1. EOPS 789

Given the following plant conditions:

- Loss of offsite power (115KV and 230 KV) occurred.
- Steam Generator Tube Rupture occurred.
- EOP-4.0, STEAM GENERATOR TUBE RUPTURE, in progress.
- Both Charging pumps are in injection mode.
- RCS cooldown complete.
- RCS depressurization is in progress.
- Pressurizer level is 50%, rising rapidly.
- RCS pressure is 950 psig, lowering.
- Ruptured SG pressure is 800 psig, stable.
- RCS temperature is 430°F, stable.

Which ONE (1) of the following describes a valid reason for the rapidly increasing pressurizer level and a required action in accordance with EOP-4.0?

A. Accumulators are injecting; Stop the depressurization immediately.

B. Accumulators are injecting; Continue the depressurization to lower RCS pressure to less than the ruptured S/G pressure.

C. The Reactor Vessel head is voiding; Stop the depressurization immediately.

D. ✓ The Reactor Vessel Head is voiding; Continue the depressurization to lower RCS pressure to less than the ruptured S/G pressure.

QUESTION USAGE:

MODIFIED FROM EOPS162

QUESTION HISTORY:

Rev. 0 submitted by RJ
Ops Review: Nick O'Kimosh
Approved: 6/14/13 Rick Garner

DISTRACTOR ANALYSIS:

In order to answer this question correctly, the applicant must assess conditions and determine that no RCPs are running, that head voiding is occurring and that the RCS depressurization must continue to mitigate the event.

A. Plausible because accumulators would inject if RCS pressure decreases an additional 300 psig resulting in an addition of inventory to the RCS. Additionally, 950 psig is slightly below the pressure of 1000 psig, at which accumulators are removed from service so the applicant may assume that they are pressurized to just below that pressure. Second part is plausible; EOP-4.0 requires stopping the depressurization if pressurizer level reaches 76%.

   Incorrect because head voiding is the reason for the rapid increase in pressurizer level and the depressurization must continue until RCS pressure is less than ruptured steam generator pressure.

B. Plausible because accumulators would inject if RCS pressure decreases an additional 300 psig resulting in an addition of inventory to the RCS. Additionally, 950 psig is slightly below the pressure of 1000 psig, at which accumulators are removed from service so the applicant may assume that they are pressurized to just below that pressure. Second part is correct; The depressurization must continue to lower RCS pressure less than ruptured SG pressure with pressurizer level greater than 10%.

   Incorrect because head voiding is the reason for the rapid increase in pressurizer level.

C. The first part is correct; With no RCPs running, head voiding will likely occur during the RCS depressurization if less than the saturation pressure for the head temperature and the second part is plausible; EOP-4.0 requires stopping the depressurization if pressurizer level reaches 76%.

   Incorrect because the depressurization must continue until RCS pressure is less than ruptured steam generator pressure.

D. CORRECT, With no RCPs running, head voiding will occur during the RCS depressurization when pressure lowers to less than the saturation pressure for the head temperature. At power T COLD is approximately 557°F, saturation pressure is 1031 psig, RCS pressure as given is 950 psig and lowering -> voiding should be occurring if no RCPs are running. Per EOP-4.0, unless subcooling is lost or pressurizer level reaches 76%, the depressurization must continue until RCS pressure is less than Steam Generator pressure.

K/A: 002A2.02 K/A: 002 Reactor Coolant System (RCS) A2: Ability to (a) predict the impacts of the following malfunctions or operations on the RCS; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: 2.02: Loss of coolant pressure

K/A Match: the KA is matched because it requires the candidate to assess conditions and use procedures to control pressure while mitigating a primary to secondary loss of reactor coolant.

Selection criteria; MODIFIED FROM EOPS162

Tier: 2 **Group:** 2
Importance Rating: RO 4.2 SRO 4.4
Technical Reference: **EOP-4.0 STEAM GENERATOR TUBE RUPTURE**
TS 3.5.1

Proposed references to be provided to applicants during examination: None

Learning Objective: EOP-4.0 04. STATE the bases or reasons for each action contained in EOP-4.0 This should include, but not be limited to, the following: t. Knowledge that depressurization should continue even with void in RV Head

Question Cognitive Level: **Memory or Fundamental Knowledge** _____

Comprehension or Analysis __X__

10 CFR Part 55 Content: 41(b)(10) Administrative, normal, abnormal, and emergency operating procedures for the facility.

SRO Justification: N/A

NRC Form ES-401-9 Comments

Facility Response:

Comments;

2. REACTOR COOLANT PUMP 107

Given the following plant conditions:

Time 10:00:

- 100% power.
- "B" CCW Train is aligned as the active loop.

Time 10:30:

- Reactor trip.

Time 10:35:

- Lockout occurs on XTF-32.
- No EDGs start.

Which of the following describes the status of Reactor Coolant Pump(s) and whether there is CCW cooling flow to Reactor Coolant Pump (RCP) bearing oil coolers?

Assume no operator actions

A. **All** RCPs are running; CCW flow is supplied to RCP bearing oil coolers.

B. **All** RCPs are running; CCW flow is **not** supplied to RCP bearing oil coolers.

C. **Only** "C" RCP is running; CCW flow is supplied to RCP bearing oil coolers.

D. **Only** "C" RCP is running; CCW flow is **not** supplied to RCP bearing oil coolers.

QUESTION USAGE:

NEW for 2013 NRC.

REVISION HISTORY:

Rev. 0 Submitted by RJ
Ops Review: Nick O'Kimosh
Approved: 6/14/13 Rick Garner

DISTRACTOR ANALYSIS:

This question requires the candidate to recall that when a lockout occurs on XTF-32 that this will deenergize XTF-31 but this will only deenergize alternate supplies to BOP busses. They will remain energized after a trip via backfeed through the main generator. Additionally, the candidate must recognize that if XTF-31 deenergizes without a diesel start that a loss of 1DB will result in the loss of B CCW train. Finally, the candidate must recognize that the loss of the active loop will lose CCW supply to non-essential loads and that this includes RCP bearing oil coolers in the RB.

A. First part is correct. Power to the BOP busses and remains intact via main generator backfeed and RCPs continue to run. Second part is plausible because CCW supply to RCPs would be available if A train was the active loop and 1DA is still energized from 115KV supplies (1DX).

   Incorrect because CCW to RCP motors is not supplied due to the loss of "B" CCW train.

B. CORRECT, All RCPs are running since power to the BOP busses remains intact via main generator backfeed and RCPs continue to run.. XTF-31 deenergized due to the XTF-32 lockout. Without the "B" diesel start, 1DB has been lost resulting in the loss of B CCW train which, as the active train, supplies non-essential CCW loads, including RCP bearing oil coolers in the RB.

C. Plausible because XTF-32 is the alternate supply to BOP busses 1A and 1B which may lead to the candidate to conclude that power is only supplied to C RCP. This would be the true if only XFT-32 and the main generator transformer is lost. The second part is plausible because CCW supply to RCPs would be available if A train was the active loop and 1DA is still energized from 115KV supplies (1DX).

   Incorrect because all RCPs are running and CCW to RCP motors is not supplied due to the loss of "B" CCW train.

D. Plausible because XTF-32 is the alternate supply to BOP busses 1A and 1B which may lead to the candidate to conclude that power is only supplied to C RCP. This would be the true if XFT-32 and the main generator transformer is lost while XTF-31 remains intact. The second part is correct; XTF-31 deenergized due to the XTF-32 lockout. Without the "B" diesel start, 1DB has been lost resulting in the loss of B CCW train which, as the active train, supplies non-essential CCW loads, including RCP bearing oil coolers in the RB.

   Incorrect because all RCPs are running.

K/A: 003K2.02 K/A: 003 Reactor Coolant Pump System (RCPS) K2: Knowledge of bus power supplies to the following: 2.02: CCW pumps

K/A Match: This question requires knowledge of power supplies upstream of 1DB and the effect of a loss of 1DB will have on Reactor Coolant Pump motor CCW supply.

Selection criteria; NEW

Tier: 2 **Group:** 1
Importance Rating: RO 2.5 SRO 2.6
Technical Reference: **Drawing E-206-005**
SOP-118, COMPONENT COOLING WATER
IB-2, COMPONENT COOLING WATER SYSTEM

Proposed references to be provided to applicants during examination: None

Learning Objective: AB-4-04 DESCRIBE the Reactor Coolant Pump interfaces with the following Systems and/or Subsystems: 1. CCW System

Question Cognitive Level: **Memory or Fundamental Knowledge** _____

Comprehension or Analysis __**X**__

10 CFR Part 55 Content: 41(b) (4) Secondary coolant and auxiliary systems that affect the facility.

SRO Justification: N/A

NRC Form ES-401-9 Comments

Facility Response:

Comments;

3. CVCS 197

Given the following plant conditions:

- Plant shutdown is in progress for a refueling outage in accordance with GOP-6, PLANT SHUTDOWN FROM HOT STANDBY TO COLD SHUTDOWN (MODE 3 TO MODE 5).

Select ONE of the choices below that describes control of the VCT atmosphere during the shutdown?

Operators will:

A. ✔ switch the VCT atmosphere from Hydrogen to Nitrogen to reduce explosion hazards when the RCS is opened.

B. switch the VCT atmosphere from Hydrogen to Nitrogen to reduce the introduction of hydrogen into the Shutdown Decay Tanks.

C. maintain a Hydrogen atmosphere on the VCT to provide oxygen scavenging in the RCS.

D. maintain a Hydrogen atmosphere on the VCT to operate catalytic recombiners for waste gas reduction.

QUESTION USAGE:

NEW for 2013 NRC

QUESTION HISTORY:

Rev. 0 submitted by RJ
Ops Review: Nick O'Kimosh
Approved: 6/14/13 Rick Garner

DISTRACTOR ANALYSIS:

In order to answer this question correctly, the applicant must recall the requirement to switch the VCT atmosphere to nitrogen to reduce explosion hazards when the RCS is to be opened in a plant shutdown .

A. CORRECT. In accordance with GOP-6, if the RCS is to be opened, the VCT atmosphere will be changed to nitrogen and the RCS degassed. This is done to reduce hydrogen concentration and explosion hazards if the RCS is to be opened.

B. Plausible because there is a limit on Hydrogen and Oxygen in that system. This is regulated by the operation of the CVCS hydrogen recombiner and nitrogen cover gas control.

   Incorrect because the purpose of establishing Nitrogen in the VCT is not to reduce hydrogen concentration in the Waste Gas system.

C. Plausible because Hydrogen is added and used during at power operation to scavenge oxygen.

   Incorrect because the VCT atmosphere is changed from Hydrogen to Nitrogen during a shutdown.

D. Plausible because the CVCS Hydrogen Recombiner requires hydrogen for catalytic action and recombiners are used for reduction of stored waste gas.

   Incorrect because the VCT atmosphere is changed from Hydrogen to Nitrogen during a shutdown.

K/A: 004K5.02 K/A: 004 Chemical and Volume Control System K5: Knowledge of the operational implications of the following concepts as they apply to the CVCS: 5.02: Explosion hazard associated with hydrogen containing systems

K/A Match: the KA is matched because it requires knowledge of expected operator actions regarding VCT hydrogen when shutting down with the intent to open the RCS for refueling.

Selection criteria; NEW

Tier: 2 **Group:** 1
Importance Rating: RO 3.5 SRO 3.9
Technical Reference: **SOP-101, REACTOR COOLANT SYSTEM**
GOP-6, PLANT SHUTDOWN FROM HOT STANDBY TO COLD SHUTDOWN (MODE 3 TO MODE 5)
GS-06, PRIMARY CHEMISTRY AND SAMPLING
AB-12, WASTE GAS SYSTEM

Proposed references to be provided to applicants during examination: None

Learning Objective: AB-3-14 DESCRIBE the Operation of the following Control Systems. Include function, instrumentation, and setpoints: 5. VCT H2 Pressure Control

Question Cognitive Level: **Memory or Fundamental Knowledge** __X__

Comprehension or Analysis _____

10 CFR Part 55 Content: 41(b)(10)Administrative, normal, abnormal, and emergency operating procedures for the facility.

SRO Justification: N/A

NRC Form ES-401-9 Comments

Facility Response:

Comments;

4. CVCS 198

Given the following plant conditions:

- The plant is in Mode 5.
- The PZR is solid.
- RCS temperature is 190°F.
- RCS pressure is 350 psig.
- "A" RHR Train is aligned for shutdown cooling.
- Low pressure letdown is in service.
- PCV-145, LO PRESS LTDN is in AUTO.

Which ONE of the following describes an event that will cause both PCV-145 to **initially** throttle closed and RCS pressure to **initially** increase upon initiation of the event?

A. Tripping the in-service RHR Pump

B. Throttling FCV-122, CHG FLOW from 100% open to 50% open.

C. Increasing CCW flow through an in-service RHR heat exchanger.

D. Throttling HCV-142, LTDN FROM RHR from 50% open to 100% open.

QUESTION USAGE:

MODIFIED FROM CVCS21 FOR 2013 NRC

QUESTION HISTORY:

Rev. 0 submitted by RJ
Ops Review: Nick O'Kimosh
Approved: 6/14/13 Rick Garner

DISTRACTOR ANALYSIS:

In order to answer this question correctly, the applicant must recall the effect of the running RHR pump trip on Letdown pressure control valve PCV-145.

A. CORRECT; PCV-145 will close when the running RHR pump trips because the pump discharge is very close to where the pressure transmitter that controls PCV-145 senses pressure. Thus the loss of pressure causes the valve to close and as a result, letdown reduces. With charging and seal injection the same, pressure will immediately rise.

B. Plausible because throttling FCV-122 closed would lower RCS pressure and letdown pressure and cause PCV-145 to throttle close to restore letdown pressure.

   Incorrect because RCS pressure will decrease because letdown exceeds charging.

C. Plausible because increasing CCW flow through the RHR heat exchanger would cause RCS temperature and pressure and letdown pressure to decrease and PCV-145 would therefore close to restore letdown pressure.

   Incorrect because RCS pressure will decrease due to the contraction of the RCS.

D. Plausible because throttling open HCV-142 will cause RCS pressure to lower and letdown pressure to rise so PCV-145 will open to restore letdown pressure.

   Incorrect because RCS pressure will decrease because letdown exceeds charging and PCV-145 will open.

K/A: 005K5.05 K/A: 005 Residual Heat Removal System (RHRS) K5: Knowledge of the operational implications of the following concepts as they apply to the RHRS: 5.05: Plant response during "solid plant": pressure change due to the relative incompressibility of water

K/A Match: the KA is matched because it requires the candidate to predict the plant response when solid and the running RHR pump trips.

Selection criteria; BANK REVISED FROM CVCS21, CHOSEN FROM SEARCH ON RCP AND 1A OR 1B AND FOR ATTRIBUTES AND KA MATCH.

Tier: 2 **Group:** 1
Importance Rating: RO 2.7 SRO 3.1
Technical Reference: **SOP-102, CHEMICAL AND VOLUME CONTROL SYSTEM**
AB-7, RESIDUAL HEAT REMOVAL SYSTEM
AB-3, CHEMICAL AND VOLUME CONTROL SYSTEM

Proposed references to be provided to applicants during examination: None

Learning Objective: AB-3-15 DESCRIBE the Operation of the CVCS, including expected parameters, for the following conditions: 8. Solid Plant Pressure Control

Question Cognitive Level: **Memory or Fundamental Knowledge** _____

Comprehension or Analysis __X__

10 CFR Part 55 Content: 41(b)(5) Facility operating characteristics during steady state and transient conditions, including coolant chemistry, causes and effects of temperature, pressure and reactivity changes, effects of load changes, and operating limitations and reasons for these operating characteristics.

SRO Justification: N/A

NRC Form ES-401-9 Comments

Comments;

5. RHR SYSTEM 055

Given the following plant conditions:

Initial Conditions:

- 100% power.
- A Large Break LOCA occurs.
- "A" Train of SI actuated.
- "B" Train of SI **failed** to actuate automatically or manually.
- Operators started pumps and aligned valves as necessary in accordance with EOP-1.0, REACTOR TRIP/ SAFETY INJECTION ACTUATION, Attachment 3.

Current Condition:

- XCP-612, 4-3, RWST LVL LO-LO XFER TO SUMP is illuminated

Which ONE (1) of the following describes the setpoint of XCP-612, 4-3 and the suction source(s) that will supply the RHR pumps five (5) minutes after XCP-612, 4-3 alarms?

Assume no additional operator actions.

A. Setpoint is 10%; "A" and "B" RHR pump suctions will **both** be supplied by the RB Recirculation sump.

B. Setpoint is 18%; "A" and "B" RHR pump suctions will **both** be supplied by the RB Recirculation sump.

C. Setpoint is 10%; "A" RHR pump suction will be supplied by the RB Recirculation Sump and "B" RHR pump suction will be supplied by the RWST.

D. ✔ Setpoint is 18%; "A" RHR pump suction will be supplied by the RB Recirculation Sump and "B" RHR pump suction will be supplied by the RWST.

QUESTION USAGE:

MODIFIED FROM RHR44

REVISION HISTORY:

Rev. 0 Submitted by RJ
Ops Review: Nick O'Kimosh
Approved: 6/14/13 Rick Garner

DISTRACTOR ANALYSIS:

This question requires the candidate to recall the setpoint for the alarm that warns operators that automatic switchover to recirculation should begin and predict the effect of the SI train actuation failure on the automatic switchover functions.

A. The first part is plausible because 10% is the level stated in EOP-2.2 at which all pumps must be stopped of taking suction on the RWST. The second part is plausible if the candidate thinks that both trains of SI actuation are required for either train of RHR suction valves to automatically transfer. This is similar to the way that manual spray actuation requires both trains to actuate.

   Incorrect because the setpoint for XCP-612, 4-3 is 18% and the swapping function is train dependent so "A" train suction will automatically swap to the sump since "A" SI train has actuated.

B. The first part is correct; The setpoint for XCP-612, 4-3 is 18%. The second part is plausible if the candidate thinks that both trains of SI actuation are required for either train of RHR suction valves to automatically transfer. This is similar to the way that manual spray actuation requires both trains to actuate.

   Incorrect because the swapping function is train dependent so only "A" train suction will automatically swap to the sump since "A" SI train has actuated.

C. The first part is plausible because 10% is the level stated in EOP-2.2 at which all pumps must be stopped of taking suction on the RWST. The second part is correct; The suction path to the train ("A") on which SI has actuated will swap to the recirculation sump and the "B" train will remain aligned to the RWST.

   Incorrect because the setpoint for XCP-612, 4-3 is 18%.

D. CORRECT. The suction path to the train ("A") on which SI has actuated will swap to the recirculation sump and the "B" train will remain aligned to the RWST.

K/A: 006A3.08 K/A: 006 Emergency Core Cooling System (ECCS) A3: Ability to monitor automatic operation of the ECCS, including: 3.08: Automatic transfer of ECCS flowpaths

K/A Match: the KA is matched because it requires the applicant to recall the setpoint at which automatic transfer of ECCS flowpaths occurs and predict the effects of a failure of one train SI on the ability of ECCS to automatically transfer suctions.

Selection criteria: MODIFIED FROM RHR44

Tier: 2 **Group:** 1
Importance Rating: RO 4.2 SRO 4.3
Technical Reference: **AB-10, Emergency Core Cooling System.**
XCP-612 4-3, RWST LVL LO-LO XFER TO SUMP
EOP-2.2, TRANSFER TO COLD LEG RECIRCULATION
SOP-112, SAFETY INJECTION SYSTEM

Proposed references to be provided to applicants during examination: None

Learning Objective: IC-9-21 DESCRIBE the actions that occur on a safety injection actuation signal, specifying equipment affected and its status.

Question Cognitive Level: **Memory or Fundamental Knowledge** _____

Comprehension or Analysis __**X**__

10 CFR Part 55 Content: 41(b)(7) Design, components, and functions of control and safety systems, including instrumentation, signals, interlocks, failure modes, and automatic and manual features.

SRO Justification: N/A

NRC Form ES-401-9 Comments

Facility Response:

Comments;

6. SAFETY INJECTION SYS 016

Given the following plant conditions:

- 100% Power.
- LOCA in progress.
- 51BX Lockout on Bus 1DB occurred.
- EOP-2.0, LOSS OF REACTOR OR SECONDARY COOLANT in progress.

Select ONE of the choices below that completes the following statements:

Accumulator Discharge Isolation Valves MVG-8808A(B)(C) are normally ____(1)_____ at power;

Power is available to operate _____(2)_____ if isolation of Accumulators is required.

	(1)	(2)
A.	Energized	MVG-8808A **only**.
B.	Energized	MVG-8808A and MVG-8808C **only**.
C.	Deenergized	MVG-8808A **only**.
D. ✔	Deenergized	MVG-8808A and MVG-8808C **only**.

QUESTION USAGE:

NEW for 2013 NRC

QUESTION HISTORY:

Rev. 0 submitted by RJ
Ops Review: Nick O'Kimosh
Approved: 6/14/13 Rick Garner

DISTRACTOR ANALYSIS:

In order to answer this question correctly, the applicant must recall that MVG-8808A(B)(C) are normally deenergized at power via a power lockout feature and that with only 1DB energized, power is available to only MVG-8808A and C.

A. Plausible because the accumulator discharge valves perform a critical safety function and they receive a open signal on Safety Injection. The second part is plausible because power will be available to MVG-8808A and because one power supply powering one valve is similar to the real case that 1DB solely powers MVG-8808B.

   Incorrect because MVG-8808A(B)(C) are normally deenergized at power and with 1DA energized, power is available to MVG-8808A and C.

B. Plausible because the accumulator discharge valves perform a critical safety function and they receive a open signal on Safety Injection. The second part is correct; With 1DA energized, power is available to MVG-8808A and C.

   Incorrect because MVG-8808A(B)(C) are normally deenergized at power.

C. The first part is correct; MVG-8808A(B)(C) are normally deenergized at power. The second part is plausible because power will be available to MVG-8808A and because one power supply powering one valve is similar to the real case that 1DB solely powers MVG-8808B.

   Incorrect because with 1DA energized, power is available to MVG-8808A and C.

D. CORRECT. MVG-8808A(B)(C) are normally deenergized at power. With 1DA energized, power is available to MVG-8808A and C.

K/A: 006K2.02 K/A: 006 Emergency Core Cooling System (ECCS) K2: Knowledge of bus power supplies to the following: 2.02: Valve operators for accumulators.

K/A Match: the KA is matched because it requires the applicant to recall the normal power status of Accumulator Discharge Valves MVG-8808A(B)(C) and determine which valves are available with only one 7.2KV bus energized.

Selection criteria; NEW

Tier: 2 **Group:** 1
Importance Rating: RO 2.5 SRO 2.9
Technical Reference: **SOP-112 SAFETY INJECTION SYSTEM: System Lineup**

Proposed references to be provided to applicants during examination: None

Learning Objective: AB-10-13 IDENTIFY power supplies for the following Emergency Core Cooling System Components: 15. MVG-8808A/B/C.

Question Cognitive Level: **Memory or Fundamental Knowledge** _____

Comprehension or Analysis __X__

10 CFR Part 55 Content: 41(b)(8) Components, capacity, and functions of emergency systems.

SRO Justification: N/A

NRC Form ES-401-9 Comments

Facility Response:

Comments;

7. EOPS 790

Given the following plant conditions:

- 100% Power.
- Reactor trip occurs.
- Two (2) control rods are stuck at 220 steps.
- ALL other control rods indicate 0 steps.
- T_{AVG} 557°F and stable.

Select ONE of the choices below that completes the following statements:

One minute after the trip, shutdown margin is ____(1)____ ;

Operators will be required to borate ____(2)____ gallons as directed by EOP-1.1, REACTOR TRIP RECOVERY.

	(1)	(2)
A. ✔	Increasing	2500
B.	Increasing	5800
C.	Decreasing	2500
D.	Decreasing	5800

QUESTION USAGE:

MODIFIED FROM EOPS 200

QUESTION HISTORY:

Rev. 0 submitted by RJ
Ops Review: Nick O'Kimosh
Approved: 6/14/13 Rick Garner

DISTRACTOR ANALYSIS:

In order to answer this question correctly, the applicant must recall how shutdown margin changes after a reactor trip and recall the amount of boration required if two rods are stuck out after a trip.

A. CORRECT; Shutdown margin will increase after a reactor trip as iodine decays to xenon and two rods stuck out will require a boration of 2500 gallons in accordance with EOP-1.1 step 5.

B. The first part is correct; Shutdown margin will increase after a reactor trip as iodine decays to xenon. The second part is plausible because 5800 gallons is the amount of boration required if more than 2 rods fail to insert.

   Incorrect because 2500 gals is the required boration for 2 stuck rods.

C. Plausible because shutdown margin will eventually decrease after a reactor trip as xenon decays below the concentration at the time of trip and two rods stuck out will require a boration of 2500 gallons in accordance with EOP-1.1 step 5.

   Incorrect because shutdown margin is increasing one minute after the reactor trip.

D. Plausible because shutdown margin will eventually decrease after a reactor trip as xenon decays below the concentration at the time of trip and if more than two rods are stuck out, a boration of 5800 gallons is required in accordance with EOP-1.1 step 5.

   Incorrect because shutdown margin is increasing one minute after the reactor trip and because 2500 gals is the required boration for 2 stuck rods..

K/A: 007EK1.02 K/A: 007 Reactor Trip EK1: Knowledge of the operational implications of the following concepts as they apply to the reactor trip: 1.02: Shutdown margin.

K/A Match: the KA is matched because it requires the applicant to recall how shutdown margin changes after a reactor trip and recall the amount of boration required if two rods are stuck out after a trip.

Selection criteria; MODIFIED FROM EOPS 200

Tier: 1 **Group:** 1
Importance Rating: RO 3.4 SRO 3.8
Technical Reference: **EOP-1.1, REACTOR TRIP RECOVERY**
RT-15, ECC AND SHUTDOWN MARGIN

Proposed references to be provided to applicants during examination: None

Learning Objective: EOP-1.1 06 APPLY EOP-1.1 by predicting a discrete path through EOP-1.1 given a set of plant conditions.

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

10 CFR Part 55 Content: 41(b)(10) Administrative, normal, abnormal, and emergency operating procedures for the facility.

SRO Justification: N/A

NRC Form ES-401-9 Comments

Facility Response:

Comments;

8. RCS 050

Given the following plant conditions:

- 100% power.
- XCP-616, 4-4, PRT LVL LO/TEMP/LVL/PRESS HI.
- PRT conditions are as follows:

Temperature	115°F.
Level	66%.
Pressure	7 psig.

Which ONE of the following describes the parameter causing the alarm and the method that can be used to clear the alarm?

A. ✔ Temperature is high;

Cool the PRT with the RCDT heat exchanger using Component Cooling Water to cool the heat exchanger.

B. Temperature is high;

Cool the PRT with the RCDT heat exchanger using Service Water to cool the heat exchanger.

C. Pressure is high;

Drain the PRT to the Recycle Holdup tank.

D. Pressure is high;

Vent the PRT to the Waste Gas System.

QUESTION HISTORY:

MODIFIED FROM RCS 49

QUESTION HISTORY:

Rev. 0 submitted by RJ
Ops Review: Nick O'Kimosh
Approved: 6/14/13 Rick Garner

DISTRACTOR ANALYSIS:

In order to answer this question correctly, the applicant must recall PRT alarm setpoints and design features and operation of systems that cool the Pressurizer Relief tank contents.

A. CORRECT; Temperature is greater than the alarm setpoint of 113°F. To cool the PRT, it is recirculated through the Reactor Coolant Drain Tank (RCDT) heat exchanger, using Component Cooling Water to cool the heat exchanger.

B. Plausible because temperature is greater than the alarm setpoint of 113°F and recirculation of the PRT will be required. Service water is plausible choice because it is used to cool the Reactor Building Cooling Units and other loads in the Reactor Building and the RCDT Heat Exchanger is located in the Reactor Building.

   Incorrect because CCW is used to cool the RCDT Heat Exchanger.

C. Plausible because pressure is the high end of the normal band and level above the low level alarm setpoint. An adjustment to level in accordance with SOP-101 could be used to simultaneously lower level and reduce pressure. Demineralized water is a plausible choice because it is used as a pure makeup water source for various systems such as Chill Water and Emergency Feedwater.

   Incorrect because PRT temperature is the cause of the XCP-616, 4-4, PRT LVL LO/TEMP/LVL/PRESS HI alarm.

D. Plausible because pressure is the high end of the normal band. If the candidate thinks that the cause of the alarm is high pressure then lowering pressure by venting the PRT to the waste gas system would clear the alarm.

   Incorrect because PRT temperature is the cause of the XCP-616, 4-4, PRT LVL LO/TEMP/LVL/PRESS HI alarm.

K/A: 007K4.01 K/A: 007 Pressurizer Relief Tank/Quench Tank System (PRTS) K4: Knowledge of PRTS design feature(s) and/or interlock(s) which provide for the following: 4.01: Quench tank cooling.

K/A Match: the KA is matched because it requires the applicant to recall the design features and operation of systems that cool the Pressurizer Relief tank contents.

Selection criteria; MODIFIED FROM RCS 49

Tier: 2 **Group:** 1
Importance Rating: RO 2.6 SRO 3.2
Technical Reference: **SOP-101, REATCTOR COOLANT SYSTEM**
XCP-616 4-4, PRT LVL LO/TEMP/LVL/PRESS HI
SOP-118, COMPONENT COOLING WATER
IB-1, SERVICE WATER SYSTEM

Proposed references to be provided to applicants during examination: None

Learning Objective: AB-2-04 DESCRIBE the Reactor Coolant System interfaces with the following systems and/or subsystems: 1. Component Cooling Water System, 4. Reactor Makeup Water System, 5. Waste Processing System.

Learning Objective: AB-2-30 For the following annunciators: XCP-616 4-1 PRT LVL LO/TEMP/LVL/PRESS HI a. STATE the setpoint. b. DESCRIBE the associated automatic actions.c. STATE the associated automatic actions. d. DESCRIBE the operator guidance contained in the alarm response procedure.

Question Cognitive Level: **Memory or Fundamental Knowledge** **__X__**

Comprehension or Analysis _____

10 CFR Part 55 Content: 41(b)(4) Secondary coolant and auxiliary systems that affect the facility.

SRO Justification: N/A

NRC Form ES-401-9 Comments:

Facility Response:

Comments;

9. PZR PRESS CNTRL SYS 018

Given the following plant conditions:

Initial Condition:

- PZR Pressure Transmitter PT-455 failed high.

Current Condition:

- PZR Pressure Transmitter PT-444 failed high.

Select ONE of the choices below that completes the following statement:

PORV(s) ____(1)____ will open, and the valve(s) ___(2)____ be closed at an actual pressurizer pressure of 1950 psig.

Assume no operator actions.

	(1)	(2)
A. ✔	PCV-444B **only**	will
B.	PCV-444B **only**	will **not**
C.	PCV-445B and PCV-444B	will
D.	PCV-445B and PCV-444B	will **not**

QUESTION USAGE:

MODIFIED FROM PZR PRESS CNTRL SYS 45

QUESTION HISTORY:

Rev 0 submitted by RJ
Ops Review: Nick O'Kimosh
Approved: 6/14/13 Rick Garner

DISTRACTOR ANALYSIS:

In order to answer this question correctly, the applicant must assess the failure of Pressurizer pressure channels and determine the PORVs will open and also determine that the channel failures do not impact the ability of the P-11 interlock to close the valves.

A. CORRECT; The failure of PT-444 will cause only PCV-444B to open. Since only one protection channel is failed, the 2/3 coincidence of P-11 will be satisfied with channels PT-456 and PT-457 and close the valve when pressurizer pressure falls below 1985 psig.

B. The first part is correct; The failure of PT-444 will cause only PCV-444B to open. The second part is plausible because two pressurizer pressure channels have failed and P-11 requires a 2/3 coincidence (but not two needed to defeat P-11).

   Incorrect because to PT-444 does not provide input to the function of P-11. Two of the three Pressurizer pressure protection channels (PT-455, 456 and/or 457) must fail for the blocking function to fail.

C. Plausible because for a high failure of PT-445, two PORVs will open. PCV-445B is plausible since it is also entitled as a "B" channel; It may be assumed in error that they will operate together. The second part is correct; Since only one protection channel is failed, the 2/3 coincidence of P-11 will be satisfied with channels PT-456 and PT-457 and close the valve when pressurizer pressure falls below 1985 psig.

   Incorrect because only PCV-444B will open.

D. Plausible because for a high failure of PT-445, two PORVs will open. PCV-445B is plausible since it is also entitled as a "B" channel; It may be assumed in error that they will operate together. The second part is plausible because two pressurizer pressure channels have failed and P-11 requires a 2/3 coincidence (but not two needed to defeat P-11). PT-444 does not, however, provide input to the P-11 function.

   Incorrect because only PCV-444B will open and P-11 will function as required since two of the three Pressurizer pressure protection channels are still available for the blocking function.

K/A: 008AK2.03 K/A: 008 Pressurizer (PZR) Vapor Space Accident (Relief Valve Stuck Open) AK2: AK2: Knowledge of the interrelations between the Pressurizer Vapor Space Accident and the following: 2.03: Controllers and positioners.

K/A Match: the KA is matched because it requires the applicant to assess the effect of a failed control input to the PORV circuits that will create a stuck-open PORV event.

Selection criteria; MODIFIED FROM PZR PRESS CNTRL SYS 45

Tier: 1 **Group:** 1
Importance Rating: RO 2.5 SRO 2.4
Technical Reference: **Drawing 1-MS-41-0011 Sh. 6**
Drawing 1-MS-41-0011 Sh. 11

Proposed references to be provided to applicants during examination: None

Learning Objective: IC-3-02 DRAW and LABEL a block diagram of the subsystem, Pressurizer Pressure Control. Include signal flowpaths for the following: 2. Pressure Operated Relief Valves

IC-3-04 DESCRIBE the pressurizer pressure and level control system interfaces with the following systems: 1. Reactor Protection System

Question Cognitive Level: **Memory or Fundamental Knowledge** _____

Comprehension or Analysis __**X**__

10 CFR Part 55 Content: 41(b)(7) Design, components, and functions of control and safety systems, including instrumentation, signals, interlocks, failure modes, and automatic and manual features.

SRO Justification: N/A

NRC Form ES-401-9 Comments:

Facility Response:

Comments;

10. AOPS 607

Given the following plant conditions:

- 55% power.
- A loss of Component Cooling Water has occurred.
- "A" RCP motor bearing temperature is 189°F and increasing slowly.
- "A" RCP lower seal water bearing temperature is 226°F and increasing slowly.
- The crew is taking actions as directed by AOP-118.1, TOTAL LOSS OF COMPONENT COOLING WATER.

Which ONE of the following identifies the parameter that has exceeded an operating limit and describes required actions in accordance with AOP-118.1?

A. RCP Motor Bearing temperature;

   Initiate a plant shutdown and stop "A" RCP when less than 38% power.

B. RCP Lower Seal Water Bearing temperature;

   Initiate a plant shutdown and stop "A" RCP when less than 38% power.

C. RCP Motor Bearing temperature;

   Trip the Reactor, then stop "A" RCP.

D. ✔ RCP Lower Seal Water bearing temperature;

   Trip the Reactor, then stop "A" RCP.

QUESTION USAGE:

MODIFIED FROM AOPS71

QUESTION HISTORY:

Rev. 0 submitted by RJ
Ops Review: Nick O'Kimosh
Approved: 6/14/13 Rick Garner

DISTRACTOR ANALYSIS:

In order to answer this question correctly, the applicant must determine which parameter exceeds the limit that would require a trip of the associated RCP and additionally, determine that a Reactor Trip is required prior to taking that action.

