POST-EXAM COMMENTS
(Green Paper)

CATAWBA 2008-301

Written Exam - Post Exam Comments

Exam Given - 12-10-2008

Licensee Submitted Post-Exam Comments

[X] Attached

[ ] None

Question 5

Unit 1 was in Mode 5 preparing to enter Mode 6.

Given the following:

- Both trains of ND have been lost.
- The crew entered AP/1/A/5500/019 (Loss of Residual Heat Removal System) but actions to restore cooling have failed.
- The OSM has determined an immediate need to take an action per 10CFR50.54(X).

Per the requirements of OMP 1-7 (Emergency/Abnormal Procedure Implementation Guidelines):

1. Is notification to the NRC Operations Center required prior to taking the action?
2. How many additional SROs (if any) are required to agree with the OSM prior to the action being taken?

A. 1. Yes
   2. None

B. 1. Yes
   2. One additional SRO

C. 1. No
   2. None

D. 1. No
   2. One additional SRO

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0 applicants chose answer A

0 applicants chose answer B

5 applicants chose answer C

4 applicants chose answer D

Answer D was designated as the correct answer based upon the following:

Operation's administrative procedure OPM 1-7 (Emergency/Abnormal Procedure Implementation Guidelines) has a section 7.6 (Deviation From Approved Procedures) and 7.7 (Situations Not Covered by Procedure). The question developers considered this condition to fit into a situation not covered by procedure; therefore, OMP 1-7 section 7.7 would apply and paragraph B which states, "The planned course of action shall be reviewed and approved by a second SRO…" would require one additional SRO to approve the desired action.

The applicants who chose answer C believed that OMP 1-7 section 7.6 (Deviation From Approved Procedures) applied because the stem of the question stated that the OSM determined an immediate need to take action. Section 7.6 paragraph C.3 states that actions outside approved procedures can be taken when, "Actions are needed to minimize immediate personnel hazard/injury or damage to plant equipment." Section 7.6 paragraph D. 2 states that only one SRO must approve the action.

If the OSM's chosen actions are taken from various procedures unrelated to the current condition, then section 7.6 would apply. If the OSM's chosen actions aren't described in any procedure then section 7.7 would apply. The question didn't provide enough information for the applicants to know whether to apply section 7.6 or 7.7. Therefore, we request that both answers C and D be accepted as correct answers.

7.6. Deviation From Approved Procedures

A. EPs/APs may not cover all situations. Licensed Operators shall take appropriate action as described below to place the plant in a safe condition.

NOTE:	Operator action taken in anticipation of automatic actions or action taken to correct a failed or incomplete automatic action is not considered a deviation.

B. Deviations from EPs/APs are normally not allowed.

C. However, actions outside procedural guidance may be taken under the following conditions:

1. The existing guidance is incorrect or non-conservative due to current plant or equipment conditions.

2. A situation occurs where established procedures do not apply.

3. Actions are needed to minimize immediate personnel hazard/injury or damage to plant equipment.

4. An unexpected or uncontrolled loss of process fluids/gasses occurs.

D. In the event of an emergency, the licensed Senior Reactor Operators have the authority and responsibility to take action necessary to protect the health and safety of the public as stated in 10CFR50.54(X) and 10CFR50.72 which reads:

1. A licensee may take reasonable action that departs from license condition or a technical specification in an emergency when this action is immediately needed to protect the public health and safety and no action consistent with license conditions and technical specifications that can provide adequate or equivalent protection is immediately apparent.

2. Licensee action permitted by the previous paragraph shall be approved at a minimum, by a licensed Senior Reactor Operator (SRO) prior to taking the action.

3. The licensee shall notify the NRC Operations Center by ENS telephone of emergency circumstances requiring the licensee to take any protective action that departs from a license condition or technical specification as permitted by the preceding paragraphs. When time permits, the notification must be made before the protective action is taken; otherwise, the notification must be made as soon as possible thereafter. The Commission may require written statements from a licensee concerning its action. Also, the licensee should notify the Resident NRC Inspector as soon as practical.

E. In the event of a national security emergency, licensed Senior Reactor Operators have the authority to take action necessary to implement national security objectives as stated in 10CFR50.54(dd) which reads:

- A licensee may take reasonable action that departs from license condition or a technical specification in a national security emergency when this action is immediately needed to implement national security objectives as designated by the national command authority through the Commission, and no action consistent with license conditions and technical specifications that can meet national security objectives is immediately apparent.

- A national security emergency is an occurrence, including nuclear attack, a national disaster, or other emergency, which seriously degrades or seriously threatens the national security of the United States or has been declared by the Congress. A national security emergency is established by a law enacted by the Congress or by an order or directive issued by the President pursuant to statues or the Constitution of the United States.

7.7. Situations <u>Not</u> Covered by Procedure

NOTE:	If sufficient time exists, a procedure revision is always the preferred route.

Operations Management Procedure 1-7 Page 20 of 31

When situations occur where established procedures do not apply, or plant operation can not be performed in accordance with approved procedures, use of the procedure shall be suspended and action shall be taken to place the plant in a safe condition. Any actions beyond those required to place the plant in a safe condition shall apply the conservative decision-making philosophy. (SOER 94-1). Further actions shall not be taken without first performing the following steps:

A. Based on knowledge and resources needed (including the partially applicable APs or EPs), the SRO shall develop a planned course of action. The SRO is responsible for ensuring these actions are within the bounds of Technical Specifications and licensed basis. If the required actions are outside the bounds of Technical Specifications or licensed basis, then 10CFR50.54(x) shall be declared and the associated requirements of 10CFR50.54(x) shall be implemented (PPRB OMP 1-7/94-113).

B. The planned course of action shall be reviewed and approved by a second SRO, preferably the Operations Shift Manager. The SRO should obtain other reviews such as Station Manager, Group Superintendent, TSC or other involved groups, as necessary based on the complexity of the situation and the time allowed.

C. If time allows, the plan shall be entered in the SRO logbook. Otherwise, this may be done after the actions have been taken.

D. The SRO shall carefully monitor the situation to ensure the course of action is appropriate. As soon as approved procedures can be re-entered, the SRO shall return to the applicable procedure.

