconds.** "If a stable period of 30 seconds or less is encountered then reactivity conditions that caused the short period should be determined **PRIOR to further withdrawal**".

D: **Incorrect-** assuming the reactor should have tripped from a RPS setpoint. No RPS setpoint has been reached.

Technical Reference(s): HC.OP-IO.ZZ-0003 Precaution and Limitations (Attach if not previously provided)

HC.OP-AR.ZZ-0009 and HC.OP-AR.ZZ-0020 "SRM PERIOD" alarm response.

Proposed References to be provided to applicants during examination: none

Learning Objective: Apply Precautions, Limitations and Notes while executing the STARTUP FROM COLD SHUTDOWN TO RATED POWER Integrated Operating Procedure. (As available)

Question Source: Bank #

Modified Bank # (Note changes or attach parent)

New X

Question History:

Question Cognitive Level:

Comprehension or Analysis

10 CFR Part 55 Content:

55.43 (6)

Comments:

| | |
|---|---|
| Facility: | Hope Creek |
| Vendor: | GE |
| Exam Date: | 2018 |
| Exam Type: | SRO |

| Examination Outline Cross-reference: | Level | RO | SRO |
|---|---|---|---|
| | Tier # | | 2 |
| | Group # | | 1 |
| | K/A # | 264000 | A2.06 |
| | Importance Rating | | 3.4 |

K/A Statement: Ability to (a) predict the impacts of the following on the EMERGENCY GENERATORS (DIESEL/JET) ; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations: Opening normal and/or alternate power to emergency bus

Question: SRO #86

Given:

- The plant is at 100% rated power.

Then:

- A loss of off-site power occurs.

The 10A401 4Kv bus is in the following alignment:

- 52-40101 - CLOSED
- 52-40108 - OPEN
- 52-40107 - OPEN

What is the status of the “A” Emergency Diesel Generator (EDG) and the next action(s) to be directed?

“A” EDG is ____ (1) ______. Perform actions of _____ (2) ________.

A. (1) NOT running
(2) HC.OP-AB.ZZ-0135, “Station Blackout /Loss of Off-Site Power / Diesel Generator Malfunction” to START and LOAD the “A” EDG.

B. (1) running unloaded
(2) HC.OP-AB.ZZ-0170, “Loss of 4.16KV Bus 10A401 A Channel” to RESTORE the 10A401 Bus.

C. (1) running unloaded
(2) HC.OP-AB.ZZ-0135, “Station Blackout /Loss of Off-Site Power / Diesel Generator Malfunction” to LOAD the “A” EDG.

D. (1) NOT running
(2) HC.OP-AB.ZZ-0170, “Loss of 4.16KV Bus 10A401 A Channel” to RESTORE the 10A401 Bus.

Proposed Answer: **C**

Explanation (Optional):

A: **Incorrect-** "A" EDG would be running (LOP). Correct guidance for starting the "A" EDG if it did not start and load IAW HC.OP-AB.ZZ-0135, "Station Blackout /Loss of Off-Site Power / Diesel Generator Malfunction" (see attached)

B: **Incorrect –** The next action would be to LOAD the EDG IAW HC.OP-AB.ZZ-0135, "Station Blackout /Loss of Off-Site Power / Diesel Generator Malfunction". **The CRS would have to ensure the immediate operator actions** were completed. In this case IAW AB-135 would be to START and LOAD the EDG.(see attached).

C: **Correct -** Breaker 40107 cannot close on the bus with the 40101 closed. The "A" EDG would still be running but NOT loaded due to breaker configuration. HC.OP-AB.ZZ-0135, "Station Blackout /Loss of Off-Site Power / Diesel Generator Malfunction" gives the guidance to START the EDG if it did NOT start and load the EDG if it did NOT load (see attached).

D: **Incorrect –** "A" EDG is running (LOP).

Technical Reference(s): HC.OP-AB.ZZ-0135 (Attach if not previously provided)

Station Blackout /Loss of Off-Site Power / Diesel Generator Malfunction
HC.OP-AB.ZZ-0170
Loss of 4.16KV Bus 10A401 A channel

Proposed References to be provided to applicants during examination: none

Learning Objective: (As available)

Given plant conditions and a drawing of the controls, instrumentation, and/or alarms located in the 1E switchgear room, determine the status of the Emergency Diesel Generators by evaluation of the controls/instrumentation/alarms in the 1E switchgear room IAW available control room references

Question Source: Bank #120402

Modified Bank # (Note changes or attach parent)

New

Question History: NRC 2010

Question Cognitive Level: Comprehension or Analysis

10 CFR Part 55 Content: 55.43 (5)

Comments:

| | |
|---|---|
| Facility: | Hope Creek |
| Vendor: | GE |
| Exam Date: | 2018 |
| Exam Type: | SRO |

| Examination Outline Cross-reference: | Level | RO | SRO |
|---|---|---|---|
| | Tier # | | 2 |
| | Group # | | 1 |
| | K/A # | 211000 | A2.08 |
| | Importance Rating | | 4.2 |

K/A Statement: Ability to (a) predict the impacts of the following on the STANDBY LIQUID CONTROL SYSTEM ; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations: Failure to SCRAM

Question: SRO #87

Given:

- The plant was at 100% rated power when the10A402 bus de-energizes.
- During the power reduction to satisfy Technical Specifications an ATWS occurs.

