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**Date:** 11-Dec-05 12:36:33 PM  
**Subject:** SSES December ILO Exam

**!!!!!!!!!!!!!! THINK EXAM SECURITY PLEASE !!!!!!!!!!!!!!!**

This is our seventh submission for the December 2005 ILO exam. These are the four questions that we discussed by telephone last week. A formal ES-401-6 cover sheet is not included with this submission because the four changes are minor and have no substantive impact.

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**!!!!!!!!!!!!!! THINK EXAM SECURITY PLEASE !!!!!!!!!!!!!!!**

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## RO EXAM

# 16

SSES Unit 1 is operating in Mode 1. Which of the following describes the method that provides the highest flow rate of makeup to the Suppression Pool per OP-159-001, Suppression Pool Cleanup System?

- A** Pump the Condensate Storage Tank with the Condensate Transfer Pump to the CORE SPRAY CONDENSATE TRANSFER ISOLATION TO LOOP "B" MINIMUM FLOW LINE 152028.
- B** Gravity drain the Condensate Storage Tank through the Reactor Core Isolation Cooling (RCIC) Pump Casing to the RCIC MIN FLOW TEST LINE HV-149-F019.
- C** Pump the Condensate Storage Tank with the Reactor Core Isolation Cooling (RCIC) Pump to the RCIC MIN FLOW TEST LINE HV-149-F019.
- D** Gravity drain the Condensate Storage Tank through CORE SPRAY CST SUPPLY ISOLATION 152021 and CORE SPRAY PUMP B&D CST SUCTION SUPPLY 152F002B to the Core Spray suction strainers.

## RO EXAM

# 27

Following a loss of coolant accident, the Primary Containment Hydrogen and Oxygen (H<sub>2</sub>O<sub>2</sub>) Analyzers are placed in service per OP-173-001 H<sub>2</sub>O<sub>2</sub> ANALYZER OPERATION DURING EMERGENCY. The following conditions exist:

- Analyzer "A" is aligned to the SUPPRESSION POOL.
- Analyzer "A" O<sub>2</sub> reads 2%.
- Analyzer "A" H<sub>2</sub> reads 9%
  
- Analyzer "B" is aligned to the DRYWELL.
- Analyzer "B" O<sub>2</sub> reads 6%
- Analyzer "B" H<sub>2</sub> reads less than 1%
  
- Sample flow to both analyzers was restored 35 minutes ago.
- Both analyzers are on the 10% range.

Which ONE of the following statements is correct?

All Hydrogen Recombiners, Drywell Coolers and Fans MUST . . .

- A** . . . be Operated to adequately mix the Primary Containment atmosphere.
- B** . . . be Operated to adequately recombine Hydrogen in the Primary Containment atmosphere.
- C** . . . be Shutdown because Hydrogen and Oxygen concentrations are above combustible limits.
- D** . . . be Shutdown because Hydrogen and Oxygen concentrations can NOT be determined.

## RO EXAM

# 30

SSES Unit 1 is at full power. The Feedwater Level Control System (FWLCS) is in 3-Element Average control. Unit 1 High Pressure Coolant Injection (HPCI) inadvertently initiates and injects to the Reactor Pressure Vessel (RPV). Assuming no Operator action, which ONE of the following correctly describes the condition of the plant one minute after HPCI initiates?

- A** RPV Water Level will be LOWER and  
Total Actual Steam Flow will be LOWER and  
Total Indicated Feedwater Flow will be LOWER
- B** RPV Water Level will be LOWER and  
Total Actual Steam Flow will be HIGHER and  
Total Indicated Feedwater Flow will be LOWER
- C** RPV Water Level will be HIGHER and  
Total Actual Steam Flow will be LOWER and  
Total Indicated Feedwater Flow will be HIGHER
- D** RPV Water Level will be HIGHER and  
Total Actual Steam Flow will be HIGHER and  
Total Indicated Feedwater Flow will be LOWER

## RO EXAM

# 57

SSES Unit 1 is in Mode 5 with the Reactor Mode Switch locked in REFUEL. It is necessary to withdraw one Control Rod to support the One-Rod-Out-Interlock surveillance.