Question 19

Given the following events and conditions on Unit 1:

- NC system is at full temperature and pressure.
- "A" Shutdown Bank control rods are fully withdrawn.
- CRD BANK SELECT switch is in the "SBB" position.
- The OATC is withdrawing "B" Shutdown Bank control rods with the current bank position at 64 steps withdrawn.
- The OATC releases the ROD MOTION switch but "B" Shutdown Bank control rods continue to withdraw.

1. What is the current plant Mode of Operation?
2. Which of the following describes the first required action(s) for this situation per AP/1/A/5500/015 (Rod Control Malfunction)?

A. 1. Mode 2
   2. Immediately trip the reactor.

B. 1. Mode 3
   2. Immediately trip the reactor.

C. 1. Mode 2
   2. Immediately place CRD BANK SELECT switch IN MANUAL; if rods continue to move then trip the reactor.

D. 1 Mode 3
   2. Immediately place CRD BANK SELECT switch IN MANUAL; if rods continue to move then trip the reactor.

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1 applicant chose answer A

4 applicants chose answer B

0 applicants chose answer C

4 applicants chose answer D

Answer D was designated as the correct answer based upon the following:

Unwarranted continuous rod movement is an entry condition for procedure AP/1/A/5500/015 Rod Control Malfunction Case II. The immediate actions of the AP are to place the rod bank select switch in manual, verify rod motion stops and trip the reactor if the rods continue to move. The question developers considered strict procedural compliance when developing the question.

Post Exam Comment 2

The intent of the step C.1 is to remove the CRD Bank Select switch from Auto. Any rod movement with the switch in any position other than Auto indicates a fault in the rod control system, and a reactor trip is warranted.

If the CRD Bank Select switch is in any position other than AUTO the rods can only be moved manually. The applicants who selected answer B applied NSD 705 allowance of intent met, and understood that any position other than AUTO is a position that only supports manual control of the rods; therefore, the intent of step C 1 was already met and the only required action was an immediate trip of the reactor per step C.2 RNO.

The applicants who selected answer D considered that strict procedural compliance required the rod bank select switch to be placed in the MAN position. Per strict procedural compliance answer D is correct.

Using the allowance of intent met, the first required action is to trip the reactor, and answer B is correct. Considering strict procedure compliance the first required action is to place the CRD Bank Select switch to manual, so the first require action is to place the switch in the MAN position, and answer D is correct. Therefore, we request that both answers B and D be accepted as correct.

CNS AP/1/A/5500/015	ROD CONTROL MALFUNCTIONS Case II Continuous Rod Movement	PAGE NO. 9 of 12 Revision 11

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
C. Operator Actions	
__ 1. **Ensure "CRD BANK SELECT" switch - IN MANUAL.**	
__ 2. **Verify all rod motion - STOPS.**	**Perform the following:** __ a. Trip reactor. __ b. GO TO EP/1/A/5000/E-0 (Reactor Trip Or Safety Injection).

704.5 PROCEDURE USE PHILOSOPHY

5.1 Procedures shall be followed as written without deviating from the original intent and purpose.

iewer

12/17/2008

DocuTracks
Submitted Request

Request Number: CNS-2008-005202

Document Number: AP/1/A/5500/015

Document Title: Rod Control Malfunction

Originator: TWG5149

Origination Date: 12/17/2008

Suggested Due Date:

Description:

In case 2 for continuous rod movement, the immediate action steps states " Place CRD bank select" switch in MANUAL. If the rods are are selected to any position other than "auto" (i.e. individual bank select) then the intent of the step should be considered met and if rod motion is occuring without the operator manipulating the "IN-HOLD-OUT" switch then a RX trip is warranted.

Evaluate revising the immediate action step to state " ensure CRD bank select NOT in "AUTO"

Justification:

If the CRD BANK SELECT switch is in any position other than auto then the only way to cause rod movement is by manually manipulating the "IN-HOLD-OUT switch.

refenence PIP C-08-7004

Page 1 of 1

Question 23

Given the following:

- Unit 1 is operating with a known 0.6 GPD S/G tube leak
- 1A CF pump tripped and results in a plant runback.
- The crew has stabilized the plant at the runback target per AP/1/A/5500/003 (Load Rejection)
- The transient has caused the tube leak to increase to 12 GPD.

Which one of the following indications will provide the best indication (most sensitive and timely) that the S/G tube leak has increased?

A. Observing 1EMF-26, 27, 28 and 29 (Steamline 1A – 1D)

B. Comparing S/G feed flow to steam flow mismatch

C. Observing 1EMF-33 (Condenser Air Ejector Exhaust)

D. Observing 1EMF-71, 72, 73, 74 (S/G A-D leakage)

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0 applicants chose answer A

0 applicants chose answer B

5 applicants chose answer C

4 applicants chose answer D

Answer D was designated as the correct answer based on the following:

The question developer considered the EMFs 71-74 to be correct because their location on the steam lines makes them the first monitors to detect the change in secondary contamination.

The applicants who chose answer C selected 1EMF 33 because it will be the first EMF to generate an alarm.

The question asks for the, "best indication (most sensitive and most timely)." The candidates selected different answers due to making different assumptions about what indication is being observed. Normally the operators infrequently monitor the EMF readings but are frequently monitoring the EMFs' alarm state. AP/1/A/5500/003 (Load Rejection), which would have been implemented due to the runback, does not require the operators to monitor the EMF readings. AP/1/A/5500/010 (NC System Leakage), which would be entered once a tube leak greater than 5 gpd is detected, requires monitoring of EMF readings every 15 minutes but only if the SG leak rate is greater than 40 gpd. Given the situation described in the question the operators would be monitoring the EMF alarm state not the EMF readings.

In accordance with NSD 513 (see attached) EMFs 71-74 are set to alarm at 5 GPD. 1EMF-33 readings input to a calculation that runs continuously on the Operator Aid Computer (OAC). Per NSD 513 that calculation is set to produce an OAC alarm at 5 gpd. 1EMF-33 will produce an alarm on the annunciator panel based upon a predetermined increase in count rate above the background. Consequently, EMF-33 produces an annunciator due to increasing count rate before an OAC alarm based upon the calculated leak rate.