Current plant conditions:

- Rx power is 20 percent and stable.
- RPV level and pressure are stable and being maintained in the required bands.
- SLC is directed to be manually placed in service.
- All attempts to insert control rods are unsuccessful.

Assuming the SLC system delivers Technical Specification minimum flow rate for the next 90 minutes, which one of the following actions would be required to be directed?

A. Verify the both SLC pumps are tripped and exit EOP-101A.

B. Continue SLC pump operation and begin reactor cooldown.

C. Verify the 'A' SLC pump is tripped and continue attempting rod insertion.

D. Secure both SLC pumps and exit EOP-101A.

Proposed Answer: **B**

Explanation (Optional):

A: **Incorrect.** 'A' pump will still be running. B pump and Squib valve are deenergized (loss of 10A402).

B: **Correct**. After 90 minutes operation with only 1 SLC pump running, less than 1100 gallons remain in the SLC Tank, but level is above the 325 gallon Low Level Pump trip setpoint. 4640 Gallons at the low level alarm point with 90 minutes runtime at 41.2 gpm [4640 - (41.2 x 90)] = 932 gallons remaining for Step RC/P-19 (1100 gallons) then directs continuation at step RC/P-20 for depressurization and cooldown.

C: **Incorrect**. 'A' pump will still be running. EOP 101A is not exited until the reactor is shutdown under all conditions without boron.

D: **Incorrect**. Only 'A' pump is running, EOP 101A is not exited until the reactor is shutdown under all conditions without boron.

Technical Reference(s): NOH01SLCSYS - "A" SLC pump and squib valve F004A, and isolation valve F006A supplied by MCC 10B212 . "B" SLC pump and squib valve F004B supplied by MCC 10B222 (10A402). (Attach if not previously provided)

HC.OP-AB.ZZ-0170 LOSS OF 4.16KV BUS 10A401 A CHANNEL- 10B212 MCC - 1A-P-208 A SLC Pump

HC.OP-AB.ZZ-0171 LOSS OF 4.16KV BUS 10A402 B CHANNEL – 10B222 MCC - 1B-P-208, B SLC Pump

Proposed References to be provided to applicants during examination: none

Learning Objective: From memory, summarize/identify the impact that a loss or malfunction of each of the following would have on the Standby Liquid Control System: (As available)

a. Standby Liquid Control Squib Valve
b. Standby Liquid Control Storage Tank Level
c. Redundant Reactivity Control System
d. AC Power

Question Source: Bank #116103

Modified Bank # (Note changes or attach parent)

New

Question History:

Question Cognitive Level: Comprehension or Analysis

10 CFR Part 55 Content: 55.43 (5)

Comments:

Facility: Hope Creek

Vendor: GE

Exam Date: 2012

Exam Type: SRO

Examination Outline Cross-reference:

| Level | RO | SRO |
|---|---|---|
| Tier # | | 2 |
| Group # | | 1 |
| K/A # | 215005 | A2.03 |
| Importance Rating | | 3.8 |

K/A Statement: Ability to (a) predict the impacts of the following on the AVERAGE POWER RANGE MONITOR/LOCAL POWER RANGEMONITOR SYSTEM ; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations: Inoperative trip (all causes)

Question: SRO #88

Given:

- The plant is in Operational Condition 4.
- The RPS shorting links are INSTALLED for testing.

Then:

- An electrical fault on Panel AJ483 causes a loss of power to APRMs A, C and E.

Which of the following actions, if any, is required by Technical Specifications?
**[Reference attached]**

A. NO action is required since the number of operable APRM channels is greater than the minimum operable channels for the "A" RPS trip system.

B. Verify all insertable control rods to be inserted in the core and lock the reactor mode switch in the Shutdown position within one hour.

C. Suspend all operations involving CORE ALTERATIONS and insert all insertable control rods within one hour.

D. Place the inoperable APRM channel(s) and/or the "A" RPS trip system in the tripped condition within 12 hours.

Proposed Answer: D

Explanation (Optional

A: **Incorrect-** . With the shorting links Installed, the minimum operable APRM channels are 2 per trip system for INOP and Neutron Flux Setdown.

B: **Incorrect-** Action 2 of table 3.3.1-1 for both RPS systems INOP.

C: **Incorrect-** IRM action for Mode 5 NOT for the given plant conditions.

D: **Correct-** in accordance with Tech Spec Table 3.3.1-1 and 3.3.1-1 (see attached).

Technical Reference(s): HCGS Tech Specs- 3.3.1 and Table 3.3.1-1 (Attach if not previously provided)

Proposed References to be provided to applicants during examination: 3.3.1Tech Spec and Table 3.3.1-1

Learning Objective: Given a scenario of applicable conditions and access to Technical Specifications: (As available)
a. Select those sections which are applicable to the APRMS
b. Evaluate LPRM/APRM operability and determine required actions applicable to the APRMS (SRO Only)
c. Explain the bases for those Technical Specifications associated with the APRMS IAW HCGS Technical Specifications.