Which ONE of the following correctly describes operation of the Rod Worth Minimizer for this activity?

- A** The Rod Worth Minimizer (RWM) is AUTOMATICALLY BYPASSED when the Reactor Mode Switch is NOT in RUN.
- B** The Rod Worth Minimizer (RWM) is MANUALLY BYPASSED by rotating the RWM Keylock Bypass Switch to BYPASS.
- C** The Rod Worth Minimizer (RWM) is AUTOMATICALLY BYPASSED when the Reactor Mode Switch is in REFUEL.
- D** The Rod Worth Minimizer (RWM) permits withdrawal of multiple rods if the Control Room Operator selects "Rod Test" at the RWM Main Display.

## SRO EXAM

# 16

SSES Unit 1 is operating in Mode 1. Which of the following describes the method that provides the highest flow rate of makeup to the Suppression Pool per OP-159-001, Suppression Pool Cleanup System?

- A** Pump the Condensate Storage Tank with the Condensate Transfer Pump to the CORE SPRAY CONDENSATE TRANSFER ISOLATION TO LOOP "B" MINIMUM FLOW LINE 152028.
- B** Gravity drain the Condensate Storage Tank through the Reactor Core Isolation Cooling (RCIC) Pump Casing to the RCIC MIN FLOW TEST LINE HV-149-F019.
- C** Pump the Condensate Storage Tank with the Reactor Core Isolation Cooling (RCIC) Pump to the RCIC MIN FLOW TEST LINE HV-149-F019.
- D** Gravity drain the Condensate Storage Tank through CORE SPRAY CST SUPPLY ISOLATION 152021 and CORE SPRAY PUMP B&D CST SUCTION SUPPLY 152F002B to the Core Spray suction strainers.

## SRO EXAM

# 27

Following a loss of coolant accident, the Primary Containment Hydrogen and Oxygen (H<sub>2</sub>O<sub>2</sub>) Analyzers are placed in service per OP-173-001 H<sub>2</sub>O<sub>2</sub> ANALYZER OPERATION DURING EMERGENCY. The following conditions exist:

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All Hydrogen Recombiners, Drywell Coolers and Fans MUST . . .

- A** . . . be Operated to adequately mix the Primary Containment atmosphere.
- B** . . . be Operated to adequately recombine Hydrogen in the Primary Containment atmosphere.
- C** . . . be Shutdown because Hydrogen and Oxygen concentrations are above combustible limits.
- D** . . . be Shutdown because Hydrogen and Oxygen concentrations can NOT be determined.



## SRO EXAM

# 30

SSES Unit 1 is at full power. The Feedwater Level Control System (FWLCS) is in 3-Element Average control. Unit 1 High Pressure Coolant Injection (HPCI) inadvertently initiates and injects to the Reactor Pressure Vessel (RPV). Assuming no Operator action, which ONE of the following correctly describes the condition of the plant one minute after HPCI initiates?

- A** RPV Water Level will be LOWER and  
Total Actual Steam Flow will be LOWER and  
Total Indicated Feedwater Flow will be LOWER
- B** RPV Water Level will be LOWER and  
Total Actual Steam Flow will be HIGHER and  
Total Indicated Feedwater Flow will be LOWER
- C** RPV Water Level will be HIGHER and  
Total Actual Steam Flow will be LOWER and  
Total Indicated Feedwater Flow will be HIGHER
- D** RPV Water Level will be HIGHER and  
Total Actual Steam Flow will be HIGHER and  
Total Indicated Feedwater Flow will be LOWER

## SRO EXAM

# 57

SSES Unit 1 is in Mode 5 with the Reactor Mode Switch locked in REFUEL. It is necessary to withdraw one Control Rod to support the One-Rod-Out-Interlock surveillance.

Which ONE of the following correctly describes operation of the Rod Worth Minimizer for this activity?

- A** The Rod Worth Minimizer (RWM) is AUTOMATICALLY BYPASSED when the Reactor Mode Switch is NOT in RUN.
- B** The Rod Worth Minimizer (RWM) is MANUALLY BYPASSED by rotating the RWM Keylock Bypass Switch to BYPASS.
- C** The Rod Worth Minimizer (RWM) is AUTOMATICALLY BYPASSED when the Reactor Mode Switch is in REFUEL.
- D** The Rod Worth Minimizer (RWM) permits withdrawal of multiple rods if the Control Room Operator selects "Rod Test" at the RWM Main Display.