A. Plausible because RCP Motor Bearing Temperature is just below the limit of 195°F and increasing. The second part is plausible since lowering power to less than 38% would allow tripping the RCP without resulting in an automatic reactor trip.

   Incorrect because the RCP Motor Bearing Temperature has not yet reached 195°F and the reactor and the RCP must be tripped.

B. The first part is correct; RCP Lower Seal Water Bearing Temperature has exceeded the limit of 225°F. The second part is plausible since lowering power to less than 38% would allow tripping the RCP without resulting in an automatic reactor trip.

   Incorrect because the reactor must be tripped and the RCP stopped.

C. Plausible because RCP Motor Bearing Temperature is just below the limit of 195°F and increasing. The second part is correct; The reactor must be tripped prior to tripping the RCP.

   Incorrect because the RCP Motor Bearing Temperature has not yet reached 195°F.

D. CORRECT; RCP Lower Seal Water Bearing Temperature has exceeded the limit of 225°F and the reactor must be tripped prior to tripping the RCP.

K/A: 008G2.4.11 K/A: 008 Component Cooling Water System (CCWS) G2.4.11: Knowledge of abnormal condition procedures.

K/A Match: the KA is matched because it requires the applicant to recall actions from AOP-118.1, TOTAL LOSS OF COMPONENT COOLING WATER that will address a RCP parameter in excess of it's limit.

Selection criteria; MODIFIED FROM AOPS71

Tier: 2 **Group:** 1
Importance Rating: RO 4.0 SRO 4.2
Technical Reference: **AOP-118.1, TOTAL LOSS OF COMPONENT COOLING WATER, Step 5.**

Proposed references to be provided to applicants during examination: None

Learning Objective: AOP-118.1 03. Given a set of plant conditions, DETERMINE the appropriate plant response and operator actions in accordance with AOP-118.1.

Question Cognitive Level: **Memory or Fundamental Knowledge** **__X__**

Comprehension or Analysis **_____**

10 CFR Part 55 Content: 41(b)(10) Administrative, normal, abnormal, and emergency operating procedures for the facility.

SRO Justification: N/A

NRC Form ES-401-9 Comments:

Facility Response:

Comments;

11. AOPS 615

Given the following plant conditions:

Time 1700:

- Mode 4.
- RHR Train "B" running in the shutdown cooling mode.
- "A" CCW loop is active.
- "A" CCW pump discharge pressure is 30 psig.
- XCP-601, 1-2, CCP A/C AUTOSTART FAIL in alarm.
- "A" Charging pump in service.
- Component temperatures are being monitored in the Control Room **only**.

Time **now** - 1720

Which ONE of the following identifies the pump that must be stopped and the reason?

A. Stop "A" Charging pump to prevent damage to the RCP seals.

B. ✔ Stop "A" Charging pump to prevent damage to the pump gearbox.

C. Stop "B" RHR pump to prevent steam binding of "B" RHR heat exchanger.

D. Stop "B" RHR pump to prevent damage to the pump seals.

QUESTION USAGE:

MODIFIED FROM AOPS409

QUESTION HISTORY:

Revised version 0 submitted by RJ
Ops Review: Nick O'Kimosh
Approved: 6/14/13 Rick Garner

DISTRACTOR ANALYSIS:

In order to answer this question correctly, the applicant must recall the caution from AOP-118.1 regarding the maximum time limit that a Charging pump without CCW flow without incurring damage to the pump.

A. The first part is correct; The charging pump must be stopped after 20 minutes unless pump temperatures are locally monitored in accordance with AOP-118-1. The second part is plausible because the 90 minute restriction for running RHR pumps is intended to protect the pump seals. Additionally, if seal cooling is lost, a Charging pump will not be restarted without an engineering evaluation to prevent seal failure. If the pump is already running however, there is no restriction that requires stopping the Charging pump for this concern.

   Incorrect because if the 20 minute restriction for running a Charging pump is not intended to prevent RCP seal failure.

B. CORRECT; The charging pump must be stopped after 20 minutes unless pump temperatures are locally monitored in accordance with AOP-118-1. The pump gearbox is component that is monitored for overheating when running the Charging pump without CCW.

C. Plausible because the RHR pump must be tripped if run for 90 minutes without CCW flow to the associated RHR heat exchanger. The second part is plausible because introduction of steam into the Component Cooling System is a concern when unisolating non essential CCW after a loss of all AC.

D. Plausible because the caution in AOP-118.1 contains a 90 minute limit for running RHR pumps and the second part is plausible because that caution is to prevent damage to the RHR pump seals.

   Incorrect because the component of concern is the RHR Pump.

K/A: 008K3.01 K/A: 008 Component Cooling Water System (CCWS) K3: Knowledge of the effect that a loss or malfunction of the CCWS will have on the following: 3.01: Loads cooled by CCWS

K/A Match: the KA is matched because it requires the applicant to recall the time limit at which a Charging pump must be stopped to prevent damage during a loss of CCW.

Selection criteria; MODIFIED FROM AOPS409

Tier: 2 **Group:** 1
Importance Rating: RO 3.4 SRO 3.5
Technical Reference: **AOP-118.1 CAUTION prior to step 15.**

Proposed references to be provided to applicants during examination: None

Learning Objective: AOP-118.1 05.STATE/IDENTIFY the bases for the overall mitigating strategies and the bases for the steps, notes, or caution (as applicable), including all attachments for AOP-118.1

Question Cognitive Level: **Memory or Fundamental Knowledge** _____

Comprehension or Analysis __X__

10 CFR Part 55 Content: 41(b)(10) Administrative, normal, abnormal, and emergency operating procedures for the facility.

SRO Justification: N/A

NRC Form ES-401-9 Comments:

Facility Response:

Comments;

12. CORE SUBCOOLING MON 011

Given the following plant conditions:

- Small break LOCA has occurred.
- Cooldown in progress as directed in EOP-2.1, POST-LOCA COOLDOWN AND DEPRESSURIZATION.
- "A" Charging pump has been stopped in accordance with EOP-2.1.
- "B" Charging pump is running in injection mode.
- Pressurizer level 37%.
- RCS WR pressure 885 psig.
- RCS T_{COLD} 464°F.
- RCS T_{HOT} 474°F.
- Core Exit TCs 482°F.
- RB pressure 3 psig.

Which ONE of the following describes the current value of RCS subcooling on TI-499A/499B, A(B) TEMP °F and the required action, if any, regarding the "A" Charging Pump in accordance with EOP-2.1?

A. ✔ 50°F; Start "A" Charging Pump.

B. 50°F; No action required.

C. 58°F; Start "A" Charging Pump.

D. 58°F; No action required.

QUESTION USAGE:

MODIFIED FROM CORE SUBCOOLING MON 7

QUESTION HISTORY:

Rev. 0 submitted by RJ
Ops Review: Nick O'Kimosh
Approved: 6/14/13 Rick Garner

DISTRACTOR ANALYSIS:

In order to answer this question correctly, the applicant must use steam tables and the given RCS parameters to determine the correct subcooling monitor reading and then use subcooling values to determine the correct course of action regarding an idle Charging pump in accordance with EOP-2.1.

A. CORRECT; Using RCS pressure 885 psig (900 psia) and the CET temperature =474°F, this yields a subcooling value of 50°F. EOP-2.1 requires restarting the idle charging pump if subcooling drops below 52.5°F.

B. The first part is correct; Using RCS pressure 885 psig (900 psia) and the CET temperature =474°F, this yields a subcooling value of 50°F. The second part is plausible because B Charging pump is running in injection mode and "A" pump was stopped by procedure.

   Incorrect because EOP-2.1 requires restarting the idle Charging pump if subcooling drops below 52.5°F.

C. The first part is plausible because 58°F subcooling is the value for subcooling if the T_{HOT} temperature is used and T_{HOT}s are inputs to the subcooling monitors although they are not used to calculate subcooling on TI-499A and B. The second part is plausible because EOP-2.1 would require restarting the idle Charging pump if subcooling drops below 67.5°F and adverse containment conditions were in effect.

   Incorrect because 50°F is the correct calculated subcooling value.

D. The first part is plausible because 58°F subcooling is the value for subcooling if the T_{HOT} temperature is used and T_{HOT}s are inputs to the subcooling monitors although they are not used to calculate subcooling on TI-499A and B. The second part is plausible because with normal containment conditions, the idle Charging pump would not be restarted until subcooling lowers to less than 52.5°F.

   Incorrect because 50°F is the correct calculated subcooling value and because EOP-2.1 requires restarting the idle Charging pump if subcooling drops below 52.5°F.

K/A: 009EK1.02 K/A: 009 Small Break LOCA EK1: Knowledge of the operational implications of the following concepts as they apply to the small break LOCA: 1.02: Use of steam tables.

K/A Match: the KA is matched because it requires the applicant to use steam tables to calculate a subcooling value and then determine the appropriate action for an idle Charging pump in accordance with a procedure used for a small-break LOCA event.

Selection criteria; MODIFIED FROM CORE SUBCOOLING MON 7

Tier: 1 **Group:** 1
Importance Rating: RO 3.5 SRO 4.2
Technical Reference: **IC-12 COURSE HANDOUT PAGE 5**
EOP-2.1, REFERENCE PAGE

Proposed references to be provided to applicants during examination: None

Learning Objective: IC-12-09 **DESCRIBE** the following modes of operation for the core subcooling monitor: 1. DEG F MAR, 2. PSI MAR, 3. T SAT; P SAT, 4. DELTA T LP, 5. IND SEN Thumbwheel.

Question Cognitive Level: **Memory or Fundamental Knowledge** _____

Comprehension or Analysis __**X**__

10 CFR Part 55 Content: 41(b)(10) Administrative, normal, abnormal, and emergency operating procedures for the facility.

41(b)(7) Design, components, and functions of control and safety systems, including instrumentation, signals, interlocks, failure modes, and automatic and manual features.

SRO Justification: N/A

NRC Form ES-401-9 Comments:

Facility Response:

Comments;

13. EPPS/FEPS 129

Given the following plant conditions:

- 100% Power.
- Plant fire reported.
- Reactor Trip initiated.
- The crew has entered FEP-2.1, TRAIN A SHUTDOWN FROM HOT STANDBY TO COLD SHUTDOWN DUE TO A FIRE.
- All **Balance of Plant Busses** are de-energized.
- It becomes necessary to raise RCS pressure.

Which ONE of the following describes **all** Pressurizer heaters that are available to raise RCS pressure during the cooldown to Mode 4?

A. Group 1 Backup Heaters, ONLY.

B. Control Group **and** Group 1 Backup Heaters ONLY.

C. Group 1 Backup Heaters **and** Group 2 Backup Heaters, ONLY.

D. Control Group **and** Group 1 Backup Heaters **and** Group 2 Backup Heaters.

QUESTION USAGE:

BANK
RO-SRO 10-01 MakeUp EPP-FEP

QUESTION HISTORY:

Rev. 0 submitted by RJ
Ops Review: Nick O'Kimosh
Approved: 6/14/13 Rick Garner

DISTRACTOR ANALYSIS:

In order to answer this question correctly, the applicant must determine the Pressurizer heaters that are available when BOP electrical busses are deenergized and the guidance of FEP-2.1, TRAIN A SHUTDOWN FROM HOT STANDBY TO COLD SHUTDOWN DUE TO A FIRE is used.

A. CORRECT; In the FEP-2 series, 1DB is deenergized. With the BOP busses deenergized, control group heaters are not available. Only Group 1 Backup Heaters are available off of 1DA.

B. Plausible if the applicant does not know the power supply for Control Group heaters and assumes that they are powered from ESF busses. The second part is correct; In the FEP-2 series, 1DB is deenergized, only Group 1 Backup heaters are available.

   Incorrect because Control Group heaters are not available with BOP busses deenergized.

C. Plausible; SInce the question does not state which ESF busses are available, if the applicant does not know that 1DB is deenergized in FEP-2.0, he or she may assume that both Backup Heater groups are available.

   In the FEP-2 series, 1DB is deenergized. With the BOP busses deenergized only Group 1 Backup Heater are available off of 1DA.

D. Plausible if the applicant does not know the power supply for Control Group heaters and assumes that they are powered from ESF busses. Additionally, sInce the question does not state which ESF busses are available, if the applicant does not know that 1DB is deenergized in FEP-2.0, he or she may assume that both Backup Heater groups are available.

   In the FEP-2 series, 1DB is deenergized. With the BOP busses deenergized only Group 1 Backup Heaters are available off of 1DA.

K/A: 010K2.01 K/A: 010 Pressurizer Pressure Control System (PZR PCS) K2: Knowledge of bus power supplies to the following: 2.01: PZR heaters

K/A Match: the KA is matched because it requires the applicant to assess the electrical busses that are energized and identify the Pressurizer Heater groups that are available.

Selection criteria; BANK
SELECTED AT RANDOM FROM A SEARCH ON "HEATER" AND FOR KA AND ATTRIBUTES.

Tier: 2 **Group:** 1
Importance Rating: RO 3.0 SRO 3.4
Technical Reference: **SOP-101, Att IIB, page 1,2 of 5**
FEP-2.0, Enclosure C, page 3 of 4.

Proposed references to be provided to applicants during examination: None

Learning Objective: IC-3-15 IDENTIFY power supplies for the following pressurizer pressure and level control system components:1. Pressurizer Heaters

Question Cognitive Level: **Memory or Fundamental Knowledge** _____

Comprehension or Analysis __X__

10 CFR Part 55 Content: 41(b)(10) Administrative, normal, abnormal, and emergency operating procedures for the facility.

41(b)(7) Design, components, and functions of control and safety systems, including instrumentation, signals, interlocks, failure modes, and automatic and manual features.

SRO Justification: N/A

NRC Form ES-401-9 Comments:

Facility Response:

Comments;

14. EOPS 827

Given the following plant conditions:

- Large Break LOCA occurred.
- EOP-2.0, LOSS OF REACTOR OR SECONDARY COOLANT in progress.
- All Steam Generator pressures are 700 psig, lowering slowly.
- Total RHR flow is 1400 gpm, increasing.
- Operators are preparing Condenser Steam Dumps for service to depressurize Steam Generators.

Which ONE of the following describes the current state of the Steam Generator interface with the RCS and a purpose for the Steam Generator depressurization?

A. Steam Generators are a heat sink; Steam generators will be depressurized to cool the RCS to allow RHR to be placed in service.

B. Steam Generators are a heat sink; Steam Generators will be depressurized to increase injection flow to the RCS.

C. ✔ Steam Generators are a heat source; Steam Generators will be depressurized to remove heat input to the RCS.

D. Steam Generators are a heat source; Steam Generators will be steamed to enable cooling by reflux boiling.

QUESTION USAGE:

NEW for 2013 NRC

QUESTION HISTORY:

Rev. 0 submitted by RJ
Ops Review: Nick O'Kimosh
Approved: 6/14/13 Rick Garner

DISTRACTOR ANALYSIS:

In order to answer this question correctly, the applicant must determine the hotter system based on the type of event and the status of steam generators and recall the basis for depressurizing steam generators during a Large Break LOCA in accordance with EOP-2.2.

A. The first part is plausible since steam generators are a heat sink during the initial stages of a small break LOCA. The second part is plausible because cooling the RCS to place RHR in service is a mitigation strategy for Small break LOCAs and Steam Generator tube ruptures.

   Incorrect because for the conditions given, the steam generators are a source of heat and in a Large Break LOCA, recirculation will be placed in service.

B. The first part is plausible since steam generators are a heat sink during the initial stages of a small break LOCA. The second part is plausible because steam generators are depressurized in some EOPs to increase injection flow such as in EOP-14.1 in response to degraded core cooling.

   Incorrect because for the conditions given, the steam generators are a source of heat and steam generators are not depressurized in a large break LOCA to increase injection flow.

C. CORRECT. With steam generators at 700 psig and RCS pressure below the shutoff head of the RHR pumps, they are a heat source. They will be depressurized to remove heat input to the RCS.

D. Plausible because with steam generators at 700 psig and RCS pressure below the shutoff head of the RHR pumps, they are a heat source. They will be depressurized to remove heat input to the RCS but not to enhance reflux boiling. Reflux boiling is part of heat removal mechanisms discussed for LOCAs but is not one for which operators establish conditions as a mitigation action.

   Incorrect because steam generators are not depressurized to enhance reflux boiling.

K/A: 011EG2.2.44 K/A: 011 Large Break LOCA: G2.2.44: Ability to interpret control room indications to verify the status and operation of a system, and understand how operator actions and directives affect plant and system conditions.

K/A Match: the KA is matched because it requires the candidate to assess conditions and determine that the steam generators are a heat source relative to the primary and recall the reason for depressurizing steam generators.

Selection criteria; NEW

Tier: 1 **Group:** 1
Importance Rating: RO 4.2 SRO 4.4
Technical Reference: **ERG for E-1, LOSS OF REACTOR SECONDARY COOLANT.**

Proposed references to be provided to applicants during examination: None

Learning Objective: EOP-2.0 04 STATE the bases or reasons for each action contained in EOP-2.0

Question Cognitive Level: **Memory or Fundamental Knowledge** _____

Comprehension or Analysis __X__

10 CFR Part 55 Content: 41(b)(10) Administrative, normal, abnormal, and emergency operating procedures for the facility.

SRO Justification: N/A

NRC Form ES-401-9 Comments:

Facility Response:

Comments;

15. RCS TEMP INDICATION 037

Given the following plant conditions:

- 75% power.
- An accidental boration occurs.
- Rods are withdrawing.

The rod motion causes the output currents from all Power Range NI detectors to change as follows:

- Upper detector currents increase from the normal 75% value to the normal 100% value.
- Lower detector currents decrease from the normal 75% value to the normal 50% value.

Which ONE of the following describes the effect on the OTΔT trip setpoints as a result of the change in detector currents?

The setpoints will:

A. INCREASE because Δ I (AFD) will be excessively POSITIVE.

B. DECREASE because Δ I (AFD) will be excessively NEGATIVE.

C. INCREASE because Δ I (AFD) will be excessively NEGATIVE.

D. ✔ DECREASE because Δ I (AFD) will be excessively POSITIVE.

QUESTION USAGE:

MODIFIED FROM RCS TEMP IND 34

QUESTION HISTORY:

Rev.0 submitted by RJ
Ops Review: Nick O'Kimosh
Approved: 6/14/13 Rick Garner

DISTRACTOR ANALYSIS:

A. The first part is plausible because Axial Flux Differential (AFD) is normally negative. There is a penalty for the OTDT calculation applied below an extreme value of -35. Thus if the candidate assumes that this penalty is removed as AFD becomes positive, then an increase in setpoint may be chosen in error. The second part is correct; AFD will become more positive.

   Incorrect because the setpoint will decrease, not increase.

B. The first part is correct; For a failure of calculated AFD in the positive direction in excess of 6%, a penalty is applied to the OTDT calculation. The second part is plausible because the upper detector has failed to a value equivalent to 100% power and AFD normally becomes more negative with an increases in power. The lower detector, however, now reads much less flux; Since AFD is power upper - power lower, the overall trend is positive, not negative.

   Incorrect because the axial flux will become positive, not negative.

C. The first part is plausible because AFD is normally negative. There is a penalty for the OTDT calculation applied below -35. Thus if the candidate assumes that this penalty is removed as AFD becomes positive, then an increase in setpoint may be chosen in error. The second part is plausible because the upper detector has failed to a value equivalent to 100% power and AFD is normally becomes more negative with an increases in power. The lower detector, however, now reads much less flux; Since AFD is power upper - power lower, the overall trend is positive, not negative.

   Incorrect, the setpoint will decrease, not increase.

D. CORRECT; For a failure of calculated AFD in the positive direction in excess of 6%, a penalty is applied to the OTDT calculation. The calculated AFD is approximately 50% for the case given. The second part is correct; Since AFD is power upper - power lower, the AFD is more positive, not negative.

K/A: 012A1.01 K/A: 012 Reactor Protection System A1: Ability to predict and/or monitor Changes in parameters (to prevent exceeding design limits) associated with operating the RPS controls including: 1.01: Trip setpoint adjustment.

K/A Match: the KA is matched because it requires the candidate to assess conditions cause and determine the direction in which an automatic trip setpoint calculation will trend.

Selection criteria; MODIFIED FROM RCS TEMP IND 34

Tier: 2 **Group:** 1
Importance Rating: RO 2.9 SRO 3.4
Technical Reference: **TECHNICAL SPECIFICATION TABLE 2.2-1.**

Proposed references to be provided to applicants during examination: None

Learning Objective: SB-4-14 EXPLAIN the bases for the Safety Limits and Limiting Safety System Settings in Technical Specifications.

Question Cognitive Level: **Memory or Fundamental Knowledge** _____

Comprehension or Analysis __X__

10 CFR Part 55 Content: 41(b)(7) Design, components, and functions of control and safety systems, including instrumentation, signals, interlocks, failure modes, and automatic and manual features

SRO Justification: N/A

NRC Form ES-401-9 Comments:

Facility Response:

Comments;

16. REACTOR PROT SYSTEM 058

Given the following plant conditions:

- 100% power.
- Flow in the RCS loop "A" drops to 75%.

Which ONE of the following permissive bistables, if in the wrong condition for current plant status, would **prevent** an automatic reactor trip?

A. P-7

B. ✔ P-8

C. P-9

D. P-12

QUESTION USAGE:

2011 RO NRC

QUESTION HISTORY:

New for 2011 wdb 4/8/11.

Rev. 1 Submitted by Matthew R. Bender
Changed stem from "Which ONE (1) of the following **failures** would **prevent** an automatic reactor trip?" to "Which ONE (1) of the following permissive bistables, if in the wrong condition for current plant status, would **prevent** an automatic reactor trip?"
Removed status of lights and false from choices per review comment.
OPS review RT
Approved RJ

Reviewed for 2013 NRC exam
Ops Review: Nick O'Kimosh
Approved: 6/14/13 Rick Garner

DISTRACTOR ANALYSIS:

A. Plausible, P-7 would block the anticipatory 2-loop loss of flow trips on UV and UF that are present.

Incorrect because the single loop loss of flow > P-8 would still operate since it is not blocked by P-7.

B. CORRECT the single loop loss of flow signal is the only one present .

C. Plausible because P-9 is a permissive that exists and is related to power.

Incorrect because P-9 is 50% power and is used to cause a reactor trip on a turbine trip above 50% power.

D. Plausible because P-12 is a permissive that exists.

Incorrect because P-12 is LO-LO RCS T_{avg} of 552°F and is not used to block a loss of flow trip.

K/A: 012K6.10 K/A: 012 Reactor Protection K6.10 Knowledge of the effect of a loss or malfunction of the following will have on the RPS: Permissive Circuits.

K/A Match: K/A is met because candidate must determine what affect a failure of the permissive inputs to the trip logic will have on the ability of the RPS to generate a trip.

Selection criteria; 2011 RO NRC, RANDOMLY SELECTED FOR KA MATCH

Tier: 2 **Group:** 1
Importance Rating: RO 3.3 SRO 3.5
Technical Reference: IC-9
Proposed references to be provided to applicants during examination: None

Learning Objective: IC-9-17 DESCRIBE the following permissives associated with the reactor protection system, include function, setpoint and coincidence:4. P-8, Loss of Flow

Question Cognitive Level: **Memory or Fundamental Knowledge** _____

Comprehension or Analysis __X__

10 CFR Part 55 Content: 41(b)(7) Design, components, and functions of control and safety systems, including instrumentation, signals, interlocks, failure modes, and automatic and manual features.

SRO Justification: N/A

NRC Form ES-401-9 Comments:

Facility Response:

Comments;

17. SAFETY INJECTION SYS 020

Given the following plant conditions:

- Initially 100% power.
- A guillotine break of the "A" RCS Cold Leg occurred at 7:00.
- All equipment worked as designed.
- It is now 7:40.

Which ONE of the following contains the **largest** list of alignments that will have occurred **automatically** for the given conditions, if any?

Assume no operator actions.

A. **No** automatic alignments have occurred.

B. ✔ MVG-8811A(B), RHR SUMP A(B) TO RHR PP A(B) OPENED
MVG-8812A(B), RHR SUMP A(B) TO RHR PP A(B) OPENED
MVG-8809A(B), RWST TO PP A(B) CLOSED

C. MVG-8811A(B), RHR SUMP A(B) TO RHR PP A(B) OPENED
MVG-8812A(B), RHR SUMP A(B) TO RHR PP A(B) OPENED
MVG-8809A(B), RWST TO PP A(B) CLOSED
MVG-8706A(B), RHR LP A(B) TO CHG PP OPENED

D. MVG-8811A(B), RHR SUMP A(B) TO RHR PP A(B) OPENED
MVG-8812A(B), RHR SUMP A(B) TO RHR PP A(B) OPENED
MVG-8809A(B), RWST TO PP A(B) CLOSED
MVG-8706A(B), RHR LP A(B) TO CHG PP OPENED
MVG-8130A(B), LP A SUCT TO CHG PP C CLOSED
MVG-8131A(B), LP B SUCT TO CHG PP C CLOSED

QUESTION USAGE:

MODIFIED FROM SIS14

REVISION HISTORY:

Rev. 0 Submitted by RJ
Ops Review: Nick O'Kimosh
Approved: 6/14/13 Rick Garner

DISTRACTOR ANALYSIS:

In order to answer this question correctly, the applicant must determine that the RWST has reached the Automatic switchover setpoint using time elapsed after a Large-break LOCA and identify the proper automatic alignments that should have occurred.

A. Plausible because this is the alignment prior to switchover. The applicant may assume that the RWST switchover level has not yet been reached.

Incorrect because the RWST will be drained below 18% in less than 40 minutes on a DBLOCA.

B. CORRECT; The RHR will swap to RB sump automatically with level less than 18% and a latched SI and in a DBLOCA the RWST will be depleted in less than 40 min.

RWST between T.S. Level and switchover = (90-18) **72% level injection prior to 18%**

100% level = 502,843 gals -> = 5030 gal/% x 72% = **362,160 gals injection prior to 18% switchover.**

Charging pumps (2) 688 x 2 = 1376 gpm

RHR pumps (2) = 4850 x 2 = 9700 gpm

RB Spray pumps (2) = 2500 x 2 = 5000 gpm

Total draw on the RWST = **16,076 gpm total injection flow**

362,160 gals/ 16,076 gpm = **22.5 minutes elapsed time to switchover**

The following valves will reposition automatically:

MVG-8811A(B), RHR SUMP A(B) TO RHR PP A(B) open
MVG-8812A(B), RHR SUMP A(B) TO RHR PP A(B) open
MVG-8809A(B), RWST TO PP A(B) close

C. Plausible because this would be the case if the suction valves to charging pumps also auto swapped. These valves will be repositioned manually in EOP-2.2, TRANSFER TO COLD LEG RECIRCULATION.

Incorrect because the charging pump suction valves will not autoswap and must be manually aligned to the RHR pumps.

D. Plausible because this would be the case if the suction valves to charging pumps also auto swapped and charging pump suction headers automatically split. These valves will be repositioned manually in EOP-2.2, TRANSFER TO COLD LEG RECIRCULATION.

Incorrect because the charging pump suction valves will not autoswap and must be manually aligned to the RHR pumps and suction header valves will not automatically close.

K/A: 013A3.02 K/A: 013 Engineered Safety Features Actuation System (ESFAS) A3: Ability to monitor automatic operation of the ESFAS including: 3.02: Operation of actuated equipment

K/A Match: the KA is matched because it requires the applicant to determine that the RWST has depleted less than the Automatic switchover setpoint for ECCS using time elapsed after a Large-break LOCA and identify the proper automatic alignments that should have occurred.

Selection criteria; MODIFIED FROM SIS14

Tier: 2 **Group:** 1
Importance Rating: RO 4.1 SRO 4.2
Technical Reference: **AB-10, EMERCENCY CORE COOLING SYSTEM.**

Proposed references to be provided to applicants during examination: None

Learning Objective: AB-10-14 DESCRIBE the following Emergency Cooling System Interlocks. Specify purpose and setpoint: 1. Refueling Water Storage Tank Level Lo-Lo Transfer To Sump 2. Safety Injection Valves

Question Cognitive Level: **Memory or Fundamental Knowledge** _____

Comprehension or Analysis __X__

10 CFR Part 55 Content: 41(b)(7) Design, components, and functions of control and safety systems, including instrumentation, signals, interlocks, failure modes, and automatic and manual features.

41(b)(8) Components, capacity, and functions of emergency systems.

SRO Justification: N/A

NRC Form ES-401-9 Comments:

Facility Response:

Comments;

18. ESFAS SYSTEM 033

Given the following plant conditions:

- 100% power.
- IPT-950, Reactor Building Pressure Channel I, has failed HIGH.
- Containment Pressure HI-3 bistable PB-950 has been placed in BYPASS.

Which ONE of the following identifies how many of the **remaining** channels must measure high pressure to initiate a HI-1 and a HI-3 RB Pressure actuation signal?

Assume no additional operator actions.

	HI-1	HI-3
A.	1	1
B.	1	2
C.	2	1
D. ✓	2	2

QUESTION USAGE:

BANK
RO-SRO 11-01 SYSTEMS COMPREHENSIVE EXAM MAKEUP

REVISION HISTORY:

OPS Review: WB
Approved: RJ

Reviewed for 2013 NRC exam
Ops Review: Nick O'Kimosh
Approved: 6/14/13 Rick Garner

DISTRACTOR ANALYSIS:

In order to answer this question correctly the applicant must assess the Containment pressure instrument failure and the effect of placing the associated HI-3 bistable in BYPASS and determine the minimum number of channels that must trip to achieve HI-1 and HI-3.

A. ONE(1) in the first column would be plausible if IPT-951, 952 or 953 was failed since these 3 channels provide input to HI-1. ONE (1) is plausible in the second column if the applicant equates BYPASS with tripped bistable as is the normal action for other ESF and RPS failures and thinks that one bistable is tripped.

   Incorrect because coincidences for both HI-1 and HI-3 are 2/3.

B. ONE(1) in the first column would be plausible if IPT-951, 952 or 953 was failed since these 3 channels provide input to HI-1. Two (2) is correct in the second column since there is a 2/3 coincidence in effect with the IPT-950 HI-3 bistable in BYPASS.

   Incorrect because the coincidence for HI-1 is 2/3.

C. The first part is correct; The HI-1 logic is not impacted so its logic remains 2/3. ONE (1) is plausible in the second column if the applicant equates BYPASS with tripped bistable as is the normal action for other ESF and RPS failures and thinks that one bistable is tripped.

   Incorrect because the HI-3 function is 2/3 using the three remaining channels.

D. CORRECT - The HI-1 logic is not impacted so its logic remains 2/3. Two (2) is correct in the second column since there is a 2/3 coincidence in effect with the IPT-950 HI-3 bistable in BYPASS.

K/A: 013K6.01 K/A: 013 Engineered Safety Features Actuation System (ESFAS) K6: Knowledge of the effect of a loss or malfunction on the following will have on the ESFAS: 6.01: Sensors and detectors.

K/A Match: the KA is matched because it requires the applicant to assess the Containment pressure instrument failure and the effect of placing the associated HI-3 bistable in BYPASS and determine the minimum number of channels that must trip to achieve HI-1 and HI-3.

Selection criteria; BANK
SELECTED AT RANDOM FROM A SEARCH ON "FAILED" FOR KA MATCH AND ATTRIBUTES.

Tier: 2 **Group:** 1
Importance Rating: RO 2.7 SRO 3.1
Technical Reference: **1MS-41-11 Sh. 8**

Proposed references to be provided to applicants during examination: None

Learning Objective:
IC-9-22 STATE the conditions that actuate safety injection, include setpoint and coincidence.

IC-9-29 DESCRIBE the actions that occur on a containment high-three pressure signal, specify setpoint and equipment affected.

Question Cognitive Level: **Memory or Fundamental Knowledge** _____

Comprehension or Analysis __**X**__

10 CFR Part 55 Content: 41(b)(7) Design, components, and functions of control and safety systems, including instrumentation, signals, interlocks, failure modes, and automatic and manual features.

SRO Justification: N/A

NRC Form ES-401-9 Comments:

Facility Response:

Comments;

19. ROD CONTROL 053

Given the following plant conditions:

- 80% power.
- Plant startup is in progress.
- Rods are in MANUAL.
- Indication for Rod K-10 in Control Bank "D", Group 2 is at 180 steps and does not move with the rest of the associated group.
- The Control Bank "D" Group 2 demand counter indicates 188 steps.

Which ONE of the following identifies the procedure that will be entered and a method that is allowed to be used **first** to maintain Tavg **after immediate actions are complete**.

A. Enter AOP-403.4, FAILURE OF CONTROL RODS TO MOVE.

   Adjust turbine load.

B. Enter AOP-403.4, FAILURE OF CONTROL RODS TO MOVE.

   Move control rods in manual.

C. ✓ Enter AOP-403.5, STUCK OR MISALIGNED CONTROL RODS.

   Adjust turbine load.

D. Enter AOP-403.5, STUCK OR MISALIGNED CONTROL RODS.

   Move control rods in manual.

QUESTION USAGE:

MODIFIED FROM ROD CONTROL 50

QUESTION HISTORY:

Rev. 0 submitted by RJ
Ops Review: Nick O'Kimosh
Approved: 6/14/13 Rick Garner

DISTRACTOR ANALYSIS:

In order to answer this question correctly, the applicant must assess plant conditions and determine the procedure for which entry conditions are met and recall the action that will taken to match TAVG and TREF.

A. Plausible because AOP-403.4 provides guidance for failure of a group of control rods to move as demanded and one control rod has failed to move. The second part is plausible because stabilizing load is a method employed in AOP-403.5 to stabilize temperature.

   Incorrect because AOP-403.5 is the correct procedure.

B. Plausible because AOP-403.4 provides guidance for failure of a group of control rods to move as demanded and one control rod has failed to move. The second part is plausible because that is a method employed in AOP-403.4.

   Incorrect because AOP-403.5 is the correct procedure and movement of control rods is not allowed to adjust TAVG until after the rod is realigned and the problem corrected.

C. CORRECT; AOP-403.5 is the correct procedure that will be used for a misaligned rod and turbine load is one of two allowed methods that can be used to adjust T_{AVG} after immediate actions are complete.

D. The first part is correct; AOP-403.5 is the correct procedure that will be used for a misaligned rod. The second part is plausible because manual control rod movement is still available and is a method used in AOP-403.4.

   Incorrect because turbine load is the method that will be used and movement of control rods is not allowed to adjust T_{AVG} until after the rod is realigned and the problem corrected.

K/A: 014G2.4.20 K/A: 014 Rod Position Indication System (RPIS) G2.4.4 Ability to recognize abnormal indications for system operating parameters that are entry-level conditions for emergency and abnormal operating procedures.

K/A Match: the KA is matched because it requires the applicant to assess abnormal rod position indications and determine the procedure for which entry conditions are met.

Selection criteria; MODIFIED FROM ROD CONTROL 50

Tier: 2 **Group:** 2
Importance Rating: RO 4.5 SRO 4.7
Technical Reference: **AOP-403.5 Entry Conditions, page 1 of 18**
AOP-403.5, Step 5, Page 2 of 18.

Proposed references to be provided to applicants during examination: None

Learning Objective: AOP-403.5 02. STATE/IDENTIFY the immediate operator actions from memory, including all sub-steps and response not obtained actions, for AOP-403.5.

04. Given a set of plant conditions, DETERMINE the plant response and appropriate operator actions in accordance with AOP-403.5.