Question Source: Bank #119851

Modified Bank # (Note changes or attach parent)

New

Question History:

Question Cognitive Level: Analysis

10 CFR Part 55 Content:

55.43 (2)

Comments: This question is not a direct lookup due to the fact that the student must make a decision between the table and the action statement of the header page of the Tech Spec. The student could infer that the action statement on the table is appropriate for this condition however, due to the current system status of the APRMs the 12 hour action statement is applicable

| | |
|---|---|
| Facility: | Hope Creek |
| Vendor: | GE |
| Exam Date: | 2018 |
| Exam Type: | SRO |

Examination Outline Cross-reference:

| Level | RO | SRO |
|---|---|---|
| Tier # | | 2 |
| Group # | | 1 |
| K/A # | 206000 | 2.2.37 |
| Importance Rating | | 4.6 |

K/A Statement: Equipment Control: Ability to determine operability and / or availability of safety related equipment.

Question: SRO #89

Given:

- The plant is operating at 100% rated power.
- HPCI Pump ISI test is in progress at rated flow.
- HPCI discharge pressure is 1150 psig.

When:

- Attempting to adjust HPCI pump flow, the flow controller setpoint remains stationary at 4,000 gpm in AUTO.

Then:

- The PO reports the HPCI flow controller works in MANUAL and develops rated flow.

What effect does this have on HPCI Operability?

A. HPCI is operable because it can develop rated flow.

B. HPCI is inoperable because it is NOT capable of meeting all surveillance requirements.

C. HPCI is “operable but degraded” because it has lost its testing capacity.

D. HPCI is “operable but non-conforming” because it is NOT capable of meeting all surveillance requirements.

Proposed Answer: B

Explanation (Optional): (see attched)IAW T.S. 3.5.1 HPCI must be in AUTO with a setpoint of 5600 gpm and capable of rated flow and discharge pressure.

A: **Incorrect** – It must develop rated flow in AUTO

B: **Correct-** see attached

C: **Incorrect** – The case could be made if flow in AUTO remained stationary at 5600 gpm.

D: **Incorrect -** operable but non-conforming does not apply with flow at 4000 gpm in AUTO.

Technical Reference(s): T.S. 3.5.1 (Attach if not previously provided)

Proposed References to be provided to applicants during examination: none

Learning Objective: Given a scenario of applicable conditions and access to technical specifications:(NCO and Above) Choose those sections which are applicable to the High Pressure Coolant Injection System
Assess High Pressure Coolant Injection System operability and determine required actions associated with Residual Heat Removal System inoperability,. (As available)

Question Source: Bank #120178

Modified Bank # (Note changes or attach parent)

New

Question History: NRC 2009

Question Cognitive Level:

Memory or Fundamental Knowledge

10 CFR Part 55 Content:

55.43 (2)

Comments:

Facility: Hope Creek

Vendor: GE

Exam Date: 2018

Exam Type: SRO

Examination Outline Cross-reference:

| Level | RO | SRO |
| --- | --- | --- |
| Tier # | | 2 |
| Group # | | 1 |
| K/A # | 400000 | A2.02 |
| Importance Rating | | 3.0 |

K/A Statement: Ability to (a) predict the impacts of the following on the CCWS and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal operation: High/low surge tank level

Question: SRO #90

Given:

- The plant is at 100% rated power.
- TACS is being supplied by SACS loop "A".

Then:

- An un-isolable leak develops in line to the “A” Recirculation MG set lube oil cooler which is greater than the makeup capacity to the SACS expansion tanks.

How does SACS/TACS respond to the above conditions and what will be required IAW HC.OP-AB.COOL-0002 “Safety/Turbine Auxiliaries Cooling System”?

A. TACS will isolate and NOT transfer to SACS loop “B”. Start the Emergency Instrument Air compressor.

B. TACS will isolate and transfer to SACS loop "B". Reduce Recirculation pumps to minimum and Lock the Mode Switch in Shutdown.

C. TACS will isolate and NOT transfer to SACS loop “B”. Reduce Recirculation pumps to minimum and Lock the Mode Switch in Shutdown.

D. TACS will isolate and transfer to SACS loop "B". Verify the standby SACS pump starts.

Proposed Answer: B

Explanation (Optional): Low-Low-Low level will cause TACS to automatically transfer. The leak will not be isolated so **the CRS would then determine that there is a Complete and sustained loss of TACS** IAW HC.OP-AB-COOL-0002 **Condition C (see attached) retainment override-** REDUCE Recirc to Min. and Lock the MS in shutdown due to the fact that on a low-low-low level in the B SACS loop expansion tank, all SACs to TACS isolation valve would automatically isolate.

A: **Incorrect-** TACS isolates and will transfer to the “B” loop, however the “B” tank will drain to the low-low-low level with the un-isolable leak and therefore a sustained loss of TACS. Retain override would be the next action. Condition C.2 Start the Emergency Instrument Air compressor.

B: **Correct-** see above explanation

C: **Incorrect-** TACS isolates and will transfer to the “B” loop.

D: **Incorrect-** With the auto swap of TACS to the “B” loop and then the sustained loss of TACS the retainment override would be the next action directed. IAW Condition B.1 Ensure the standby SACS pump starts, however **Condition C would be performed first** (Retainment Override).