**Question Number: 16**

**# 16**

RO

SRO

Question ID: 29577 Origin: New

Memory Level

SSES Unit 1 is operating in Mode 1. Which of the following describes the method that provides the highest flow rate of makeup to the Suppression Pool per OP-159-001, Suppression Pool Cleanup System?

- A** Pump the Condensate Storage Tank with the Condensate Transfer Pump to the CORE SPRAY CONDENSATE TRANSFER ISOLATION TO LOOP "B" MINIMUM FLOW LINE 152028.
- B** Gravity drain the Condensate Storage Tank through the Reactor Core Isolation Cooling (RCIC) Pump Casing to the RCIC MIN FLOW TEST LINE HV-149-F019.
- C** Pump the Condensate Storage Tank with the Reactor Core Isolation Cooling (RCIC) Pump to the RCIC MIN FLOW TEST LINE HV-149-F019.
- D** Gravity drain the Condensate Storage Tank through CORE SPRAY CST SUPPLY ISOLATION 152021 and CORE SPRAY PUMP B&D CST SUCTION SUPPLY 152F002B to the Core Spray suction strainers.

**Question Number: 16**

Answers:

**A**

**B**

**C**

**D**

References Provided to Applicant:

**Justification**

CHOICE (A) - NO  
WRONG: lower flow rate than the correct response.  
VALID DISTRACTOR: normal method of makeup.

CHOICE (B) - NO  
WRONG: Not procedurally authorized.  
VALID DISTRACTOR: would work.

CHOICE (C) - NO  
WRONG: Not procedurally authorized.  
VALID DISTRACTOR: Would work

CHOICE (D) - YES

**References**

Section 3.4 of OP-159 and SP/L-1 specify use of the Suppression Pool Cleanup system.

**Comments and Question Modification History**

**GXJ**

**THF**

**RJC**

**SSES**

Inspired by Peach Bottom 2 September 2002 exam (Question ID 24782)

Gil 09/09/05 - editorial change to stem

CONSIDER CHANGING ALL DISTRACTORS TO: Gravity drain CST through RHR, HPCI, RCIC suction strainers.  
??????????

Gil 09/26/05 - Correct answer is longest. Should balance with other distracters.  
R: added full noun name descriptions to "B" and "C" for HPCI and RCIC. However, unable to perfect length of selections without degrading operational validity of the distracters or creating new psychometric clues.

Todd 09/30/05 - deleted "SSES Unit 1 is operating at full power. A failure of PSV152-F032B, the "B" Core Spray loop pump suction relief valve has lowered Suppression Pool water level. PSV152-F032B has been gagged shut. However, Suppression Pool water level has been below 22 feet for one hour. Per Emergency Operating Procedure EO-100-103, step SP/L-1, the Unit Supervisor has directed you to raise Suppression Pool water level to 23 feet." from stem.

SQ 10/14/05 - OK

SQ 11/14/05 - no comments during validation week.

SQ 11/28/05 - change distractor "A" from Line Fill Pp to Condensate Transfer Pp to conform to SSES configuration. Changed distractor "C" to return to RCIC using the Min Flow line. Added ". . . during Mode 1" to end of stem to emphasize that EOPs are not in use.

SQ 12/02/05 - added "SSES Unit 1 is operation in Mode 1. " to the beginning of the stem and deleted ", during Mode 1 Operation" from the end of the stem. Confirmed that this activity can be done while in Mode 1.

SQ 12/06/05 - changed "operation" to "operating" in the stem.