EMFs 71-74 are located on the steam line coming from each of the SGs. EMF-33 is monitoring the offgas from the condenser air ejectors. Due to their locations, EMFs 71-74 will be the first to detect an increase in secondary activity due to a tube leak.

This scenario was performed on the simulator at 100% power and again after a runback on loss of a CF pump. A 12 gpd leak in 1A SG was inserted, and in both cases 1EMF-71 count rate was the first EMF to increase, but 1EMF-33 was the first EMF to produce an alarm.

Based upon observing the EMF alarm status EMF-33 will be the timeliest indicator, which would make answer C correct.

Based upon monitoring the EMF readings EMFs 71-74 will be the timeliest because they are the first monitors to be exposed to the increase in secondary activity which makes answer D correct.

Since the question didn't clearly ask if the operators were monitoring the EMF readings or alarm state, we request that both answers C and D be accepted as correct.

NSD 513 Primary-to-Secondary Leakrate Monitoring Program

Paragraph 513.4.8

Alarm set points on the radiation monitors and/or OAC point used to monitor primary-to-secondary leak rate shall be set at a level that will provide an early indication of increasing primary-to-secondary leak rate. When the indicated leak rate is less than 5 gallons per day, the alarm shall be set to a level that corresponds to a leak rate of 5 gallons per day, or a level that will not give numerous spurious alarms (10 gallons per day or less if possible). When the leak rate increases to greater than 5 gallons per day, the alarm shall be set to a level that corresponds to a leak rate of 30 gallons per day. When the leak rate increases to greater than 30 gallons per day, the alarm shall be set to a level that corresponds to a leak rate of 30 gallons per day above the current leak rate, or the station shutdown limit (Action Level 2 limit), whichever is less.

Question 42

Given the following:

- A large break LOCA has occurred.
- Containment pressure is 3.2 psig and slowly decreasing.
- The crew has just transitioned to EP/1/A/5000/ES-1.3 (Transfer to Cold Leg Recirculation)

What is the minimum containment sump level that will support operation of all ECCS pumps and the NS pumps?

A. 0.5 ft

B. 2.5 ft

C. 3.3 ft

D. 5.0 ft

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0 applicants chose answer A

5 applicants chose answer B

4 applicants chose answer C

0 applicants chose answer D

Answer C was designated as the correct answer based on the following:

The question developer considered the level required to support all ECCS and NS pumps taking suction on the containment sump. The crew enters EP/ES-1.3 when the FWST level decreases to 37%. The ND pump suctions automatically align to the containment sump, and the operators will align the remaining ECCS pumps suctions' from the FWST to the ND pump discharge per ES-1.3. When FWST level decreases to 11% the operators will align the NS pumps' suction to the containment sump per ES-1.3.

The stem states that the crew has just entered EP/ES-1.3; therefore, at that point in time the only pumps with their suction aligned to the sump are the ND pumps and all other pumps are still aligned to the FWST. EP/ES-1.3 step 2 checks for a sump level > 3.3 feet. If it isn't, the RNO verifies sump level > 2.5 feet at step 2.f. If level is > 2.5 feet then the NV and NI pumps' suctions can be aligned to the containment sump. In this situation a level of 2.5 feet will support the operations all ECCS pumps while the NS pumps are still aligned to the FWST.

When the FWST level decreases to 11% ES-1.3 directs aligning the NS pumps to the containment sump using enclosure 2. Step 2 checks for a sump level of > 3.3 feet. If it isn't then the NS pump suction isn't aligned to the containment sump. Therefore, after FWST level has decreased to 11%, 3.3 feet in the containment sump is required to support operation of all ECCS pumps.

The stem didn't provide the applicants information concerning the FWST level. That information is needed to determine which pumps are supposed to be aligned to the containment sump. If FWST level is <37% and > 11%, then answer B is correct. If the FWST level is < 11% then answer C is correct.

Since the question didn't have enough information for the applicants to know the point in time they are required to evaluate the question, we request that both answers B and C be accepted as correct.

CNS EP/1/A/5000/ES-1.3	TRANSFER TO COLD LEG RECIRCULATION	PAGE NO. 2 of 38 Revision 21

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

C. <u>Operator Actions</u>

__ 1. **Monitor Enclosure 1 (Foldout Page).**

<u>CAUTION</u> **S/I recirculation flow to NC System must be maintained at all times.**

<u>NOTE</u>
- Steps 2 through 8 should be performed without delay.
- CSF should not be implemented until directed by this procedure.

2. **Verify at least one of the following annunciators - LIT:**

__ • 1AD-20, B/3 "CONT. SUMP LEVEL >3.3 ft"

OR

__ • 1AD-21, B/3 "CONT. SUMP LEVEL >3.3 ft".

Perform the following:

a. Ensure S/I - RESET:

__ 1) ECCS.

__ 2) D/G load sequencers.

__ 3) **<u>IF AT ANY TIME</u>** a B/O occurs, **<u>THEN</u>** restart S/I equipment previously on.

b. Ensure the following valves - CLOSED:

__ • 1FW-27A (ND Pump 1A Suct From FWST)

__ • 1FW-55B (ND Pump 1B Suct From FWST).

(RNO continued on next page)

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

2. (Continued)

c. **IF** valve(s) will not close, **THEN**:

__ 1) Stop associated ND pump(s).

2) Depress the following "DEFEAT" pushbutton(s) for the affected train(s):

__ • "C-LEG RECIR FWST TO CONT SUMP SWAP TRN A"

__ • "C-LEG RECIR FWST TO CONT SUMP SWAP TRN B".

__ 3) Close the associated ND pump(s) containment sump suction valve(s).

__ d. **IF** FWST level less than 37% due to FWST puncture, **THEN RETURN TO** procedure and step in effect.

__ e. **IF** both NS pumps are off, **THEN GO TO** Step 2 RNO g.

f. **IF** either of the following annunciators are lit:

__ • 1AD-20, B/2 "CONT. SUMP LEVEL >2.5 ft"

OR

__ • 1AD-21, B/2 "CONT. SUMP LEVEL >2.5 ft",

__ **THEN GO TO** Step 3.

(RNO continued on next page)

__ 3. Verify KC flow to ND heat exchangers - GREATER THAN 5000 GPM.

__ Establish KC flow to affected ND Hx(s).

CNS EP/1/A/5000/ES-1.3	TRANSFER TO COLD LEG RECIRCULATION	PAGE NO. 12 of 38 Revision 21

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
5. (Continued)	
i. Verify proper recirc flow as follows:	__ i. **IF** any S/I pump on without a suction flowpath, **THEN** stop the affected pump(s).
__ • "NV S/I FLOW" - INDICATING FLOW	
__ • NI pumps - INDICATING FLOW	
__ • ND pumps - INDICATING FLOW.	
6. **WHEN FWST level decreases to 11% (1AD-9, E/8 "FWST LO-LO LEVEL" alarm lit), THEN perform the following:**	
__ a. Stop NS Pumps.	
__ b. Align NS for recirc. **REFER TO** Enclosure 2 (Aligning NS for Recirculation).	

CNS EP/1/A/5000/ES-1.3	TRANSFER TO COLD LEG RECIRCULATION Enclosure 2 - Page 1 of 13 **Aligning NS for Recirculation**	PAGE NO. 21 of 38 Revision 21

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
1. **Close the following valves:** __ • 1NS-20A (NS Pump 1A Suct From FWST) __ • 1NS-3B (NS Pump 1B Suct From FWST).	
2. **Verify at least one of the following annunciators - LIT:** __ • 1AD-20, B/3 "CONT. SUMP LEVEL >3.3 ft" OR __ • 1AD-21, B/3 "CONT. SUMP LEVEL >3.3 ft".	**Perform the following:** __ a. **WHEN** at least one "CONT. SUMP LEVEL >3.3 ft" annunciator is LIT, **THEN GO TO** Step 3. __ b. Do not continue in this enclosure until at least one annuciator is LIT.

Post Exam Comment 5

Questions 55

Unit 1 is operating at 100% power with a routine containment air release in progress through 1VQ-10 (VQ Fans Disch To Unit Vent).

1. At what containment pressure will 1VQ-10 first receive a "CLOSE" signal?
2. What is the basis for closing 1VQ-10 at that pressure?

A.
1. -0.08 psig
2. Non-compliance with technical specification on containment pressure

B.
1. -0.08 psig
2. Unexpected opening of ice condenser inlet doors

C.
1. 0 psig
2. Non-compliance with technical specification on containment pressure

D.
1. 0 psig
2. Unexpected opening of ice condenser inlet doors

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0 applicants chose answer A

0 applicants chose answer B

3 applicants chose answer C

6 applicants chose answer D

Answer C was designated as correct based upon the following:

Valve VQ-10 gets a close signal at 0 psig. The fans are large enough to reduce containment pressure below the Tech Spec limit (See Attached). Therefore, basis for closing the valve at that 0 psig is to prevent the VQ fans from reducing containment pressure to the minimum tech spec value.

The 6 applicants who chose answer D rejected answer C because the wording of the answer implied that the minimum tech spec value had been reached when the valve closed which is incorrect since the minimum tech spec value is -0.1 psig. At 0 psig the plant is in compliance with Tech Specs; therefore, the answer is not technically correct. Had the answer stated, "To prevent non-compliance…" then the answer would have been correct.

Post Exam Comment 5

The VQ fans are sized small enough to prevent them from opening the ice condenser doors; therefore answer D is wrong. (See attached.)

We recommend that this question be deleted from the exam since there is no technically correct answer.

REFERENCES:

Design Basis Specification for the

Containment Air Release and Addition (VQ) System CNS-1585.VQ-00-0001

VQ SYSTEM FANS

The VQ System fans are sized large enough to relieve pressure from containment during all normal modes of plant operation. The pressure rise that occurs during plant start-up when the containment is initially heating up, provides the conditions where maximum pressure build up in containment occurs during normal plant operation. Thus the VQ fans are sized with a flow rate high enough to relieve pressure during plant start-up.

One other consideration in the sizing of the fans is to size the fans small enough to eliminate possible impacts on containment safety related functions. The fans take suction from the upper containment. The fans are sized small enough to eliminate the possibility of lifting the ice condenser doors due to the pressure differential between upper and lower containment.

The non-safety Containment Air Release and Addition Fans (VQ) are capable of challenging the containment negative pressure design limit of -1.5 psig as stated in the FSAR. There is no safety related input which ensures this fan is tripped prior to exceeding this limit. Assuming the VQ controller was to fail and the fan allowed to run unchecked, the fan could theoretically develop a negative pressure exceeding the -1.5 psig design limit.

1.1.1.1 Containment Air Release Flow Control Valve (1VQ10)

This valve is controlled by controller 1VQSS0100, which is located on control board 1MC5 in the main control room. A permissive signal of containment pressure above 0 psig is required to open this valve.

Valve 1VQ10 closes automatically at 0 psig containment pressure decreasing and upon high radiation in the unit vent.

1.1.2 SYSTEM LIMITS AND PRECAUTIONS

1. Containment Pressure Technical Specification limits are -.1 to +0.3 psig with operational limits between -0.08 psig and +0.25 psig.

VQ lesson pg 5 rev 24

1.1.1 Containment Air Release Fans

1.1.1.1 Two fans per unit (A and B fans) with normal flow rates at 250-300 SCFM per fan. VQ fans are used only to release air from containment.

1.1.1.2 Fans are large enough to relieve containment pressure during normal operations but small enough to prevent opening ice condenser doors from the pressure differential created across the doors. The fans take suction on upper containment.

1.1.1.3 The fan could lower containment pressure to -2.8 psig should the release not properly terminate automatically with the closure of VQ-10.