Technical Reference(s): HC.OP-AB.COOL-0002 (Attach if not previously provided)

Condition B and C

Proposed References to be provided to applicants during examination: none

Learning Objective: Given automatic signals, select the AUTO OPEN and AUTO CLOSE signals for the SACS to TACS supply and return isolation valves (HV-2496A-D and HV-2522A-D). (As available)

Question Source: Bank #

Modified Bank # (Note changes or attach parent)

New X

Question History:

Question Cognitive Level: Memory or Fundamental Knowledge

10 CFR Part 55 Content: 55.43 (5)

55.43

Comments:

Facility: Hope Creek

Vendor: GE

Exam Date: 2018

Exam Type: SRO

Examination Outline Cross-reference:

| Level | RO | SRO |
| --- | --- | --- |
| Tier # | | 2 |
| Group # | | 2 |
| K/A # | 214000 | A2.03 |
| Importance Rating | | 3.9 |

K/A Statement: Ability to (a) predict the impacts of the following on the ROD POSITION INFORMATION SYSTEM ; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations: Overtravel/in-out.

Question: SRO #91

Given:

- Hope Creek is operating at 24% power performing a plant startup.
- When control rod 38-47 is fully withdrawn, annunciator C6-F3, ROD OVERTRAVEL, comes in.

Based on the above a/an __ (1) ___. Action(s) required IAW Technical Specifications and/or plant procedures include ___ (2) ___.
**[Reference attached]**

A. (1) RWM malfunction along with an uncoupled control rod has occurred.
(2) Inserting the control rod in an attempt to recouple and declaring RPIS inoperable.

B. (1) Uncoupled control rod has occurred.
(2) Declaring the control rod and RPIS inoperable.

C. (1) RWM malfunction along with an uncoupled control rod has occurred.
(2) Declaring the control rod and RWM inoperable.

D. (1) Uncoupled control rod has occurred.
(2) Inserting the control rod in an attempt to recouple.

Proposed Answer: D

Explanation (Optional):

A: **Incorrect** - An RPIS malfunction. Move the control rod to a position with an operable position indication. - OVERTRAVEL is an indication of an **uncoupled rod**, not an RPIS malfunction.

B: **Incorrect** - Uncoupled control rod. Declare the control rod inoperable. - Only if the RWM does not permit movement. Power is above the transition zone (19-22%), so no rod blocks will be enforced. OVERTRAVEL is an indication of an **uncoupled rod**, not an RPIS malfunction.

C: **Incorrect** - An RPIS malfunction. Declare the control rod inoperable. - OVERTRAVEL is an indication of an uncoupled rod, not an RPIS malfunction.

D: **Correct** - Uncoupled control rod. Insert the control rod in an attempt to recouple. - TS 3.1.3.6, HC.OP-AB.IC-0001, CONTROL ROD Step D, E (see attached).

Technical Reference(s): T.S. 3.1.3 CONTROL RODS (Attach if not previously provided)

HC.OP-AB.IC-0001, CONTROL ROD

Proposed References to be provided to applicants during examination: T.S. 3.1.3.6 and 7

Learning Objective: Given various plant conditions and access to Technical Specifications:(NCO and Above) Select those sections applicable to control rods and CRDMs. Evaluate control rod and CRDM operability and required actions based upon inoperability. (SRO Only) Explain the bases for those Technical Specification sections associated with control rods and CRDMs. IAW HCGS Technical Specifications (As available)

Question Source: Bank #

Modified Bank # 112800 (Note: added distractor with RWM. Not in the original question. RWM is part of the abnormal and Tech Specs)

New

Question History:

Question Cognitive Level: Comprehension or Analysis

10 CFR Part 55 Content:

55.43 (2)

Comments:

Facility: Hope Creek

Vendor: GE

Exam Date: 2018

Exam Type: SRO

Examination Outline Cross-reference:

| Level | RO | SRO |
|---|---|---|
| Tier # | | 2 |
| Group # | | 2 |
| K/A # | | 202002/2.2.42 |
| Importance Rating | | 4.6 |

K/A Statement: Ability to recognize system parameters that are entry-level conditions for Technical Specifications. Recirculation Flow Control

Question: SRO #92

Given:

- A Reactor Recirculation pump transient has occurred.

Plant conditions have stabilized with the following Reactor Recirculation system parameters:

- Reactor Recirc Pump 'A' is at 32 KGPM loop flow.
- Reactor Recirc Pump 'B' is at 25 KGPM loop flow.
- Indicated total core flow is 74 MLBM/hr.

Which one of the following describes the current limit for loop flow mismatch and the reason for the limit?
**[Reference attached]**

A. 10% rated core flow; Maintain MCPR operating limits.

B. 10% rated core flow; Maintain adequate core flow coast-down following a LOCA.

C. 5% rated core flow; Maintain MCPR operating limits.

D. 5% rated core flow; Maintain adequate core flow coast-down following a LOCA.

Proposed Answer: B

Explanation (Optional): Using footnote ** of 3.4.1.3 (see attached) "Effective core flow shall be the core flow that would result if both recirculation loop flows were assumed to be at the smaller value of the 2 loop flows", the smaller loop flow is **25KGPM +25KGPM = 50KGPM**. **50KGPM corresponds to 68 MLBM/HR** on Attachment 6 of HC.OP.ST.BB-0008 (see attached). This is less than the limit of **70 MLBM/HR (70% effective core flow) by TS 3.4.1.3.** Therefore the limit is **10% of rated core flow.** The basis for the limit is to ensure an adequate core flow coastdown from either recirculation loop following a LOCA (see attached bases).