**NRC K/A System/E/A**

**System** 2950 Low Suppression Pool Water Level  
30

**Number** EA1.06 **RO** 3.4 **SRO** 3.4 **CFR Link** (CFR 41.7, 45.6)

Ability to operate and/or monitor the Condensate storage and transfer (make up to the suppression pool) (Plant-Specific) as it applies to LOW SUPPRESSION POOL WATER LEVEL

**NRC K/A Generic**

**System**

**Number** **RO** **SRO** **CFR Link**

**Question Number: 27**

**# 27**

RO

SRO

Question ID: 29597 Origin: New

Memory Level

Following a loss of coolant accident, the Primary Containment Hydrogen and Oxygen (H<sub>2</sub>O<sub>2</sub>) Analyzers are placed in service per OP-173-001 H<sub>2</sub>O<sub>2</sub> ANALYZER OPERATION DURING EMERGENCY. The following conditions exist:

- Analyzer "A" is aligned to the SUPPRESSION POOL.
- Analyzer "A" O<sub>2</sub> reads 2%.
- Analyzer "A" H<sub>2</sub> reads 9%
  
- Analyzer "B" is aligned to the DRYWELL.
- Analyzer "B" O<sub>2</sub> reads 6%
- Analyzer "B" H<sub>2</sub> reads less than 1%
  
- Sample flow to both analyzers was restored 35 minutes ago.
- Both analyzers are on the 10% range.

Which ONE of the following statements is correct?

All Hydrogen Recombiners, Drywell Coolers and Fans MUST . . .

- A** . . . be Operated to adequately mix the Primary Containment atmosphere.
- B** . . . be Operated to adequately recombine Hydrogen in the Primary Containment atmosphere.
- C** . . . be Shutdown because Hydrogen and Oxygen concentrations are above combustible limits
- D** . . . be Shutdown because Hydrogen and Oxygen concentrations can NOT be determined.

**Question Number: 27**

Answers:

**A**

**B**

**C**

**D**

References Provided to Applicant:

**Justification**

CHOICE (A) - NO

WRONG: EO-100-103 requires that Recombiners, Fans and Coolers be secured when H2>6% AND O2>5% whether the gases are in the same CTMT section or not because migration is possible.

VALID DISTRACTOR: EO-103-113 calls for mixing and recombining for the individual CTMT sections (SP or DW) given the individual conditions.

CHOICE (B) - NO

WRONG: EO-100-103 requires that Recombiners, Fans and Coolers be secured when H2>6% AND O2>5% whether the gases are in the same CTMT section or not because migration is possible.

VALID DISTRACTOR: EO-103-113 calls for mixing and recombining for the individual CTMT sections (SP or DW) given the individual conditions.

CHOICE (C) - YES

Analyzers have been in-service for >30 minutes.

H2 and O2 conditions exceed combustible limits.

CHOICE (D) - NO

WRONG: The Analyzers require 30 minutes to stabilize. They've had 35 minutes.

VALID DISTRACTOR: Applicant may consider the Analyzers inoperable due to the disparate SP and DW readings or because Analyzers have been in service for a short time period. (Note: 1 hour at PB)

**References**

EO-000-103

**Comments and Question Modification History**

**GXJ**

**THF**

**RJC**

**SSES**

Gil 09/26/05 - OK

Todd 09/30/05 - OK

SQ 10/14/05 - moved "All Hydrogen Recombiners, Drywell Fans and Drywell Coolers MUST" to the stem.

SQ 11/14/05 - no comments during validation week.

SQ 12/02/05 - deleted ", Section 2.8," from stem to avoid inference that memory or knowledge of the specific section was expected. Replaced "Drywell Fans and Drywell Coolers" with "Drywell Cooler and Fans" to conform with SSES vernacular and SSC configuration (generally consider a single component - original wording implied two separate components).

SQ 12/06/05 - changed "Cooler" to "Coolers"

**NRC K/A System/E/A**

**System** 5000 High Containment Hydrogen Concentration  
00

**Number** EA2.04 **RO** 3.3 **SRO** 3.3 **CFR Link** (CFR 41.10, 43.5, 45.13)

Ability to determine and / or interpret Combustible limits for wetwell as it applies to HIGH PRIMARY CONTAINMENT HYDROGEN CONCENTRATIONS

**NRC K/A Generic**

**System**

**Number** **RO** **SRO** **CFR Link**

**Question Number: 30**

**# 30**

RO

SRO

Question ID: 29600 Origin: Bank

Memory Level

SSES Unit 1 is at full power. The Feedwater Level Control System (FWLCS) is in 3-Element Average control. Unit 1 High Pressure Coolant Injection (HPCI) inadvertently initiates and injects to the Reactor Pressure Vessel (RPV). Assuming no Operator action, which ONE of the following correctly describes the condition of the plant one minute after HPCI initiates?