Question Cognitive Level: **Memory or Fundamental Knowledge** **__X__**

Comprehension or Analysis _____

10 CFR Part 55 Content: 41(b)(6) Design, components, and functions of reactivity control mechanisms and instrumentation.

SRO Justification: N/A

NRC Form ES-401-9 Comments (2011 NRC Exam):

Facility Response:

Comments;

20. REACTOR COOLANT PUMP 095

Given the following plant conditions:

- 15% Reactor power.
- Bus 1A/1B/1C frequency 55.0 hz.
- Bus 1A/1B/1C voltage 5400 VAC.
- RCP breakers **open.**

Which ONE of the following describes the purpose for the automatic function that has opened RCP breakers and whether the Reactor has also tripped?

A. To preserve RCP flywheel kinetic energy; The reactor has tripped.

B. To preserve RCP flywheel kinetic energy; The reactor has **not** tripped.

C. To ensure that motor windings do not overheat; The reactor has tripped.

D. To ensure that motor windings do not overheat; The reactor has **not** tripped.

QUESTION USAGE:

MODIFIED FROM RCP 29

REVISION HISTORY:

Rev. 0 Submitted by RJ
Ops Review: Nick O'Kimosh
Approved: 6/14/13 Rick Garner

DISTRACTOR ANALYSIS:

A. CORRECT; Balance of Plant bus frequency dropped to less than 57.5 hz. The underfrequency reactor trip signal will trip all 3 pump breakers to allow coastdown before pump speed has been dragged down to the point where a subsequent pump trip would result in DNB margins being challenged. Since all three RCP breakers tripped with power greater than P-10, the reactor also tripped.

B. The first part is correct; The underfrequency reactor trip signal will trip all 3 pump breakers to allow coastdown before pump speed has been dragged down to the point where a subsequent pump trip would result in DNB margins being challenged. The second part is plausible because if power was initially less than P-10, (10%), the reactor would not have tripped.

Incorrect because the reactor has tripped.

C. The first part is plausible because an undervoltage condition will cause motor windings to overheat due to the increase in current for the same power. The second part is correct; Since all three RCP breakers tripped with power greater than P-10, the reactor also tripped.

Incorrect the RCPs tripped on underfrequency that is designed to preserve RCP coastdown.

D. The first part is plausible because an undervoltage condition will cause motor windings to overheat due to the increase in current for the same power. The second part is plausible because if power was initially less than P-10, (10%), the reactor would not have tripped.

Incorrect the RCPs tripped on underfrequency that is designed to preserve RCP coastdown and the reactor has also tripped.

K/A: 015AG2.1.28 K/A: Reactor Coolant Pump (RCP) Malfunctions G2.1.28: Knowledge of the purpose and function of major system components and controls.

K/A Match: the KA is matched because it requires the candidate to determine the cause of an RCP trip and the purpose for that RCP control function.

Selection criteria; MODIFIED FROM RCP 29

Tier: 1 **Group:** 1
Importance Rating: RO 4.1 SRO 4.1
Technical Reference: AB-4 REACTOR COOLANT PUMP COURSE HANDOUT

Proposed references to be provided to applicants during examination: None

Learning Objective: AB-4-20 DESCRIBE the following trips associated with the Reactor Coolant Pump. Include purpose and setpoints:2. RCP Motor Low Frequency

Question Cognitive Level: **Memory or Fundamental Knowledge** _____

Comprehension or Analysis __X__

10 CFR Part 55 Content: 41(b) (7) Design, components, and functions of control and safety systems, including instrumentation, signals, interlocks, failure modes, and automatic and manual features.

SRO Justification: N/A

NRC Form ES-401-9 Comments:

Facility Response:

Comments;

21. SGWLC 029

Given the following plant conditions:

- 70% power.
- All SGWLC controls and MFP speed controls are in Automatic.
- "A" S/G level 61%, stable.
- Channel III SGWLC detectors are selected as controlling.

Which ONE of the following individual detector failures will cause "A" S/G water level to **increase** if NO operator action is taken?

A. Main steam header pressure detector PT-464 fails LOW.

B. "A" S/G steam flow detector FT-474 (Channel III) fails LOW.

C. ✔ "A" S/G steam pressure detector PT-475 (Channel III) fails HIGH.

D. Feedwater pump discharge header pressure detector PT-508 fails HIGH.

QUESTION USAGE

BANK
RO-SRO 10-01-SYSTEMS-WEEK 11

QUESTION HISTORY:

Revision: Bank Question
Selected for use and verified by Patrick Leary 3-5-10
OPS Approval: RT
TRN Approval: RJ

Reviewed for 2013 NRC exam

Ops Review: Nick O'Kimosh
Approved: 6/14/13 Rick Garner

DISTRACTOR ANALYSIS:

In order to answer this question correctly, the candidate must determine that a steam pressure input to a controlling steam flow channel failing high will cause the feed regulating valve to open and steam generator level to increase.

A. Plausible: Main Steam header pressure is an input to SGWLC, and a failure high would cause an increase in level.

   Incorrect because Steam Header pressure is compared to feed water pressure to control the Main Feed pump speed. An erroneously low Main Steam pressure will cause MFP speed to decrease and SG level to decrease.

B. Plausible: SG steam flow is an input to Main Feed Pump Speed control, and a failure HIGH would cause an increase in level.

   Incorrect because steam Flow is Compared to Feed Flow in the SGWLC circuit. An erroneous low Steam flow will cause SGWLC to decrease the Feedflow, resulting in decreasing SG level.

C. CORRECT; When the compensating steam pressure channel fails high, the associated steam flow channel will also fail high. The SGWLC circuit will open the feed regulating valve to match feed flow to steam flow. SG level will increase.

D. Plausible: Main Feed header pressure is an input to Main Feed Pump Speed control, and a failure low would cause an increase in level.

   Incorrect because Feed pump speed is controlled to maintain a programmed feed pressure above steam pressure. Feed header pressure failing High will increase the measured differential pressure and cause MFP speed to decrease and SG level to decrease.

K/A: 016K1.12 K/A: 016 Non-Nuclear Instrumentation System (NNIS) K1: Knowledge of the physical connections and/or cause-effect relationships between the NNIS and the following systems: 1.12: S/G

K/A Match: the KA is matched because it requires the candidate to determine the effect caused by a failure of non-nuclear instrumentation channel PT-475, "A" Steam Generator Pressure.

Selection criteria; BANK
SELECTED ON FIELD SEARCH OF "SGWLC" FOR KA MATCH AND ATTRIBUTES.

Tier: 2 **Group:** 2
Importance Rating: RO 3.5 SRO 3.5
Technical Reference: **IC-02, STEAM GENERATOR WATER LEVEL CONTROL**

Proposed references to be provided to applicants during examination: None

Learning Objective: IC-2-18 DESCRIBE the effects of failure of the following inputs to the steam generator water level control system during normal power operations: 2. Steam Flow (Pressure Fails Low/Fails High)

Question Cognitive Level: **Memory or Fundamental Knowledge** _____

Comprehension or Analysis __**X**__

10 CFR Part 55 Content: 41(b) (7) Design, components, and functions of control and safety systems, including instrumentation, signals, interlocks, failure modes, and automatic and manual features.

SRO Justification: N/A

NRC Form ES-401-9 Comments:

Facility Response:

Comments;

22. CONTAINMENT CLG SYS 037

Give the following plant conditions:

- Mode 1
- The following RB temperatures are noted on station logs:
  - RB 412' Average - 118°F
  - RB 436' Average - 119°F
  - RB 463' Average - 124°F
- XFN-64B/XFN 65B - RBCU TRAIN B EMERG is selected to XFN 64B.
- The NROATC took the XFN0065B 2B **NORM (fast speed)** control switch to START for 1 second and released the switch.
- The NROATC noted the following indications:
  - The red running light remained dim.
  - Fan amps remained at 0 amps.

Which ONE of the choices below answers both of the following:

1) Is L.C.O. T.S. 3.6.1.5 CONTAINMENT SYSTEMS - AIR TEMPERATURE currently met?
2) What action will allow the operator to start Fan XFN-65B in accordance with SOP-114, REACTOR BUILDING VENTILATION SYSTEM?

A. 1) T.S. 3.6.1.5 L.C.O. is met;

   2) The XFN-64B/XFN 65B - RBCU TRAIN B EMERG must be selected to XFN 65B prior to taking the control switch to START.

B. 1) T.S. 3.6.1.5 L.C.O. is met;

   2) The XFN0065B 2B NORM switch must be held to START until the red running light is lit and fan amps are indicated.

C. 1) T.S. 3.6.1.5 L.C.O. is **not** met;

   2) The XFN-64B/XFN 65B - RBCU TRAIN B EMERG must be selected to XFN 65B prior to taking the control switch to START.

D✓ 1) T.S. 3.6.1.5 L.C.O. is **not** met;

   2) The XFN0065B 2B NORM switch must be held to START until the red running light is lit and fan amps are indicated.

QUESTION USAGE:

NEW for 2013 NRC

QUESTION HISTORY:

Rev. 0 submitted by RJ
Ops Review: Nick O'Kimosh
Approved: 6/14/13 Rick Garner

DISTRACTOR ANALYSIS:

In order to answer this question correctly, the applicant must determine whether the containment temperature is above the Technical Specification limit based on three given temperatures and assess the reason for a failure of a RBCU to start.

A. The first part is plausible because two temperatures are below the 120°F limit of T.S. 3.6.1.5. The second part is plausible because the XFN-64B/XFN 65B - RBCU TRAIN B EMERG selection will determine the fan that starts automatically on a Safety Injection signal and the candidate may assume that selection is required for a manual start.

   Incorrect because the average RB temperature violates the T.S. 3.6.1.5 limit and XFN-64B/XFN 65B - RBCU TRAIN B EMERG does not affect the manual start of a RBCU fan.

B. The first part is plausible because two temperatures are below the 120°F limit of T.S. 3.6.1.5. The second part is correct; The XFN0065B 2B NORM switch must be held to START until the red running light is lit and fan amps are indicated.

   Incorrect because the average RB temperature violates the T.S. 3.6.1.5 limit.

C. The first part is correct; The average of the RB temperatures is (118+119+124)/3=120.33 is in excess of the 120°F limit of T.S. 3.6.1.5. The second part is plausible because the XFN-64B/XFN 65B - RBCU TRAIN B EMERG selection will determine the fan that starts automatically on a Safety Injection signal and the candidate may assume that selection is required for a manual start.

   Incorrect because XFN-64B/XFN 65B - RBCU TRAIN B EMERG does not affect the manual start of a RBCU fan.

D. CORRECT. The average of the RB temperatures is (118+119+124)/3=120.33 is in excess of the 120°F limit of T.S. 3.6.1.5. The XFN0065B 2B NORM switch must be held to START until the red running light is lit and fan amps are indicated.

K/A: 022A1.01 K/A: 022 Containment Cooling System (CCS) A1: Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating the CCS controls including: 1.03: Containment temperature

K/A Match: the KA is matched because it requires the candidate to assess compliance with Technical Specification limits for RB temperature and apply knowledge of RBCU controls.

Selection criteria; NEW

Tier: 2 **Group:** 1
Importance Rating: RO 3.6 SRO 3.7
Technical Reference: **SOP-114, REACTOR BUILDING VENTILATION. TECHNICAL SPECIFICATION 3.6.1.5.**

Proposed references to be provided to applicants during examination: None

Learning Objective: AB-17-11 DESCRIBE the normal operation of the following subsystems of the Reactor Building Ventilation System: • Reactor Building Cooling Units

Question Cognitive Level: **Memory or Fundamental Knowledge** _____

Comprehension or Analysis __X__

10 CFR Part 55 Content: 41(b)(7) Design, components, and functions of control and safety systems, including instrumentation, signals, interlocks, failure modes, and automatic and manual features.

SRO Justification: N/A

NRC Form ES-401-9 Comments:

Facility Response:

Comments;

23. AOPS 604

Given the following plant conditions:

- 100% power.
- "A" Charging Pump is running.
- Operators note the following indications on the Main Control Boards:
  - FI-122A, CHG FLOW GPM 50 gpm, oscillating.
  - "A" Charging Pump amps 20 amps, oscillating.
  - Charging Pump discharge pressure 50 psig, oscillating.
- AOP-102.2, LOSS OF CHARGING in progress.

Which ONE of the following describes an action, or set of actions, directed in the **first** step of AOP-102.2 and the cause of the indications above?

A. ✔ Isolate Charging and Letdown; "A" Charging Pump is cavitating.

B. Start "B" Charging Pump; "A" Charging Pump is cavitating.

C. Isolate Charging and Letdown; FCV-122 flow controller failing in the closed direction.

D. Start "B" Charging Pump; FCV-122 flow controller failing in the closed direction.

QUESTION USAGE:

NEW for 2013 NRC

QUESTION HISTORY:

Rev. 0 submitted by RJ
Ops Review: Nick O'Kimosh
Approved: 6/14/13 Rick Garner

DISTRACTOR ANALYSIS:

In order to answer this question correctly, the applicant must assess conditions and determine the cause of charging pump indications and recall the correct action upon entry into the AOP-102.2, LOSS OF CHARGING.

A. CORRECT. Per AOP-102.2, after the charging pump is tripped in the first step, operators will isolate charging and letdown. Oscillating low flow, amperage, and discharge pressure are symptoms of a cavitating pump.

B. The first part is plausible because AOP-102.2 will start a Charging pump in step 4 after the cause of the event is corrected. The second part is correct; Oscillating low flow, amperage, and discharge pressure are symptoms of a cavitating pump.

   Incorrect because a Charging pump is not started in the first step of AOP-102.2.

C. The first part is correct; Per AOP-102.2, after the charging pump is tripped in the first step, operators will isolate charging and letdown. The second part is plausible because low flow and amperage would indicate a low flow which could be caused by the downstream Charging flow control valve failing shut.

   Incorrect because oscillating indications and low discharge pressure are not indicative of a low flow condition caused by a shut valve.

D. The first part is plausible because AOP-102.2 will start a Charging pump in step 4 after the cause of the event is corrected. The second part is plausible because low flow and amperage would indicate a low flow which could be caused by the downstream Charging flow control valve failing shut.

   Incorrect because a charging pump is not started until step 4 of AOP-102.2 and oscillating indications and low discharge pressure are not indicative of a low flow condition caused by a shut valve.

K/A: 022AK3.07 K/A: 022 Loss of Reactor Coolant Makeup AK3: Knowledge of the reasons for the following responses as they apply to the Loss of Reactor Coolant Makeup: 3.07: Isolating charging

K/A Match: the KA is matched because it requires the candidate to identify when charging is isolated when taking action for a loss of Charging.

Selection criteria; NEW

Tier: 1 **Group:** 1
Importance Rating: RO 3.0 SRO 3.2
Technical Reference: **AOP-102.2, LOSS OF CHARGING.**
GFES

Proposed references to be provided to applicants during examination: None

Learning Objective: AOP-102 03.Given a set of plant conditions, DETERMINE the appropriate plant response and operator actions in accordance with AOP-102.2.

Question Cognitive Level: **Memory or Fundamental Knowledge** _____

Comprehension or Analysis __X__

10 CFR Part 55 Content: 41(b)(10) Administrative, normal, abnormal, and emergency operating procedures for the facility.

SRO Justification: N/A

NRC Form ES-401-9 Comments:

Facility Response:

Comments;

24. EOPS 812

Given the following plant conditions:

- Large-break LOCA occurred.
- RWST level 18%.
- RHR Sump level 412 ft.

Which ONE of the following describes the significance of the indicated RHR sump level as operators take action to transfer to cold leg recirculation?

A. ✔ RHR pump NPSH may be inadequate to maintain recirculation.

B. Sump PH may be less than required to reduce general corrosion.

C. Sump Boron may be inadequate to maintain the reactor shutdown.

D. Vital equipment in the Reactor Building may be flooded.

QUESTION USAGE:

MODIFIED FROM EOPS 145

QUESTION HISTORY:

Rev. 0 submitted by RJ
Ops Review: Nick O'Kimosh
Approved: 6/14/13 Rick Garner

DISTRACTOR ANALYSIS:

In order to answer this question correctly, the applicant must determine that with the RWST level at the switchover setpoint and sump level at a low level that NPSH requirements may not be met for RHR pumps in recirculation mode.

A. CORRECT; Per EOP-2.2 course handout, the auto swapover is based on RWST level and not available sump level. The operator must verify sump level greater than 414 ft to ensure NPSH for the [RHR] pumps. If sump level is not sufficient then transfer to EOP-2.4, Loss of Emergency Coolant Recirculation is directed.

B. Plausible because a low sump level would indicate that less than normal Sodium Hydroxide may be present in the sump which would affect sump pH.

   Incorrect because RHR sump level is not evaluated as an indication of adequate NaOH concentration.

C. Plausible because a high level of 419.5 ft is associated with RB flooding and could be indicative of a leak of service water, CCW or other non-borated water source into containment which could lower sump boron concentration to less than expected.

   Incorrect because 412 ft. of RHR sump level is low not high.

C. Plausible because a high level of 419.5 ft us associated with RB flooding and would indicate a potential for flooding of vital equipment.

   Incorrect because 412 ft. of RHR sump level is low not high.

K/A: 025AK2.05 K/A: 025 Loss of Residual Heat Removal System (RHRS) AK2: Knowledge of the interrelations between the Loss of Residual Heat Removal System and the following: 2.05: Reactor building sump

K/A Match: the KA is matched because it requires

Selection criteria; MODIFIED FROM EOPS 145

Tier: 1 **Group:** 1
Importance Rating: RO 2.6 SRO 2.6
Technical Reference: **EOP-2.2, TRANSFER TO COLD LEG RECIRCULATION**
EOP-2.2 (ES-1.3) BASES

Proposed references to be provided to applicants during examination: None

Learning Objective: EOP-2.2 05. RELATE each CAUTION and NOTE in EOP-2.2 to its corresponding step by identifying the bases or reasons for the CAUTION or NOTE. This should include, but not be limited to, the following: 1. Importance of maintaining suction source to SI pumps

Question Cognitive Level: **Memory or Fundamental Knowledge** _____

Comprehension or Analysis __**X**__

10 CFR Part 55 Content: 41(b)(8) Components, capacity, and functions of emergency systems.

41(b)(10)Administrative, normal, abnormal, and emergency operating procedures for the facility.

SRO Justification: N/A

NRC Form ES-401-9 Comments:

Facility Response:

Comments;

25. CONT SPRAY SYSTEM 081

Given the following plant conditions:

Time 0400:

- A partial steamline break occurred in the Reactor Building.
- Reactor Building Pressure peaked at 13 psig.

Time 0410:

- Reactor Building Pressure is 5 psig, lowering.
- EOP-1.2, SAFETY INJECTION TERMINATION in progress.
- Operators are checking to determine if RB Spray should be stopped.

Which ONE of the choices below answers both of the following:

1) When is the **earliest** time that stopping RB Spray pumps will be allowed by EOP-1.2?
2) What is the **minimum** number of control manipulations that will **satisfy the reset circuit logic** to allow operators to stop RB Spray pumps from the Main Control Board?

A. ✔ 1) Immediately.
   2) Depress both RESET TRAIN A(B) RB SPRAY pushbuttons ONLY.

B. 1) Immediately.
   2) Depress both RESET Phase A - TRAIN A(B) CTMT ISOL pushbuttons **then** depress both RESET Phase B - TRAIN A(B) CNTMT ISOL pushbuttons **then** depress both RESET TRAIN A(B) RB SPRAY pushbuttons.

C. 1) 0800
   2) Depress both RESET TRAIN A(B) RB SPRAY pushbuttons ONLY.

D. 1) 0800
   2) Depress both RESET Phase A - TRAIN A(B) CTMT ISOL pushbuttons **then** depress both RESET Phase B - TRAIN A(B) CNTMT ISOL pushbuttons **then** depress both RESET TRAIN A(B) RB SPRAY pushbuttons.

QUESTION USAGE:

MODIFIED FROM CONTAINMENT SPRAY 45

QUESTION HISTORY:

Rev. 0 submitted by RJ.
Ops Review: Nick O'Kimosh
Approved: 6/14/13 Rick Garner

DISTRACTOR ANALYSIS:

In order to answer this question correctly, the candidate must determine that EOP-14.0 has not been entered from the given conditions and recall that spray can be stopped without delay. Additionally, the candidate must recall the reset circuit logic and identify the manipulation that will satisfy the logic.

A. CORRECT; EOP-1.2 will stop RB spray pumps without delay when RB pressure is less than 11 psig unless EOP-14.0 has been previously entered. Only the RESET TRAIN A(B) RB SPRAY buttons must be depressed to satisfy the reset circuitry.

B. The first part is correct; EOP-1.2 will stop RB spray pumps without delay when RB pressure is less than 11 psig unless EOP-14.0 has been previously entered. The second part is plausible because the Emergency Operating Procedures are sequenced such that Phase A and Phase B are reset prior to resetting spray. In the case given, Phase A and Phase B were reset in EOP-3.0, FAULTED STEAM GENERATOR ISOLATION. Finally, Phase A opens NaOH isolation valves for spray and Phase B occurs coincident with RB Spray. It may be reasonable to assume that these would be reset as part of spray reset.

   Incorrect because only the RESET TRAIN A(B) RB SPRAY buttons must be depressed to satisfy the reset circuitry.

C. The first part is plausible because if EOP-14.0 is previously entered, spray must run for a minimum of 4 hours as stated in the note in step 12 of EOP-1.2. The second part is correct; Only the RESET TRAIN A(B) RB SPRAY buttons must be depressed to satisfy the reset circuitry.

   Incorrect because RB spray can be stopped immediately for the given conditions.

D. The first part is plausible because if EOP-14.0 is previously entered, spray must run for a minimum of 4 hours as stated in the note in step 12 of EOP-1.2. The second part is plausible because the Emergency Operating Procedures are sequenced such that Phase A and Phase B are reset prior to resetting spray. In the case given, Phase A and Phase B were reset in EOP-3.0, FAULTED STEAM GENERATOR ISOLATION. Finally, Phase A opens NaOH isolation valves for spray and Phase B occurs coincident with RB Spray. It may be reasonable to assume that these would be reset as part of spray reset.

   Incorrect because RB spray can be stopped immediately for the given conditions and because only the RESET TRAIN A(B) RB SPRAY buttons must be depressed to satisfy the reset circuitry.

K/A: 026A4.01 K/A: 026 Containment Spray System (CSS) A4: Ability to manually operate and/or monitor in the control room: 4.01: CSS controls

K/A Match: the KA is matched because it requires the candidate to recall the manipulations that are required reset logic circuits to allow stopping RB Spray pumps.

Selection criteria; MODIFIED FROM CONTAINMENT SPRAY 45

Tier: 2 **Group:** 1
Importance Rating: RO 4.5 SRO 4.3
Technical Reference: **EOP-1.2, SAFETY INJECTION TERMINATION**
DRAWING 1-MS-41-011 SH. 3

Proposed references to be provided to applicants during examination: None

Learning Objective: AB-8-12DESCRIBE the component operation associated each switch position for the following switches and controls: 7. RB Spray Reset

Question Cognitive Level: **Memory or Fundamental Knowledge** **__X__**

Comprehension or Analysis _____

10 CFR Part 55 Content: 41(b)(10) Administrative, normal, abnormal, and emergency operating procedures for the facility.

41(b)(7) Design, components, and functions of control and safety systems, including instrumentation, signals, interlocks, failure modes, and automatic and manual features.

SRO Justification: N/A

NRC Form ES-401-9 Comments:

Facility Response:

Comments;

26. CCW SYSTEM 057

Given the following plant conditions:

Time 0800:

- Loss of CCW occurred.
- AOP-118.1, TOTAL LOSS OF COMPONENT COOLING WATER in progress.

Time 0830:

- LOCA occurred.
- RB pressure 13 psig.

Time 900:

- ONE loop of CCW restored.
- Operators are restoring RCP Thermal Barrier flow.

Which ONE of the choices below answers both of the following:

1) What is the **lowest** flow rate that will meet the RCP Thermal barrier flow requirement?
2) What containment isolation function will prevent reestablishing flow to the RCP Thermal Barriers from the Main Control Board if **not** reset?

A. 1) 91 gpm.
   2) Phase A.

B✔ 1) 91 gpm.
   2) Phase B.

C. 1) 401 gpm.
   2) Phase A.

D. 1) 401 gpm.
   2) Phase B.

QUESTION USAGE:

NEW for 2013 NRC

QUESTION HISTORY:

Rev. 0 submitted by RJ
Ops Review: Nick O'Kimosh
Approved: 6/14/13 Rick Garner

DISTRACTOR ANALYSIS:

In order to answer this question correctly, the applicant recall the flow rate for RCP thermal barrier flow as specified in AOP-118.1, TOTAL LOSS OF COMPONENT COOLING WATER and determine the containment isolation that would prevent opening thermal barrier isolation valves if not reset.

A. The first part is correct; 91 gpm meets the 90 gpm requirement for thermal barrier flow contained in step 6 of AOP-118.1. The second part is plausible because there are numerous containment isolation valves associated with Phase A.

   Incorrect because Phase A will not prevent opening thermal barrier containment isolation valves.

B. CORRECT. 91 gpm meets the 90 gpm requirement for thermal barrier flow contained in step 6 of AOP-118.1. Phase B would prevent opening CC TO RC CNTMT ISOL 9568, RCP THERM BAR ISOL 9600 and RCP THERM BAR ISOL 9605.

C. The first part is plausible because 400 gpm is specified for RCP bearing coolers in step 6 of AOP-118.1. The second part is plausible because there are numerous containment isolation valves associated with Phase A.

   Incorrect because 401 gpm is not the lowest flowrate that is given that will satisfy RCP Thermal Barrier Flow requirements in AOP-118.1. and because Phase A will not prevent opening thermal barrier containment isolation valves.

D. The first part is plausible because 400 gpm is specified for RCP bearing coolers in step 6 of AOP-118.1. Phase B would prevent opening CC TO RC CNTMT ISOL 9568, RCP THERM BAR ISOL 9600 and RCP THERM BAR ISOL 9605.

   Incorrect because 401 gpm is not the lowest flowrate that is given that will satisfy RCP Thermal Barrier Flow requirements in AOP-118.1.

K/A: 026AA1.06 K/A: 026 Loss of Component Cooling Water (CCW) AA1: Ability to operate and / or monitor the following as they apply to the Loss of Component Cooling Water: 1.06: Control of flow rates to components cooled by the CCWS

K/A Match: the KA is matched because it requires the candidate to determine a flowrate that indicates that proper flow to RCP Thermal Barriers is restored when responding to a loss of Component Cooling Water.

Selection criteria; NEW

Tier: 1 **Group:** 1
Importance Rating: RO 2.9 SRO 2.9
Technical Reference: **AOP-118.1, TOTAL LOSS OF COMPONENT COOLING WATER. IC-9, REACTOR PROTECTION AND SAFEGAURDS ACTUATION SYSTEM, ENCLOSURE F**

Proposed references to be provided to applicants during examination: None

Learning Objective: IB-2-04 DESCRIBE the Component Cooling Water System Interfaces with the following systems and/or subsystems: 6. Containment Isolation.

Question Cognitive Level: **Memory or Fundamental Knowledge** **__X__**

Comprehension or Analysis _____

10 CFR Part 55 Content: 41(b)(7) Design, components, and functions of control and safety systems, including instrumentation, signals, interlocks, failure modes, and automatic and manual features.

41(b)(10)Administrative, normal, abnormal, and emergency operating procedures for the facility.

SRO Justification: N/A

NRC Form ES-401-9 Comments:

Facility Response:

Comments;

27. EOPS 830

Given the following plant conditions:

Initial conditions:

- 100% power initially.
- Spurious Safety Injection occurs.
- ATWS occurred.

Current conditions:

- EOP-13.0, RESPONSE TO ABNORMAL NUCLEAR POWER GENERATION.

Which ONE of the following describes the verification that operators will perform to ensure that adequate boration is occurring in accordance with EOP-13.0?

A. Operators will verify that a **minimum** of 30 gpm is indicated on FI-110, EMRG BORATE FLOW GPM.

B. ✔ Operators will verify that **any** High Head injection flow is indicated on FI-943, CHG LOOP B CLD/ HOT LG FLOW GPM.

C. Operators will verify that a **minimum** of 30 gpm is indicated on FI-943, CHG LOOP B CLD/ HOT LG FLOW GPM.

D. Operators will verify that **any** flow is indicated on FI-110, EMRG BORATE FLOW GPM.

QUESTION USAGE:

NEW for 2013 NRC

QUESTION HISTORY:

Rev. 0 submitted by RJ
Ops Review: Nick O'Kimosh
Approved: 6/14/13 Rick Garner

DISTRACTOR ANALYSIS:

In order to answer this question correctly, the applicant must recall that high head injection is verified in EOP-13.0, RESPONSE TO ABNORMAL NUCLEAR POWER GENERATION to determine appropriate boration when safety injection is actuated during an ATWS.

A. Plausible because a minimum of 30 gpm is verified on FI-110, EMRG BORATE FLOW GPM if SI is not actuated.

   Incorrect because high head injection flow is monitored for boration if SI is actuated.

B. CORRECT; If SI is actuated then, in step 4 of EOP-13.0, any observed high head injection flow on FI-943, CHG LOOP B CLD/ HOT LG FLOW GPM will satisfy EOP-13.0, step 4 for emergency boration.

C. Plausible because a minimum of 30 gpm is verified on FI-110, EMRG BORATE FLOW GPM if SI is not actuated.

   Incorrect because high head injection flow is monitored for boration if SI is actuated.

D. Plausible because the correct indication (FI-110) is given in the distractor. Additionally, any indicated flow satisfies the requirement if SI flow is being verified in EOP-13.0, step 4.

   Incorrect because at least 30 gpm must be verified on FI-110.

K/A: 029EA1.01 K/A: 029 Anticipated Transient Without Scram (ATWS) EA1: Ability to operate and monitor the following as they apply to a ATWS: 1.01: Charging pumps.

K/A Match: the KA is matched because it requires candidate to determine the indication that will indicate proper boration flow if high-head injection (Charging pumps) is actuated during an ATWS.

Selection criteria; NEW

Tier: 1 **Group:** 1
Importance Rating: RO 3.4 SRO 3.1
Technical Reference: **EOP-13.0, RESPONSE TO ABNORMAL NUCLEAR POWER GENERATION.**

Proposed references to be provided to applicants during examination: None

Learning objective:EOP-13.0 06. RELATE each CAUTION and NOTE in EOP-13.0 to its corresponding step by identifying the bases or reasons for the CAUTION or NOTE. This should include, but not be limited to, the following: Use of SI to obtain adequate shutdown margin following completion of this EOP

Question Cognitive Level: **Memory or Fundamental Knowledge** **__X__**

Comprehension or Analysis **_____**

10 CFR Part 55 Content: 41(b)(10) Administrative, normal, abnormal, and emergency operating procedures for the facility.

SRO Justification: N/A

NRC Form ES-401-9 Comments:

Facility Response:

Comments;

28. AOPS 609

Given the following plant conditions:

- Mode 6.
- Spent Fuel Pool level decreasing.
- RM-G17A(B), RB MANIP CRANE AREA GAMMA, indication rising.
- AOP-123.1, DECREASING LEVEL IN THE SPENT FUEL POOL OR REFUELING CAVITY DURING REFUELING, in progress.

Which ONE of the following identifies the radiation threshold, as read on RM-G17A(B), that is specifically used in AOP-123.1 to trigger immediate evacuations and the areas that are evacuated.

A. 2 R/ hr; Reactor Building **only.**

B. 2 R/hr; Reactor Building **and** Fuel Handling Building.

C. 20 R/hr; Reactor Building **only.**

D. ✓ 20 R/hr; Reactor Building **and** Fuel Handling Building.

QUESTION USAGE:

NEW for 2013 NRC

QUESTION HISTORY:

Rev. 0 submitted by RJ
Ops Review: Nick O'Kimosh
Approved: 6/14/13 Rick Garner

DISTRACTOR ANALYSIS:

In order to answer this question correctly, the applicant must recall the radiation reading on RM-G17A(B) that will require immediate evacuation from the RB and Fuel Handling building during performance of AOP-123.1, DECREASING LEVEL IN THE SPENT FUEL POOL OR REFUELING CAVITY DURING REFUELING.

A. The first part is plausible because 2 R/hr is the threshold used in EOP-12.0 for determining a yellow path condition on for high RB radiation. The second part is plausible because the Radiation Monitor RM-G17A(B) is inside of the RB.

   Incorrect because the correct threshold is 20 R/hr and because both the RB and the Fuel Handling Building will be evacuated.

B. The first part is plausible because 2 R/hr is the threshold used in EOP-12.0 for determining a yellow path condition on for high RB radiation. The second part is correct; Both the RB and the Fuel Handling Building will be evacuated.

   Incorrect because the correct threshold is 20 R/hr and because both the RB and the Fuel Handling Building will be evacuated.

C. The first part is correct; The threshold contained in the caution prior to step 1 of AOP-123.1, step is 20 R/ hr. The second part is plausible because the Radiation Monitor RM-G17A(B) is inside of the RB.

   Incorrect because both the RB and the Fuel Handling Building will be evacuated.

D. CORRECT; The correct threshold as contained in the caution prior to step 1 of AOP-123.1, step is 20 R/ hr. Both the RB and the Fuel Handling Building will be evacuated.

K/A: 033K3.02 K/A: 033 Spent Fuel Pool Cooling System (SFPCS) K3: Knowledge of the effect that a loss or malfunction of the Spent Fuel Pool Cooling System will have on the following: 3.02: Area and ventilation radiation monitoring systems.

K/A Match: the KA is matched because it requires the candidate to identify the reading on RM-G17A(B), RB MANIP CRANE AREA GAMMA that will require evacuation of personnel in the RB and Fuel Handling Building when responding to a lowering spent fuel pool level..

Selection criteria; NEW

Tier: 2 **Group:** 2
Importance Rating: RO 2.8 SRO 3.2
Technical Reference: **AOP-123.1, DECREASING LEVEL IN THE SPENT FUEL POOL OR REFUELING CAVITY DURING REFUELING.**

Proposed references to be provided to applicants during examination: None

Learning Objective: AOP-123.1 05. STATE/ IDENTIFY the bases for the overall mitigating strategies and the bases for the steps, notes, or caution (as applicable), for AOP-123.1.

Question Cognitive Level: **Memory or Fundamental Knowledge** **__X__**

Comprehension or Analysis _____

10 CFR Part 55 Content: 41(b)(13) Procedures and equipment available for handling and disposal of radioactive materials and effluents.

SRO Justification: N/A

NRC Form ES-401-9 Comments:

Facility Response:

Comments;

29. CONT VENTILLATION 006

Given the following plant conditions:

- Mode 6.
- Fuel handling in progress.
- RB 36" purge is in progress.
- The RM-A2, REACTOR BUILDING VENT **gas** channel detector has failed **high**.

Which ONE of the following describes the valves that have closed in response to the malfunction of RM-A2, if any?

A. No valves have closed.

B. PVB-1A, CNTMT SPLY ISOL
PVB-2A, CNTMT EXH ISOL

C. PVB-1B, CNTMT SPLY ISOL
PVB-2B, CNTMT EXH ISOL

D. PVB-1A, CNTMT SPLY ISOL
PVB-1B, CNTMT SPLY ISOL
PVB-2A, CNTMT EXH ISOL
PVB-2B, CNTMT EXH ISOL

QUESTION USAGE:

MODIFIED FROM CONT VENTILATION 5

QUESTION HISTORY:

Rev. 0 submitted by RJ
Ops Review: Nick O'Kimosh
Approved: 6/14/13 Rick Garner

DISTRACTOR ANALYSIS:

In order to answer this question correctly, must determine the valves that will close for a failure of the RM-A2 gas channel.

A. Plausible because if the particulate or iodine channel fails then automatic containment ventilation isolation will not occur.

   Incorrect because PVB-1B and 2B will close for a high radiation reading on the RM-A2 gas channel.