A: **INCORRECT-** MCPR is a concern for single loop operations.

B: **CORRECT-** see above explanation.

C: **INCORRECT**- 10% rated core flow; MCPR is a concern for single loop operations.

D: **INCORRECT-** IAW Attachment 6 of ST.BB-0008 and T.S. 3.4.1.3 the limit is 10% of rated core flow.

Technical Reference(s): T.S. 3.4.1.3 Recirculation Loop Flow
HC.OP-ST.BB-0008 Recirculation Jet Pump Operability Manual Method
3/4.4.1 Recirculation System Bases
(Attach if not previously provided)

Proposed References to be provided to applicants during examination: 3.4.1.3 and ATT. 6 of HC.OP-ST.BB-0008

Learning Objective: Evaluate Reactor Recirculation System operability and determine required actions based upon system inoperability
Explain the bases for those Technical Specifications associated with the Reactor Recirculation System
(As available)

Question Source: Bank #120320

Modified Bank # (Note changes or attach parent)

New

Question History:

Question Cognitive Level: Analysis

10 CFR Part 55 Content:

55.43 (2)

Comments:

Facility: Hope Creek

Vendor: GE

Exam Date: 2018

Exam Type: SRO

Examination Outline Cross-reference:

| Level | RO | SRO |
|---|---|---|
| Tier # | | 2 |
| Group # | | 2 |
| K/A # | 288000 | A2.01 |
| Importance Rating | | 3.4 |

K/A Statement: Ability to (a) predict the impacts of the following on the PLANT VENTILATION SYSTEMS ; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations: High drywell pressure: Plant-Specific.

Question: SRO #93

Given:

- The plant was operating at 100% power when an electrical malfunction caused a loss of ALL of the #2 Drywell Cooling fans (A2V212-H2V212).

Current plant conditions:

- Drywell pressure is 1.0 psig and rising 0.1 psig every ten minutes.
- There is NO evidence of elevated coolant system leakage in the drywell.
- Preparations are being made to vent the drywell for pressure control.
- RBVS is in service.

Which of the following accurately states the requirements to vent the drywell under these conditions?

A. Containment must be verified to be aligned to vent through RBVS/FRVS within 4 hours PRIOR to venting, Administrative Control of valve open time is NOT required due to the size of the vent line.

B. Containment must be verified to be aligned to vent through RBVS/FRVS within 8 hours PRIOR to venting, Administrative Control of valve open time is required to comply with Technical Specifications.

C. Containment must be verified to be aligned to vent through RBVS/FRVS within 4 hours PRIOR to venting, Administrative Control of valve open time is required to comply with Technical Specifications.

D. Containment must be verified to be aligned to vent through RBVS/FRVS within 8 hours PRIOR to venting, Administrative Control of valve open time is NOT required due to the size of the vent line.

Proposed Answer: A

Explanation (Optional): HC.OP-AB.CONT-0001 requires ensuring containment venting is aligned to vent thru RBVS/FRVS within 4 hours prior to start IAW DL.ZZ-0026. HC-OP-103-105, This Administrative Procedure applies to the operation of Drywell and Suppression Chamber Purge System supply and exhaust isolation valves, including the 6 inch nitrogen supply line, during Operational Conditions 1, 2, and 3, except that valves open for pressure control are not subject to the 500 hours per 365 days limit provided the 2 inch bypass lines are being utilized, as allowed by Technical Specifications.

A: **Correct-** see above

B: **Incorrect-** valves open for pressure control are not subject to the 500 hours per 365 days limit provided the 2 inch bypass lines are being utilized, as allowed by Technical Specifications.

C: **Incorrect-** valves open for pressure control are not subject to the 500 hours per 365 days limit provided the 2 inch bypass lines are being utilized, as allowed by Technical Specifications.

D: **Incorrect**-containment venting is aligned to vent thru RBVS/FRVS within 4 hours prior to start

Technical Reference(s): HC.OP-AB.CONT-0001 Drywell Pressure
HC.OP-103-105 Administrative Control of GS Valve Open Time.

T.S. 3.6.1.8 Drywell and Suppression Chamber Purge System.

(Attach if not previously provided)

Proposed References to be provided to applicants during examination: none

Learning Objective: Regarding HC.OP-AB.CONT-0001, Drywell Pressure, be able to discuss the following items:
Given the procedure, state the subsequent operator actions and Retainment Override including the reason for each action.
Given a set of conditions determine if a high drywell pressure conditions exists.

(As available)

Question Source: Bank #

Modified Bank # 62521 (Significant changes in the answer and distractors)

New

Question History:

Question Cognitive Level: Memory or Fundamental Knowledge

10 CFR Part 55 Content:

55.43 (5)

Comments:

Facility: Hope Creek

Vendor: GE

Exam Date: 2018

Exam Type: SRO

| Examination Outline Cross-reference: | Level | RO | SRO |
|---|---|---|---|
| | Tier # | | 3 |
| | Group # | | |
| | K/A # | 2.1.38 | |
| | Importance Rating | | 3.8 |

K/A Statement: Knowledge of the station's requirements for verbal communications when implementing procedures

.