Question 76

Given the following Unit 1 conditions and sequence of events:

- NC system temperature is 208 °F
- NC system pressure is 350 psig
- 1A NV pump is red tagged to replace its 1ETA breaker
- 1B NI pump is white tagged
- 1A ND and 1B ND loops operating in residual heat removal mode
- An ND pump suction relief has spuriously lifted and has not reseated
- Both ND pumps have been secured per AP/1/A/5500/027 (Shutdown LOCA)

1. What is the correct procedure flowpath for this situation?
2. What is the limiting component that the current ECCS pump configuration is designed to protect from over-pressurization?

A. 1. Remain in AP/1/A/5500/027 (Shutdown LOCA)
   2. NC loop crossover pipe

B. 1. Transition to AP/1/A/5500/019 (Loss of Residual Heat Removal System)
   2. NC loop crossover pipe

C. 1. Remain in AP/1/A/5500/027 (Shutdown LOCA)
   2. Reactor vessel

D. 1. Transition to AP/1/A/5500/019 (Loss of Residual Heat Removal System)
   2. Reactor vessel

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0 applicants chose answer A

0 applicants chose answer B

4 applicants chose answer C

3 applicants chose answer D

Answer D was designated as correct based on the following:

The stem told the applicant that the ND suction relief was leaking. The applicant was required to know that the ND relief valves discharge to the PRT. The applicant was also required to know that AP/27 will transition the operator to AP/19 if PRT level is increasing without indication that the input is from the NC system pressurizer.

The symptoms of this event would be pressurizer level and pressure decreasing and PRT level increasing. These symptoms match the entry conditions for AP/19 rather than AP/27. (See attached.) Therefore, entry into AP/27 was an incorrect diagnosis of the event.

In the event of a leak step 3 of AP/27 will stop any ND pump taking suction on an NC system loop to protect the ND pump from damage.

AP/27 step 4 looks for PRT level increasing without indication of safety valve input. The intent of this step is to rule out input to the PRT from the pressurizer safety. If the safety valve is not discharging to the PRT, then the procedure assumes the input is from the ND system and the operator is directed to transition to AP/19. The only indication available for the operator to determine if the PRT input is from a pressurizer safety is safety valve tailpipe temperature and acoustic flow monitors. The question did not provide the applicant the status of those indicators. Additionally, the question didn't provide the applicant with information about the status of PRT level before or after the actions of AP/27 were performed. AP/27 step 4 doesn't specifically state pressurizer safety. The ND relief valve is a safety valve which discharges to the PRT. The background document for that step doesn't clarify that the step applies to pressurizer safety valves. The stem stated that the ND relief was open can be interpreted as indication that a safety is discharging to the PRT. Procedure change request number CNS-2008-5216 has been submitted to revise AP/27 step 4a to state "pressurizer safety valve."

All of the applicants correctly answered part 2 of the question. However, the applicants were not given information about pressurizer safety valve status and PRT level response which was needed adequately determine the proper procedure flowpath.

Given the ambiguity of AP/27 step 4, and the lack of information to properly evaluate the status of the pressurizer safeties and PRT level we request that question 76 be deleted.

CNS AP/1/A/5500/027	SHUTDOWN LOCA	PAGE NO. 3 of 162 Revision 29

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
C. <u>Operator Actions</u>	
__ 1. **Monitor Enclosure 1 (Foldout Page).**	
__ 2. **Verify any ND train suction - ALIGNED TO NC LOOP.**	__ **<u>GO TO</u> Step 5.**
3. **<u>IF AT ANY TIME</u> either of the following conditions occurs:**	
__ • Pzr level - LESS THAN 11% (20% ACC)	
<u>OR</u>	
__ • NC System subcooling based on core exit T/Cs - LESS THAN 0°F.	
<u>THEN</u>:	
__ a. Stop ND pump(s) with suction aligned to NC loop.	
b. Ensure the following valves - CLOSED:	
__ • 1ND-32A (ND Train 1A Hot Leg Inj Isol)	
__ • 1ND-65B (ND Train 1B Hot Leg Inj Isol).	

CNS AP/1/A/5500/027	SHUTDOWN LOCA

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAI
4. **Verify leak is on ND:**	
a. Verify indications of a leak on ND:	__ a. GO TO Step 5.
__ • Plant alarms and indications - INDICATE LEAK OUTSIDE CONTAINMENT	
OR	
__ • PRT level - INCREASING WITHOUT INDICATION OF SAFETY VALVE INPUT.	
__ b. GO TO AP/1/A/5500/019 (Loss of Residual Heat Removal System).	
__ 5. **Initiate containment evacuation.**	

CNS AP/1/A/5500/027	SHUTDOWN LOCA	PAGE NO. 2 of 162 Revision 29

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

B. Symptoms

- **Pzr level - DECREASING**
- **NC W/R Pressure - DECREASING**
- **NC Hot Leg L/R Pressure - DECREASING**
- **1AD-13, A/7 "ICE COND LOWER INLET DOORS OPEN" - LIT**
- **NC System subcooling - DECREASING UNCONTROLLED**
- **Any of the following EMF indications - INCREASING OR IN ALARM:**
  - EMF-41 (Aux Bldg Ventilation)
  - 1EMF-38 (Containment Particulate)
  - 1EMF-39 (Containment Gas)
  - 1EMF-46A (Component Cooling Train A)
  - 1EMF-46B (Component Cooling Train B).
- **Containment floor and equipment sump level(s) - INCREASING.**

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Case II. Leak in ND:

- Pzr level - DECREASING
- NC pressure - DECREASING
- NC vessel level - DECREASING
- PRT level - INCREASING
- ND flow - HIGH
- Any of the following EMF indications - INCREASING OR IN ALARM:
  - EMF-41 (Aux Bldg Ventilation)
  - Any area monitor EMF.
- Containment sump level - INCREASING
- 1AD-10, C/1 "ND & NS ROOMS SUMP LEVEL EMERG HI" - LIT
- 1AD-10, C/2 "ND & NS ROOMS SUMP LEVEL HI-HI" - LIT
- Refueling Canal level - DECREASING.

12/18/2008

DocuTracks
Submitted Request

Request Number: CNS-2008-005216

Document Number: AP/1/A/5500/027

Document Title: Shutdown LOCA

Originator: HCD7322

Origination Date: 12/18/2008

Suggested Due Date:

Description:

Revise step 4 a to state PRT level- increasing without indication of pressurizer safety valve input

Justification:

The ND suction relief valves are safety valves which discharge to the PRT. If this is occuring, an operator could incorrectly consider this as indication of safety valve input and remain in AP/27.