- A** RPV Water Level will be LOWER and  
Total Actual Steam Flow will be LOWER and  
Total Indicated Feedwater Flow will be LOWER
- B** RPV Water Level will be LOWER and  
Total Actual Steam Flow will be HIGHER and  
Total Indicated Feedwater Flow will be LOWER
- C** RPV Water Level will be HIGHER and  
Total Actual Steam Flow will be LOWER and  
Total Indicated Feedwater Flow will be HIGHER
- D** RPV Water Level will be HIGHER and  
Total Actual Steam Flow will be HIGHER and  
Total Indicated Feedwater Flow will be LOWER

**Question Number: 30**

Answers:

**A**

**B**

**C**

**D**

References Provided to Applicant:

**Justification**

CHOICE (A) - No  
WRONG: Wrong Level, ST & FW changes  
VALID DISTRACTOR: correct power changes.

CHOICE (B) - No  
WRONG: Wrong RPV Water Level Effect.  
VALID DISTRACTOR: Correct Power, ST and FW changes

CHOICE (C) - No  
WRONG: Reverses the actual FW and ST changes - both affect Level Error.  
VALID DISTRACTOR: Correct Power and Level change

CHOICE (D) - YES  
Steam Flow RISES cause HPCI Turbine Operating.  
Therefore, RPV pressure drops caused by ST rise.  
Pressure drop causes power rises due to colder FW.  
RPV Water Level will rise because FW now > ST. Stable when Level Error offsets Flow Error  
Total Steam Flow will rise because now have additional steam flow path  
Indicated FW Flow lowers to create the Flow Error that offsets Level Error.

**References**

Adopted directly from SQ exam bank. Editorial and format changes only.

**Comments and Question Modification History**

**CXJ**

**THF**

**RJC**

**SSES**

1. Gil 09/26/05 - could not validate with enclosed references. Note for justification "A" Power increases due to lowering freshwater temperature with HPCI injection.

R: Low risk of error because it is drawn from SSES Exam Bank and is theoretical rather than plant specific.

2. Todd 09/30/05 - changed "INITIAL to FINAL" to "INITIAL change from SS"

3. SQ 10/14/05 - moved "Thermal Power will RISE" from choices to stem.

SQ 11/14/05 - no comments during validation week.

SQ 12/02/05 - edited stem and distractors for better readability and accuracy. Specifics: added condition that FWLCS in 3-Element Average to ensure no argument over how FWLCS responds / asked condition of the plant 1 min after HPCI initiates to avoid arguments over ST v. LT changes and conditions / deleted "Thermal power will RIS and . . ." from stem / replaced verbs LOWER and RISE with adjectives be LOWER and be HIGHER / added "Actual" to each choice specify which steam flow.

SQ 12/05/05 - SSES Training Staff confirmed that the simulator response supports the correct answer.

SQ 12/06/05 - changed "(FWLCS) in" to "(FWLCS) is in" in the stem.

**NRC K/A System/E/A**

**System** 2060 High Pressure Coolant Injection System  
00

**Number** A1.01 **RO** 4.3 **SRO** 4.4 **CFR Link** (CFR 41.5 / 45.5)

Ability to predict and/or monitor changes in parameters associated with operating the HIGH PRESSURE COOLANT INJECTION SYSTEM controls including Reactor water level (BWR-2,3,4)

**NRC K/A Generic**

**System**

**Number** **RO** **SRO** **CFR Link**



**Question Number: 57**

**# 57**

RO

SRO

Question ID: 29719 Origin: New

Memory Level

SSES Unit 1 is in Mode 5 with the Reactor Mode Switch locked in REFUEL. It is necessary to withdraw one Control Rod to support the One-Rod-Out-Interlock surveillance.

Which ONE of the following correctly describes operation of the Rod Worth Minimizer for this activity?

- A** The Rod Worth Minimizer (RWM) is AUTOMATICALLY BYPASSED when the Reactor Mode Switch is NOT in RUN.
- B** The Rod Worth Minimizer (RWM) is MANUALLY BYPASSED by rotating the RWM Keylock Bypass Switch to BYPASS.
- C** The Rod Worth Minimizer (RWM) is AUTOMATICALLY BYPASSED when the Reactor Mode Switch is in REFUEL.
- D** The Rod Worth Minimizer (RWM) permits withdrawal of multiple rods if the Control Room Operator selects "Rod Test" at the RWM Main Display.

## Question Number: 57

Answers:

A

B

C

D

References Provided to Applicant:

### Justification

CHOICE (A) - No

WRONG: This is NOT an automatic bypass

VALID DISTRACTOR: Applicant could reasonably believe this to be true given that a "Refuel Position One-Rod-Out" interlock exists.

CHOICE (B) - YES

RWM Keylock Bypass Switch can only be used in the following two instances:

The RWM Bypass Switch can be used by the operator to override active RWM rod blocks during any operating condition. There are administrative controls regarding the use of the RWM Bypass function in NDAP-QA-0338 (Reactivity Management and Control Program), Technical Specifications and Emergency Operating Procedures (EOPs). NDAP-QA-0338 permits bypassing for Special Tests. This is not a Special Test.

Per SSES, this is not true - showed NRC where in SO-156-001, BYPASS is permitted.

During a failure to SCRAM (ATWS) condition, execution of EOPs EO-000-113, "Level/Power Control" in the section for Control Rod Insertion, there is a step requiring this switch to be placed in the bypass position. This is not an EOP directed activity

VALID DISTRACTOR: This would work but is ADMINISTRATIVELY impermissible.

CHOICE (C) - NO

CHOICE (D) - NO

Causes a SELECT ERROR, INSERT BLOCK, WITHDRAW BLOCK - only works for ONE rod.

### References

TM-OP-031D

TS 3.9.2

OP-131-001

NDAP-QA-0338

SO-156-003

GO-100-006

### Comments and Question Modification History

**GXJ**

**THF**

**RJC**

**SSES**

Gil 09/26/05 - K/A mismatch. The question is about system interlocks, not administrative requirements. "A" and "D" look implausible to me. RWM has to work in RUN. Everyone should know only one rod can be withdrawn in REFUEL. R: need to beef up link to Administrative requirements. Disagree on plausibility of A and D. AUTO bypass is plausible if you understand that the RWM is not the primary means of enforcing the one rod out requirement. D is weaker but permits psychometric balance. Also somewhat plausible if you know that the RWM can be bypassed and that bypassing it allows multiple rods to be moved. Only error is method of bypassing.

Satisfied with "A". Gil is not satisfied that this addresses the "administrative requirements" associated with refueling. However, the K/A requires a nexus between the RWM and refueling administrative requirements. The ROD TEST function is the only nexus I am aware of. Therefore, added second part of question concerning ONE-ROD-OUT Interlock functional test.

09/28/05: SSES is considering how to better include administrative requirements.

Todd 10/05/05 - may not be RO unless L.O. exists to memorize test frequency.

R - deleted second part of question concerning TSS frequency.

Returning to original concept - nexus between RWM and Refueling Admin - this hits it by testing the Applicant's knowledge of the RWM Keylock Bypass Switch. Use of the keylock is ADMINISTRATIVELY prohibited.

SQ 11/14/05 - inserted "only" into distractor "C".

SQ 12/02/05 - substantive changes that may drive the question off the original K/A. Saved original as 571. Saved distractor "C" from "The Rod Worth Minimzer (RWM) permits withdrawal of only a single rod if the Control Room Operator selects "Rod Test" at the RWM Main Display." to "The Tod Worth Minimzer (RWM) is AUTOMATICALLY BYPASSED when the Reactor Mode Switch is in REFUEL."

SQ 12/06/05 - change "The Tod Worth Minimzer" to "The Rod Worth Minimzer "

**Question Number: 57**

**NRC K/A System/E/A**

**System** 2010  
06

**Number** **RO** **SRO** **CFR Link**

**NRC K/A Generic**

**System** 2.2 Equipment Control

**Number** 2.2.26 **RO** 2.5 **SRO** 3.7 **CFR Link**

Knowledge of refueling administrative requirements.