Question: SRO #94

A transient is in progress and you need to communicate with the crew regarding plant status, set priorities, and discuss what is coming up next.

What type of verbal communication is appropriate for this situation IAW OP-AA-104-101,"Communications"?

A. Crew Update

B. Heightened Level of Awareness (HLA) Brief

C. Crew (Alignment) Brief

D. Pre Job Brief

Proposed Answer: C

Explanation (Optional): (see attached procedure)

A: **Incorrect** –

B: **Incorrect-**

C: **Correct** – See attached

D: **Incorrect** -

Technical Reference(s): OP-AA-104-101 Communications (Attach if not previously provided)

Proposed References to be provided to applicants during examination: none

Learning Objective: Given various conditions Identify the types of communication brief and when they should be used
Crew Brief
Crew Update IAW OP-AA-104-101 and HU-AA-1211 (As available)

Question Source: Bank #84245

Modified Bank # (Note changes or attach parent)

New

Question History: NRC 2007

Question Cognitive Level: Memory

10 CFR Part 55 Content:

55.43 (5)

Comments:

Facility: Hope Creek

Vendor: GE

Exam Date: 2018

Exam Type: SRO

Examination Outline Cross-reference:

| Level | RO | SRO |
|---|---|---|
| Tier # | | 3 |
| Group # | | |
| K/A # | 2.2.5 | |
| Importance Rating | | 3.2 |

K/A Statement: Knowledge of the process for making design or operating changes to the facility.

Question: SRO #95

Which of the following set of proposed actions requires a 10CFR50.59 Applicability Review prior to implementation?

A. Installation of a pressure gauge on an instrument taps during the conduct of a system pressure test.

B. Connection of a sample tube to a sampling connection to obtain an RHR system sample.

C. Installation of a temporary space heater to prevent freezing in a SSW pump room during inclement weather.

D. Hookup of an air supply hose for a grinder to a station air manifold during maintenance.

Proposed Answer: C

Explanation (Optional): All distracters are not considered Temporary Modifications as described in CC-AA-112 and LS-AA-104-1000 (see attached).

A: **Incorrect -** Covered as part of a test and is not a temporary modification.

B: **Incorrect –** This is the normal use of this sampling tap and is not a temporary modification.

C: **Correct** – This creates a possibility for a malfunction of an SSC important to safety with a different result than any previously evaluated in the final safety analysis report.

D: **Incorrect** – Covered as maintenance and is not a temporary modification.

Technical Reference(s): CC-AA-112 (Attach if not previously provided)

Proposed References to be provided to applicants during examination: none

Learning Objective: Provided access to control room references. Determine the approved review and extension requirements for installed Temporary Configuration change packages IAW CC-AA-112 (As available)

Question Source: Bank #35456

Modified Bank # (Note changes or attach parent)

New

Question History:

Question Cognitive Level:

Comprehension or Analysis

10 CFR Part 55 Content:

55.43 (3)

Comments:

| | |
|---|---|
| Facility: | Hope Creek |
| Vendor: | GE |
| Exam Date: | 2018 |
| Exam Type: | SRO |

| Examination Outline Cross-reference: | Level | RO | SRO |
|---|---|---|---|
| | Tier # | | 3 |
| | Group # | | |
| | K/A # | 2.3.13 | |
| | Importance Rating | | 3.8 |

K/A Statement: Knowledge of Radialogical Safety Procedures pertaining to licensed operator duties, such as response to radiation monitor alarms, containment entry requirements, fuel handling responsibilities, access to locked high radiation areas, aligning filters, etc.

Question: SRO #96

Given:

- The Refueling SRO reports he is ready to commence Core Alterations.
- Radiation Protection has been notified and is evacuating the upper regions of the Drywell.

IAW Technical Specifications, which of the following controls satisfies the requirements if the upper regions of the Drywell radiation levels are determined to be > 1000 mRem/Hr.?
**[Reference attached]**

A. Qualified personnel providing direct or remote (e.g., closed circuit TV) roving surveillance, the area is conspicuously posted.

B. The area is conspicuously posted and qualified personnel providing direct or remote (e.g., closed circuit TV) continuous surveillance.

C. Qualified personnel providing direct or remote (e.g., closed circuit TV) continuous surveillance to ensure positive control over the area.

D. The area is roped off, conspicuously posted and a flashing light provided as a warning device.

Proposed Answer: D

Explanation (Optional):

A: **INCORRECT**- see attached procedure and Technical Specification

B: **INCORRECT**- see attached procedure and Technical Specification

C: **INCORRECT**- see attached procedure and Technical Specification

D: **CORRECT**- see attached procedure and Technical Specification

Technical Reference(s): Technical Specifications 6.12.2 Administrative Controls for a LHRA (Attach if not previously provided)
HC.OP-SO.KE-0001 Refuel Platform and Fuel Grapple Operation
RP-AA-460 Controls for High and Very High Radiation Areas

Proposed References to be provided to applicants during examination: T/S 6.12.2

Learning Objective: Given a scenario of applicable operating conditions and access to Technical Specifications: Choose those sections which are applicable to the administrative controls for radiation protection IAW HCGS Technical Specifications. (As available)

Question Source: Bank #33666

Modified Bank # (Note changes or attach parent)

New

Question History:

Question Cognitive Level: Memory or Fundamental Knowledge

10 CFR Part 55 Content:

55.43 (2)

Comments:

Facility: Hope Creek

Vendor: GE

Exam Date: 2018

Exam Type: SRO

Examination Outline Cross-reference:

| Level | RO | SRO |
|---|---|---|
| Tier # | | 3 |
| Group # | | |
| K/A # | 2.4.29 | |
| Importance Rating | | 4.4 |

K/A Statement: Knowledge of the emergency plan.