Post Exam Comment 7

Question 77

Unit 2 is at 3% power. Given the following sequence of events:

12/01/08 1100 2A NI pump tagged to replace the motor cooler.
12/03/08 0500 2B D/G tripped on high vibration during performance of PT/2/A/4350/002B (Diesel Generator 2B Operability Test).
12/03/08 0700 You complete turnover and take the position of CRS.

1. What is the latest time that entry into Mode 3 is required per Technical Specifications assuming both components remain inoperable?
2. When you take shift duty at 0700, can the ECCS design criteria for a large break LOCA be assumed to be met?

Reference provided

A. 1. 12/03/08 1200
2. Yes

B. 1. 12/03/08 1200
2. No

C. 1. 12/03/08 1600
2. Yes

D. 1. 12/03/08 1600
2. No

---

0 applicants chose answer A

1 applicant chose answer B

1 applicant chose answer C

5 applicants chose answer D

The answer C was designated as correct due to the following:

The developer considered the basis for Tech Spec 3.8.1 which states either off site or on site power is available, and in this scenario off site power is maintained. Therefore, entry into 3.0.3 was considered to be the time that the design criteria were no longer met. Tech Spec 3.8.1 action B2 requires declaring 2B NI inoperable 4 hours after 2B DG was declare inoperable. Thus, at 0700 2B NI is still considered operable; so, the ECCS design criteria for a large break LOCA was met.

All of the applicants that selected answers C and D understood that the 2B NI didn't have to be declared inoperable until 0900. Those who selected answer D considered design criteria to be separate from the declaration of inoperability. Declaration of inoperability is an administrative function. The Regulatory Compliance department was asked to interpret this scenario. Regulator Compliance contacted Excel Services who writes our Tech Specs. The following is their reply:

From: Dan Williamson [dan.williamson@excelservices.com]
Sent: Monday, December 15, 2008 8:32 PM
To: pwrog@excelservices.com
Subject: RE: Initial License Exam TS Question

Few comments:

>> If not yet adopted, consult TSTF-273 for "intent clarifications" related to this situation.

>> The "ECCS design criteria for a large LOCA" is different than "loss of safety function" typically used in TSpecs / SFDP. The "design criteria" was not met when the first 1A SI was inop --> loss of single failure protection.

>> The example is a bit confusing when the ending question mentions "when 2A DG becomes inoperable" -- prior to this, 2A DG was not at issue (?) Seems a typo of some kind.

>> The [A-SI + B-DG] is still is not a "loss of safety function" (see TSTF-273). The directed declaration of B-SI inop at 4 hrs due to B-DG inop (<u>and one can wait the full 4 hours to make this declaration</u>) can be argued to be the first time that a "loss of safety function" exists --> both A & B SI inop.

<u>Dan Williamson</u>

EXCEL Services Corporation

Main Offc/Cell: (904) 272-5300

Given that the design criteria were not met when 2A NI pump was declared inoperable, we request that the correct answer be changed to D.

3.8.1.

The OPERABILITY of the AC electrical power sources is consistent with the initial assumptions of the Accident analyses and is based upon meeting the design basis of the unit. This results in maintaining at least one train of the onsite or offsite AC sources OPERABLE during Accident conditions in the event of:

a. An assumed loss of all offsite power or all onsite AC power; and

b. A worst case single failure.

3.5.2

The OPERABILITY requirements for the ECCS are based on the following LOCA analysis assumptions:

a. A large break LOCA event, with loss of offsite power and a single failure disabling one ECCS train; and

b. A small break LOCA event, with a loss of offsite power and a single failure disabling one ECCS train.

Post Exam Comment 8

Question 83

Unit 1 is operating at 100% power. Unit 2 is in No Mode. The control room has become uninhabitable due to chlorine gas intrusion and control has been shifted to the Auxiliary Shutdown Complex per AP/1/A/5500/017 (Loss of Control Room).

1. How is adequate primary side inventory assured?
2. For the situation above, which one of the following sets of valves would require a temporary modification to prevent them from automatically aligning should a safety injection occur?

A. 1. Automatic swap of NV pump suctions to the FWST
2. 1NI-9A (NV Pmp C/L Inj Isol) and 1NI-10B (NV Pmp C/L Inj Isol)

B. 1. Automatic swap of NV pump suctions to the FWST
2. 1ND-26 (ND Hx 1A Outlet Ctrl) and 1ND-60 (ND Hx 1B Outlet Ctrl)

C. 1. Manual swap of NV pump suctions to the FWST
2. 1NI-9A (NV Pmp C/L Inj Isol) and 1NI-10B (NV Pmp C/L Inj Isol)

D. 1. Manual swap of NV pump suctions to the FWST
2. 1ND-26 (ND Hx 1A Outlet Ctrl) and 1ND-60 (ND Hx 1B Outlet Ctrl)

---

1 applicant chose answer A

3 applicants chose answer B

1 applicant chose answer C

2 applicants chose answer D

Answer D was designated as the correct answer for the following reason:

When plant control is aligned to the control room and a VCT Lo-Lo Level (4.3%) is detected the suction valves from the FWST open and the suction valves from the VCT close. The Design Basis Document for Loss of Control room states that all automatic NV functions are disabled when control is transferred to the Auxiliary Shutdown Complex (ASC). The DBD also states that the suction valves from the VCT open upon transfer to the ASC and are blocked from closing on Lo-Lo Level. The Loss of Control Room lesson plan states the same information found in the DBD. The DBD for the NV system doesn't discuss how the suction valves from the FWST are affected by swapping control to the ASC. Additionally, AP/1/A/5500/017 (Loss of Control Room) Enclosure 1 page 12 directs manual alignment of the NV pump suction to the FWST if VCT level is < 23%. The background document for the procedure states that, "All automatic transfer of the NV pump suction to the FWST on low VCT level is lost when control is transferred to the ASP." Based upon controlled information available to the question developers they determined that the automatic swap of the NV pump suction to the FWST on lo-lo VCT level would not occur.

During the exam review the applicants stated that they were taught that the swap to the FWST will occur automatically. The instructor who teaches the Loss of Control Room had determined that the suction valves from the FWST are unaffected by the swap to the ASC, and had included that information in the notes section of the Power Point presentation used to teach the lesson. A copy of the Power Point presentation had been provided to the applicants. The notes section of a single slide of the presentation includes the statement, "NV-252A & NV-253B will auto open on Lo-Lo VCT level, but NV-188A & NV 189B will not close." Brian Woolweber (Senior Engineer) and Nick Burgess (Engineer III) reviewed the electrical drawings and confirmed that the FWST suction valves are unaffected by a swap to the ASC and will in fact open on a VCT Lo-Lo- Level signal. (See attached note from engineering.)

Answer B is technically correct because if the suction of the NV pumps isn't manually aligned to the FWST when VCT level is < 23%, then the valves will automatically open on Lo-Lo VCT level and primary side makeup would be assured.

Answer D is technically correct because the suction supply valves from the FWST are manually opened per the requirements of procedure AP/17 to ensure primary side makeup is assured.

We request that both answers B and D be accepted as correct.

In researching the applicable electrical elementary drawings, it was determined that both NV252 and 253 will still be able to open once a LO-LO signal has been received from VCT level. Neither of these valve are affected by the transition to the ASP, thus there is no contact that would prevent a signal to open if the LO-LO setpoint is research. Furthermore, it was confirmed that if this LO-LO setpoint is reached, while in normal control, both NV188 and 189 would close, performing the swap to FWST. If control is swapped to the ASP both of these valves are forced open and are prevented from closing, as stated below. These conclusions have also been verified by Brian Woolweber. Hope this clears up any confusion.

Nick Burgess

CNS AP/1/A/5500/017	LOSS OF CONTROL ROOM Enclosure 1 - Page 12 of 19 **ASP Operator Actions**	PAGE NO. 18 of 71 Revision 47

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
15. (Continued)	
	6) **IF** Pzr level is decreasing, **THEN**:
	__ a) Notify Unit 1 Aux Bldg operator to align Unit 1 NV pump suction to FWST. **REFER TO** Enclosure 4 (Aux Bldg Operator Actions), Step 5.
	__ b) **WHEN** charging pump suction is aligned to FWST, **THEN** start additional NV pump(s) as required to increase Pzr level.
	__ 7) **IF AT ANY TIME** VCT level decreases to 23%, **THEN** notify Unit 1 Aux Bldg operator to align Unit 1 NV pump suction to FWST. **REFER TO** Enclosure 4 (Aux Bldg Operator Actions), Step 5.

Post Exam Comment 9

Question 87

The night shift surveillance readings for Lake Wylie temperature over the past several days are as follows:

- 8/01/08 – 87.50° F.
- 8/02/08 – 88.25° F.
- 8/03/08 – 89.00° F.
- 8/04/08 – 89.75° F.
- 8/05/08 – 90.50° F.

1. Assuming lake temperature continues to increase at a constant rate, on what date will Lake Wylie temperature first exceed the requirements of SLC 16.9-14 (Lake Wylie Water Temperature)?
2. What affect, if any, will this higher lake temperature have on the ability of the NS system to affect containment pressure following a large break LOCA?

A. 1. 8/09/08
   2. Minimal impact prior to ice melt, but significant impact later in the accident sequence when the ice has been depleted.

B. 1. 8/09/08
   2. Minimal impact during the entire accident sequence since lake temperature is still below the design basis accident assumptions.

C. 1. 8/12/08
   2. Minimal affect prior to ice melt, but significant affect later in the accident sequence when the ice has been depleted.

D. 1. 8/12/08
   2. Minimal impact during the entire accident sequence since lake temperature is still below the design basis accident assumptions.

---

0 applicants chose answer A

1 applicant chose answer B

2 applicants chose answer C

4 applicants chose answer D

Answer C was designated as the correct answer for the following reasons:

During the first stage of a LOCA the ice condenser is the major heat sink for cooling the containment atmosphere. After the ice has melted then NS becomes the major heat sink. RN flow rate to the NS heat exchangers is a constant value; therefore, the temperature of NS is directly related to RN temperature. Once the ice has melted containment pressure will be related to the NS temperature, and if NS temperature is higher, then containment pressure will be higher.

The higher NS temperature would have little to no affect on containment pressure before the ice melts because the ice is the major heat sink, but pressure would be affected after the ice was melted. (See attached excerpt from Tech Spec 3.7.9 bases.) The developer included the word significant in the second part of the answer because the difference in NS temperature will be observable to the operator in the control room.

If the Lake Wylie temperature reaches the SLC limit, the remedial action is to align at least one train of RN to the Standby Nuclear Service Water Pond (SNSWP). The Tech Spec basis for the (SNSWP) states, "NSWS (Nuclear Service Water System) temperature influences containment pressure following a Loss of Coolant Accident and offsite dose following a Main Steam Line Break. The containment peak pressure analysis can accommodate NSWS temperatures up to 100°F. " Since the Lake Wylie temperature, thus NSWS temperature had not exceeded 100°F the applicants who chose answer D determined that the elevated RN temperature would <u>not</u> have a "significant" affect on containment temperature. Therefore, they rejected answer C and selected answer D as the most correct for the given conditions.

Question 2 asked the applicant to compare the affect of the higher lake temperature, but it doesn't ask which higher temperature to use, the last observed or the SLC limit, or what temperature it should be compared to. In reference to answer C for question 2, the first part of the answer is correct, but statement that the affect would be significant cannot be supported since question didn't imply how big a temperature difference to consider. Consequently, answer C cannot be supported as correct.

Answer D is a correct answer since all of the temperatures given for comparison are below the analyzed value of 100°F. Thus, the impact or consequence would be minimal throughout the entire sequence of the accident.

We request that the correct answer be changed to D.