B. Plausible because high radiation on RM-A4 will cause PVB-1A and 2A to close.

   Incorrect because RM-A2 is not interlocked with PVB-1A and 2A.

C. CORRECT; A high radiation cause by a high failure of the RM-A2 gas channel will cause PVBs-1B and 2B to close.

D. Plausible because both trains of some protection functions will actuate upon one detector failure such as a reactor trip on 1 of 2 intermediate ranges failing high during a startup.

   Incorrect because RM-A2 will only close PVBs-1B and 2B.

K/A: 034K6.02 K/A: 034 Fuel Handling Equipment System (FHES) K6: Knowledge of the effect of a loss or malfunction on the following will have on the Fuel Handling System: 6.02: Radiation monitoring systems.

K/A Match: the K/A is met because the candidate must identify the effect on Reactor Building ventilation during Mode 6 if a radiation monitor fails high.*

Selection criteria: MODIFIED FROM CONT VENTILATION SYSTEM 5

Tier: 2 **Group:** 2
Importance Rating: RO 2.6 SRO 3.3.
Technical Reference: **PANEL XCP-643 2-2 RB AREA RM-A2 HI RAD**

Proposed references to be provided to applicants during examination: None

Learning Objective: AB-17-22 EXPLAIN the effect of the following failures of the Reactor Building Ventilation System: • High Radiation/Instrument Failure

Question Cognitive Level: **Memory or Fundamental Knowledge** _____

Comprehension or Analysis __X__

10 CFR Part 55 Content: 41(b)(11) Purpose and operation of radiation monitoring systems, including alarms and survey equipment.

SRO Justification: N/A

***NOTE TO REVIEWER:** This KA was discussed with Chief Examiner. V.C. Summer has removed high radiation interlocks on refueling equipment. The approach for this question was developed as a result of that discussion. The effect is an automatic isolation of RB ventilation due to a malfunction of a radiation monitor.

NRC Form ES-401-9 Comments:

Facility Response:

comments;

30. STEAM GENERATOR SYST 034

Given the following plant conditions:

- 13% power.
- Tavg is 564°F, stable.
- Steam dumps are controlling in **automatic** in the STEAM PRESSURE mode.
- The Main Generator is being prepared to parallel to the grid.
- The synchroscope is rotating slowly in the SLOW direction.

Which ONE (1) of the following actions would potentially cause an **initial** "swell" in S/G water level?

A. ✔ Adjusting turbine controls so that the synchroscope rotates in the FAST direction.

B. Raising the setpoint on the STM DUMP CNTRL potentiometer.

C. Shifting the STM DUMP MODE SELECT to T_{AVG} MODE.

D. Inserting control rods 5 steps in MANUAL.

QUESTION USAGE:

MODIFIED FROM STEAM GENERATOR SYST 33

QUESTION HISTORY:

Rev 0 submitted by RJ
Ops Review: Nick O'Kimosh
Approved: 6/14/13 Rick Garner

DISTRACTOR ANALYSIS:

In order to answer this question correctly, the candidate must identify an action that will cause additional steam to be drawn and, in turn, cause steam generator levels to swell.

A. CORRECT; Turbine control valves must be opened further to increase the speed of rotation of the synchroscope which will increase steam demand and cause steam generator levels to swell.

B. Plausible because adjusting the setpoint downward would open the steam dumps momentarily until pressure comes down to the new set pressure.

   Incorrect because raising the setpoint would cause steam dumps to close and shrink steam generator levels.

C. Plausible because steam dumps would open in T_{AVG} Plant trip mode if the reactor is tripped. This would produce a swelling of steam generator levels.

   Incorrect because an arming signal is required for steam dumps to open.

D. Plausible because raising rods increases RCS temperature and raises steam generator temperature and pressure which will cause steam dumps to open and generators to swell.

   Incorrect because inserting rods will not cause steam generators to swell.

K/A: 035K5.03 K/A: 035 Steam Generator System (S/GS) K5: Knowledge of operational implications of the following concepts as the apply to the S/GS: 5.03: Shrink and swell concept

K/A Match: the K/A is met because the candidate must determine effects of raising the turbine speed to parallel the generator and the resulting effect on SG level.

Selection criteria; MODIFIED FROM STEAM GENERATOR SYST 33

Tier: 2 **Group:** 2
Importance Rating: RO 2.8 SRO 3.1
Technical Reference: **TB-1, STEAM GENERATOR AND BLOWDOWN**

Proposed references to be provided to applicants during examination: None

Learning Objective: TB-1-09 DESCRIBE the operation of the Steam Generator during transient conditions, including power changes, faults and ruptures.

Question Cognitive Level: **Memory or Fundamental Knowledge** _____

Comprehension or Analysis __X__

10 CFR Part 55 Content: 41(b)(5) Facility operating characteristics during steady state and transient conditions, including coolant chemistry, causes and effects of temperature, pressure and reactivity changes, effects of load changes, and operating limitations and reasons for these operating characteristics.

SRO Justification: N/A

NRC Form ES-401-9 Comments:

_____

Facility Response:

comments;

31. AOPS 478

Given the following plant conditions:

- Mode 6.
- Core offload was in progress.
- A fuel assembly has been dropped from the Manipulator Crane.
- AOP-123.3, POTENTIAL FUEL ASSEMBLY DAMAGE WHILE HANDLING FUEL, in progress.

Which ONE of the following is the **first** action directed by AOP-123.3, **of those listed**?

A. Close the Fuel Transfer Tube Valve.

B. ✔ Return the fuel transfer cart to the Fuel Handling Building.

C. Start up both trains of Control Room Emergency Ventilation.

D. Verify either XFN-23A(B), FUEL BLDG EXH FAN A(B), is running.

QUESTION USAGE:
BANK
RO 11-01 AOP-1 Makeup Exam
RO 10-01 AOP MakeUp EXAM

QUESTION HISTORY:

8/15/12 RSG Changed correct answer from Transfer all remaining fuel assemblies in the Refueling Cavity to a safe location.
OPS Approval: AH
TRN Approval: RJ
Reviewed for 2013 NRC exam
Ops Review: Nick O'Kimosh
Approved: 6/14/13 Rick Garner

DISTRACTOR ANALYSIS

In order to answer this question correctly, the candidate must identify, from a given list of actions, that returning the fuel transfer cart to the RB after a fuel assembly has been dropped is the first action required.

A. Plausible because actions are taken to close the fuel transfer tube in step 4 of AOP-123.3.

   Incorrect because this is after the Fuel Transfer Cart is returned to the RB.

B. CORRECT. Returning the Fuel Transfer Cart to the RB is performed in step 3 and is the earliest step of those listed.

C. Plausible because one train of ventilation is started in step 10.

   Incorrect because starting ventilation is not the earliest action of those listed and both trains of ventilation are not started.

D. Plausible because this step is performed in step 9.

   Incorrect because this is not the earliest action listed and is only covered if an assembly is dropped in the FHB

K/A: 036AA1.04 K/A: 036 Fuel Handling Incidents AA1: Ability to operate and / or monitor the following as they apply to the Fuel Handling Incidents: 1.04: Fuel handling equipment during an incident

K/A Match: the KA is matched because it requires the candidate to identify, from a given list of actions, that returning the fuel transfer cart to the RB after a fuel assembly has been dropped is the first action required.

Selection criteria: **BANK**
SELECTED FROM A SEARCH OF PROCEDURE FIELD FOR "AOP-123" FOR KA MATCH AND ATTRIBUTES

Tier: 1 **Group:** 2
Importance Rating: RO 3.1 SRO 3.7
Technical Reference: **AOP-123.3, POTENTIAL FUEL ASSEMBLY DAMAGE WHILE HANDLING FUEL**

Proposed references to be provided to applicants during examination: None

Learning Objective: AOP-123.3 05. STATE/IDENTIFY the bases for the overall mitigating strategies and the bases for the steps, notes, or cautions (as applicable), for AOP-123.3.

Question Cognitive Level: **Memory or Fundamental Knowledge** __**X**__

Comprehension or Analysis _____

10 CFR Part 55 Content:

41(b)(10)	Administrative, normal, abnormal, and emergency operating procedures for the facility.
41(b)(13)	Procedures and equipment available for handling and disposal of radioactive materials and effluents.

SRO Justification: N/A

NRC Form ES-401-9 Comments:

Facility Response:

Comments;

32. AOPS 618

Given the following plant conditions:

Time 1400:

- 40% power.
- Steam Generator tube leak in progress.
- AOP-112.2, STEAM GENERATOR TUBE LEAK NOT REQUIRING SI, in progress.
- XCP-645, 1-4 CNDSR EXH RM-A9 TRBL in alarm.
- The RM-A9, CNDSR EXHAUST GAS ATMOS, module has the following indications:

  - Meter reading 0 c/m
  - HI RAD light DIM
  - WARN light DIM
  - FAIL light LIT
  - NOR-CS light DIM

Select the ONE choice below that answers both of the following questions:

1) What is causing the indications on the RM-A9 module?

2) What method will be used to determine the time by which the plant must be shutdown?

A. 1) RM-A9 has lost power.
   2) Steam Generator or Blowdown chemistry analysis.

B. 1) RM-A9 has lost power.
   2) Rate of change of RMG-19A(B)(C), STMLN HI RNG GAMMA.

C✓ 1) RM-A9 has a detector failure.
   2) Steam Generator or Blowdown chemistry analysis.

D. 1) RM-A9 has a detector failure.
   2) Rate of change of RMG-19A(B)(C), STMLN HI RNG GAMMA.

QUESTION USAGE:

NEW for 2013 NRC

QUESTION HISTORY:

Rev. 0 submitted by RJ
Ops Review: Nick O'Kimosh
Approved: 6/14/13 Rick Garner

DISTRACTOR ANALYSIS:

In order to answer this question correctly, the applicant must assess the indications of a failed radiation monitor RM-A9 and determine that the module has a detector failure rather than lost power and recall the method for determining shutdown requirements as a result of the failed module.

A. The first part is plausible because the meter reading is zero and the HIGH RAD and WARN lights are DIM and one of the causes for XCP-645, 1-4, is a loss of power. The second part is correct; The alternate method of determining the required rate of shutdown is via Steam Generator or Blowdown chemistry analysis.

   Incorrect because all indications would be DIM for a power supply failure.

B. The first part is plausible because the meter reading is zero and the HIGH RAD and WARN lights are DIM and one of the causes for XCP-645, 1-4, is a loss of power. The second part is plausible because RM-G19 is also an indication of primary to secondary leakage.

   Incorrect because all indications would be DIM for a power supply failure and because RM-G19s are not used to determine the rate of shutdown in AOP-112.2.

C. CORRECT. The module indication FAIL light is an indication of a detector failure and the alternate method of determining the required rate of shutdown is via Steam Generator or Blowdown chemistry analysis.

D. The first part is correct; The module indication FAIL light is an indication of a detector failure. The second part is plausible because RM-G19 is also an indication of primary to secondary leakage.

   Incorrect because because RM-G19s are not used to determine the rate of shutdown in AOP-112.2.

K/A: 037AA2.08 K/A: 037 Steam Generator (S/G) Tube Leak AA2: Ability to determine and interpret the following as they apply to the Steam Generator Tube Leak: 2.08: Failure of Condensate air ejector exhaust monitor.

K/A Match: the KA is matched because it requires the candidate to assess the cause of the Condensate air ejector exhaust monitor failure during a Steam Generator tube leak response.

Selection criteria; NEW

Tier: 1 **Group:** 2
Importance Rating: RO 2.8 SRO 3.3
Technical Reference: **AOP-112.2 STEAM GENERATOR TUBE LEAK NOT REQUIRING SI**
ARP-635, 1-4 CNDSR EXH RM-A9 TRBL

Proposed references to be provided to applicants during examination: None

Learning Objective: GS-9-16 EXPLAIN the importance of the following items when performing a gaseous or liquid waste discharge:4. Radiation monitor channel check 5. Radiation monitor operability check

AOP-112.2 04.Given a set of plant conditions, DETERMINE the following for AOP-112.2: Requirements for a power reduction or unit shutdown based on primary to secondary leakage.

Question Cognitive Level: **Memory or Fundamental Knowledge** _____

Comprehension or Analysis __**X**__

10 CFR Part 55 Content: 41(b)(10) Administrative, normal, abnormal, and emergency operating procedures for the facility.

41(b)(11) Purpose and operation of radiation monitoring systems, including alarms and survey equipment.

SRO Justification: N/A

NRC Form ES-401-9 Comments:

Facility Response:

Comments;

33. MAIN STEAM 076

Given the following plant conditions:

Initial conditions:

- Mode 3.
- Main Condenser Steam Dumps are in AUTO in STEAM PRESSURE MODE.
- Tavg is 557°F, stable.
- Main Steam Header Pressure is 1092 psig, stable.
- Potentiometer setting on STM DUMP CNTRL is 8.4.

Current condition:

- Potentiometer setting on STM DUMP CNTRL is 7.5.

Which ONE of the following contains the **closest** values to the Main Steam Header pressure and RCS temperature that result from the current potentiometer setting?

A.	820 psig	521°F.
B.	820 psig	523°F.
C.	975 psig	541°F.
D. ✔	975 psig	543°F.

QUESTION USAGE:

NEW for 2013 NRC

QUESTION HISTORY:

Rev. 0 submitted by RJ
Ops Review: Nick O'Kimosh
Approved: 6/14/13 Rick Garner

DISTRACTOR ANALYSIS:

In order to answer this question correctly, the applicant must determine the new plant condition after adjustment of the potentiometer on the condenser steam dump controller.

A. The first part is plausible because 819 psig is 1092 psig x 0.75. 7.5 turns represents 0.75 of span on the controller and 1092 psig is the pressure prior to the adjustment. The second part is plausible because 521°F is the approximate saturation pressure for 820 **psia**, which represents an additional error.

   Incorrect because these are not the correct values for the new setting.

B. The first part is plausible because 819 psig is 1092 psig x 0.75. 7.5 turns represents 0.75 of span on the controller and 1092 psig is the pressure prior to the adjustment. The second part is plausible because 523°F is the approximate saturation pressure for 820 psig.

   Incorrect because these are not the correct values for the new setting.

C. The first part is plausible because 975 psig is 1092 psig x (.75/.84). Each turn represents 0.1 of span. 1092 psig is the pressure prior to the adjustment. The second part is plausible because 541°F is the approximate saturation pressure for **975 psia** which represents an additional error.

   Incorrect because these are not the correct values for the new setting.

D. CORRECT; 1092 psig x (.75/.84) = 975 psig 0.75 (note that the span of the controller, 1300 psig x 0.75 = 975 psig). Each turn of the potentiometer represents 0.1 of span on the controller and 1092 psig is the pressure prior to the adjustment. The second part is the approximate saturation pressure for 975 psig.

K/A: 039A1.06 K/A: 039 Main and Reheat Steam System (MRSS) A1: Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating the MRSS controls including: 1.06: Main steam pressure.

K/A Match: the KA is matched because it requires the candidate to predict the change in main steam pressure and monitor temperatures after a change in the condenser steam dump control system.

Selection criteria; NEW

Tier: 2 **Group:** 1
Importance Rating: RO 3.0 SRO 3.1
Technical Reference: **IC-1, STEAM DUMP SYSTEM**

Proposed references to be provided to applicants during examination: None

Learning Objective: IC-1-07 DESCRIBE the operation of the following components of the Steam Dump Control System. Include description and uses of each component: 3. Steam dump valves.

Question Cognitive Level: **Memory or Fundamental Knowledge** _____

Comprehension or Analysis __X__

10 CFR Part 55 Content: 41(b)(7) Design, components, and functions of control and safety systems, including instrumentation, signals, interlocks, failure modes, and automatic and manual features.

SRO Justification: N/A

NRC Form ES-401-9 Comments:

Facility Response:

Comments;

34. EOPS 350

Given the following plant conditions:

- Reactor is tripped.
- Small break LOCA in progress.
- All RCPs are **off.**
- EOP-1.0, REACTOR TRIP/ SAFETY INJECTION ACTUATION, in progress.
- RCS T_{AVG} is 559°F, decreasing.
- RCS T_{COLD} is 555°F, decreasing.
- ALL SG narrow range levels are 10% increasing.

Which ONE of the following describes the action required **first** to control RCS temperature for the current conditions in accordance with EOP-1.0?

A. Close MSIVs, PVM-2801A(B)(C).

B. Throttle EFW flow to 50 gpm per steam generator.

C. Close IPV-2231 MS/PEGGING STM TO DEAERATOR.

D. Place the Steamline Power Relief A(B)(C) Mode switches in PWR RLF and adjust the controller setpoints.

QUESTION USAGE:
BANK
RO-11-01 EOP Exam 1

REVISION HISTORY:

Rev. 0 Submitted by Jason Galloway (placed in normal format by MRB) 9/6/12.

Reviewed for 2013 NRC exam
Ops Review: Nick O'Kimosh
Approved: 6/14/13 Rick Garner

DISTRACTOR ANALYSIS:

In order to answer this question correctly, the applicant must identify that an uncontrolled cooldown below no-load temperature is occurring and recall the first action used in EOP-1.0, REACTOR TRIP/ SAFETY INJECTION ACTUATION to isolate steam flowpaths.

A. Plausible because actions for an uncontrolled cooldown in step 9 of EOP-1.0 will eventually close the MSIVs if other actions are not successful.

   Incorrect because it is not the first method used to control the cooldown.

B. Plausible because with a cooldown in progress, EFW will be throttled after a steam generator reaches 26% and after pegging steam is isolated.

   Incorrect because throttling is not allowed prior to a steam generator reaching 26% and it is not the first action that will be taken to control the cooldown.

C. CORRECT. In the alternate action for the RCS temperature check in step 9 in EOP-1.0, closing IPV-2231, MS/PEGGING STM TO DEAERATOR is the first action to isolate steam flowpaths.

D. Plausible because adjustment of SG PORV setpoints is used in Step 9 for the case of increasing RCS temperature.

   Incorrect because this is not a method used for decreasing RCS temperature.

K/A: 039A2.01 K/A: 039 Main and Reheat Steam System (MRSS) A2: Ability to (a) predict the impacts of the following malfunctions or operations on the MRSS; and (b) based on predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: 2.01: Flow paths of steam during a LOCA.

K/A Match: the KA is matched because it requires the candidate to identify a component manipulation on the Main and Reheat Steam System that that will isolate a steam flow path during a LOCA with an uncontrolled cooldown.

Selection criteria; BANK
SELECTED FROM A SEARCH ON "LOCA" AND "STEAM" FOR KA MATCH AND ATTRIBUTES

Tier: 2 **Group:** 1
Importance Rating: RO 3.1 SRO 3.2
Technical Reference: **EOP-1.0, REACTOR TRIP/ SAFETY INJECTION ACTUATION**

Proposed references to be provided to applicants during examination: None

Learning Objective: EOP-1.005. STATE the bases or reasons for each action contained in EOP-1.0 This should include, but not be limited to, the following: 4. Definition of "uncontrolled" with respect to S/G pressure and level.

Question Cognitive Level: **Memory or Fundamental Knowledge** _____

Comprehension or Analysis __X__

10 CFR Part 55 Content: 41(b)(10) Administrative, normal, abnormal, and emergency operating procedures for the facility.

SRO Justification: N/A

NRC Form ES-401-9 Comments:

Facility Response:

Comments;

35. EOPS 828

Given the following plant conditions:

Initial conditions:

- Reactor Power 50%, stable.
- MWe 475 MWe, stable.

Final conditions:

- MWe 400 MWe, lowering.
- Reactor Power 53%, rising.
- Pzr pressure 1868, lowering.
- T_{AVG} 564°F, lowering.
- RB Pressure 2 psig, rising.
- Steam Generator pressures:
  - "A" 925 psig, decreasing.
  - "B" 827 psig, decreasing.
  - "C" 925 psig, decreasing.
- **No** automatic actuations have occurred.

Which ONE of the following describes a **required** set of actions and the reason for their performance?

A. Trip the Reactor, actuate SI and close MSIVs. A Reactor Trip and SI should have occurred due to SG pressure differentials and the MSIVs must be closed to protect plant personnel.

B. Trip the Reactor and close MSIVs; The reactor should have tripped on Pressurizer pressure and the MSIVs must be closed to protect plant personnel.

C. Trip the Reactor and actuate SI. Both actuations should have occurred due to low Pressurizer pressure.

D. ✔ Trip the Reactor and actuate SI; Both actuations should have occurred due to SG pressure differentials.

QUESTION USAGE:

NEW for 2013 NRC

QUESTION HISTORY:

Rev. 0 submitted by RJ
Ops Review: Nick O'Kimosh
Approved: 6/14/13 Rick Garner

DISTRACTOR ANALYSIS:

In order to answer this question correctly, the applicant must assess plant conditions and determine that a reactor trip and safety injection are necessary due to a rising power and a differential pressure between generators.

A. Plausible because steam generator differential pressures exceeds the 97 psid for Safety Injection and because operators are authorized to trip the reactor and close MSIVs to protect plant personnel if a steam break occurs outside of the RB.

   Incorrect because the steam break is inside the RB.

B. The first part is plausible because pressurizer pressure is less than the Reactor Trip setpoint of 1870 psig and because operators are authorized to trip the reactor and close MSIVs to protect plant personnel if a steam break occurs outside ofthe RB.

   Incorrect because the steam break is inside the RB.

C. Plausible because the reactor should have tripped due to a pressurizer pressure less than 1870 psig and because for a pressure less than 1850 psig, an SI will occur.

   Incorrect because the pressurizer pressure is not below the SI setpoint.

D. CORRECT; The reactor should have tripped due to less than pressurizer pressure less than 1870 psig and SI should have actuated due to "B" steam generator pressure less than the "A" and "C" by more than 97 psid.

K/A: 040AA2.02 K/A: 040 Steam Line Rupture AA2: Ability to determine and interpret the following as they apply to the Steam Line Rupture: 2.02: Conditions requiring a reactor trip.

K/A Match: the KA is matched because it requires the candidate to identify a condition requiring a reactor trip during a steam line rupture.

Selection criteria; NEW

Tier: 1 **Group:** 1
Importance Rating: RO 4.6 SRO 4.7
Technical Reference: **EOP-1.0, REACTOR TRIP/ SAFETY INJECTION ACTUATION**

Proposed references to be provided to applicants during examination: None

Learning Objective: EOP-1.0 02. STATE the entry conditions of EOP-1.0 1. Symptoms

Question Cognitive Level: **Memory or Fundamental Knowledge** _____

Comprehension or Analysis __X__

10 CFR Part 55 Content: 41(b)(10) Administrative, normal, abnormal, and emergency operating procedures for the facility.

SRO Justification: N/A

NRC Form ES-401-9 Comments:

Facility Response:

Comments;

36. FEEDWATER SYS 157

Given the following plant conditions:

- The Plant is operating at 75% power.
- RB pressure is 2.5 psig, increasing.
- RCS T_{AVG} is 582°F, increasing.
- "A" SG steam flow is 3.0 MPPH, stable.
- "A" SG feed flow is 3.7 MPPH, increasing.
- "A" SG narrow range level is 42%, decreasing.
- The CRS orders a trip of the reactor.

Which ONE of the following describes how temperature will trend after the reactor trip and the **first** procedure that will be used **after** EOP-1.0, REACTOR TRIP/ SAFETY INJECTION ACTUATION to mitigate this event?

A. RCS temperature will decrease below no-load T_{AVG} in an uncontrolled manner;

   EOP-2.0, LOSS OF REACTOR OR SECONDARY COOLANT.

B. ✔ RCS temperature will decrease below no-load T_{AVG} in an uncontrolled manner;

   EOP-3.0, FAULTED STEAM GENERATOR ISOLATION.

C. RCS temperature will stabilize at no-load T_{AVG} shortly after the Main Feedwater Isolation Valves (FWIVs) close;

   EOP-1.2, SAFETY INJECTION TERMINATION.

D. RCS temperature will stabilize at no-load T_{AVG} shortly after the Main Feedwater Isolation Valves (FWIVs) close;

   EOP-2.0, LOSS OF REACTOR OR SECONDARY COOLANT.

QUESTION USAGE:

MODIFIED FROM FEEDWATER SYS 147

REVISION HISTORY

Rev.0 submitted by RJ
Ops Review: Nick O'Kimosh
Approved: 6/14/13 Rick Garner

DISTRACTOR ANALYSIS

In order to answer this question correctly, the applicant must diagnose a feedwater rupture and determine the procedure transition that will occur after EOP-1.0.

A. The first part is plausible because the feedwater rupture will cause steam generator pressure to decrease uncontrollably and cooldown the RCS. The second part is plausible because transition to EOP-2.0, LOSS OF REACTOR OR SECONDARY COOLANT can occur for a loss of secondary coolant if SI termination criteria are not met in EOP-3.0, FAULTED STEAM GENERATOR ISOLATION.

   Incorrect because the correct transition will be to EOP-3.0.

B. CORRECT; A rising RB pressure with lowering SG level and feedflow is indicative of a feedwater rupture. The feedwater rupture will cause steam generator pressure to decrease uncontrollably and cooldown the RCS. The second part is correct; An uncontrolled SG pressure decrease will require transfer to EOP-3.0.

C. The first part is plausible because a feedwater rupture upstream of the Feedwater Isolation Valves would be isolated from the steam generator after the reactor trip and RCS temperature decrease below 564°F. The second part is plausible because SI termination criteria would likely be met if the feedwater rupture was isolated and transfer would occur to EOP-1.2, SAFETY INJECTION TERMINATION.

   Incorrect because the feedwater rupture inside the RB will not be isolated after the reactor trip.

D. The first part is plausible because a feedwater rupture upstream of the Feedwater Isolation Valves would be isolated from the steam generator after the reactor trip and RCS temperature decrease below 564°F. The second part is plausible because transition to EOP-2.0, LOSS OF REACTOR OR SECONDARY COOLANT can occur for a loss of secondary coolant if SI termination criteria are not met in EOP-3.0, FAULTED STEAM GENERATOR ISOLATION and this is also a transition from EOP-1.0..

   Incorrect because the feedwater rupture inside the RB will not be isolated after the reactor trip.

K/A: 054AK1.01 K/A: 054 Loss of Main Feedwater (MFW) AK1: Knowledge of the operational implications of the following concepts as they apply to Loss of Main Feedwater (MFW): 1.01: MFW line break depressurizes the S/G (similar to a steam line break).

K/A Match: the KA is matched because it requires the candidate to identify the procedure that will be entered to mitigate a MFW line break based on the knowledge that the steam generator will continue to depressurize after the reactor trip.

Selection criteria; MODIFIED FROM FEEDWATER SYS 147

Tier: 1 **Group:** 1
Importance Rating: RO 4.1 SRO 4.3
Technical Reference: **EOP-1.0, REACTOR TRIP SAFETY INJECTION ACTUATION.**

Proposed references to be provided to applicants during examination: None

Learning Objective: EOP-1.0, 09. SELECT an appropriate transition out of EOP-1.0 given a set of plant conditions

Question Cognitive Level: **Memory or Fundamental Knowledge** _____

Comprehension or Analysis __X__

10 CFR Part 55 Content: 41(b)(10) Administrative, normal, abnormal, and emergency operating procedures for the facility.

SRO Justification: N/A

NRC Form ES-401-9 Comments:

Facility Response:

Comments;

37. EOPS 123

Given the following plant conditions:

Initial conditions:

- 100% power.
- Turbine-driven EFW Pump is **inoperable.**
- All offsite power is lost (115 KV and 230 KV).

Current conditions:

- Operators are in EOP-1.1, REACTOR TRIP RECOVERY.
- Both EDGS have stopped and will **not** start from the control room.
- SG narrow range levels are 20%, decreasing slowly.

Which ONE of the following describes the required procedure transition and the **first** action that is performed in that procedure?

A. Transition to EOP-15.0, RESPONSE TO LOSS OF SECONDARY HEAT SINK; Check if secondary heat sink is required.

B. Transition to EOP-15.0, RESPONSE TO LOSS OF SECONDARY HEAT SINK; Try to establish EFW flow to at least one SG.

C. ✓ Transition to EOP-6.0, LOSS OF ALL ESF AC POWER immediately; Verify the Reactor is tripped.

D. Transition to EOP-6.0, LOSS OF ALL ESF AC POWER immediately; Attempt to start any EDG.

QUESTION USAGE:

BANK
REVISED FOR 2013 NRC WITHOUT FULL MODIFICATION

QUESTION HISTORY:

Adjusted distractors and question format.
Rev. 1 submitted by RJ
Ops Review: Nick O'Kimosh
Approved: 6/14/13 Rick Garner

DISTRACTOR ANALYSIS:

In order to answer this question correctly, the applicant must identify that conditions are met for entry into EOP-6.0, LOSS OF ALL ESF AC POWER and recall the an immediate action step performed upon entry.

A. The first part is plausible because there is a RED path condition present on Heat Sink due to steam generator levels less than 26% and no EFW flow present. The second part is plausible because the first step upon entry into EOP-15.0, RESPONSE TO LOSS OF SECONDARY HEAT SINK; is to check if secondary heat sink is required.

   Incorrect because Critical Safety Function Status Trees are monitored for information only during a loss of all AC.

B. The first part is plausible because there is a RED path condition present on Heat Sink due to steam generator levels less than 26% and no EFW flow present. The second part is plausible because attempts to restore EFW are performed early in EOP-15.0.

   Incorrect because Critical Safety Function Status Trees are monitored for information only during a loss of all AC.

C. CORRECT. Conditions are met for transfer to EOP-6.0, LOSS OF ALL ESF AC POWER since all offsite power lost and both EDGs are stopped. The first step is to verify the reactor is tripped. This has been previously performed but is read and verified again upon entry to EOP-6.0.

D. CORRECT. Conditions are met for transfer to EOP-6.0, LOSS OF ALL ESF AC POWER since all offsite power lost and both EDGs are stopped. An attempt to start a EDG occurs in step 6 and is a critical step to attempt to restore power but is not the first steps in EOP-6.0.

   Incorrect because starting an EDG is not the first step that will be performed.

K/A: 056AG2.4.1 K/A: 056 Loss of Offsite Power G2.4.1: Knowledge of EOP entry conditions and immediate action steps.

K/A Match: the KA is matched because it requires the candidate to identify entry conditions are met for EOP-6.0, LOSS OF ALL ESF AC POWER and to recall the first immediate action step in that procedure.

Selection criteria; **BANK**
SELECTED FROM A SEARCH ON "EOP" AND "OFFSITE" AND FOR ATTTIBUTES AND KA MATCH.

Tier: 1 **Group:** 1
Importance Rating: RO 4.6 SRO 4.8
Technical Reference: **EOP-6.0, LOSS OF ALL ESF AC POWER.**

Proposed references to be provided to applicants during examination: None

Learning Objective: EOP-6.0 01 STATE the entry conditions of Emergency Operating Procedure EOP-6.0. 02 LIST the immediate operator actions of Emergency Operating Procedure EOP-6.0.

Question Cognitive Level: **Memory or Fundamental Knowledge** _____

Comprehension or Analysis __X__

10 CFR Part 55 Content: 41(b)(10) Administrative, normal, abnormal, and emergency operating procedures for the facility.

SRO Justification: N/A

NRC Form ES-401-9 Comments:

Facility Response:

Comments;

38. EPPS/FEPS 227

Given the following plant conditions:

- A LOCA with a leak outside of the RB is in progress.
- The Emergency Response Organization has been activated.
- An action by an AO can be used to save a valuable piece of equipment in the Auxiliary Building.

Which ONE of the following describes the **TEDE** dose limit the AO can receive for this activity in accordance with EPP-020, EMERGENCY PERSONNEL EXPOSURE CONTROL?

A. 5 REM

B. ✔ 10 REM

C. 25 REM

D. >25 REM, if the person is a volunteer.

QUESTION USAGE:

MODIFIED FROM EPPS/FEPS 203

QUESTION HISTORY:

Rev. 0 submitted by RJ
Ops Review: Nick O'Kimosh
Approved: 6/14/13 Rick Garner

DISTRACTOR ANALYSIS:

In order to answer this question correctly, the applicant must recall the maximum emergency exposure an employee can receive to preserve valuable equipment and apply knowledge that previous annual dose is not part of the emergency exposure allowance in accordance with EPP-20.EMERGENCY PERSONNEL EXPOSURE CONTROL.

A. Plausible because 5 REM is the lowest limit for activities not associated with more critical activities in EPP-20.

   Incorrect because 10 REM is allowed for preserving valuable equipment.

B. CORRECT; 10 REM is the limit for saving valuable equipment per EPP-20.

C. Plausible because 25 REM is the limit for life saving or protecting large populations in EPP-20.

   Incorrect because 10 REM is allowed for preserving valuable equipment.

C. Plausible because >25 REM is the limit for life saving or protecting large populations in EPP-20 on a volunteer basis.

   Incorrect because 10 REM is allowed for preserving valuable equipment.

K/A: 059AK1.02 K/A: 059 Accidental Liquid Radwaste Release AK1: Knowledge of the operational implications of the following concepts as they apply to Accidental Liquid Radwaste Release: 1.02: Biological effects on humans of various types of radiation, exposure levels that are acceptable for nuclear power plant personnel, and the units used for radiation-intensity measurements and for radiation exposure levels

K/A Match: the KA is matched because it requires the candidate to assess the maximum exposure an employee can receive to preserve valuable equipment during a release of coolant outside of the RB.

Selection criteria; MODIFIED FROM EPPS/FEPS 203

Tier: 1 **Group:** 2
Importance Rating: RO 2.6 SRO 3.2
Technical Reference: **EPP-20, EMERGENCY PERSONNEL EXPOSURE CONTROL**

Proposed references to be provided to applicants during examination: None

Learning Objective: EPP-20, 02.STATE the maximum exposure limits for company personnel

Question Cognitive Level: Memory or Fundamental Knowledge __X__

Comprehension or Analysis _____

10 CFR Part 55 Content: 41(b)(12) Radiological safety principles and procedures.

SRO Justification: N/A

NRC Form ES-401-9 Comments:

Facility Response:

Comments;

39. FEEDWATER SYS 015

Given the following plant conditions:

- 100% power.
- XCP-625, 2-1, FWP A/B/C TRIP lit.
- Main Feedwater pump "A" is verified tripped.

Which ONE of the following is the **maximum** power level prescribed by the Annunciator Response Procedures immediately following this event?

A. 65 percent.

B. 80 percent.

C. 91 percent.

D. 95 percent.

QUESTION USAGE:

RO-SRO-11-01-Exam 2 (Secondary Systems)
RO-SRO-10-01 SYSTEMS WEEK 5 AND 6

QUESTION HISTORY:

Rev.1 (dow 3/26/02) revised all distractors (including the correct answer) to numbers that more accurately reflect the current ARP.

OPS Approval: RT
TRN Approval: RJ

Reviewed for 2013 NRC exam
Ops Review: Nick O'Kimosh
Approved: 6/14/13 Rick Garner

DISTRACTOR ANALYSIS:

In order to answer this question correctly the candidate must recall the power limit when a feedwater pump has tripped in accordance with XCP-625, 2-1, FWP A/B/C TRIP.

A. Plausible, because power is limited to 65% prior to starting the third Feedwater pump in GOP-4A.POWER OPERATION (MODE 1 - ASCENDING).

   Incorrect because the ARP limits power to 91%.

B. Plausible, 80% is the power limit for taking a feedwater heater out of service in accordance with SOP-204. EXTRACTION STEAM, REHEAT STEAM, HEATER VENTS AND DRAINS.

   Incorrect because the ARP limits power to 91%.

C. CORRECT; XCP-625, 2-1, FWP A/B/C TRIP directs operators to reduce power to less than 91% with two Main Feedwater pumps in service.