Question: SRO #97

Given:

- A Site Area Emergency has been declared 2 hours ago.
- All Emergency Response Organization facilities are activated.

Based on the above conditions, which one of the following has the duty to notify and recommend protective actions to offsite agencies?

A. Shift Manager

B. Emergency Duty Officer

C. Emergency Response Manager

D. Radiological Support Manager

Proposed Answer: C

Explanation (Optional): This is a non-delegable responsibility of the Emergency Coordinator (EC) who at this point is the **Emergency Response Manager** since the Emergency Operations Facility (EOF) is activated (all facilities activated).

A: (see attached)

B: (see attached)

C: (see attached)

D: Even though the Radiation Support Manager (assigned to EOF) is not in the capacity of an Emergency Coordinator like SM and EDO, the ERM can delegate some responsibilities to the RSM but not PAR recommendations.

Technical Reference(s): NEPOVERVIEWC (Attach if not previously provided)

Emergency Preparedness Overview Lesson Plan
NC.EP-EP.ZZ-0102
Emergency Coordinator Response

Proposed References to be provided to applicants during examination: none

Learning Objective: Describe the Emergency Response Organization including: (As available)

- Expectations for All Responders.
- Expectations for Duty Responders.
- Expectations for Support Responders.
- **Emergency Coordinator (EC) roles and responsibilities.**

Question Source: Bank #30682

Modified Bank # (Note changes or attach parent)

New

Question History:

Question Cognitive Level: Memory or Fundamental Knowledge

10 CFR Part 55 Content: 55.43 (5)

Comments:

Facility: Hope Creek

Vendor: GE

Exam Date: 2018

Exam Type: SRO

Examination Outline Cross-reference:

| Level | RO | SRO |
|---|---|---|
| Tier # | | 3 |
| Group # | | |
| K/A # | 2.2.15 | |
| Importance Rating | | 4.3 |

K/A Statement: Ability to determine the expected plant configuration using design and configuration control documentation, such as drawings, line-ups, tag-outs, etc..

Question: SRO #98

Given:

- While performing a HPCI system lineup check the equipment operator finds that a local Limitorque position indicator for FD-HV-F003 does not indicate fully open.
- To verify position, he disengages the motor actuator and attempts to open the valve further.
- After manually back seating the valve to ensure that it is fully open, he notes the problem on the lineup to document the actions taken.
- The valve had not been subsequently operated from the Control room prior to the manual operation.

As the CRS on-shift, what is your evaluation of the Equipment Operator's actions and current valve status?

A. The actions taken by the Equipment Operator are in accordance with plant procedures. The valve should be considered OPERABLE.

B. The actions taken by the Equipment Operator are in accordance with plant procedures. The valve must be declared INOPERABLE and HPCI operability evaluated.

C. The actions taken by the Equipment Operator are NOT in accordance with plant procedures. The valve should be considered OPERABLE.

D. The actions taken by the Equipment Operator are NOT in accordance with plant procedures. The valve must be declared INOPERABLE and HPCI operability evaluated.

Proposed Answer: D

Explanation (Optional): OP-AA-108-101-1002 Attachment 4 (see attached) Valve Operations- MOVS When a MOV has been manually seated or backseated to a position that would require it to change position in order to fulfill a safety function, the MOV shall be declared inoperable. OP-AA-101-111-1003, USE OF PROCEDURES, Attachment 1, Skill of the Craft (Common), the actions taken by the EO are NOT in accordance with plant procedures. The list includes engaging a MOV, NOT manually back-seating the valve..

A: **Incorrect-** the valve must be declared Inoperable.

B: **Incorrect** – backseating of MOVs valves requires CRS permission.

C: **Incorrect-** the valve must be declared Inoperable.

D: **Correct-** see above explanation

Technical Reference(s): OP-AA-108-101-1002 Attachment 4 Valve Operations MOVs (Attach if not previously provided)
OP-AA-101-111-1003, USE OF PROCEDURES

Proposed References to be provided to applicants during examination: none

Learning Objective: Given a set of conditions, determine when a Motor Operated Valve must be declared Inoperable due to manual operation. IAW OP-AA-108-101-1002. (As available)

Question Source: Bank #70962

Modified Bank # (Note changes or attach parent)

New

Question History:

Question Cognitive Level: Memory or Fundamental Knowledge

10 CFR Part 55 Content:

55.43 (5)

Comments:

Facility: Hope Creek

Vendor: GE

Exam Date: 2018

Exam Type: SRO

Examination Outline Cross-reference:

| Level | RO | SRO |
|---|---|---|
| Tier # | | 3 |
| Group # | | |
| K/A # | 2.4.6 | |
| Importance Rating | | 4.7 |

K/A Statement: Knowledge of EOP mitigation strategies.