Tech Spec 3.7.9 Standby Nuclear Service Water Pond basis states the following:

APPLICABLE SAFETY ANALYSES

The SNSWP is the seismically-assured sink for heat removed from the reactor core following all accidents and anticipated operational occurrences in which the unit is cooled down and placed on residual heat removal (RHR) operation.

NSWS temperature influences containment pressure following a Loss of Coolant Accident and offsite dose following a Main Steam Line Break. The containment peak pressure analysis can accommodate NSWS temperatures up to 100°F. The Main Steam Line Break dose analysis assumes an activity release from the steam generators for the time required to cool the Reactor Coolant System (RCS) to 210°F. The NSWS temperature assumed in the current analysis is 95.5°F. This assumption prevents the RCS cooldown time from exceeding that assumed in the current Main Steam Line Break dose analysis. Therefore, the Main Steam Line Break is limiting with respect to the assumed NSWS temperature.APPLICABLE SAFETY ANALYSES (continued)

To ensure that the assumptions related to NSWS temperature in the safety analyses remain valid and to ensure that long term NSWS temperature does not exceed the 100°F design basis of the NSWS components, a limit of 95°F is observed for the initial temperature of the SNSWP. This temperature is important in that it, in part, determines the capacity for energy removal from containment incorporated into the peak containment pressure analysis. NSWS temperature is also important in determining the time required to cool the RCS of a nuclear unit after the occurrence of an accident. This in turn determines the extent of releases of radioactivity to the environment following a Main Steam Line Break.

The peak containment pressure occurs when energy addition to containment (core decay heat) is balanced by energy removal from the Containment Spray and Component Cooling Water heat exchangers. This balance is reached after the transition from injection to cold leg recirculation and after ice melt. Because of the effectiveness of the ice bed in condensing the steam which passes through it, containment pressure is insensitive to small variations in containment spray temperature prior to ice meltout.

16.9 AUXILIARY SYSTEMS

16.9-14 Lake Wylie Water Temperature

COMMITMENT The water temperature of Lake Wylie shall be ≤ 95.5°F when aligned to the Nuclear Service Water System (NSWS).

APPLICABILITY: MODES 1, 2, 3, and 4.

REMEDIAL ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. COMMITMENT not met.	A.1 Align at least one NSWS loop to the Standby Nuclear Service Water Pond (SNSWP).	Immediately

Post Exam Comment 10

Question 89

Unit 1 is operating at 100% power. Given the following:

- 1A D/G was manually started by NLOs for monthly surveillance testing
- A grid instability and relay failures caused all Unit 1 Switchyard PCBs to open
- 1B D/G failed to start
- Annunciator D/G 1A Panel, A/4 "TRIP LOW PRESS LUBE OIL" – LIT
- The ensuing transient resulted in a 1B S/G tube rupture

Which procedure will be used to isolate the ruptured S/G in this situation, and what procedural guidance is given regarding isolation of the ruptured steam generator?

A. EP/1/A/5000/E-3 (Steam Generator Tube Rupture) is used to isolate the ruptured S/G as soon as it is identified.

B. EP/1/A/5000/E-3 (Steam Generator Tube Rupture) is used to isolate the ruptured S/G only if S/G NR level is greater than 11%.

C. EP/1/A/5000/ECA-0.0 (Loss of All AC Power) is used to isolate the ruptured S/G as soon as it is identified.

D. EP/1/A/5000/ECA-0.0 (Loss of All AC Power) is used to isolate the ruptured S/G only if S/G NR level is greater than 11%.

---

4 applicants chose answer A

2 applicants chose answer B

0 applicants chose answer C

1 applicant chose answer D

Answer B was designated as the correct answer based on the following:

The developer was considering that to isolate a ruptured S/G (RSG) a level of > 11% is a precondition that must be satisfied. However, to completely isolate a RSG steps 3 – 6 within EP/E-3 must be performed, and step 6 which completes the isolation can only be performed if RSG level is > 11%.

The question didn't differentiate between initiating the isolation of an RSG and completely isolating an RSG.

Answer A is correct because, once steps 3, 4, & 5 are reached, the operator is required to perform these actions as soon as the RSG is identified. There are no preconditions to performing these steps.

Answer B is correct because it is part of the guidance which completes the isolation of the RSG by isolating the auxiliary feedwater supply when level is > 11%.

If the question had asked for the guidance to completely isolate the RSG, then there would be no correct answer to the question; however, the question asked for the procedural guidance regarding isolation which is found in both answers A & B, so both answers A and B are correct.

We request that both answers A and B be accepted as correct.

CNS EP/1/A/5000/E-3	STEAM GENERATOR TUBE RUPTURE	PAGE NO 3 of 100 Revision 3

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
__ 3. **Verify at least one intact S/G - AVAILABLE FOR NC SYSTEM COOLDOWN.**	__ **Maintain one S/G available for NC System cooldown in subsequent steps.**
4. **Isolate steam flow from ruptured S/G(s) as follows:**	
__ a. Verify all ruptured S/G(s) PORV - CLOSED.	a. **WHEN** ruptured S/G(s) pressure is less than 1090 PSIG, **THEN** perform the following:
4. (Continued)	
c. Isolate blowdown and steam drain on all ruptured S/G(s) as follows:	
5. **Close the following valves on all ruptured S/G(s):** __ • MSIV __ • MSIV bypass valve.	
6. **Control ruptured S/G(s) level as follows:**	
__ a. Verify ruptured S/G(s) N/R level - GREATER THAN 11% (29% ACC).	a. Perform the following: __ 1) **IF** any ruptured S/G is also faulted, **THEN** do not establish feed flow to the ruptured S/G unless needed for NC System cooldown. 2) **IF** any ruptured S/G(s) is not faulted **OR** is required for cooldown, **THEN**: __ a) Establish and maintain feed flow to affected S/G(s). __ b) **WHEN** affected S/G(s) N/R level greater than 11% (29% ACC), **THEN** perform Steps 6.b and 6.c.

6. (Continued)

b. Isolate feed flow to all ruptured S/G(s) as follows:

6. (Continued)

__ c. **IF AT ANY TIME** ruptured S/G(s) N/R level is less than 11% (29% ACC), **THEN** perform Step 6.