D. Plausible because 95% is the limit upon loss of a feedwater booster pump per XCP-625, 1-2 FWBP A/B/C/D TRIP.

   Incorrect because the ARP limits power to 91%.

K/A: 059G2.4.31 K/A: 059 Main Feedwater (MFW) System G2.4.31: Knowledge of annunciator alarms, indications, or response procedures.

K/A Match: the KA is matched because it requires the candidate to recall the limit for power directed by an ARP upon loss of a Main Feedwater pump.

Selection criteria; BANK
SELECTED FROM A SEARCH OF MAIN FEEDWATER QUESTIONS FOR KA MATCH AND ATTRIBUTES.

Tier: 2 **Group:** 1
Importance Rating: RO 4.2 SRO 4.1
Technical Reference: **XCP-625, 2-1, FWP A/B/C TRIP**

Proposed references to be provided to applicants during examination: None

Learning Objective: TB-7-32 For the following annunciators: • XCP-625, 2-1, FWP A/B/C TRIP HI-HI d. DESCRIBE the operator guidance contained in the alarm response procedure.

Question Cognitive Level: **Memory or Fundamental Knowledge** **__X__**

Comprehension or Analysis **_____**

10 CFR Part 55 Content: 41(b)(10) Administrative, normal, abnormal, and emergency operating procedures for the facility.

SRO Justification: N/A

NRC Form ES-401-9 Comments:

Facility Response:

Comments;

40. EFW SYSTEM 179

Given the following plant conditions:

Time 10:00

- 8% power.
- "A" Main Feedwater pump running.
- "B" and "C" Main Feedwater pumps TRIP/RESET switches indicate TRIP.
- Turbine-driven EFW pump is OFF.
- "A" and "B" MD EFW Pumps are in NORMAL AFTER STOP.
- Hand Controllers IFV-3531(3541)(3551), MD EFP TO SG A(B)(C) are at **0% and indicate full closed.**
- Flow Control Valve Switches FCV-3531(3541)(3551), MD EFP TO SG A(B)(C) are in MANUAL**.**

Time 10:02

- "A" Main Feedwater pump has **tripped**.
- Steam Generator narrow range levels are at 45%, lowering.

Which ONE of the following describes the condition of **Motor-driven** Emergency Feedwater system components?

Assume no operator actions.

A. "A" and "B" pumps EFW Pumps are running;
IFV-3531(3541)(3551) are closed.

B. "A" and "B" pumps EFW Pumps are running;
IFV-3531(3541)(3551) are 100% open.

C. "A" and "B" pumps EFW Pumps are **off**.
IFV-3531(3541)(3551) are closed.

D. "A" and "B" pumps EFW Pumps are **off**.
IFV-3531(3541)(3551) are 100% open.

QUESTION USAGE:

MODIFIED FROM EFW 144

QUESTION HISTORY:

Rev. 0 submitted by RJ
Ops Review: Nick O'Kimosh
Approved: 6/14/13 Rick Garner

DISTRACTOR ANALYSIS:

In order to answer this question correctly, the applicant must assess the status of the Main Feedwater system and determine the response of the EFW system if the running Main Feedwater pump trips.

A. CORRECT. Since "B" and "C" Feedwater pumps are in a tripped condition, a trip of "A" feedwater pump will demand an immediate start of the Motor Driven EFW pumps. A trip of three feedwater pumps does not generate an open signal to the EFW flow control valves.

B. The first part is plausible because "B" and "C" Feedwater pumps are in a tripped condition and a trip of "A" feedwater pump will demand an immediate start of the Motor Driven EFW pumps. The second part is plausible because if steam generators levels are less than 35%, the EFW flow control valves will open.

   Incorrect because the EFW flow control valves will not open for a trip of three Feedwater pumps.

C. The first part is plausible because Steam Generator levels are above 35%, the level at which an auto start of the EFW pumps occurs and the second part is correct because with steam generators levels above 35%, the EFW flow control valves are not demanded to open automatically.

   Incorrect because the Motor Driven EFW pumps start for a trip of three Feedwater pumps.

D. The first part is plausible because Steam Generator levels have not yet reached 35% which would generate an auto start of the Motor Driven EFW pumps and the second part is plausible because if steam generator levels were less than 35%, the EFW flow control valves would open automatically.

   Incorrect because the Motor Driven EFW pumps start for a trip of three Feedwater pumps.

K/A: 061K6.02 K/A: 061 Auxiliary / Emergency Feedwater (AFW) System K6: Knowledge of the effect of a loss or malfunction of the following will have on the AFW components: 6.02: Pumps.

K/A Match: the KA is matched because it requires the candidate to predict the effect of the loss of a Main Feedwater pump on the EFW system.

Selection criteria; MODIFIED FROM EFW 144

Tier: 2 **Group:** 1
Importance Rating: RO 2.6 SRO 2.7
Technical Reference: **IB-03, EMERGENCY FEEDWATER SYSTEM**

Proposed references to be provided to applicants during examination: None

Learning Objective: IB-3-13 DESCRIBE the following Emergency Feedwater System Interlocks/Auto-Start Signals. Specify purpose and setpoint: 3. MD EFW Pump Auto-Start 5. MD EFW Pump Flow Control Valve Open Signal

Question Cognitive Level: **Memory or Fundamental Knowledge** _____

Comprehension or Analysis __X__

10 CFR Part 55 Content: 41(b)(7) Design, components, and functions of control and safety systems, including instrumentation, signals, interlocks, failure modes, and automatic and manual features.

SRO Justification: N/A

NRC Form ES-401-9 Comments:

Facility Response:

Comments;

41. SERVICE WATER SYSTEM 076

Given the following plant conditions:

- A Large Break LOCA occurred.
- Service water flow rate indications on the Main Control Board are as follows:
  - FI-4466, SWBP A DISCH FLOW, 2550 gpm
  - FI-4468, FR LOOP A TO POND FLOW, 2550 gpm
  - FI-4496, SWBP B DISCH FLOW, 2550 gpm
  - FI-4498, FR LOOP B TO POND FLOW, 2100 gpm

Which ONE of the following will explain the above indications?

A. A tube in 2A RBCU is leaking.

B. ✔ A tube in 2B RBCU is leaking.

C. There is a pipe break in the supply line to DRPI system cooling coils.

D. MVG-3111B, RBCU 64B/65B TO IND CLG has failed to close.

QUESTION USAGE:

MODIFIED FROM SERVICE WATER 74

REVISION HISTORY:

Rev. 0 Submitted by RJ
Ops Review: Nick O'Kimosh
Approved: 6/14/13 Rick Garner

DISTRACTOR ANALYSIS:

In order to answer this question correctly, the applicant must assess flow in and out of the Service Water cooling lines and choose the leaking component from a given list.

A. Plausible because the candidate may assume the Service Water train B supplies cooling to 2A and 2B RBCUs and that the low return flow on "B" train is due to a leak in that cooling unit.

   Incorrect because 2A RBCU is not supplied by "B" service water train.

B. CORRECT; The low return flow in comparison to the high flow on B Service Water train indicates that 2B RBCU has a leak.

C. Plausible because the DRPI cooling system is a load a load supplied by Service Water in the RB.

   Incorrect because DRPI cooling is supplied by "A" service water train and would not produce the indications given.

D. Plausible because if both MVG-3111(3112)B failed to close, then service water would partly return to the Industrial Cooling surge tank rather than flow past the return side flow detector.

   Incorrect because MVG-3112B would isolate this line during a Safety Injection.

K/A: 062AA2.01 K/A: 062 Loss of Nuclear Service Water AA2: Ability to determine and interpret the following as they apply to the Loss of Nuclear Service Water: 2.01: Location of a leak in the SWS .

K/A Match: the KA is matched because it requires the candidate to identify the location of a service water leak.

Selection criteria; MODIFIED FROM SERVICE WATER 74

Tier: 1 **Group:** 1
Importance Rating: RO 3.8 SRO 4.5
Technical Reference: **EOP-17.1 RESPONSE TO REACTOR BUILDING FLOODING**

Proposed references to be provided to applicants during examination: None

Learning Objective: EOP-17.1 07 RELATE any systems'/components' operation, indication, or malfunction to its effect on EOP-17.1.

Question Cognitive Level: Memory or Fundamental Knowledge _____

Comprehension or Analysis __X__

10 CFR Part 55 Content: 41(b)(10) Administrative, normal, abnormal, and emergency operating procedures for the facility.

41(b)(8) Components, capacity, and functions of emergency systems.

SRO Justification: N/A

NRC Form ES-401-9 Comments:

Facility Response:

Comments;

42. EMERGENCY DIESEL GEN 149

Given the following plant conditions:

- Large Break LOCA.
- All offsite power is lost (115 KV and 230 KV).
- Diesel Generator "B" failed to start.

Which ONE of the following events will result in a loss of all AC power?

A. Bus 1DA overcurrent lockout.

B. ✔ "A" EDG differential relay actuation.

C. "A" EDG negative phase sequence.

D. "A" EDG ground overcurrent relay actuation.

QUESTION USAGE:

RO-SRO 10-01 AOP MakeUp EXAM
2006 VCS practice audit exam 1

RO-SRO-10-01 AUDIT PRACTICE 1 EXAM

QUESTION HISTORY:

OPS Approval: AH

TRN Approval: PL

Reviewed for 2013 NRC exam

Ops Review: Nick O'Kimosh

Approved: 6/14/13 Rick Garner

DISTRACTOR ANALYSIS:

In order to answer this question correctly, the applicant must select the event that will cause a loss of all ESF AC power by tripping the last running EDG.

A. Plausible because if the "A" EDG was tied to bus 1DA after a non-emergency start, a 51BX lockout on 1DA would open the diesel generator output breaker and remove the last remaining source of ESF power.

   Incorrect because "A" EDG is running in Emergency mode so a 51BX lockout on 1DA will not open the output breaker.

B. CORRECT; An EDG differential relay actuation will shutdown the EDG during an emergency start and remove the last remaining source of ESF power.

C. Plausible because the Negative phase sequence will open the EDG output breaker in the test mode.

   Incorrect because "A" EDG is running in Emergency mode so negative phase sequence will not open the EDG output breaker.

D. Plausible because the Ground overcurrent relay will open the EDG output breaker in the test mode.

   Incorrect because "A" EDG is running in Emergency mode so the Ground overcurrent relay will not open the EDG output breaker.

K/A: 062K1.02 K/A: 062 A.C. Electrical Distribution K1: Knowledge of the physical connections and/or cause effect relationships between the ac distribution system and the following systems: 1.02: ED/G.

K/A Match: the KA is matched because it requires the candidate to determine the effect of losing an EDG due to a electrical fault during a loss of offsite power.

Selection criteria; BANK
SELECTED FROM A SEARCH ON "EDG" AND FOR ATTRIBUTES AND KA MATCH.

Tier: 2 **Group:** 1
Importance Rating: RO 4.1 SRO 4.4
Technical Reference: **XCP-637, 2-4, DG B DIFF LCKOUT ENERGIZED**
IB-5, DIESEL GENERATOR SYSTEM

Proposed references to be provided to applicants during examination: None

Learning Objective: IB-5-24 DESCRIBE the following trips associated with the Emergency Diesel Generator System. Include purpose and setpoint: 1. Diesel Engine Trips While in Emergency Start

Question Cognitive Level: **Memory or Fundamental Knowledge** _____

Comprehension or Analysis __X__

10 CFR Part 55 Content: 41(b)(7) Design, components, and functions of control and safety systems, including instrumentation, signals, interlocks, failure modes, and automatic and manual features.

SRO Justification: N/A

NRC Form ES-401-9 Comments:

Facility Response:

Comments;

43. AC ELECT DIST SYSTEM 107

Given the following plant conditions:

Initial condition:

- 100% power.
- All offsite power was lost (115 KV and 230 KV).
- "A" **and** "B" EDG failed to start.

Current condition:

- Power will be restored via XTF5052 , ALTERNATE AC SOURCE TRANSFORMER in accordance with SOP-304, 115KV/ 7.2KV OPERATIONS.

Which ONE of the choices below answers **both** of the following:

1) What is the **maximum** number of 7.2 KV ESF busses that can be restored from this source at one time in accordance with SOP-304?

2) Which 7.2 KV ESF bus can be energized **only** by its ALTERNATE feeder breaker from this source?

A. 1) 1 bus.
   2) 1DA.

B. ✔ 1) 1 bus.
   2) 1DB.

C. 1) 2 busses.
   2) 1DA.

D. 1) 2 busses.
   2) 1DB.

QUESTION USAGE:

NEW for 2013 NRC

REVISION HISTORY:

Rev. 0
Ops Review: Nick O'Kimosh
Approved: 6/14/13 Rick Garner

DISTRACTOR ANALYSIS:

In order to answer this question correctly, the applicant must recall the circuit flowpath from the Alternate AC source via breaker 5052 to bus 1DA and whether this is via the normal or alternate flowpath to 1DA..

A. The first part is correct; In accordance with SOP-304, 115KV/ 7.2KV OPERATIONS, only one 7.2KV bus may be energized from the Alternate AC source. The second part is plausible because 1DA is supplied from 1DX via the **normal** supply breaker which will be supplied by 5052.

   Incorrect because 1DA cannot be supplied from 5052 via the alternate supply breaker.

A. CORRECT. In accordance with SOP-304, 115KV/ 7.2KV OPERATIONS, only one 7.2KV bus may be energized from the Alternate AC source and 1DB is supplied from 1DX via the alternate supply breaker which will be supplied by 5052.

C. The first part is plausible because 2 busses can physically be supplied by 5052 via 1DX and power is typically restored to any deenergized 7.2 KV bus in the EOPs. The second part is plausible because 1DA is supplied from 1DX via the **normal** supply breaker which will be supplied by 5052.

   Incorrect because only one bus can be supplied by 5052 in accordance with SOP-304 and because 1DA cannot be supplied from 5052 via the alternate breaker.

D. The first part is plausible because 2 busses can physically be supplied by 5052 via 1DX and power is typically restored to any deenergized 7.2 KV bus in the EOPs. The second part is correct; DB is supplied from 1DX via the alternate supply breaker which will be supplied by 5052.

   Incorrect because only one bus can be supplied by 5052 in accordance with SOP-304.

K/A: 062K4.06 K/A: 062 A.C. Electrical Distribution K4: Knowledge of ac distribution system design feature(s) and/or interlock(s) which provide for the following: 4.06: One-line diagram of 6.9kV distribution, including sources of normal and alternative power.

K/A Match: the KA is matched because it requires the candidate to recall the circuit flowpath from the Alternate AC source to bus 1DA via the alternate feeder breaker.

Selection criteria; NEW

Tier: 2 **Group:** 1
Importance Rating: RO 2.9 SRO 3.3
Technical Reference: **SOP-304, 115KV/ 7.2KV OPERATIONS**
DRAWING E-206-005

Proposed references to be provided to applicants during examination: None

Learning Objective: GS-2-08 DESCRIBE the normal operation of the following subsystems of the Safeguards Power Systems: 4. Alternate AC Power Supply

Question Cognitive Level: **Memory or Fundamental Knowledge** **__X__**

Comprehension or Analysis _____

10 CFR Part 55 Content: 41(b)(10) Administrative, normal, abnormal, and emergency operating procedures for the facility.

SRO Justification: N/A

NRC Form ES-401-9 Comments:

Facility Response:

Comments;

44. DC ELECT DIST SYSTEM 022

The normal source of power for 125 VDC distribution panel 1HA is:

A. 125 VDC storage battery XBA-1A.

B. 125 VDC storage battery XBA-1X.

C. Battery charger XBC-1A, powered by XMC-1DA2X.

D. Battery charger XBC-1A, powered by XMC-1DA2Y.

QUESTION USAGE:

BANK

QUESTION HISTORY:

Submitted for review by RJ
Ops Review: Nick O'Kimosh
Approved: 6/14/13 Rick Garner

DISTRACTOR ANALYSIS:

In order to answer this question correctly, the applicant must recall the normal source of power to 125 VDC distribution panel 1HA.

A. Plausible because battery XBA-1A is the source of power to the bus via the inverter when the battery charger is lost.

   Incorrect because XBC-1A is the normal source of power to 1HA.

B. Plausible because battery XBA-1X is the source of power to the switchyard battery bus 1HX via the inverter when the battery charger is lost. Additionally, 1DX is the normal source of power to 1DA ESF bus.

   Incorrect because XBC-1A is the normal source of power to 1HA.

C. CORRECT; Battery Charger XBC-1A is the normal source of power to 125 VDC bus 1HA and that battery charger is supplied by 1DA2X.

D. Plausible because Battery Charger XBC-1A is the normal source of power to 125 VDC bus 1HA and 1DA2Y is an alternate supply to XIT-5901 inverter which is fed by bus 1HA.

   Incorrect because Battery Charge XBC-1A is supplied by 1DA2X.

K/A: 063K1.03 K/A: 063 D.C. Electrical Distribution K1: Knowledge of the physical connections and/or cause-effect relationships between the DC electrical system and the following systems: 1.03: Battery charger and battery.

K/A Match: the KA is matched because it requires the candidate to recall the battery charger and its supply that supplies normal power to a DC bus.

Selection criteria; BANK
SELECTED FROM A SYSTEM FIELD SEARCH ON "DC DIST" FOR KA MATCH AND ATTRIBUTES.

Tier: 2 **Group:** 1
Importance Rating: RO 2.9 SRO 3.5
Technical Reference: **DRAWING E-206-005**

Proposed references to be provided to applicants during examination: None

Learning Objective: GS-3-03 IDENTIFY the following flowpaths through the DC power system: 1. DC power system electrical flowpath

Question Cognitive Level: **Memory or Fundamental Knowledge** **__X__**

Comprehension or Analysis **_____**

10 CFR Part 55 Content: 41(b)(8) Components, capacity, and functions of emergency systems.

SRO Justification: N/A

NRC Form ES-401-9 Comments:

Facility Response:

Comments;

45. AC ELECT DIST SYSTEM 128

Given the following plant conditions:

- All offsite power is lost (115 KV and 230 KV).
- "A" D/G is supplying the 1DA bus.
- A transfer of 1DA back its normal source of power is in progress as directed by SOP-306 EMERGENCY DIESEL GENERATOR.

Which ONE of the following describes a required action and a condition that will be satisfied prior to paralleling the offsite source to the 1DA bus in accordance with SOP-306?

A. "A" D/G TEST switch is turned to START;

Synchroscope rotating slowly in the **fast** direction.

B. "A" D/G TEST switch is turned to START;

Synchroscope rotating slowly in the **slow** direction.

C. "A" D/G EMERG START pushbutton is depressed

Synchroscope rotating slowly in the **slow** direction.

D. "A" D/G EMERG START pushbutton is depressed;

Synchroscope rotating slowly in the **fast** direction.

QUESTION USAGE:

BANK
2011-RO Audit
RO-SRO 10-01 IPO-1 EXAM
RO-03-01 Licensing Exam No. 48

QUESTION HISTORY:

Rev. 1: (wdb 10/12/10) changed "Test Start to Stop" in C. and D. to "EMERG START switch to START" for plausibility, unlikely to stop EDG prior to paralleling it. Removed middle sentence "SYNCH SEL switch in NORM/DSL" from all 4 choices to avoid 3-way (knowledge not really tested, answer arrived at based on first and last parts).

Rev. 2 Submitted by Matthew R. Bender based on 2nd validation.
Changed from "switch is placed in START" to "pushbutton is depressed" in all of the choices.

Rev. 3 (wdb 6/13/11) added "not all inclusive" to stem per validator feedback

Reviewed for 2013 NRC exam
Ops Review: Nick O'Kimosh
Approved: 6/14/13 Rick Garner

DISTRACTOR ANALYSIS:

In order to answer this question correctly, the candidate must determine a switch manipulation and the correct rotation of the EDG sychroscope when returning the normal source of power to an ESF bus.

A. The first part is correct; SOP-306 directs that the TEST switch be taken to START to reintroduce speed droop prior to paralleling the diesel. The second part is plausible because the diesel speed synchroscope would be adjusted to turn in the fast direction if the diesel was the oncoming source.

   Incorrect, in this case the "incoming" source is offsite power so the synchroscope will be adjusted so that it is turning in the slow direction prior to paralleling.

B. CORRECT per SOP-306 section IV.G SOP-306 directs that the TEST switch be taken to START to reintroduce speed droop prior to paralleling the diesel. The synchroscope will be adjusted so that it is turning in the slow direction prior to paralleling.

C. The first part is plausible, because the EMERG START OVRRIDE pushbutton is depressed when the emergency mode is no longer desired. The second part is correct; The synchroscope will be adjusted so that it is turning in the slow direction prior to paralleling.

   Incorrect because the Emergency Start signal must be overridden and a Test Start inserted per Section V to restore load droop and permit paralleling.

D. The first part is plausible, because the EMERG START OVRRIDE pushbutton is depressed when the emergency mode is no longer desired. The second part is plausible because FAST is the normal direction when paralleling EDG to the energized ESF bus.

   Incorrect because the EMERG START pushbutton is not depressed prior to paralleling and the "incoming" source is offsite power so diesel speed will be adjusted to make the synchroscope turn in the slow direction.

K/A: 064A4.03 K/A: 064 Emergency Diesel Generators (ED/G) A4: Ability to manually operate and/or monitor in the control room: 4.03: Synchroscope.

K/A Match: the KA is matched because it requires the candidate to identify the proper operation of the sychroscope prior to paralleling the diesel to restore normal power to a 7.2 KV bus.

Selection criteria; BANK
SELECTED FROM A SEARCH OF "DIESEL" OR "EDG" AND "SYNCHR" FOR KA MATCH AND ATTRIBUTES.

Tier: 2 **Group:** 1
Importance Rating: RO 3.2 SRO 3.3
Technical Reference: **SOP-306, EMERGENCY DIESEL GENERATOR.**

Proposed references to be provided to applicants during examination: None

Learning Objective: IB-5-19 DESCRIBE the normal operation of the Diesel Generator System including: 9. Paralleling operations

Question Cognitive Level: **Memory or Fundamental Knowledge** **__X__**

Comprehension or Analysis **_____**

10 CFR Part 55 Content: 41(b)(10) Administrative, normal, abnormal, and emergency operating procedures for the facility.

41(b)(7) Design, components, and functions of control and safety systems, including instrumentation, signals, interlocks, failure modes, and automatic and manual features.

SRO Justification: N/A

NRC Form ES-401-9 Comments:

Facility Response:

Comments;

46. AOPS 610

Given the following plant conditions:

- 100% power initially.
- Loss of Instrument Air has occurred.
- The crew has entered AOP-220.1, LOSS OF INSTRUMENT AIR.
- The reactor is now tripped.
- Operators have been dispatched to operate the SG PORVs locally.

Which ONE of the choices below completes the following statement?

Operators are cautioned to maintain steam generator steam loads balanced in AOP-220.1 in order to:

A. ✔ prevent a safety injection.

B. avoid a stall of natural circulation.

C. reduce the starting duties of EFW pumps.

D. maintain steam generator pressures less than the code safety setpoint.

QUESTION USAGE:

NEW for 2013 NRC

QUESTION HISTORY:

Rev. 0 submitted by RJ
Ops Review: Nick O'Kimosh
Approved: 6/14/13 Rick Garner

DISTRACTOR ANALYSIS:

In order to answer this question correctly, the applicant must identify the reason for maintaining balanced steam loads while operating directing local operations of the SG PORVs while responding to a loss of instrument air.

A. CORRECT; Steam loads must be balanced to ensure that a Safety Injection does not occur due to differential pressures between steam generators.

B. Plausible because EOP bases warn that imbalanced steam loads can stall natural circulation in loops that have been steamed less because they will have a lower difference in density across the loops.

   Incorrect because natural circulation is not completely lost.

C. Plausible because steam generator levels may be controlled in AOP-220.1 by starting and stopping motor driven EFW pumps. Steaming some loops more than other may cause more frequent starts and stops.

   Incorrect because this is not the reason why steam loads must be maintained balanced.

D. Plausible because an imbalance of steam generator loads will cause some steam generators to be higher than others.

   Incorrect because this is not the reason why steam loads must be maintained balanced.

K/A: 065AK3.08 K/A: 065 Loss of Instrument Air AK3: Knowledge of the reasons for the following responses as they apply to the Loss of Instrument Air: 3.08: Actions contained in EOP for loss of instrument air.

K/A Match: the KA is matched because it requires the candidate to recall the reason for maintaining balanced steam loads while directing local operation of SG PORVs during a loss of instrument air.

Selection criteria; NEW

Tier: 1 **Group:** 1
Importance Rating: RO 3.7 SRO 3.9
Technical Reference: **AOP-220.1, LOSS OF INSTRUMENT AIR**

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

Learning Objective: AOP-220.1 05. STATE/IDENTIFY the bases for the overall mitigating strategies and the bases for the steps, notes, or caution (as applicable), for AOP-220.1

Question Cognitive Level: **Memory or Fundamental Knowledge** **__X__**

Comprehension or Analysis **_____**

10 CFR Part 55 Content: 41(b)(10) Administrative, normal, abnormal, and emergency operating procedures for the facility.

SRO Justification: N/A

NRC Form ES-401-9 Comments:

Facility Response:

Comments;

47. TECH SPECS 222

Given the following plant conditions:

- Plant is in Mode 3.
- Personnel Hatch inner door has been declared INOPERABLE due to a bad seal.
- Personnel Hatch outer door is closed and OPERABLE.
- All other containment penetrations are OPERABLE.
- Action statement of T.S. 3.6.1.3, CONTAINMENT AIR LOCKS has been entered.

Which ONE of the following identifies the **lowest** Mode in which the Personnel Hatch doors are required to be operable and whether Technical Specification L.C.O. 3.6.1.1, CONTAINMENT INTEGRITY is met for the current conditions?

A. Mode 3; T.S. 3.6.1.1 is met.

B. Mode 3; T.S. 3.6.1.1 is **not** met.

C. Mode 4; T.S. 3.6.1.1 is met.

D. Mode 4; T.S. 3.6.1.1 is **not** met.

QUESTION USAGE:

MODIFIED FROM TECH SPECS 213

QUESTION HISTORY:

Rev. 0 submitted by RJ
Ops Review: Nick O'Kimosh
Approved: 6/14/13 Rick Garner

DISTRACTOR ANALYSIS:

In order to answer this question correctly, the candidate must assess whether compliance with an action statement in T.S. 3.6.1.3 for an inoperable door will also satisfy the requirements of T.S. 3.6.1.1 for containment integrity.

A. The first part is plausible because some specifications are applicable in Modes 1, 2 and 3 such as ECCS T.S. 3.5.2. The second part is correct; T.S. 3.6.1.1 is met even if an airlock is inoperable as long as compliance is maintained via the action statements.

   Incorrect because Mode 4 is the lowest mode of applicability for T.S.3.6.1.1.

B. The first part is plausible because some specifications are applicable in Modes 1, 2 and 3 such as ECCS T.S. 3.5.2. The second part is plausible because if both airlock doors were inoperable, then 3.6.1.1 would not be met.

   Incorrect because Mode 4 is the lowest mode of applicability for T.S.3.6.1.1 and because the specification is met.

C. CORRECT; Mode 4 is the lowest mode of applicability for T.S. 3.6.1.1 and the specification is met as long as the compliance is maintained under the actions of T.S. 3.6.1.3.

D. First part is plausible because Mode 4 is the lowest mode of applicability for T.S. 3.6.1.1. The second part is plausible because if both airlock doors were inoperable, then 3.6.1.1 would not be met.

   Incorrect because T.S.3.6.1.1 is met.

K/A: 069AK2.03 K/A: 069 Loss of Containment Integrity AK2: Knowledge of the interrelations between the Loss of Containment Integrity and the following: 2.03: Personnel access hatch and emergency access hatch.

K/A Match: the KA is matched because it requires the candidate to determine compliance with Containment Integrity specification T.S. 3.6.1.1 with one airlock door inoperable.

Selection criteria; MODIFIED FROM TECH SPECS 213

Tier: 1 **Group:** 2
Importance Rating: RO 2.8 SRO 2.9
Technical Reference: **TECHNICAL SPECIFICATION DEFINITIONS SECTION 1**

Proposed references to be provided to applicants during examination: None

Learning Objective: SB-4-02 DEFINE terms listed in section one of Technical specifications.

Question Cognitive Level: **Memory or Fundamental Knowledge** **__X__**

Comprehension or Analysis **_____**

10 CFR Part 55 Content: 41(b)(10) Administrative, normal, abnormal, and emergency operating procedures for the facility.

SRO Justification: N/A

NRC Form ES-401-9 Comments:

Facility Response:

Comments;

48. WASTE GAS DISPOSAL S 064

Given the following plant conditions:

- AO reports the following alarm at Waste Gas Recombiner "A" panel:

  XPN-7209, 1-2, "HARC-1104 OAIC-1112 HI-HI H2/O2 O2 SHUTDOWN"

Which ONE of the following describes the setpoint for **oxygen** concentration that will cause this alarm and a valve, or set of valves, that will automatically close?

A. 2%;
HCV-1118A RECOMBINER A OXYGEN ADDITION VALVE **only**

B. ✔ 2%;
HCV-1118A RECOMBINER A OXYGEN ADDITION VALVE **and**
PCV-1092, VOLUME CONTROL TANK ISOLATION VALVE.

C. 4%;
HCV-1118A RECOMBINER A OXYGEN ADDITION VALVE **only**

D. 4%;
HCV-1118A RECOMBINER A OXYGEN ADDITION VALVE **and**
PCV-1092, VOLUME CONTROL TANK ISOLATION VALVE.

QUESTION USAGE:

NEW for 2013 NRC

QUESTION HISTORY:

Rev. 0 submitted by RJ
Ops Review: Nick O'Kimosh
Approved: 6/14/13 Rick Garner

DISTRACTOR ANALYSIS:

In order to answer this question correctly, the applicant must recall the correct value for Oxygen concentration that will actuate XPN-7209, 1-2, "HARC-1104 OAIC-1112 HI-HI H2/O2 O2 SHUTDOWN

A. The first part is correct; 2% Oxygen concentration is the setpoint for XPN-7209, 1-2. The second part is plausible because HCV-1118A RECOMBINER A OXYGEN ADDITION VALVE modulates the flow of oxygen to the catalyst bed and is cutoff to prevent further increase in oxygen flow. There could be reason to assume that this would remedy the high oxygen concentration without closure of other valves.

   Incorrect because PCV-1092, VOLUME CONTROL TANK ISOLATION VALVE also closes.

B. CORRECT; 2% Oxygen concentration is the setpoint for XPN-7209, 1-2 and both HCV-1118A RECOMBINER A OXYGEN ADDITION VALVE and PCV-1092, VOLUME CONTROL TANK ISOLATION VALVE will close upon actuation of the alarm.

C. The first part is plausible because 4% is the concentration of Hydrogen that will actuate XPN-7209. The second part is plausible HCV-1118A RECOMBINER A OXYGEN ADDITION VALVE modulates the flow of oxygen to the catalyst bed and is cutoff to prevent further increase in oxygen flow. There could be reason to assume that this would remedy the high oxygen concentration without closure of other valves.

   Incorrect because 2% is the correct setpoint for oxygen to actuate the alarm and both HCV-1118A RECOMBINER A OXYGEN ADDITION VALVE and PCV-1092, VOLUME CONTROL TANK ISOLATION VALVE will close upon actuation of the alarm.

D. The first part is plausible because 4% is the concentration of Hydrogen that will actuate XPN-7209, 1-2. The second part is correct; Both HCV-1118A RECOMBINER A OXYGEN ADDITION VALVE and PCV-1092, VOLUME CONTROL TANK ISOLATION VALVE will close upon actuation of the alarm.

   Incorrect because 2% is the correct setpoint for oxygen to actuate the alarm.

K/A: 071A3.01 K/A: 071 Waste Gas Disposal System (WGDS) A3: Ability to monitor automatic operation of the Waste Gas Disposal System including: A3.01 HRPS.

K/A Match: the KA is matched because it requires the candidate to recall the alarm setpoint for high oxygen concentration in the Hydrogen Recombiner and the automatic actions that will occur at the setpoint.

Selection criteria; NEW

Tier: 2 **Group:** 2
Importance Rating: RO 2.6 SRO 2.7
Technical Reference: **XPN-7209, 1-2, "HARC-1104 OAIC-1112 HI-HI H2/O2 O2 SHUTDOWN**

Proposed references to be provided to applicants during examination: None

Learning Objective: AB-12-17 LIST the condition or setpoint associated with the following system limitations: 1. O2 Inlet Connection to Recombiner

Question Cognitive Level: **Memory or Fundamental Knowledge** __**X**__

Comprehension or Analysis _____

10 CFR Part 55 Content: 41(b)(7) Design, components, and functions of control and safety systems, including instrumentation, signals, interlocks, failure modes, and automatic and manual features.

SRO Justification: N/A

NRC Form ES-401-9 Comments:

Facility Response:

Comments;

49. RADIATION MONITORING 072

Given the following plant conditions:

- 100% power.
- XCP-645, 1-5, CR SPLY RM-A1 HI RAD in alarm.
- XCP-645, 2-6, CR SPLY GAS RM-A1 TRBL in alarm.
- I&C has identified a failed power supply.
- The SS has declared the RM-A1 channel INOPERABLE.

Which ONE of the following describes whether an automatic action has occurred and an action, if any, that is required by T.S. L.C.O. 3.3.3.1, RADIATION MONITORING INSTRUMENTATION?

A. No automatic action has occurred; Establish Emergency Ventilation within 1 hour.

B. Control Room Emergency Ventilation has actuated; Secure one train of Emergency Ventilation within 30 minutes.

C. ✔ Control Room Emergency Ventilation has actuated; No further actions are required by Technical Specifications.

D. No automatic action has occurred; Perform area surveys and sampling within 1 hour.

QUESTION USAGE:

NEW for 2013 NRC

QUESTION HISTORY:

Rev. 0 submitted by RJ
Ops Review: Nick O'Kimosh
Approved: 6/14/13 Rick Garner

DISTRACTOR ANALYSIS:

In order to answer this question correctly, the applicant must recall the response of the RM-A1 module due to a failed power supply and determine compliance with Technical Specifications.

A. The first part is plausible if the candidate assumes Emergency Ventilation requires power to actuate as is the case for other functions such as Containment Spray. The second part correct; T.S. Table 3.3-6, action 29 requires initiation of Emergency Ventilation within one hour.

   Incorrect because Control Room Emergency Ventilation is running.

B. The first part is correct; Failure of the RM-A1 power supply will cause actuation of Emergency Ventilation. The second part is plausible because the EOPs require securing one train of Control Room ventilation within 30 minutes of actuation.

   Incorrect because securing one train of Control Room ventilation within 30 minutes of actuation is not required and not a Technical Specification action.

C. CORRECT. Failure of the RM-A1 power supply will cause actuation of Emergency Ventilation. T.S. Table 3.3-6, action 29 requires initiation of Emergency Ventilation within one hour and this requirement is met.

D. The first part is plausible if the candidate assumes Emergency Ventilation requires power to actuate as is the case for other functions such as Containment Spray. The second part is plausible because performing area surveys is a common T.S. action for a failed radiation monitor (see Table 3.3-6, action 25)

   Incorrect because Control Room Emergency Ventilation is running and performing area surveys and sampling is not a required action.

K/A: 073A2.01 K/A: 073 Process Radiation Monitoring (PRM) System A2: Ability to (a) predict the impacts of the following malfunctions or operations on the PRM system; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: 2.01: Erratic or failed power supply.

K/A Match: the KA is matched because it requires the candidate to recall the effects of a failed power supply on radiation monitor channel RM-A1.

Selection criteria; NEW

Tier: 2 **Group:** 1
Importance Rating: RO 2.5 SRO 2.9
Technical Reference: **TECHNICAL SPECIFICATION TABLE 3.3-6**
GS-9, RADIATION MONITORING SYSTEM.

Proposed references to be provided to applicants during examination: None

Learning Objective: GS-9-21 EXPLAIN the effect of the following failures of the radiation monitoring system: 4. Loss of power

Question Cognitive Level: **Memory or Fundamental Knowledge** _____

Comprehension or Analysis __X__

10 CFR Part 55 Content: 41(b)(11) Purpose and operation of radiation monitoring systems, including alarms and survey equipment.

SRO Justification: N/A

NRC Form ES-401-9 Comments:

Facility Response:

Comments;

50. EOPS 795

Given the following plant conditions:

- A loss of coolant accident has occurred.
- Operators are taking actions as directed by EOP-2.0, LOSS OF REACTOR OR SECONDARY COOLANT.
- Operators are monitoring the IPCS screen to assess plant conditions.
- The Critical Safety Function status flags on the IPCS screens are **INOPERABLE**.

Which ONE of the following CSFST items is indicated by parameters noted on the IPCS display?

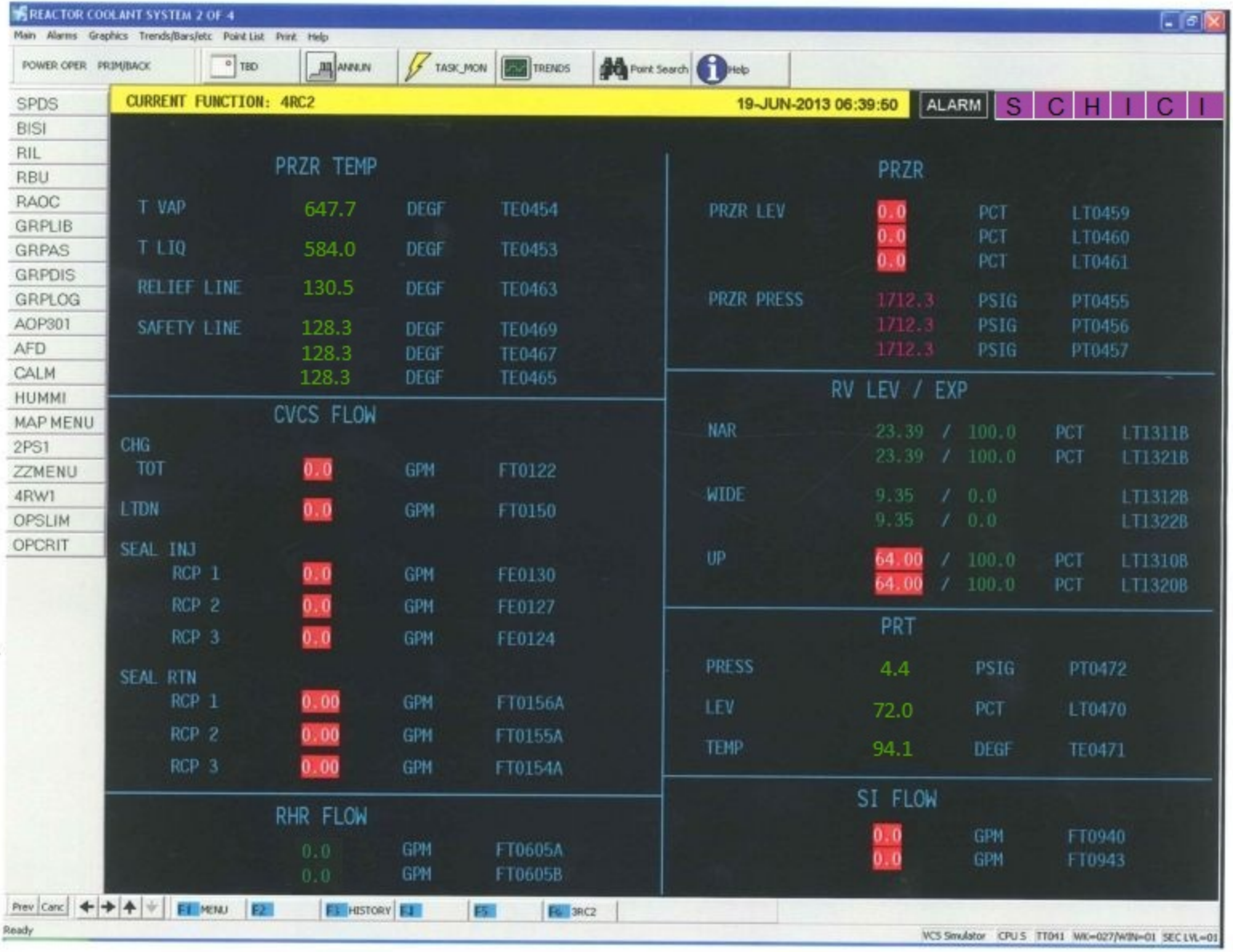
REFERENCE PROVIDED

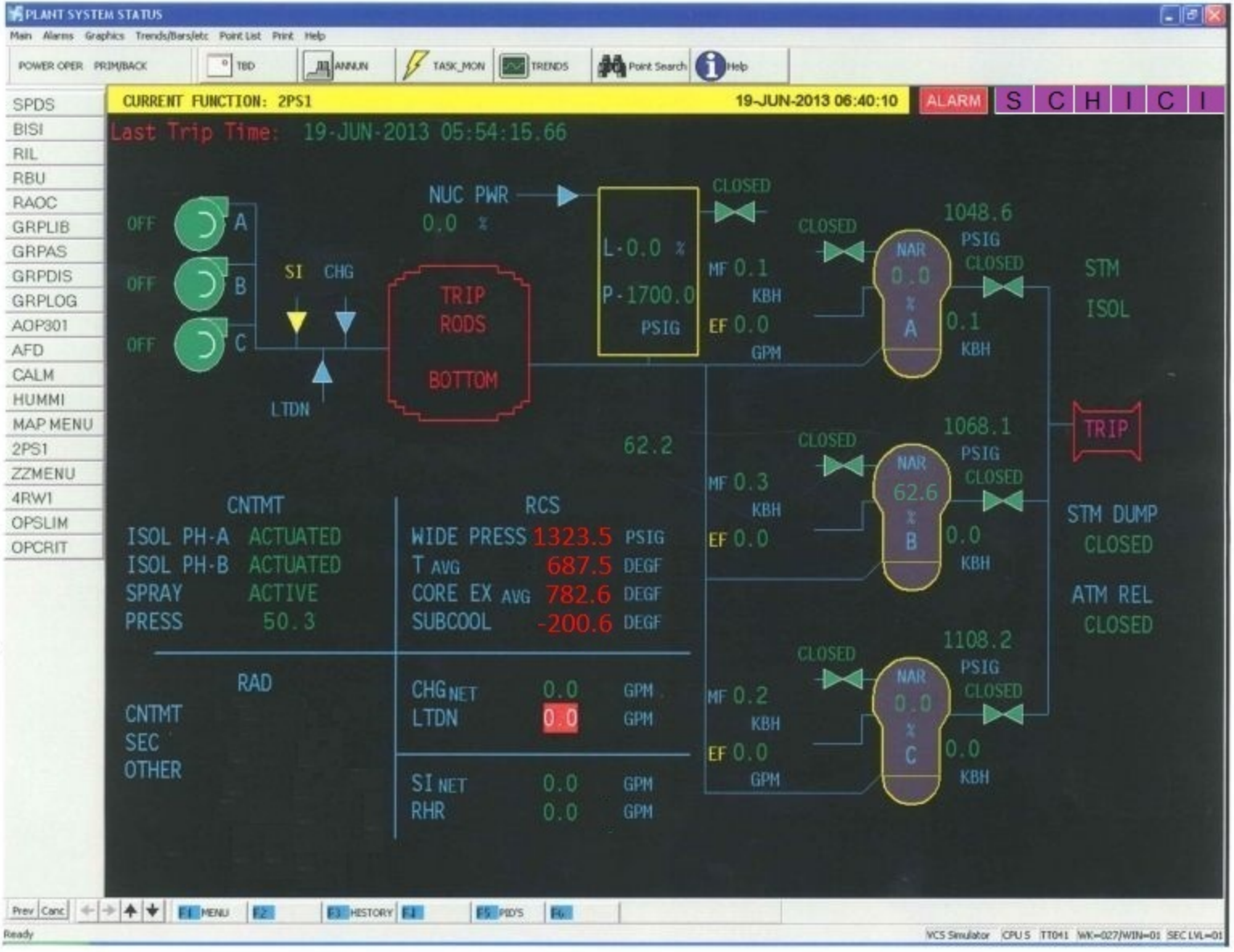
A. Red Path on Containment.

B. Red Path on Heat Sink.

C. Orange Path on Core Cooling.

D. Red path on Core Cooling.


REACTOR COOLANT SYSTEM 2 OF 4
Main Alarms Graphics Trends/Bars/etc Point List Print Help
POWER OPER PRIM/BACK
TBD
ANNUN
TASK_MON
TRENDS
Point Search
Help
SPDS
BISI
RIL
RBU
RAOC
GRPLIB
GRPAS
GRPDIS
GRPLOG
AOP301
AFD
CALM
HUMMI
MAP MENU
2PS1
ZZMENU
4RW1
OPSLIM
OPCRIT
CURRENT FUNCTION: 4RC2
19-JUN-2013 06:39:50
ALARM
S C H I C I
PRZR TEMP
T VAP 647.7 DEGF TE0454
T LIQ 584.0 DEGF TE0453
RELIEF LINE 130.5 DEGF TE0463
SAFETY LINE 128.3 DEGF TE0469
128.3 DEGF TE0467
128.3 DEGF TE0465
CVCS FLOW
CHG
TOT 0.0 GPM FT0122
LTDN 0.0 GPM FT0150
SEAL INJ
RCP 1 0.0 GPM FE0130
RCP 2 0.0 GPM FE0127
RCP 3 0.0 GPM FE0124
SEAL RTN
RCP 1 0.00 GPM FT0156A
RCP 2 0.00 GPM FT0155A
RCP 3 0.00 GPM FT0154A
RHR FLOW
0.0 GPM FT0605A
0.0 GPM FT0605B
PRZR
PRZR LEV 0.0 PCT LT0459
0.0 PCT LT0460
0.0 PCT LT0461
PRZR PRESS 1712.3 PSIG PT0455
1712.3 PSIG PT0456
1712.3 PSIG PT0457
RV LEV / EXP
NAR 23.39 / 100.0 PCT LT1311B
23.39 / 100.0 PCT LT1321B
WIDE 9.35 / 0.0 LT1312B
9.35 / 0.0 LT1322B
UP 64.00 / 100.0 PCT LT1310B
64.00 / 100.0 PCT LT1320B
PRT
PRESS 4.4 PSIG PT0472
LEV 72.0 PCT LT0470
TEMP 94.1 DEGF TE0471
SI FLOW
0.0 GPM FT0940
0.0 GPM FT0943
Prev Canc
F1 MENU
F3 HISTORY
F6 3RC2
Ready
VCS Simulator CPU:5 TT041 WK=027/WIN=01 SEC LVL=01


PLANT SYSTEM STATUS
Main Alarms Graphics Trends/Bars/etc Point List Print Help
POWER OPER PRIM/BACK
TBD
ANNUN
TASK_MON
TRENDS
Point Search
Help
SPDS
BISI
RIL
RBU
RAOC
GRPLIB
GRPAS
GRPDIS
GRPLOG
AOP301
AFD
CALM
HUMMI
MAP MENU
2PS1
ZZMENU
4RW1
OPSLIM
OPCRIT
CURRENT FUNCTION: 2PS1
19-JUN-2013 06:40:10
ALARM
S C H I C I
Last Trip Time: 19-JUN-2013 05:54:15.66
OFF A
OFF B
OFF C
SI
CHG
LTDN
TRIP RODS BOTTOM
NUC PWR
0.0 %
L-0.0 %
P-1700.0 PSIG
CLOSED
MF 0.1 KBH
EF 0.0 GPM
CLOSED
1048.6 PSIG
CLOSED
NAR 0.0 % A
0.1 KBH
STM ISOL
62.2
MF 0.3 KBH
EF 0.0
CLOSED
1068.1 PSIG
CLOSED
NAR 62.6 % B
0.0 KBH
TRIP
STM DUMP CLOSED
ATM REL CLOSED
MF 0.2 KBH
EF 0.0 GPM
CLOSED
1108.2 PSIG
CLOSED
NAR 0.0 % C
0.0 KBH
CNTMT
ISOL PH-A ACTUATED
ISOL PH-B ACTUATED
SPRAY ACTIVE
PRESS 50.3
RCS
WIDE PRESS 1323.5 PSIG
T AVG 687.5 DEGF
CORE EX AVG 782.6 DEGF
SUBCOOL -200.6 DEGF
RAD
CNTMT
SEC
OTHER
CHG NET 0.0 GPM
LTDN 0.0 GPM
SI NET 0.0 GPM
RHR 0.0 GPM
Prev Canc
F1 MENU
F2
F3 HISTORY
F4
F5 PID'S
F6
Ready
VCS Simulator CPU 5 TT041 WK=027/WIN=01 SEC LVL=01

QUESTION USAGE:

NEW for 2013 NRC

QUESTION HISTORY:

Rev. 0 submitted by RJ
Ops Review: Nick O'Kimosh
Approved: 6/14/13 Rick Garner

DISTRACTOR ANALYSIS:

In order to answer this question correctly, the applicant must examine graphics of computer screens and determine that a red path exists on core cooling.

A. Plausible because RB pressure is high at 50 psig but is less than 55 psig which constitutes a red path.

   Incorrect because a red path on Containment does not exist based on RB pressure.

B. Plausible two Steam Generators are at 0% NR level.

   Incorrect because "B" Steam Generator is at 62% and greater than the 41% required to satisfy Heat Sink. A red path on Heat Sink is not indicated.

C. Plausible because Core Exit Thermocouple (CORE EX avg) is greater than 725°F and NR RVLIS (RV LEV / EXP see NAR) is less than 34%. Either condition individually constitutes and orange path on Core Cooling.

   Incorrect because if **both** high CETs and low NR RVLIS are present a red path is in effect on Core Cooling.

D. CORRECT; Core Exit Thermocouple (CORE EX avg) is greater than 725°F and NR RVLIS (RV LEV / EXP see NAR) is less than 34%. A red path exists based on Core Cooling.

K/A: 074EG2.1.19 K/A: 074 Inadequate Core Cooling G2.1.19: Ability to use plant computers to evaluate system or component status.

K/A Match: the KA is matched because it requires the candidate to determine that core cooling is inadequate based on evaluation of computer screens.

Selection criteria; NEW

Tier: 1 **Group:** 2
Importance Rating: RO 3.9 SRO 3.8
Technical Reference: **EOP-12, MONITORING OF CRITICAL SAFETY FUNCTIONS.**

Proposed references to be provided to applicants during examination:

PLANT SYSTEM STATUS SCREEN (IPCS)
REACTOR COOLANT SYSTEM 2 OF 4 SCREEN (IPCS)

Learning Objective: EOP-12.0, 05 APPLY EOP-12.0 by predicting a discrete path through EOP-12.0 given a set of plant conditions.

Question Cognitive Level: **Memory or Fundamental Knowledge** _____

Comprehension or Analysis __**X**__

10 CFR Part 55 Content: 41(b)(10) Administrative, normal, abnormal, and emergency operating procedures for the facility.

SRO Justification: N/A

NRC Form ES-401-9 Comments:

Facility Response:

Comments;

51. SERVICE WATER SYSTEM 068

Given the following plant conditions:

Initial conditions:

- 100% power.
- "A" and "B" Service Water Pumps (SWPs) are running.
- "C" SWP is aligned mechanically with it's supply breaker racked up on the "B" train to allow shifting the running pump on that train.
- "C" SWP handswitch is in NORMAL AFTER STOP.
- BUS 1DB NORM FEED breaker has opened due to a malfunction within the breaker.

Current conditions:

- "B" EDG running.
- BUS 1DB DG FEED breaker has shut.

Which ONE of the following describes the effect of the 1DB voltage transient on the Service Water Pump motor supply breakers?

A. "B" SWP breaker remains shut; "C" SWP breaker will remain open.

B. "B" SWP breaker remains shut; "C" SWP breaker will close automatically.

C. "B" SWP breaker will open; **Both** "B" and "C" SWP breakers will remain open.

D. ✔ "B" SWP breaker will open and then reclose automatically; "C" SWP will remain open.

QUESTION USAGE:

BANK
ILO 10-01 4-6-10

QUESTION HISTORY:

Rev. 0 submitted by PL
Ops Review: WB
Approved: RJ

Reviewed for 2013 NRC exam
Ops Review: Nick O'Kimosh
Approved: 6/14/13 Rick Garner

DISTRACTOR ANALYSIS:

In order to answer this question correctly, the assess the status of Service Water pumps and the associated controls and identify the correct response after a loss of 1DB.

A. The first part is plausible because a Service Water pump breaker remains shut for a SI signal without a loss of power. The second part is correct. Since "C" SWP was not previously running, it will not start.

   Incorrect because "B" SWP breaker will open and then close automatically.

B. The first part is plausible because a Service Water pump breaker remains shut for a SI signal without a loss of power. The second part is plausible because it would start if it had been running prior to the transient.

   Incorrect because "B" SWP breaker will open and then close automatically and "C" SWP will remain OFF.

C. The first part is correct; A loss of power signal will open service water breakers; The second part is plausible because there is a contact in the starting circuit for the "A" and "B" pump breaker that provides a start signal only if the "C" breaker for a train is racked down. A contact in parallel however will start the pump if it was previously running. Additionally, "C" pump will remain open since it was not running prior to the loss of power.

   Incorrect because "B" SWP breaker will close automatically.

D. CORRECT; "B" SWP breaker will open upon loss of power to 1DB due to the LOSP contact in the trip circuit and will reclose with it's control switch in NORMAL-AFTER-START via the sequencer. "C" breaker will remain open since it is in NORMAL-AFTER-STOP and "B" breaker is still racked up.

K/A: 075K2.03 K/A: 075 Circulating Water System K2: Knowledge of bus power supplies to the following: 2.03: Emergency/essential SWS pumps.

K/A Match: the KA is matched because it requires the candidate to identify the correct response of the safety-grade service water pumps upon loss of the normal bus power supply.

Selection criteria; BANK
SELECTED FROM SEARCH OF "SWP" OR "SERVICE WATER" AND FOR KA MATCH AND ATTRIBUTES

Tier: 2 **Group:** 2
Importance Rating: RO 2.6 SRO 2.7
Technical Reference: **IB-1, SERVICE WATER SYSTEM**

Proposed references to be provided to applicants during examination: None

Learning Objective: IB-1-13 DESCRIBE the operation of the following Service Water System Components under SI, blackout or any combination of the two conditions: 1. Service Water Pump A or B 2. Service Water Swing Pump.

Question Cognitive Level: **Memory or Fundamental Knowledge** _____

Comprehension or Analysis __X__

10 CFR Part 55 Content: 41(b)(7) Design, components, and functions of control and safety systems, including instrumentation, signals, interlocks, failure modes, and automatic and manual features.

SRO Justification: N/A

NRC Form ES-401-9 Comments:

Facility Response:

Comments;

52. TECH SPECS 469

Given the following plant conditions:

- 100% power.
- Service Water Pump Discharge temperature is 91.5°F.
- Service Water Pond level is at 417.4 feet.

Which ONE of the following describes the Technical Specification limit that has been **violated** and the effect on plant systems?.

A. ✔ Service Water Pump discharge temperature is above the limit.

Jeopardizes the ability of ESF systems to cool the RCS during accident conditions.

B. Service Water Pump discharge temperature is above the limit.

Reduces the ability to maintain Reactor Building temperature below it's limit during normal operation.

C. Service Water Pond Level is below the limit.

Reduces level below Net Positive Suction Head requirements for Service Water pumps.

D. Service Water Pond Level is below the limit.

Jeopardizes the ability to perform a normal plant cooldown.

QUESTION USAGE:

MODIFIED FROM TECH SPECS 375

REVISION HISTORY:

Rev. 0: submitted by RJ
Ops Review: Nick O'Kimosh
Approved: 6/14/13 Rick Garner

DISTRACTOR ANALYSIS:

In order to answer this question correctly the candidate must identify that Service Water pond temperature is T.S. 3.7.5 ULTIMATE HEAT SINK

A. CORRECT; Service Water Pump Discharge temperature is in excess of the limit of 90.5°F under T.S. 3.7.5. Service water cools component cooling water and other ESF loads.

B. The first part is correct; Service Water Pump Discharge temperature is in excess of the limit of 90.5°F under T.S. 3.7.5. The second part is plausible because Service water supplies RBCU cooling coils under accident conditions.

   Incorrect because Service Water does not supply RBCUs under normal operating conditions.

C. The first part is plausible because a level below 416.5 ft would be in violation of the 3.7.5 limit. The second part is correct because a low pond level would reduce Net Positive Suction head for Service Water Pumps.

   Incorrect because the service water pond level is not below it's limit.

D. The first part is plausible because a level below 416.5 ft would be in violation of the 3.7.5 limit. The second part is correct; Service Water cools Component Cooling Water which in turn cools RHR. A low pond level could jeopardize the ability to cooldown.

   Incorrect because the service water pond level is not below it's limit.

K/A: 076K3.07 076 Service Water System (SWS) K3: Knowledge of the effect that a loss or malfunction of the SWS will have on the following: 3.07: ESF loads.

K/A Match: the KA is matched because it requires the candidate to identify that cooling of ESF loads is impaired by a Service Water Pond temperature in excess of Technical Specification limits.

Selection criteria; MODIFIED FROM TECHSPECS 375

Tier: 2 **Group:** 1
Importance Rating: RO 3.7 SRO 3.9
Technical Reference: **T.S. 3.7.5.**
IB-1, SERVICE WATER SYSTEM.

Proposed references to be provided to applicants during examination: None

Learning Objective: IB-1-05 **STATE** the purpose of the following components of the Service Water System: 1. Service Water Pond

IB-1-20 **INTERPRET** the applicability of the following Tech Specs to the Service Water system including the surveillance requirements and bases: 1. T. S. 3/4.7.5

Question Cognitive Level: **Memory or Fundamental Knowledge** __X__

Comprehension or Analysis _____

10 CFR Part 55 Content: 41(b)(4) Secondary coolant and auxiliary systems that affect the facility.

SRO Justification: N/A

NRC Form ES-401-9 Comments:

Facility Response:

Comments;

53. MAIN GENERATOR 054

Given the following plant conditions:

- AOP-301.1, RESPONSE TO ELECTRICAL GRID ISSUES, in progress.
- 60% power.
- Generator Megawatts - 615 MWe.
- MVARs - 200 MVARs, lagging.
- Generator Hydrogen pressure - 60 psig.
- GEN VOLT REG XFER Switch is in AUTO.
- The BOP operator is increasing Generator Voltage.

Which ONE of the following identifies the maximum limit for MVARs specified by AOP-301.1 **without** System Controller approval and describes how the EXCITER VOLTS meter is returned to 0% after each voltage adjustment?

A. ✔ 325 MVARs.

The EXCITER VOLTS meter automatically trends toward 0% after each adjustment.

B. 484 MVARs.

The EXCITER VOLTS meter automatically trends toward 0% after each adjustment.

C. 325 MVARs.

The operator adjusts EXC FIELD VOLT ADJ (MAN) to obtain EXCITER VOLTS indication of 0% after each adjustment.

D. 484 MVARs.

The operator adjusts EXC FIELD VOLT ADJ (MAN) to obtain EXCITER VOLTS indication of 0% after each adjustment.

QUESTION USAGE:

NEW for 2013 NRC

QUESTION HISTORY:

Rev. 0 submitted by RJ
Ops Review: Nick O'Kimosh
Approved: 6/14/13 Rick Garner

DISTRACTOR ANALYSIS:

In order to answer this question correctly, the applicant must recall the maximum MVARs that can be established without System Controller approval and the proper response of voltage regulator indications after voltage adjustments in accordance with AOP-301.1, RESPONSE TO ELECTRICAL GRID ISSUES.

A. CORRECT; 325 MVARs is the maximum MVARs than can be established with System Controller approval and after each voltage adjustment the EXCITER VOLTS meter will automatically trend toward 0% as the manual voltage regulator tracks the auto regulator.

B. The first part is plausible because the reference page of AOP-301.1 warns that operation in excess of 484 MVARs may result in overheating and internal generator damage. The second part is correct; After each voltage adjustment the EXCITER VOLTS meter will automatically trend toward 0% as the manual voltage regulator tracks the auto regulator.

   Incorrect because 325 MVARs is the maximum that can be established without System Controller approval.

C. The first part is correct; 325 MVARs is the maximum MVARs than can be established with System Controller approval. The second part is plausible because the operator is directed to verify the EXCITER VOLTS at 0% after each cycle above and below 22KV after control is in AUTO during generator startup.

   Incorrect because the EXCITER VOLTS meter will automatically trend toward 0% as the manual voltage regulator tracks the auto regulator.

D. The first part is plausible because the reference page of AOP-301.1 warns that operation in excess of 484 MVARs may result in overheating and internal generator damage. The second part is plausible because the operator is directed to verify the EXCITER VOLTS at 0% after each cycle above and below 22KV after control is in AUTO during generator startup.

   Incorrect because 325 MVARs is the maximum that can be established without System Controller approval and the EXCITER VOLTS meter will automatically trend toward 0% as the manual voltage regulator tracks the auto regulator.

K/A: 077AA1.03 K/A: 077 Generator Voltage and Electric Grid Disturbances AA1: Ability to operate and/or monitor the following as they apply to Generator Voltage and Electric Grid Disturbances: 1.03: Voltage regulator controls.

K/A Match: the KA is matched because it requires the candidate to determine the maximum allowed MVARs in accordance with the AOP for grid disturbances and identify proper response of voltage regulator indications.

Selection criteria; NEW

Tier: 1 **Group:** 1
Importance Rating: RO 3.8 SRO 3.7
Technical Reference: **AOP-301.1 RESPONSE TO ELECTRICAL GRID ISSUES.**

Proposed references to be provided to applicants during examination: None

Learning Objective: TB-3-12 DESCRIBE the normal operation of the following control systems. Include function, instrumentation, and setpoints: 1. Main Generator Voltage Regulator.

Question Cognitive Level: **Memory or Fundamental Knowledge** **__X__**

Comprehension or Analysis **_____**

10 CFR Part 55 Content: 41(b)(7) Design, components, and functions of control and safety systems, including instrumentation, signals, interlocks, failure modes, and automatic and manual features.

SRO Justification: N/A

NRC Form ES-401-9 Comments (2011 NRC Exam):

Facility Response:

Comments;

54. INSTRUMENT AIR SYS 084

Given the following plant conditions:

Time 13:00:

- Initially at 100% power.
- RB Air system leak is occurring.
- RB Air Header pressure - 80 psig, decreasing.
- Reactor Trips.
- Safety Injection occurs.

Time 13:05:

- RB Air Header pressure - 40 psig, decreasing.
- Actions to reset ESF systems have **not** been performed.
- Pressurizer pressure - 2300 psig, increasing.

Which ONE of the following describes the position of IPV-2659, INSTR TO RB AIR HDR VLV and whether Pressurizer PORVs will open at their setpoint under the current conditions?

A. IPV-2659 is OPEN; Two (2) PORVs will open.

B. IPV-2659 is OPEN; All PORVs will remain closed.

C. IPV-2659 is CLOSED; Two(2) PORVs will open.

D. IPV-2659 is CLOSED; All PORVs will remain closed.

QUESTION USAGE:

NEW for 2013 NRC

REVISION HISTORY:

Submitted by RJ
Ops Review: Nick O'Kimosh

Approved: 6/14/13 Rick Garner

DISTRACTOR ANALYSIS:

In order to answer this question correctly, the candidate must assess a RB Air header transient after a system break, determine the position of IPV-2659, determine that the break is outside of the RB, and recall that 2 PORVs have accumulators that will allow them to lift after a loss of air.

A . CORRECT; IPV-2659 opens when RB Air header discharge pressure lowers to 90psig. PCV-445A and PCV-444B have accumulators that will provide operating air if RB air header pressure is lost.

B. First part is correct; IPV-2659 opens when RB Air header discharge pressure lowers to 90psig. The second part is plausible because air header pressure has continued to lower outside of the Reactor Building and the candidate may assume that pressure inside the RB is 40 psig.

Incorrect because the break is outside of the RB and PCV-445A and PCV-444B have accumulators that will provide operating air inside the RB.

C. The first part is plausible because IPV-2660 in the supply line to the RB will close on Phase A. The second part is correct; PCV-445A and PCV-444B have accumulators that will provide operating air if RB air header pressure is lost.

Incorrect because IPV-2659 will open and remain open with RB air header pressure less 90 psig.

D. The first part is plausible because IPV-2660 in the supply line to the RB will close on Phase A. The second part is plausible because air header pressure has continued to lower outside of the Reactor Building and the candidate may assume that pressure inside the RB is 40 psig.

Incorrect because IPV-2659 will open and remain open with RB air header pressure less 90 psig PCV-445A and PCV-444B have accumulators that will provide operating air inside the RB..

K/A: 078K4.02 K/A: 078 Instrument Air System (IAS) K4: Knowledge of IAS design feature(s) and/or interlock(s) which provide for the following: 4.02: Cross-over to other air systems

K/A Match: the KA is matched because it requires the candidate to recall the operation of IPV-2659 which supplies backup air from Station Air to Reactor Building Air systems.

Selection criteria; NEW

Tier: 2 **Group:** 1
Importance Rating: RO 3.2 SRO 3.5
Technical Reference: **AB-2, REACTOR COOLANT SYSTEM**
AB-14, REACTOR BUILDING INSTRUMENT AIR SYSTEM

Proposed references to be provided to applicants during examination: None

Learning Objective: AB-14-03 IDENTIFY the flowpaths through the RB Instrument Air System.
AB-14-04 DESCRIBE the RB Instrument Air Interfaces with the following systems: 1. Station Instrument Air

Question Cognitive Level: **Memory or Fundamental Knowledge** _____

Comprehension or Analysis __**X**__

10 CFR Part 55 Content: 41(b)(7) Design, components, and functions of control and safety systems, including instrumentation, signals, interlocks, failure modes, and automatic and manual features.

SRO Justification: N/A

NRC Form ES-401-9 Comments (2011 NRC Exam):

Facility Response:

Comments;

55. INSTRUMENT AIR SYS 083

Given the following plant conditions:

- 100% power.
- Instrument Air Header pressure - 85 psig, decreasing.

Which ONE of the following describes the **next** automatic start feature that will mitigate the decrease in Instrument Air Header Pressure?

A. Diesel Air compressor at 65 psig.

B. Supplemental Air Compressor at 65 psig.

C. Diesel Air Compressor at 70 psig.

D. ✔ Supplemental Air Compressor at 70 psig.

QUESTION USAGE:

NEW FOR 2013 NRC

REVISION HISTORY:

Submitted by RJ
Ops Review: Nick O'Kimosh

Approved: 6/14/13 Rick Garner

DISTRACTOR ANALYSIS:

In order to answer this question correctly, the candidate must recall the setpoint for the Supplemental Air Compressor auto start.

A. Plausible because the Diesel Air Compressor starts at 65 psig Instrument Air Header pressure. Incorrect because the Supplemental Air Compressor start will occur at 70 psig.

B. Plausible because the Diesel Air Compressor starts at 65 psig Instrument Air Header pressure. Incorrect because the Supplemental Air Compressor starts at 70 psig.

C. Plausible because the Supplemental Air Compressor starts at 70 psig Instrument Air Header pressure. Incorrect because the Diesel Air Compressor will not start next.

D. CORRECT; The Supplemental Air Compressor will start at 70 psig Instrument Air Header pressure and is the next auto start feature to occur.

K/A: 079K4.01 K/A: 079 Station Air System (SAS) K4: Knowledge of SAS design feature(s) and/or interlock(s) which provide for the following: 4.01: Cross-connect with IAS.

K/A Match: the KA is matched because it requires the knowledge of the automatic start of the Supplemental Air Compressor in the Breathing Air system as a result of low Station Air pressure.

Selection criteria; NEW

Tier: 2 **Group:** 2
Importance Rating: RO 2.9 SRO 3.2
Technical Reference: **XCP-607, ANNUNCIATOR 2-5**

Proposed references to be provided to applicants during examination: None

Learning Objective: TB-12-08 For the Supplemental Instrument Air Compressor Controls: 1. DESCRIBE the MCB Switch Configuration that allows for automatic compressor start on low pressure **.**

Question Cognitive Level: **Memory or Fundamental Knowledge** **__X__**

Comprehension or Analysis **_____**

10 CFR Part 55 Content: 41(b)(4) Secondary coolant and auxiliary systems that affect the facility

SRO Justification: N/A

NRC Form ES-401-9 Comments:

Facility Response:

Comments;

56. FIRE PROT SYSTEM 116

Given the following plant conditions:

- Main Transformer Fire occurred.
- Fire Suppression System deluge actuated.
- Reactor tripped.
- 230 KV power is lost.

Which ONE of the following describes the expected Fire Header pressure transient and the Fire Protection System response?

A. System pressure will lower and stabilize at 105 psig and **only** the Jockey pump will be running.

B. System pressure will lower to less than 95 psig and **only** the Electric Fire pump will start.

C. ✔ System pressure will lower to less than 85 psig and **only** the Diesel Fire pump will start.

D. System pressure will lower to less than 85 psig and **both** the Diesel Fire pump and the Electric Fire pump will start.

QUESTION USAGE:

MODIFIED FROM FIRE PROTECTION SYSTEM 53

QUESTION HISTORY:

Rev. 0 submitted by RJ
Ops Review: Nick O'Kimosh
Approved: 6/14/13 Rick Garner

DISTRACTOR ANALYSIS:

In order to answer this question correctly, the applicant must determine that power is not available for the electric fire pump, predict the response of fire header pressure, and recall the pressure at which the diesel fire pump starts.

A. Plausible because the jockey pump starts at 105 psig.

   Incorrect because the Jockey pump will not maintain Fire Header pressure with a deluge system activated.

B. Plausible because the Electric Fire pump will start at 95 psig.

   Incorrect because power is not available for the Electric Fire pump without BOP power.

C. CORRECT. System pressure to 85 psig and the Diesel Fire pump will start.

D. Plausible if candidate thinks that the Electric Fire pump will start at the 95 psig and then that the Diesel Fire bump starts as header pressure continues to lower.

   Incorrect because power is not available for the Electric Fire pump without BOP power.

K/A: 086A1.01 K/A: 086 Fire Protection System (FPS) A1: Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with Fire Protection System operating the controls including: 01: Fire header pressure

K/A Match: the KA is matched because it requires the candidate to predict the response of Fire Header pressure if a deluge system activates and BOP power is lost.

Selection criteria; MODIFIED FROM FIRE PROTECTION SYSTEM 53

Tier: 2 **Group:** 2
Importance Rating: RO 2.9 SRO 3.3
Technical Reference: **SOP-509, FIRE SUPPRESSION SYSTEM.**

Proposed references to be provided to applicants during examination: None

Learning Objective: GS-11-15 LIST the condition and/or setpoint associated with the following fire protection system limitations: 1. Fire protection water design volume flowrate 2. Fire pump auto start.

Question Cognitive Level: **Memory or Fundamental Knowledge** _____

Comprehension or Analysis __X__

10 CFR Part 55 Content: 41(b)(4) Secondary coolant and auxiliary systems that affect the facility

SRO Justification: N/A

NRC Form ES-401-9 Comments:

Facility Response:

Comments;

57. CONTAINMENT SYSTEM 017

Given the following plant conditions:

- LOCA has occurred.
- Safety Injection is actuated.
- Reactor Building pressure indicates 14 psig and rising slowly.
- EOP-1.0, REACTOR TRIP/ SAFETY INJECTION ACTUATION, in progress.
- The following Containment Isolation Valve MCB Status Lights are BRIGHT:
  - RCP SL WTR ISOL 8100
  - LTDN ISOL 8152

Which ONE of the following identifies the containment isolation feature that has **not** functioned correctly and an action required by EOP-1.0?

A. ✔ Phase A; Place **either** Phase A actuation switches in the ACTUATE position.

B. Phase A; Place **both** Phase A actuation switches in the ACTUATE position.

C. Phase B; Place **either** RB Spray/Phase B actuation switches in the ACTUATE position.

D. Phase B; Place **both** RB Spray/Phase B actuation switches in the ACTUATE position.

QUESTION USAGE:

BANK

QUESTION HISTORY:

Reformatted
Rev. 1 submitted by RJ
Ops Review: Nick O'Kimosh
Approved: 6/14/13 Rick Garner

DISTRACTOR ANALYSIS:

In order to answer this question correctly, the applicant must recall valves that are part of Phase A isolation and the procedural direction for failure of the valves to close.

A. CORRECT; RCP Seal Water Isolation Valves and Letdown isolation valves are closed automatically by Phase A. Placing either Phase A actuation switch in ACTUATE is directed in EOP-1.0, REACTOR TRIP/ SAFETY INJECTION ACTUATION.

B. The first part is correct; RCP Seal Water Isolation Valves and Letdown isolation valves are closed automatically by Phase A. The second part is plausible because there are two trains of Phase A and the candidate may assume that turning both switches is required.

   Incorrect because only one switch is required to be turned in EOP-1.0.

C. The first part is plausible because Phase B isolation also closes containment isolation valves. The second part is plausible because EOP-1.0, REACTOR TRIP/ SAFETY INJECTION ACTUATION directs turning only one pair out of two possible pairs of RB Spray switches to ACTUATE.

   Incorrect because RCP Seal Water Isolation Valves and Letdown isolation valves are not Phase B valves.

D. The first part is plausible because Phase B isolation also closes containment isolation valves. The second part is plausible because the candidate may think that EOP-1.0, REACTOR TRIP/ SAFETY INJECTION ACTUATION directs turning both pairs of RB Spray switches to ACTUATE.

   Incorrect because RCP Seal Water Isolation Valves and Letdown isolation valves are not Phase B valves.

K/A: 103K1.02 K/A: 103 Containment System K1: Knowledge of the physical connections and/or cause effect relationships between the containment system and the following systems: 1.02: Containment isolation/containment integrity.

K/A Match: the KA is matched because it requires the knowledge of the containment isolation valves that are isolated by specific containment isolation functions.

Selection criteria; BANK
SELECTED FROM A FIELD SEARCH ON "CONTAINMENT" FOR KA MATCH AND ATTRIBUTES.

Tier: 2 **Group:** 1
Importance Rating: RO 3.9 SRO 4.1
Technical Reference: **EOP-1.0, REACTOR TRIP' SAFETY INJECTION ACTUATION**

Proposed references to be provided to applicants during examination: None

Learning Objective: IC-9-28 Describe the operation associated with each position for the following switches/controls of the containment isolation system: 1. Containment Isolation Reset Pushbuttons 2. Containment Ventilation and Phase A Isolation Switches.

IC-9-45 For the following annunciators: • XCP-612, 1-1, RB PRESS HI-1 SI/ PHASE A • XCP-612, 2-1, RB PRESS HI-2 STM LINE ISOL, State the automatic actions.

Question Cognitive Level: **Memory or Fundamental Knowledge** __**X**__

Comprehension or Analysis _____

10 CFR Part 55 Content: 41(b)(7) Design, components, and functions of control and safety systems, including instrumentation, signals, interlocks, failure modes, and automatic and manual features.

SRO Justification: N/A

NRC Form ES-401-9 Comments:

Facility Response:

Comments;

58. AOPS 617

Given the following plant conditions:

- Core off-load was in progress.
- A complete loss of RHR cooling has occurred.
- The Reactor Building has been evacuated.
- XVB-2B, RB PURGE EXHAUST ISOLATION VALVE, **and** XVB-2A, RB PURGE EXHAUST ISOLATION VALVE, will **not** close from the HVAC Panel.

Which ONE of the choice below answers both of the following:

1) If operators are successful in closing **only** ONE (1) RB Purge Exhaust Isolation Valve, can Containment Closure be satisfied in accordance with OAP-108.4, OPERATIONS OUTAGE CONTROL OF CONTAINMENT PENETRATIONS?

2) Where will an AO be directed to locally close one of these valves outside of the Reactor Building?

A. 1) Containment Closure can be satisfied with one valve.
   2) Fuel Handling Building.

B. 1) Containment Closure can be satisfied with one valve.
   2) Auxiliary Building.

C. 1) Containment Closure will **not** be satisfied with one valve.
   2) Fuel Handling Building.

D. 1) Containment Closure will **not** be satisfied with one valve.
   2) Auxiliary Building.

QUESTION USAGE:

NEW for 2013 NRC

QUESTION HISTORY:

Rev. 0 submitted by RJ
Ops Review: Nick O'Kimosh
Approved: 6/14/13 Rick Garner

DISTRACTOR ANALYSIS:

In order to answer this question correctly, the applicant must

A. CORRECT; A containment penetration satisfies containment closure if one valve is closed. XVB-2A, RB PURGE EXHAUST ISOLATION VALVE is located inside the Fuel Handling Building above the entrance on the south wall.

B. The first part is correct; A containment penetration satisfies containment closure if one valve is closed. The second part is plausible because Fuel Handling building exhaust goes to the main plant vent via the Auxiliary Building Main Exhaust fans and the Alternate Purge Exhaust Fan discharge valves are in the Auxiliary Building. The candidate may think that the RB Purge exhaust isolation are therefore in the Auxiliary Building.

   Incorrect because XVB-2A, RB PURGE EXHAUST ISOLATION VALVE is not located in the Auxiliary Building. It is located inside the Fuel Handling Building above the entrance on the south wall.

C. The first part is plausible because automatic ventilation isolation functions close two valves. The second part is correct; XVB-2A, RB PURGE EXHAUST ISOLATION VALVE is located inside the Fuel Handling Building above the entrance on the south wall.

   Incorrect because only one valve is required to establish containment closure.

D. The first part is plausible because automatic ventilation isolation functions close two valves. The second part is plausible because Fuel Handling building exhaust goes to the main plant vent via the Auxiliary Building Main Exhaust fans and the Alternate Purge Exhaust Fan discharge valves are in the Auxiliary Building. The candidate may think that the RB Purge exhaust isolation are therefore in the Auxiliary Building.

   Incorrect because only one valve is required to establish containment closure and because XVB-2A, RB PURGE EXHAUST ISOLATION VALVE is not located in the Auxiliary Building. It is located inside the Fuel Handling Building above the entrance on the south wall.

K/A: 103K3.01 K/A: 103 Containment System K3: Knowledge of the effect that a loss or malfunction of the containment system will have on the following: 3.01: Loss of containment integrity under shutdown conditions

K/A Match: the KA is matched because it requires the candidate to identify actions required to establish containment closure with a failure of Reactor Building Purge Supply and Exhaust Isolation valves.

Selection criteria; NEW

Tier: 2 **Group:** 1
Importance Rating: RO 3.3 SRO 3.7
Technical Reference: **OAP-108.4, OPERATIONS OUTAGE CONTROL OF CONTAINMENT PENETRATIONS**
AB-17, REACTOR BUILDING VENTILATION.

Proposed references to be provided to applicants during examination: None

Learning Objective: AB-17-03 IDENTIFY the following flowpaths through the Reactor Building Ventilation System: • Purge and Supply

SB-4-02 DEFINE terms listed in section one of Technical Specifications.

Question Cognitive Level: **Memory or Fundamental Knowledge** __X__

Comprehension or Analysis _____

10 CFR Part 55 Content: 41(b)(8) Components, capacity, and functions of emergency systems.
41(b)(9) Shielding, isolation, and containment design features, including access limitations.
41(b)(10)Administrative, normal, abnormal, and emergency operating procedures for the facility.

SRO Justification: N/A

NRC Form ES-401-9 Comments:

Facility Response:

Comments;

59. ADMIN PROCEDURE 591

Which ONE of the following identifies a position that may enter the Green Carpet Area in the Control Room without BOP or NROATC approval in accordance with SAP-200, CONDUCT OF OPERATIONS.

A. Shift Engineer.

B. Management Duty Supervisor.

C. NRC Resident Inspector.

D. Work Control Center SRO.

QUESTION USAGE:

NEW for 2013 NRC

QUESTION HISTORY:

Rev. 0 submitted by RJ
Ops Review: Nick O'Kimosh
Approved: 6/14/13 Rick Garner

DISTRACTOR ANALYSIS:

In order to answer this question correctly, the applicant must recall the position that is allowed to enter the area adjacent to the Main Control Boards without obtaining permission from the control room watch standers.

A. CORRECT, The Shift Engineer may enter the Green Carpeted Area without RO or BOP approval.

B. Plausible because the Shift Supervisor is allowed to enter the Green Carpeted Area without RO or BOP approval.

   Incorrect because the Management Duty Supervisor is not allowed to enter without approval.

C. Plausible because the NRC Resident Inspector has unrestricted access to the Area of Continuous Attention.

   Incorrect because the NRC Resident Inspector is not allowed to enter without approval.

D. Plausible because the Work Control Center has unrestricted access to the Area of Continuous Attention and the access to the Control Room is controlled by the Work Control Center.

   Incorrect because the Work Control Center SRO is not allowed to enter without approval.

K/A: G2.1.13 K/A: G2.1.13: Knowledge of facility requirements for controlling vital/controlled access.

K/A Match: the KA is matched because it requires the candidate to identify a position that is authorized to enter the Green Carpeted Area of the Control Room without prior authorization.

Selection criteria; NEW

Tier: 3 **Group:**
Importance Rating: RO 2.5 SRO 3.2
Technical Reference: **SAP-200, CONDUCT OF OPERATIONS**

Proposed references to be provided to applicants during examination: None

Learning Objective: SAP-200-03 DESCRIBE the requirements of SAP-200 for the following:• Control Room Access

Question Cognitive Level: **Memory or Fundamental Knowledge** **__X__**

Comprehension or Analysis **_____**

10 CFR Part 55 Content: 41(b)(10) Administrative, normal, abnormal, and emergency operating procedures for the facility.

SRO Justification: N/A

NRC Form ES-401-9 Comments:

Facility Response:

Comments;

60. ADMIN PROCEDURE 584

Given the following plant conditions:

- 100% power initially.
- Steam Generator Tube Rupture on "C" Steam Generator.
- TD EFW Pump is running.
- "A" and "B" MD EFW Pumps **cannot** be started.
- An electrician reports that a breaker problem on "A" Motor-driven EFW pump is expected to be resolved in 20 minutes.
- All NR Steam Generator levels are at 35% and rising.
- Operators are performing Step 3.g. of EOP-4.0 STEAM GENERATOR TUBE RUPTURE.

Which ONE of the following describes the step sequence as operators perform step 3.g. of EOP-4.0?

REFERENCE PROVIDED

A. Hold at step 3.g. and wait to restore a MD EFW Pump.

B. Stop performing step 3.g after Action/Expected Response Step 3.g.1) and continue on to step 3.h.

C. Notify local operators, at step 3.g to deenergize and close XVG02802B, MS HEADER C EF PUMP TURBINE SUPPLY VALVE **only**.

D. Notify local operators, at step 3.g to deenergize and close XVG02802A, MS HEADER B EF PUMP TURBINE SUPPLY VALVE **and** XVG02802B, MS HEADER C EF PUMP TURBINE SUPPLY VALVE.

ACTION/EXPECTED RESPONSE	ALTERNATIVE ACTION
(Step 3 continued)	(Step 3 continued)

CAUTION - Step 3.g

If the TD EFW Pump is the only available source of feed flow, the steam supply to the TD EFW Pump must be maintained from at least one SG, to maintain a secondary heat sink.

NOTE - Step 3.g

If the TD EFW Pump is tripped, it should be reset as time permits.

g. IF SG B OR SG C is RUPTURED, THEN perform the following:

1) IF at least one MD EFW Pump is running, THEN isolate the TD EFW Pump by placing PVG-2030, STM SPLY TO TD EFP TRN A(B), to CLOSE. ☐

2) Notify local Operators to perform **Alternative Action Step 3.g,** while continuing with this procedure. ☐

(Step 3 continued on next page)

g. IF SG B OR SG C is RUPTURED, THEN locally deenergize and close the appropriate valve:

- For SG B:

1) Open XMC1DA2X 05EH, EF PUMP MAIN STEAM BLOCK VLV XVG2802A-MS (IB-463). ☐

2) Close XVG02802A-MS, MS HEADER B EF PUMP TURBINE SUPPLY VLV (IB-436 East Pen). ☐

- For SG C:

1) Open XMC1DB2Y 05EH, EMERG FEEDWATER PUMP MAIN STEAM BLOCK XVG2802B-MS (AB-463). ☐

2) Close XVG02802B-MS, MS HEADER C EF PUMP TURBINE SUPPLY VLV (IB-436 East Pen). ☐

(Step 3 continued on next page)

QUESTION USAGE:

NEW for 2013 NRC

QUESTION HISTORY:

Rev. 0 submitted by RJ
Ops Review: Nick O'Kimosh
Approved: 6/14/13 Rick Garner

DISTRACTOR ANALYSIS:

In order to answer this question correctly, the applicant must apply rules of usage and determine the procedural flowpath and correct action to isolate the turbine-driven EFW pump steam supply.

A. Plausible because the purpose of the step is to isolate the steam supply to the Turbine Driven pump from a ruptured generator. The candidate may think that since actions are in progress to restore a motor-driven EFW pump that the operator may wait to isolate the turbine-driven pump steam supply before proceeding.

   Incorrect because the appropriate action is to continue with alternate actions to isolate the steam supply.

B. Plausible because EOP rules of usage allow starting an action and then, if completion is delayed, continuing to the next major step.

   Incorrect because the appropriate action is to continue with alternate actions to isolate the steam supply.

C. CORRECT; The alternate actions column directs that if "B" or "C" Steam Generator is ruptured then the appropriate valve should be isolated. SInce "C" is ruptured, the operator will direct local closure of XVG02802A-MS.

D. Plausible because the purpose of the step is to isolate the steam supply to the Turbine Driven pump from a ruptured generator. The candidate may think that it is appropriate to isolate both supplies since actions are in progress to restore a motor-driven EFW pump and Steam Generator levels satisfy heat sink requirements.

   Incorrect because only XVG02802A-MS will be isolated.

K/A: G2.1.20 K/A: G2.1.20 Ability to interpret and execute procedure steps.

K/A Match: the KA is matched because it requires the candidate to identify the correct flowpath through a procedure step.

Selection criteria: NEW

Tier: 3 **Group:**
Importance Rating: RO 4.6 SRO 4.7
Technical Reference: **EOP-4.0, STEAM GENERATOR TUBE RUPTURE**
OAP-103.4, EOP/AOP USER'S GUIDE

Proposed references to be provided to applicants during examination:

EOP-4.0, STEAM GENERATOR TUBE RUPTURE,
PAGE 6 OF 38

Learning Objective: EOP-4.0 06. RELATE each CAUTION and NOTE in EOP-4.0 to its corresponding step by identifying the bases or reasons for the CAUTION or NOTE. This should include, but not be limited to the following: e. Ruptured SG isolation from intact SGs

Question Cognitive Level: **Memory or Fundamental Knowledge** **__X__**

Comprehension or Analysis **_____**

10 CFR Part 55 Content: 41(b)(10) Administrative, normal, abnormal, and emergency operating procedures for the facility.

SRO Justification: N/A

NRC Form ES-401-9 Comments:

Facility Response:

Comments;

61. AOPS 176

Given the following plant conditions:

- Initially at 100% power.
- Loss of MFP "A" occurred.
- AOP-210.3, FEEDWATER PUMP MALFUNCTION, in progress.
- Power reduction is in progress.
- Rod control is in AUTO.
- Adjustment to RCS boron concentration **completed**.
- T_{AVG} 578.7°F, decreasing.
- T_{REF} 577°F, decreasing.
- XCP-621, 1-2, CRB INSRT LMT LO in alarm.

Which ONE of the following describes a condition that could have caused the alarm and an appropriate corrective action?

A. RCS Boron concentration was diluted too much. Manually withdraw rods to clear the alarm.

B. Turbine load was lowered faster than the reactivity compensation provided by the boration. Perform an emergency boration from the RWST.

C. ✔ Turbine load was lowered too low for the amount of boration. Discontinue the load decrease.

D. Load was lowered too fast and the steam dumps opened. Reduce the rate of power reduction.

QUESTION USAGE:

BANK

QUESTION HISTORY:

Reformatted.
Rev. 1 submitted by RJ
Ops Review: Nick O'Kimosh
Approved: 6/14/13 Rick Garner

DISTRACTOR ANALYSIS:

In order to answer this question correctly, the applicant must determine the reason for a rod insertion alarm and adverse temperature indications and determine the appropriate operator action.

A. Plausible a dilution will cause rods to insert and cause XCP-621, 1-2, CRB INSRT LMT LO to alarm.

   Incorrect because operators would not dilute for a power reduction and T_{AVG} is decreasing.

B. Plausible because lowering turbine load faster than what is compensated with boration will cause rods to insert excessively due to the effects of power defect. Additionally XCP-621, 1-1, CRB INSRT LMT LO directs operators to perform an emergency boration.

   Incorrect because XCP-621, 1-2, CRB INSRT LMT LO does not direct operators to borate from the RWST.

C. CORRECT; Turbine load was lowered too far for the amount of boron that was added as indicated by the value for T_{REF}. A T_{REF} of 577°F is equivalent to approximately 65% power. Rods are inserting to lower temperature. The turbine load reduction should be stabilized.

D. Plausible because turbine load was lowered excessively as indicated by the low T_{REF}. Additionally, a fast load decrease could arm steam dumps and cause them to open. If the steam dumps open however, this would cause power to increase and reduce the amount of total power defect which would **not** be consistent with the XCP-621, 1-1, CRB INSRT LMT LO

   Incorrect because opening steam dumps due to a fast load decrease would restore steam load and would not cause XCP-621, 1-1, CRB INSRT LMT LO to alarm.

K/A: G2.1.7 K/A: G2.1.7 Ability to evaluate plant performance and make operational judgments based on operating characteristics, reactor behavior, and instrument interpretation.

K/A Match: the KA is matched because it requires the candidate to discern what is causing an adverse condition based on instrument readings and alarms and determine the correct action.

Selection criteria; BANK
SELECTED FROM A FIELD SEARCH ON "INTEGRATED PLANT" FOR KA MATCH AND ATTRIBUTES.

Tier: 3 **Group:**
Importance Rating: RO 4.4 SRO 4.7
Technical Reference: **XCP-621, 1-1, CRB INSRT LMT LO**

Proposed references to be provided to applicants during examination: None

Learning Objective: IC-5-26 For the following annunciators: • XCP-621, 1-2, CRB INSRT LMT LO a. STATE the setpoint. b. DESCRIBE the potential causes for the alarm.

Question Cognitive Level: **Memory or Fundamental Knowledge** _____

Comprehension or Analysis __X__

10 CFR Part 55 Content: 41(b)(5) Facility operating characteristics during steady state and transient conditions, including coolant chemistry, causes and effects of temperature, pressure and reactivity changes, effects of load changes, and operating limitations and reasons for these operating characteristics.

SRO Justification: N/A

NRC Form ES-401-9 Comments:

Facility Response:

Comments;

62. TECH SPECS 481

Given the following plant conditions:

- Plant startup in progress.
- Power is 10^{-3}% and stable.
- Control Bank D is 115 steps withdrawn.

Time 1100

- XCP-639, 1-2, BUS 1B O/C 51BX-1B alarms.

Which ONE of the following describes an action that will satisfy Technical Specification requirements if it is the only action taken prior to 1200?

A. Clear the cause of the lockout and reenergize bus 1B.

B. Demonstrate availability of AC power sources.

C. Insert **only** the Control Bank rods to zero steps.

D. Manually trip the Reactor.

QUESTION USAGE:

NEW for 2013 NRC

QUESTION HISTORY:

Rev. 0 submitted by RJ
Ops Review: Nick O'Kimosh
Approved: 6/14/13 Rick Garner

DISTRACTOR ANALYSIS:

In order to answer this question correctly, the applicant must determine the Technical Specification LCO that is not met and select an operator action that will comply with the applicable Action Statement.

A. Plausible because the event that caused the adverse condition was a 51BX lockout on BOP bus 1B. The candidate may think that reapplying power to the bus reestablishes proper conditions. This would be true with regard to re-powering 1DA or 1DB to comply with T.S. 3.8.1.1.

   Incorrect because the loss of bus 1B has caused a loss of "B" RCP which requires taking the plant to Mode 3 in one hour.

B. Plausible because this would be required for a lockout on 1DA or 1DB in accordance with T.S. 3.8.1.1 actions.

   Incorrect because this will not address the action statement in effect.

C. Plausible because lowering the Control Bank rods to zero steps and then continuing with insertion of the Shutdown banks places the plant in Mode 3.

   Incorrect because the plant is still in Mode 2 with all Shutdown banks withdrawn.

D. CORRECT; The loss of bus 1B has caused a loss of "B" RCP which requires taking the plant to Mode 3 in one hour. Manually tripping the reactor will place the plant in Mode 3 which satisfies that Action Statement.

K/A: G2.2.39 K/A: Knowledge of less than or equal to one hour Technical Specification statements for systems.

K/A Match: the KA is matched because it requires the candidate to recall the 1 hour action required for a loss of an operating RCS loop while in Mode 2.

Selection criteria; NEW

Tier: 3 **Group:**
Importance Rating: RO 3.9 SRO 4.5
Technical Reference: **TECHNICAL SPECIFICATION 3.4.1.1.**

Proposed references to be provided to applicants during examination: None

Learning Objective: SB-4-15 Given a limiting condition for operation and a mode, **DEFINE** the requirements to satisfy the LCO, the actions if required within one hour or less, and describe the bases for the LCO.

Question Cognitive Level: **Memory or Fundamental Knowledge** _____

Comprehension or Analysis __X__

10 CFR Part 55 Content: 41(b)(10) Administrative, normal, abnormal, and emergency operating procedures for the facility.

SRO Justification: N/A

NRC Form ES-401-9 Comments:

Facility Response:

Comments;

63. TECH SPECS 226

Given the following plant conditions:

- 100% power.
- RCS leak rate data is as follows:
  - Total RCS leakage rate is 10.2 gpm.
  - Leakage to PRT is 7.5 gpm.
  - Leakage to the Reactor Coolant Drain Tank is 1.3 gpm.
  - RCS to Steam Generator leakage is as follows:
    * "A" SG 0.09 gpm
    * "B" SG 0.08 gpm
    * "C" SG 0.07 gpm

Which ONE (1) of the following describes RCS leakage in relation to Technical Specification limits of T.S. 3.4.6.2, REACTOR COOLANT SYSTEM - OPERATIONAL LEAKAGE?

A. Identified leakage is greater than the limit.

B. ✔ Unidentified leakage is greater than the limit.

C. Primary to Secondary leakage is greater than the limit.

D. All RCS leakage is **<u>within</u>** limits.

QUESTION USAGE:

MODIFIED FROM TECHSPECS 100

QUESTION HISTORY:

Rev. 0 submitted by RJ
Ops Review: Nick O'Kimosh
Approved: 6/14/13 Rick Garner

DISTRACTOR ANALYSIS:

In order to answer the question correctly, the candidate must assess various types of RCS leakage, recall the limits for each and determine the limit that has been exceeded.

A. Plausible because total RCS leakage is in excess of 10 gpm.

   Incorrect because 7.5 gpm leakage to the PRT + 1.3 gpm to the RCDT = 8.8 gpm identified leakage which is less than the 10 gpm limit in T.S. 3.6.4.2..

B. CORRECT; 10.2 gpm Total leakage - 8.8 gpm identified leakage - 0.24 gpm pri-sec leakage = 1.16 Unidentified leakage. The maximum allowed by T.S. 3.4.6.2 is 1 gpm.

C. Plausible because the total primary to secondary leakrate is 0.24 gpm (0.09+0.08+ 0.07). 0.24 gpm x 24 hrs/day x 60 min/ hr = 345.6 gpd. The candidate may think that the 150 gpd limit of T.S. 3.4.6.2 is actually a total limit and assume that it is exceeded. A math error in translating gpm to gpd could also cause selection of this answer.

   Incorrect because 0.9 gpm x 24 x 60 = 130 gpd which is the highest through any one generator and is less than the limit.

D. Plausible because a math error in any of the required calculations may lead to selection of this answer.

   Incorrect because unidentified leakage is 1.15 gpm and is in excess of the limits.

K/A: G2.2.40 K/A: 2.2.40 Ability to apply Technical Specifications for a system.

K/A Match: the KA is matched because it requires determination of compliance with the operational leakage Technical Specification.

Selection criteria; MODIFIED FROM TECHSPECS 100

Tier: 3 **Group:**
Importance Rating: RO 3.4 SRO 3.7
Technical Reference: **TECHNICAL SPECIFICATION 3.4.6.2**

Proposed references to be provided to applicants during examination: None

Learning Objective: SB-4-15 Given a limiting condition for operation and a mode, DEFINE the requirements to satisfy the LCO, the actions if required within one hour or less, and describe the bases for the LCO.

Question Cognitive Level: **Memory or Fundamental Knowledge** _____

Comprehension or Analysis __**X**__

10 CFR Part 55 Content: 41(b)(10) Administrative, normal, abnormal, and emergency operating procedures for the facility.

SRO Justification: N/A

NRC Form ES-401-9 Comments:

Facility Response:

Comments;

64. WASTE GAS DISPOSAL S 060

Given the following plant conditions:

- A waste gas release was in progress.
- HCV-014, WASTE GAS DISCHARGE CONTROL VALVE, has tripped shut.
- XCP-644, 3-1, PLANT VENT GAS RM-A3 HI RAD in alarm.
- XCP-645, 2-3, GAS WST DISCH RM-A10 HI RAD has **not** alarmed during the release.

Which ONE of the choices below answers **both** of the following:

1) What condition must be satisfied prior to recommencing the release?

2) What is the **minimum** control manipulation necessary to enable opening of HCV-014?

A. 1) RM-A3 reading must decrease to pre-release background reading.
   2) HCV-014 **selector switch** must be cycled to CLOSE, then the valve re-opened.

B. 1) A Request for Redundant Analysis must be initiated.
   2) HCV-014 **controller** must be taken to ZERO (0), then the valve re-opened.

C. 1) A Request for Redundant Analysis must be initiated.
   2) HCV-014 **selector switch** must be cycled to CLOSE, then the valve re-opened.

D. ✔ 1) RM-A3 reading must decrease to pre-release background reading.
   2) HCV-014 **controller** must be taken to ZERO (0), then the valve re-opened.

QUESTION USAGE:

BANK
RO-SRO-11-01-Exam 5 (SS, Air and Cooling Water)
RO-SRO10-01 IPO-1 MakeUp EXAM
RO-SRO-10-01 SYSTEMS WEEK 4 MAKEUP

REVISION HISTORY:

Rev 1. Submitted by Matthew R. Bender
Changed valve name to all caps.
Added distractor analysis.
Capitalized and bolded and in distractor to make more clear.
Removed RM-A10 in service and the new analysis and release permit have been requested were removed as window dressing.
OPS Approval: RT
TRN Approval: RJ

Reviewed for 2013 NRC exam
Ops Review: Nick O'Kimosh
Approved: 6/14/13 Rick Garner

DISTRACTOR ANALYSIS:

In order to answer this question correctly the candidate must recall a requirement to re-initiate a release after automatic isolation on high radiation and determine the action necessary to reopen the control valve for the release.

A. The first part is correct; If the trip of HCV-014 is due to RM-A3 high radiation, the release may be re-commenced after allowing the monitor reading to return to the pre-release background reading. The second part is plausible because it is an action that would close the valve if it were open and is similar to the actual required action to take the controller to zero.

   Incorrect because cycling the selector switch would not reset the controller and permit re-opening.

B. The first part is plausible because if the trip was due to high radiation on RM-A10, then redundant analysis would be required. The second part is correct. The HCV-014 controller must be taken to ZERO (0), then the valve re-opened.

   Incorrect because redundant sampling is not required.

C. The first part is plausible because if the trip was due to high radiation on RM-A10, then redundant analysis would be required. The second part is plausible because it is an action that would close the valve if it were open and is similar to the actual required action to take the controller to zero.

   Incorrect because cycling the selector switch would not reset the controller and permit re-opening.

D. CORRECT; If the trip of HCV-014 is due to RM-A3 high radiation, the release may be re-commenced after allowing the monitor reading to return to the pre-release background reading. The HCV-014 controller must be taken to zero, then the valve re-opened.

   .

K/A: G2.3.11 K/A: G2.3.11 Ability to control radiation releases.

K/A Match: the KA is matched because it requires the candidate to identify release requirements and a required manipulation of a control valve for gas release.

Selection criteria: **BANK**
SELECTED FROM FIELD SEARCHES OF WASTE GAS" AND "RELEASE" FOR KA MATCH AND ATTRIBUTES.

Tier: 3 **Group:**
Importance Rating: RO 3.8 SRO 4.3
Technical Reference: **SOP-119 WASTE GAS PROCESSING**

Proposed references to be provided to applicants during examination: None

Learning Objective: AB-12-21 **DESCRIBE** the following, concerning the release of Radioactive Waste to the atmosphere: 8. Methods of Automatic Termination of Waste Gas Decay Tank Release 9. Method to reset HCV-014 after trip on High Radiation.

Question Cognitive Level: **Memory or Fundamental Knowledge** **__X__**

Comprehension or Analysis **_____**

10 CFR Part 55 Content: 41(b)(13) Procedures and equipment available for handling and disposal of radioactive materials and effluents.

SRO Justification: N/A

NRC Form ES-401-9 Comments:

Facility Response:

Comments;

65. ADMIN PROCEDURE 587

Given the following plant conditions:

- A motor-operated valve (MOV) located in a High Radiation Area must be Red Danger tagged to perform work.
- The valve is normally CLOSED by the system lineup.
- The general area radiation field at the valve is 8 Rem/ Hr.
- The general area radiation field in transit is 750 mRem/ Hr.
- It will take approximately 10 seconds to transit one way to the valve.
- It will take approximately 15 seconds at the valve to verify it's position.

Which ONE of the following describes a method allowed to reduce radiological exposure for this task in accordance with SAP-153, COMPONENT/CONDITION VERIFICATION?

A. Red tag the control switch and periodically verify the closed position on main control board.

B. Red Tag the control switch in the Control Room and the MCC breaker **only**.

C. Have the person who hangs the tag sign for second verifier.

D. Waive the requirement for independent verification.

QUESTION USAGE:

MODIFIED FROM ADMIN PROCEDURE 518

QUESTION HISTORY:

Rev. 0 submitted by RJ
Ops Review: Nick O'Kimosh
Approved: 6/14/13 Rick Garner

DISTRACTOR ANALYSIS:

In order to answer this question correctly, the applicant must recall the provisions of SAP-153, COMPONENTCONDITION VERIFICATION to reduce radiological exposure during component verification.

A. Plausible because per SAP-153, the use of remote position indicators for air operated or motor operated valves where the remote position is periodically verified to be accurate with actual local position is allowed where specified by approved procedures, valve and breaker lineups.

   Incorrect because per OAP-100.5, GUIDELINES FOR CONFIGURATION CONTROL AND OPERATION OF PLANT EQUIPMENT, the valve handwheel and the motor breaker must be tagged closed to provide isolation to perform work.

B. The first part is plausible tagging the control switch and the MCC breaker would ensure electrical isolation of the valve and partially meets the requirements of OAP-100.5. Additionally, the valve is closed per the normal system lineup and this action would reduce radiological exposure.

   Incorrect because the valve handwheel must also be tagged closed.

C. Plausible because per SAP-153, during the routine system lineup verifications, the first individual performing the check of the lineup is considered to be the independent verifier and an additional second check need not be performed.

   Incorrect because a routine lineup verification is not in progress.

D. CORRECT; The requirement for Independent Verification may be waived by the Shift Supervisor if excessive radiation exposures (greater than 10 mrem) will result.

$$\frac{8\text{R} \times 1000\ \text{mrem}}{\text{hr}} \times \frac{\text{hr}}{\text{rem}} \times \frac{\text{min}}{60\ \text{min}} \times \frac{15\ \text{secs}}{60\ \text{secs}} = 33\ \text{mrem at the valve}$$

$$\frac{750\ \text{mrem}}{\text{hr}} \times \frac{\text{hr}}{60\ \text{min}} \times \frac{\text{min}}{60\ \text{secs}} \times \frac{10\ \text{secs} \times 2\ \text{transits}}{\text{transit}} = 4\ \text{mrem for two transits}$$

K/A: G2.3.12 K/A: G2.3.12 Knowledge of radiological safety principles pertaining to licensed operator duties, such as containment entry requirements, fuel handling responsibilities, access to locked high-radiation areas, aligning filters, etc.

K/A Match: the KA is matched because it requires the candidate to recall provisions to reduce radiological exposure during operator field duties.

Selection criteria; MODIFIED FROM ADMIN PROCEDURE 518

Tier: 3 **Group:**
Importance Rating: RO 3.2 SRO 3.7
Technical Reference: **SAP-153, COMPONENTCONDITION VERIFICATION**
OAP-100.5, GUIDELINES FOR CONFIGURATION CONTROL AND OPERATION OF PLANT EQUIPMENT

Proposed references to be provided to applicants during examination: None

Learning Objective: SAP-153-04 DISCUSS SAP-153's limits and precautions.

Question Cognitive Level: **Memory or Fundamental Knowledge** _____

Comprehension or Analysis __X__

10 CFR Part 55 Content: 41(b)(10) Administrative, normal, abnormal, and emergency operating procedures for the facility.

SRO Justification: N/A

NRC Form ES-401-9 Comments:

Facility Response:

Comments;

66. AOPS 619

Given the following plant conditions:

- 100% power
- Power is lost to 125 VDC circuit XPN6096.
- Operators are responding as directed by AOP-100.5, LOSS OF MAIN CONTROL BOARD ANNUNCIATORS.

Which ONE of the choices below contains the total percentage of INOPERABLE Main Control Board annunciators and a surveillance activity associated with a failed annunciator in accordance with AOP-100.5?

REFERENCE PROVIDED

A. 17.0 %; GTP-702, Attachment IV.D.

B. 18.3 %; GTP-702, Attachment IV.D.

C. 17.0 %; GTP-702, Attachment IV.G.

D. 18.3 %; GTP-702, Attachment IV.G.

RESTORATION OF FAILED MAIN CONTROL BOARD ANNUNCIATORS

A. Make a list of the annunciator panels lost.

B. Contact I&C to verify the source of power to the annunciator panel per the following table.

DPN 1HA2 04		
XPN6091	XCP-601, 604, 606, 608, 622, 629, 636	13.7% MCB ANNUNCIATORS
13.7% MCB ANNUNCIATORS TOTAL		

DPN 1HX1 02		
XPN6092	XCP-603, 628, 630, 631, 632, 633	20.3% MCB ANNUNCIATORS
XPN6093	XCP-625, 627, 634, 635, 638	18.3% MCB ANNUNCIATORS
38.6% MCB ANNUNCIATORS TOTAL		

DPN 1HB 02		
XPN6094	XCP-602, 605, 607, 609, 623, 637	12.4% MCB ANNUNCIATORS
12.4% MCB ANNUNCIATORS TOTAL		

DPN 1HX1 01		
XPN6095	XCP-610, 611, 612, 613, 614, 615, 616	18.3% MCB ANNUNCIATORS
XPN6096	XCP-617, 618, 619, 620, 621, 624, 626	17.0% MCB ANNUNCIATORS
35.3% MCB ANNUNCIATORS TOTAL		

C. Determine if the actions taken in response to a failed annunciator are subject to OAP-113.1, Operator Workaround and Dark Board Program.

SURVEILLANCE ANNUNCIATORS

NOTE

This matrix is to aid in identifying failed annunciators which have surveillance requirements. The applicable ARP shoud be utilized when performing the surveillance.

PANEL	WINDOW	SURVEILLANCE	ATTACHMENT
XCP-615	2-5	GTP-702	IV.G
XCP-615	3-3	GTP-702	VI.V-3
XCP-615	3-6	OAP-106.1 STP-114.002	RB SUMP LEVEL N/A
XCP-620	1-5	GTP-702	IV.E
XCP-620	1-6	GTP-702	IV.E
XCP-620	2-4	GTP-702	IV.D
XCP-620	2-5	GTP-702	IV.B
XCP-620	4-2	GTP-702	VI.L-2
XCP-620	4-3	GTP-702	VI.L-2
XCP-621	1-1	GTP-702	IV.C
XCP-632	6-5	GTP-702 OAP-106.1 OAP-100.6 OAP-107.1	IV.B, IV.D, IV.E, VI.KK, VI.NN RB TEMPS RB SUMP LEVEL MW/KV/MVARS GENERIC LOG SR NI OPERATION AT LICENSED LIMIT RESTORATION OF IPCS FUNCTIONS
XCP-638	1-4	OAP-106.1	MW/KV/MVARS
XCP-638	2-4	OAP-106.1	MW/KV/MVARS

QUESTION USAGE:

MODIFIED FROM AOPS 500

REVISION HISTORY

Rev. 0 Submitted by RJ
Ops Review: Nick O'Kimosh
Approved: 6/14/13 Rick Garner

DISTRACTOR ANALYSIS:

In order to answer this question correctly, the applicant must determine the total percentage of failed annunciators and surveillance activity for a failed annunciator using an excerpt from AOP-100.5, LOSS OF MAIN CONTROL BOARD ANNUNCIATORS.

A. CORRECT; In accordance with AOP-100.5, Attachment 2, a loss of XPN-6096 results in a loss of 17% of all annunciators. Per attachment 3, GTP-702, Attachment IV.D, is a surveillance associated with annunciator 2-4 on XCP-620.

B. The first part is plausible because XPN-6095 supplies 18.3% annunciators and is one line above where the correct answer is found on attachment 2. Per attachment 3, GTP-702, Attachment IV.D, is a surveillance associated with annunciator 2-4 on XCP-620.

   Incorrect because 17% of annunciators have been lost.

C. CORRECT. In accordance with AOP-100.5, Attachment 2, a loss of XPN-6096 results in a loss of 17% of all annunciators. The second part is plausible because if the candidate reads XCP-615 as a lost annunciator panel one line above the correct line on Attachment 2, then it may be determined in error that GTP-702, Attachment IV.G, is a required surveillance on attachment 3.

   Incorrect because GTP-702, Attachment IV.G is not required.

D. The first part is plausible because XPN-6095 supplies 18.3% annunciators and is one line above where the correct answer is found on attachment 2. The second part is plausible because if the candidate reads XCP-615 as a lost annunciator panel one line above the correct line on Attachment 2, then it may be determined in error that GTP-702, Attachment IV.G, is a required surveillance on attachment 3.

   Incorrect because 17% of annunciators have been lost and GTP-702, Attachment IV.G is not required.

K/A: G2.4.32 K/A: G2.4.32 Knowledge of operator response to loss of all annunciators.

K/A Match: the KA is matched because it requires the candidate to determine the percentage of lost annunciators for a loss of a DC Power panel.

Selection criteria: MODIFIED FROM AOPS 500

Tier: 3 **Group:**
Importance Rating: RO 3.6 SRO 4.0
Technical Reference: **AOP-110.5, LOSS OF MAIN CONTROL BOARD ANNUNCIATORS**

Proposed references to be provided to applicants during examination:

AOP-100.5, LOSS OF MAIN CONTROL BOARD ANNUNCIATORS, ATTACHMENTS 2 and 3

Learning Objective: AOP-110.5 04. Given a set of plant conditions, DETERMINE the following using AOP-100.5, Attachment 2: a. Total number of inoperable annunciators due to a power loss.

Question Cognitive Level: **Memory or Fundamental Knowledge** _____

Comprehension or Analysis __X__

10 CFR Part 55 Content: 41(b)(10) Administrative, normal, abnormal, and emergency operating procedures for the facility.

SRO Justification: N/A

NRC Form ES-401-9 Comments:

Facility Response:

Comments;

67. EPPS/FEPS 064

Given the following plant conditions:

- LOCA occurred two (2) hours ago.
- The Emergency Response Organization has been activated.
- All Auxiliary Operators (AOs) have been released to the OSC.
- Valves must be closed locally as directed by Emergency Operating Procedures.

Which ONE of the following describes how AOs are dispatched to perform field activities in accordance with EPP-028, OPERATIONS SUPPORT CENTER?

A. ✔ The Control Room notifies the Lead Operator who then dispatches the AOs.

B. The Control Room dispatches AOs directly and notifies the Lead Operator.

C. The Operations Supervisor in the TSC dispatches the AOs directly.

D. The Control Room dispatches AOs directly and notifies the OSC Logistics Coordinator.

QUESTION USAGE:

NEW for 2013 NRC

QUESTION HISTORY:

Rev. 0 submitted by RJ
Ops Review: Nick O'Kimosh
Approved: 6/14/13 Rick Garner

DISTRACTOR ANALYSIS:

In order to answer this question correctly, the applicant must recall how AOs are directed to perform field activities after the Emergency Response Organization has been activated.

A. CORRECT; Once the OSC is manned and the Lead AO is established, there should be no further redirects of field personnel from the Control Room. The Lead AO communicates with the field teams.

B. Plausible because the Control Room can communicate with field personnel but will not redirect them.

   Incorrect because the Control Room does not redirect field personnel after the OSC is established.

C. Plausible because contacting the Operations Supervisor in the TSC is another option for redirecting field personnel. The control room will communicate with the OS who will then communicate to the OSC to dispatch AOs.

   Incorrect because the Operations Supervisor does not dispatch AOs directly.

D. Plausible because the OSC Logistics Coordinator assists OSC Supervision with the tracking of field personnel.

   Incorrect because the OSC logistical coordinator does not dispatch AOs.

K/A: G2.4.37 1K/A: G2.4.37 Knowledge of the lines of authority during implementation of the emergency plan.

K/A Match: the KA is matched because it requires the candidate to recall how AOs are directed to perform field activities after the Emergency Response Organization has been activated.

Selection criteria; NEW

Tier: 3 **Group:**
Importance Rating: RO 3.0 SRO 4.1
Technical Reference: **EPP-028, OPERATIONS SUPPORT CENTER**

Proposed references to be provided to applicants during examination: None

Learning Objective: EPP-ILO-OVERVIEW 23 DESCRIBE the restrictions on redirecting Field Teams.

Question Cognitive Level: **Memory or Fundamental Knowledge** **__X__**

Comprehension or Analysis **_____**

10 CFR Part 55 Content: 41(b)(10) Administrative, normal, abnormal, and emergency operating procedures for the facility.

SRO Justification: N/A

NRC Form ES-401-9 Comments:

Facility Response:

Comments;

68. AOPS 024

Given the following plant conditions:

- Mode 5.
- RCS Drain Down to Mid Loop is in progress.
- RHR Pump A is in service.
- During the drain down, RHR amps and discharge pressure begin fluctuating erratically.
- The crew enters AOP-115.1, RHR PUMP VORTEXING.
- The drain-down is stopped.

Which ONE of the following is the **first** action that will be performed in accordance with AOP-115.1?

A. Go to AOP-115.5, LOSS OF RHR WITH RCS NOT INTACT (MODES 5 AND 6).

B. Initiate monitoring of RCS heatup.

C. Reduce RHR flow.

D. Raise RCS level.

QUESTION USAGE:

BANK QUESTION

QUESTION HISTORY:

Revised by RJ to restucture for submittal.
Ops Review: Nick O'Kimosh
Approved: 6/14/13 Rick Garner

DISTRACTOR ANALYSIS:

In order to answer this question correctly, the applicant must determine the first action performed upon entry into AOP-115.1, RHR PUMP VORTEXING.

A. Plausible because the note before step 1 states that if it is determined that a loss of RHR exists then the operators should transfer to AOP-115.5, LOSS OF RHR WITH RCS NOT INTACT (MODES 5 AND 6).

   Incorrect because the operator has not yet taken action to stabilize RHR flow and it cannot yet be assessed that RHR flow is totally lost.

B. Plausible because monitoring heatup is the second step in AOP-115.1

   Incorrect because monitoring heatup is not the first step.

C. CORRECT. The first step in AOP-115.1 is to reduce RHR flow to determine if flow can be stabilized.

D. Plausible because a low level is one reason why vortexing may have occurred and RCS level is checked in step 3.

   Incorrect because raising RCS level is not the first step of AOP-115.1.

K/A: G2.4.9 K/A: G2.4.9 Knowledge of low power/shutdown implications in accident (e.g., loss of coolant accident or loss of residual heat removal) mitigation strategies.

K/A Match: the KA is matched because it requires the candidate to recall the first action performed upon entry into AOP-115.1, RHR PUMP VORTEXING.

Selection criteria; BANK
SELECTED FROM A SEARCH OF AOP QUESTIONS CONTAINING "115" FOR KA MATCH AND ATTRIBUTES.

Tier: 3 **Group:**
Importance Rating: RO 3.8 SRO 4.2
Technical Reference: **AOP-115.1, RHR PUMP VORTEXING**

Proposed references to be provided to applicants during examination: None

Learning Objective: AOP-115.1 03 SUMMARIZE the immediate operator actions of AOP-115.1.

Question Cognitive Level: **Memory or Fundamental Knowledge** **__X__**

Comprehension or Analysis **_____**

10 CFR Part 55 Content: 41(b)(10) Administrative, normal, abnormal, and emergency operating procedures for the facility.

SRO Justification: N/A

NRC Form ES-401-9 Comments:

Facility Response:

Comments;

69. EOPS 814

Given the following plant conditions:

Initial conditions:

- 100% power.
- An automatic reactor trip and safety injection occurred.
- "A" Steam Generator was determined to be faulted and isolated in accordance with procedure.
- EOP-1.2, SI TERMINATION, in progress.

Current conditions:

- "B" Steam Generator is faulted.
- "C" Steam Generator is ruptured.
- EOP-1.5, REDIAGNOSIS, has been entered.

Which ONE of the following identifies the procedure that will be identified for use in accordance with EOP-1.5?

A. EOP-2.0, LOSS OF SECONDARY OR REACTOR COOLANT.

B. ✔ EOP-3.0, FAULTED STEAM GENERATOR ISOLATION.

C. EOP-4.0, STEAM GENERATOR TUBE RUPTURE.

D. EOP-4.2, SGTR WITH LOSS OF REACTOR COOLANT: SUBCOOLED RECOVERY DESIRED.

QUESTION USAGE:

NEW for 2013 NRC

QUESTION HISTORY:

Rev. 0 submitted by RJ
Ops Review: Nick O'Kimosh
Approved: 6/14/13 Rick Garner

DISTRACTOR ANALYSIS:

In order to answer this question correctly, the applicant must identify the correct EOP that will be indicated for use in EOP-1.5, REDIAGNOSIS, given a combination of ruptured and faulted generators.

A. Plausible because EOP-2.0, LOSS OF SECONDARY OR REACTOR COOLANT is a transfer from EOP-1.5 if no ruptured or faulted generators exist. This could be selected if the candidate does not know the order in which symptoms are checked.

   Incorrect because EOP-2.0 is not the correct transfer.

B. CORRECT; EOP-3.0, FAULTED STEAM GENERATOR ISOLATION must be used to isolate a generator that has not been previously isolated and checks for symptoms of a faulted generator are performed first in EOP-1.5..

C. Plausible because EOP-4.0, STEAM GENERATOR TUBE RUPTURE is a transfer from EOP-1.5 and symptoms of a ruptured generator are checked after checks for faulted generators. This could be selected if the candidate does not know the order in which symptoms are checked.

   Incorrect because EOP-4.0 is not the correct transfer.

D. Plausible because EOP-4.2, SGTR WITH LOSS OF REACTOR COOLANT: SUBCOOLED RECOVERY DESIRED is a procedure used when a ruptured generator is also faulted.

   Incorrect because EOP-4.2 is not the correct transfer.

K/A: WE01EA2.1 K/A: E01 Rediagnosis EA2:Ability to determine and interpret the following as they apply to the (Reactor Trip or Safety Injection Rediagnosis) 2.1: Facility conditions and selection of appropriate procedures during abnormal and emergency operations.

K/A Match: the KA is matched because it requires the candidate to recall the order in which symptoms are checked in EOP-1.5 and the correct transfer after diagnosis of a faulted steam generator.

Selection criteria; NEW

Tier: 1 **Group:** 2
Importance Rating: RO 3.2 SRO 4.0
Technical Reference: **EOP-1.5, REDIAGNOSIS**

Proposed references to be provided to applicants during examination: None

Learning Objective: Eop-1.5 06 APPLY EOP-1.5 by predicting a discrete path through EOP-1.5 given a set of plant conditions

Question Cognitive Level: **Memory or Fundamental Knowledge** __X__

Comprehension or Analysis _____

10 CFR Part 55 Content: 41(b)(10) Administrative, normal, abnormal, and emergency operating procedures for the facility.

SRO Justification: N/A

NRC Form ES-401-9 Comments:

Facility Response:

Comments;

70. EOPS 836

Given the following plant conditions:

- Small Break LOCA occurred.
- EOP-2.1, POST-LOCA COOLDOWN AND DEPRESSURIZATION, in progress.
- "A" RCP is running **only**.
- Both Charging Pumps are running in **injection** mode.
- Operators have been directed by EOP-2.1 to depressurize the RCS to refill the Pressurizer.

Which ONE of the following will provide the most effective depressurization?

A. Open PVT-8145, PZR SPRAY FR CVCS.

B. Open PCV 444C, PZR SPRAY **only**.

C. Open PCV 444D, PZR SPRAY **only**.

D. Open **both** PCV 444D, PZR SPRAY and PCV 444C, PZR SPRAY.

QUESTION USAGE:

NEW for 2013 NRC

QUESTION HISTORY:

Rev. 0 submitted by RJ
Ops Review: Nick O'Kimosh
Approved: 6/14/13 Rick Garner

DISTRACTOR ANALYSIS:

In order to answer this question correctly, the applicant must determine the most effective depressurization method with only one RCP running.

A. Plausible because Auxiliary Spray can be used for depressurization.

   Incorrect because Auxiliary Spray cannot be used for depressurization while CVCS is still in injection mode since pressure cannot be developed for spray with injection valves open.

B. Plausible because PCV-444C would be the most effective method with "C" RCP running.

   Incorrect because opening PCV-444C is less effective than opening PCV-444D with "A" RCP running.

C. CORRECT. With "A" RCP running, PCV-444D provides the most effective spray flow.

D. Plausible because if all RCPs are running, opening both PCV-444C and PCV-444D will provide the most effective spray flow. With only one RCP running, the spray valve associated with the inactive loop must remain shut to prevent robbing flow from the valve from an active loop.

   Incorrect because opening both PCV-444C and PCV-444D is less effective than opening PCV-444D only.

K/A: WE03EK3.3 K/A: E03 LOCA Cooldown and Depressurization EK3: Knowledge of the reasons for the following responses as they apply to the (LOCA Cooldown and Depressurization) 3.3: Manipulation of controls required to obtain desired operating results during abnormal, and emergency situations.

K/A Match: the KA is matched because it requires the candidate to identify an effective method to depressurize the RCS while in EOP-2.1, POST-LOCA COOLDOWN AND DEPRESSURIZATION.

Selection criteria; NEW

Tier: 1 **Group:** 2
Importance Rating: RO 3.9 SRO 3.9
Technical Reference: **AB-2, REACTOR COOLANT SYSTEM**
EOP-2.1, STEP DEVIATION DOCUMENT

Proposed references to be provided to applicants during examination: None

Learning Objective: AB-2-07 DESCRIBE the normal operation of the following Reactor Coolant System Components, including component types and applicable setpoints:10. Pressurizer Spray Control Valves

Question Cognitive Level: **Memory or Fundamental Knowledge** _____

Comprehension or Analysis __**X**__

10 CFR Part 55 Content: 41(b)(10) Administrative, normal, abnormal, and emergency operating procedures for the facility.

SRO Justification: N/A

NRC Form ES-401-9 Comments:

Facility Response:

Comments;

71. EOPS 798

Given the following plant conditions:

- A LOCA outside the RB has occurred.
- The crew is performing actions as directed by EOP-2.5, LOCA OUTSIDE CONTAINMENT.
- RWST level 87%, decreasing.
- RCS pressure 1470 psig, stable.
- Pressurizer level 0%

Which ONE of the following describes the action(s) that will be used **first** in an attempt to isolate the break and the indication that will be used to determine if the action was successful in accordance with EOP-2.5?

A. ✔ Close MVG-8888A, RHR LP A TO COLD LEGS **only** then check RCS pressure increasing.

B. Close MVG-8888A, RHR LP A TO COLD LEGS **only** then observe Pressurizer level return on scale.

C. Close **both** MVG-8888A, RHR LP A TO COLD LEGS and MVG-8888B, RHR LP B TO COLD LEGS simultaneously, then check RCS pressure increasing.

D. Close **both** MVG-8888A, RHR LP A TO COLD LEGS and MVG-8888B, RHR LP B TO COLD LEGS simultaneously, then observe Pressurizer level return on scale.

QUESTION USAGE:

MODIFIED FROM EOPS 552

QUESTION HISTORY:

Rev. 0 submitted by RJ
Ops Review: Nick O'Kimosh
Approved: 6/14/13 Rick Garner

DISTRACTOR ANALYSIS:

In order to answer this question correctly, the applicant must recall a portion of the RHR system that is isolated while attempting to isolate a leak outside of containment and a parameter that can be monitored to determine effectiveness.

A. CORRECT; MVG-8888A is closed first and then RCS pressure is checked to determine if the leak has been isolated.

B. The first part is plausible because MVG-8888A is closed first. The second part is plausible because pressurizer level will return on scale if the leak is isolated and injection recovers RCS inventory. Pressurizer level is used in various EOPs such as EOP-2.0, EOP-3.0 and EOP-4.0 to determine if SI can be terminated based on loss of coolant within the capacity of normal charging.

   Incorrect because pressurizer level is not used in EOP-2.5 to monitor the effectiveness of isolation actions.

C. The first part is plausible because both MVG-8888A and MVG-8888B are closed sequentially and closing both valves would isolate the leak if present in either line. This would also secure low head injection which is not desired. The second part is correct; RCS pressure is checked to determine if the leak has been isolated.

   Incorrect because MVG-8888A and MVG-8888B are not closed simultaneously.

D. The first part is plausible because both MVG-8888A and MVG-8888B are closed sequentially and closing both valves would isolate the leak if present in either line. This would also secure low head injection which is not desired. The second part is plausible because pressurizer level will return on scale if the leak is isolated and injection recovers RCS inventory. Pressurizer level is used in various EOPs such as EOP-2.0, EOP-3.0 and EOP-4.0 to determine if SI can be terminated based on loss of coolant within the capacity of normal charging.

   Incorrect because MVG-8888A and MVG-8888B are not closed simultaneously and pressurizer level is not used in EOP-2.5 to monitor the effectiveness of isolation actions.

K/A: WE04EA2.2 K/A: E04 LOCA Outside Containment EA2. Ability to determine and interpret the following as they apply to the (LOCA Outside Containment) 2.2: Adherence to appropriate procedures and operation within the limitations in the facility's license and amendments

K/A Match: K/A is met because candidate must know the general actions contained in EOP-2.5, LOCA OUTSIDE CONTAINMENT and the indication (pressure) that will show that the remedial action of isolating the leak has corrected the condition.

Selection criteria: MODIFIED FROM EOPS 552

Tier: 1 **Group:** 1
Importance Rating: RO 3.6 SRO 4.2
Technical Reference: **EOP-2.5, LOCA OUTSIDE CONTAINMENT**

Proposed references to be provided to applicants during examination: None

Learning Objective: EOP-2.5 03. STATE the major action categories of EOP-

EOP-2.5 04. STATE the bases or reasons for each action contained in EOP-2.5. This should include, but not be limited to, the following: a. RCS pressure behavior for a spectrum of RCS breaks Include both the High Level Actions and Alternative Actions .

Question Cognitive Level: **Memory or Fundamental Knowledge** **__X__**

Comprehension or Analysis _____

10 CFR Part 55 Content: 41(b)(10) Administrative, normal, abnormal, and emergency operating procedures for the facility.

SRO Justification: N/A

NRC Form ES-401-9 Comments:

Facility Response:

Comments;

72. EOPS 825

Given the following plant conditions:

- **All** Feedwater pumps tripped.
- **All** EFW pumps failed to start.
- EOP-15.0, LOSS OF SECONDARY HEAT SINK in progress.
- **All** RCPs were stopped 2 minutes ago.
- Pressurizer PORVs have opened at setpoint and then re-closed twice in the past ONE (1) minute.
- RCS Pressure 2330 psig, increasing.
- Core Exit Thermocouples 565°F, increasing.
- RCS THOT 565°F, increasing.
- RCS TCOLD 550°F, stable.
- Steam Generator pressures 900 psig, stable.
- Steam Generator WR levels 24%, decreasing.

Which ONE of the following describes the purpose for tripping the RCPs and the action required for the current conditions?

A. RCPs are tripped to reduce heat input to the RCS;
Implement steps to establish bleed and feed cooling.

B. ✔ RCPs are tripped to reduce heat input to the RCS;
Continue attempts to restore feedwater.

C. RCPs are tripped to reduce the amount of RCS inventory loss;
Implement steps to establish bleed and feed cooling.

D. RCPs are tripped to reduce the amount of RCS inventory loss;
Continue attempts to restore feedwater.

QUESTION USAGE:

NEW for 2013 NRC

QUESTION HISTORY:

Rev. 0 submitted by RJ
Ops Review: Nick O'Kimosh
Approved: 6/14/13 Rick Garner

DISTRACTOR ANALYSIS:

In order to answer this question correctly, the applicant must recall the reason tripping RCPs during a loss of heat sink and evaluate steam generator levels, core temperatures and core delta-T and determine that bleed and feed is not required.

A. The first part is correct, RCPs are tripped to remove heat input from the RCS. The second part is plausible because PORVs have lifted and core exit temperatures are increasing and the caution prior to step 4 states the bleed and feed should be initiated if pressure is greater than 2330 psig due to a loss of secondary heat sink.

   Incorrect because the EOP-15.0 (FR-H.1) basis discusses that this response can occur shortly after RCPs have been tripped as T_{HOT} temperatures rise to establish natural circulation. If delta-T across the core is present, it can be assumed that heat sink is still present.

B. CORRECT; RCPs are tripped to remove heat input from the RCS and with WR Steam generator levels are still greater than 12% and RCS pressure is not high due to a loss of secondary heat sink, efforts should continue to restore feedwater..

C. The first part is plausible because the RCPs are tripped to reduce inventory loss during a small break LOCA and PORVs have lifted. The second part is plausible because PORVs have lifted and core exit temperatures are increasing and the caution prior to step 4 states the bleed and feed should be initiated if pressure is greater than 2330 psig due to a loss of secondary heat sink.

   Incorrect because RCPs are not tripped in EOP-15.0 to reduce inventory loss and criteria are not met to establish bleed and feed cooling.

D. The first part is plausible because the RCPs are tripped to reduce inventory loss during a small break LOCA and PORVs have lifted. The second part is correct; WR Steam generator levels are still greater than 12% and RCS pressure is not high due to a loss of secondary heat sink so efforts should continue to restore feedwater.

   Incorrect because RCPs are not tripped in EOP-15.0 to reduce RCS inventory loss.

K/A: WE05EK2.2 K/A: E05 Loss of Secondary Heat Sink EK2. Knowledge of the interrelations between the (Loss of Secondary Heat Sink) and the following: 2.2: Facility's heat removal systems, including primary coolant, emergency coolant, the decay heat removal systems, and relations between the proper operation of these systems to the operation of the facility.

K/A Match: the KA is matched because it requires the candidate to recall why RCPs are tripped in EOP-15.0 and to evaluate conditions to determine if establishing bleed and feed cooling is required.

Selection criteria; NEW

Tier: 1 **Group:** 1
Importance Rating: RO 3.9 SRO 4.2
Technical Reference: **EOP-15.0, RESPONSE TO A LOSS OF SECONDARY HEAT SINK.**
FR-H.1 BASES

Proposed references to be provided to applicants during examination: None

Learning Objective: EOP-15.0 04 STATE the bases or reasons for each action contained in EOP-15.0. This should include, but not be limited to, the following: Timely use of the RHR System as an Alternate heat sink Effect of RCP trip on RCS temperature and pressure Importance of timely bleed and feed initiation Indications of secondary heat sink degradation

Question Cognitive Level: **Memory or Fundamental Knowledge** _____

Comprehension or Analysis __X__

10 CFR Part 55 Content: 41(b)(10) Administrative, normal, abnormal, and emergency operating procedures for the facility.

SRO Justification: N/A

NRC Form ES-401-9 Comments:

Facility Response:

Comments;

73. EOPS 826

Given the following plant conditions:

- A Small break LOCA occurred.
- A Steam Generator Tube Rupture subsequently occurred.
- EOP-4.3, SGTR WITH LOSS OF REACTOR COOLANT: SATURATED RECOVERY, in progress.
- MVG-8801A(B) HI HEAD TO COLD LEG INJ are both shut.
- Operators have intentionally depressurized the RCS to obtain 0°F subcooling.
- All RCPs are **off**.

Which ONE of the following identifies a parameter that operators will monitor to determine if injection should be **reinitiated** in accordance with the Reference Page of EOP-4.3?

A. Pressurizer level.

B. RVLIS Narrow Range Level.

C. RVLIS Wide Range Level.

D. RCS Hot leg temperature.

USEAGE

NEW FOR 2013 NRC

REVISION HISTORY

Rev. 0 submitted by RJ
Ops Review: Nick O'Kimosh
Approved: 6/14/13 Rick Garner

DISTRACTOR ANALYSIS

In order to answer this question correctly, the applicant must identify a parameter that is used to indicate the need to re-initiate Safety Injection while in .

A. Plausible because pressurizer level is monitored for re-initiation criteria in EOP-4.2 and other EOPs.

   Incorrect because pressurizer level is not used in EOP-4.3, SGTR WITH LOSS OF REACTOR COOLANT: SATURATED RECOVERY.

B. CORRECT; RVLIS NR level is monitored for re-initiation criteria in EOP-4.3.

C. Plausible because NR RVLIS is used to monitor for re-initiation criteria in EOP-4.3.

   Incorrect because WR RVLIS is not used in EOP-4.3, SGTR WITH LOSS OF REACTOR COOLANT: SATURATED RECOVERY.

D. Plausible because Core Exit Thermocouples are used to monitor for re-initiation criteria in EOP-4.3.

   Incorrect because Hot leg temperatures are not used in EOP-4.3, SGTR WITH LOSS OF REACTOR COOLANT: SATURATED RECOVERY.

K/A: WE07EK1.2 K/A: E07 Saturated Core Cooling EK1: Knowledge of the operational implications of the following concepts as they apply to the (Saturated Core Cooling) 1.2: Normal, abnormal and emergency operating procedures associated with (Saturated Core Cooling).

K/A Match: the KA is matched because it requires candidate to recall a parameter that is used to determine if SI should be re-initiated when the RCS is saturated in EOP-4.3, SGTR WITH LOSS OF REACTOR COOLANT: SATURATED RECOVERY DESIRED.

Selection criteria; NEW

Tier: 1 **Group:** 2
Importance Rating: RO 3.1 SRO 3.6
Technical Reference: **EOP-4.3, SGTR WITH LOSS OF REACTOR COOLANT: SATURATED RECOVERY DESIRED**

Proposed references to be provided to applicants during examination: None

Learning Objective: EOP-4.3 05. RELATE each CAUTION and NOTE in EOP-4.3 to its corresponding step by identifying the bases or reasons for the CAUTION or NOTE. This should include, but not be limited to, the following: Reference page information.

Question Cognitive Level: **Memory or Fundamental Knowledge** **__X__**

Comprehension or Analysis _____

10 CFR Part 55 Content: 41(b)(10) Administrative, normal, abnormal, and emergency operating procedures for the facility.

SRO Justification: N/A

NRC Form ES-401-9 Comments:

Facility Response:

Comments;

74. EOPS 820

Given the following plant conditions:

- Small break LOCA occurred.
- Neither RHR pump is available.
- EOP-2.4, LOSS OF EMERGENCY COOLANT RECIRCULATION, in progress.
- RCS cooldown in progress.
- Operators are intentionally minimizing subcooling by depressurizing as directed in EOP-2.4.

Which ONE of the following describes the purpose for depressurizing to the minimum specified subcooling in accordance with EOP-2.4?

A. ✔ Lower break flow.

B. Refill the pressurizer.

C. Increase charging flow.

D. Prevent thermal shock.

QUESTION USAGE:

NEW for 2013 NRC

QUESTION HISTORY:

Rev. 0 submitted by RJ
Ops Review: Nick O'Kimosh
Approved: 6/14/13 Rick Garner

DISTRACTOR ANALYSIS:

In order to answer this question correctly, the applicant must recall that depressurizing the RCS is a major action that reduces break flow during a loss of emergency recirculation.

A. CORRECT; As stated in the bases for EOP-2.4, LOSS OF EMERGENCY COOLANT RECIRCULATION, the purpose of RCS depressurization is to reduce break flow.

B. Plausible because EOPs such as EOP-2.1 and EOP-4.0 depressurize the RCS to refill the pressurizer.

   Incorrect because the purpose of the depressurization is not to refill the pressurizer.

C. Plausible because steam generators are depressurized in EOP-14 series procedures to provide injection. Conditions could exist in which RHR pumps are not available but charging pumps are still running. Since the Charging pumps are centrifugal pumps, decreasing pressure could increase charging flow.

   Incorrect because the subcooling is not minimized to increase charging flow.

D. Plausible because some EOPs such as EOP-4.0 cooldown at the maximum available rate (without a cooldown limit) and because EOP-16.0 depressurizes to minimize subcooling to reduce the challenge to RCS integrity via cold over-pressurization and thermal shock.

   Incorrect because the purpose of the depressurization is not to prevent thermal shock.

K/A: WE11EK3.2 K/A: E11 Loss of Emergency Coolant Recirculation EK3. Knowledge of the reasons for the following responses as they apply to the (Loss of Emergency Coolant Recirculation) 3.2: Normal, abnormal and emergency operating procedures associated with (Loss of Emergency Coolant Recirculation).

K/A Match: the KA is matched because it requires the candidate to recall the reason for depressurizing the RCS to minimize subcooling while in EOP-2.4, LOSS OF EMERGENCY COOLANT RECIRCULATION.

Selection criteria: NEW

Tier: 1 **Group:** 1
Importance Rating: RO 3.5 SRO 4.0
Technical Reference: **EOP-2.5, LOSS OF EMERGENCY COOLANT RECIRCULATION**
EOP-16.0, RESPONSE TO IMMINENT PRESSURIZED THERMAL SHOCK
EOP BASES FOR ECA-1.1, FR-C.1

Proposed references to be provided to applicants during examination: None

Learning Objective: EOP-2.4 03. STATE the major action categories of EOP-2.4

Question Cognitive Level: **Memory or Fundamental Knowledge** **__X__**

Comprehension or Analysis **_____**

10 CFR Part 55 Content: 41(b)(10) Administrative, normal, abnormal, and emergency operating procedures for the facility.

SRO Justification: N/A

NRC Form ES-401-9 Comments:

Facility Response:

Comments;

75. EOPS 802

Given the following plant conditions:

Time 10:00:

- 100% power.
- Large break LOCA occurred.
- Significant fuel damage occurred.
- IPCS is **not available.**

Time 10:30

- RB Pressure peaked at 37 psig and then began to decrease.

Time 10:40

- RM-G7 and RM-G18 peaked at 10,000 R/hr, increasing and then began to decrease.

Time 12:40:

- RM-G7 900 R/hr, decreasing.
- RM-G18 950 R/hr, decreasing.
- RB pressure 2 psig, decreasing.

Which ONE of the following describes whether Adverse Containment values in the EOPs must be used and, if so, the reason?

A. Adverse containment values are **not** required.

B. Adverse containment values are required for the duration of the accident. The limit for integrated radiation dose to instruments has been exceeded.

C. Adverse containment values are required until an Engineering evaluation is complete. An evaluation of integrated radiation dose to the instruments is required.

D. Adverse containment values are required until an Engineering evaluation is complete. An evaluation of instrument damage due to radiation and pressure is required.

QUESTION USAGE:

NEW FOR 2013 NRC

REVISION HISTORY

Submitted by RJ
Ops Review: Nick O'Kimosh
Approved: 6/14/13 Rick Garner

DISTRACTOR ANALYSIS:

In order to answer this question correctly, the applicant must identify that IPCS is not available and that RB radiation has exceeded 1000R/ hr and determine that Adverse Containment vlaues mut be used in the EOPs until an engineering evaluation has been performed.

A. Plausible because RB pressure is less than 3.6 psig and RB radiation is less than 1000R/ hr. The candidate may assume in error that Adverse Containment values are not required.

   Incorrect because when 1000 R/ hr is exceeded and IPCS is not available, Adverse values must be used until an engineering evaluation is done to determine integrated dose.

B. Plausible because the candidate may assume that with the 1000R/ hr threshold exceeded that limits are exceeded for integrated dose.

   Incorrect because integrated dose limits have not been exceeded and normal values may be used once an engineering evaluation is complete.

C. CORRECT. Normal values may be used once an engineering evaluation is complete.

D. Plausible because an evalaution of damage is not necessary. Engineering will determine if the integrated dose has been exceeded.

   Incorrect because the engineering evaluation for exceeding the radiation thresholds does not evaluate damage.

K/A: WE16EK3.2 K/A: E16 High Containment Radiation EK3: Knowledge of the reasons for the following responses as they apply to the (High Containment Radiation) 3.2:Normal, abnormal and emergency operating procedures associated with (High Containment Radiation).

K/A Match: the KA is matched because it requires the candidate to determine the proper use of instrumentation after high radation conditions in the RB.

Selection criteria; NEW

Tier: 1 **Group:** 2
Importance Rating: RO 2.9 SRO 3.3
Technical Reference: **OAP-103.4, AOP/ EOP USER'S GUIDE.**

Proposed references to be provided to applicants during examination: None

Learning Objective: OAP-103.4 06 Define Adverse Containment and explain its implications.

Question Cognitive Level: **Memory or Fundamental Knowledge** **__X__**

Comprehension or Analysis **_____**

10 CFR Part 55 Content: 41(b)(10) Administrative, normal, abnormal, and emergency operating procedures for the facility.

SRO Justification: N/A

NRC Form ES-401-9 Comments:

Facility Response:

Comments;

You have completed the test!