Question: SRO #99

Given:

- A Main Turbine trip and ATWS occurred from 65% power.
- EOP-101A and 102 are currently being executed.

Current plant conditions:

- Pressure is 900 psig and rising slowly.
- Level is -80 inches with RCIC and CRD injecting.
- Power is on IRM Range 8 @ 50 / 125 lowering.
- SLC is injecting.
- Suppression Pool Water Temperature is 192°F and stable.
- Suppression Pool Level is at 76.8 inches and stable.

Which of the following actions is required?
**[Reference attached]**

A. Lower Suppression Pool Temperature

B. Emergency Depressurize the Reactor Pressure Vessel

C. Reduce Reactor Pressure

D. Reduce Suppression Pool Water Level

Proposed Answer: B

Explanation (Optional): see attached flow charts for EOP-102 SP/T Leg and 101A RC/P Leg along with the following explanations:

A: **Incorrect-** EOP-102 (SP/T-1) directs to Monitor and Control Suppression Pool Temperature below 95°F, however Suppression Pool Temperature is at 192°F which is beyond temperature being maintained below 110°F (SP/T-4) and exceeding the SPT-P curve "Action Required" IAW SP/T-9 which directs the action of Emergency Depressurization (SP/T-10).

B: **Correct-** Above SPT-P **Action Required** limit (SP/T-7 and SP/T-9). Emergency Depressurization required (SP/T-10).

C: **Incorrect-** Above SPT-P Action Required limit. SP temp at 192 F and stable. Step RC/P-16 of EOP-101A directs reducing RPV pressure, exceed cooldown limits if necessary. However once in the **action required region** of curve you have to take the action noted in EOP 102 (SP/T-9) to Emergency Depressurized (SP/T-10).

D: **Incorrect-** The suppression pool level is within band for the entry conditions into EOP-102 of below 74.5 inches and above 78.5 inches. This would be just Monitor level.

Technical Reference(s): HC.OP-EO.ZZ-0102 (Attach if not previously provided)

Primary Containment Control

HC.OP-EO.ZZ-0101A
ATWS- RPV Control

Proposed References to be provided to applicants during examination: EOP-102 SP/T Leg

Learning Objective: Given any step of the procedure, explain the reason for performance of that step and/or evaluate the expected system response to control manipulations prescribed by that step (As available)

Question Source: Bank #36282

Modified Bank # (Note changes or attach parent)

New

Question History: NRC Exam 2003

Question Cognitive Level:

Comprehension or Analysis

10 CFR Part 55 Content:

55.43 (5)

Comments:

Facility: Hope Creek

Vendor: GE

Exam Date: 2018

Exam Type: SRO

Examination Outline Cross-reference:

| Level | RO | SRO |
|---|---|---|
| Tier # | | 3 |
| Group # | | |
| K/A # | 2.1.41 | |
| Importance Rating | | 3.7 |

K/A Statement: Knowledge of the refueling process.

Question: SRO #100

Given:

- The plant is in Operational Condition 4.
- The Reactor Head detensioning machine is being lowered in place to detension the reactor head.

Which one of the following personnel grants permission to begin detensioning of the first RPV Head Stud IAW HC.OP-IO.ZZ-0005 "Cold Shutdown to Refueling"?

A. Refueling Outage Manager.

B. Reactor Engineer.

C. Refueling Floor SRO.

D. Control Room Supervisor.

Proposed Answer: D

Explanation (Optional): HC.OP-IO.ZZ-0005:

**CAUTION**

**Do not proceed with Reactor head de-tensioning UNTIL:**

- **ALL systems AND equipment required to enter Mode 5 are operable.**
- **RPV Metal Temps should be recorded on a 30 min. interval.**
- **ALL departments have signed Attachment 2, Section A.** ___

5.1.11. IF all systems requirements for entering Operational Condition 5 are satisfied, AND all departments have signed Attachment 2 Section A, THEN **COMPLETE** Section A of Attachment 2. ___ SM/CRS

A: **Incorrect-** This individual can recommend a MODE change but cannot grant permission.

B: **Incorrect-** A non-licensed individual is not authorized to grant permission for MODE changes.

C: **Incorrect** The licensed SM/CRS in the Control Room has the authority.

D: **Correct-** In accordance with HC.OP-IO.ZZ-0005, Attachment 2, "Entering Operational Condition 5 Final Checks," the "SM/CRS" is responsible to grant permission for entering OPERATIONAL CONDITION 5. (see attached)

Technical Reference(s): HC.OP-IO.ZZ-0005 (Attach if not previously provided)

COLD SHUTDOWN TO REFUELING

Proposed References to be provided to applicants during examination: none

Learning Objective: Explain the basis for all Precautions, Limitations and Notes listed in the COLD SHUTDOWN TO REFUELING Integrated Operating Procedure, (As available)

Question Source: Bank #35519

Modified Bank # (Attached)

New

Question History: NRC 2016

Question Cognitive Level: Memory

10 CFR Part 55 Content:

55.43 (2)

Comments: