UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION II
101 MARIETTA STREET, N.W., SUITE 2900
ATLANTA, GEORGIA 30323-0199

Report Nos.: 50-325/95-302 and 50-324/95-302

Licensee: Carolina Power and Light Company
P. O. Box 1551
Raleigh, NC 27602

Docket Nos.: 50-325 and 50-324 License Nos.: DPR-71 and DPR-62

Facility Name: Brunswick Steam Electric Generating Plant Units 1 and 2

Report Nos.: 50-325/95-302 and 50-324/95-302

Examination Conducted: December 4-8, 1995

Chief Examiner: _____ 1/5/96
D. Charles Payne Date Signed

Examiners: Richard Miller, Sonalysts

Approved By: _____ 1-5-96
Thomas A. Peebles, Chief Date Signed
Operator Licensing and Human
Performance Branch
Division of Reactor Safety

SUMMARY

Scope:

NRC examiners conducted regular, announced operator licensing initial examinations during the period December 4-8, 1995. Examiners administered examinations under the guidelines of the Examiner Standards (ES), NUREG-1021, Revision 7. Four Limited Senior Reactor Operator (LSRO) candidates received written and operating examinations.

Results:

Examiners identified that 13 written examination questions had a high miss rate and may be indicative of a training program scope oversight. Two candidates only marginally passed the written examination. (Paragraph 2.2)

Examiners identified generic weaknesses in the candidate's familiarity with the Fuel Prep Machine, following written guidance for a stuck fuel support piece, and judging component positions and depth in the Spent Fuel Pool. (Paragraph 2.2)

Enclosure 1

Candidate Pass/Fail:

	LSRO	Percent
Pass	3	75 %
Fail	1	25 %

Examiners noted that the facility reference materials were poorly organized, incomplete, and not indexed. (Paragraph 2.3)

No violations or deviations were identified.

REPORT DETAILS

1. Persons Contacted

Licensee Employees

*Barnes, G., Manager Training
*Callis, S., Regulatory Affairs
*Hicks, D., Manager Regulatory Affairs
*Honma, G., Manager Licensing & Regulatory Programs
*Levis, W., Director Site Operations
*Lopriore, R., Plant Manager
McDaniel, H., Supervisor Operator Requalification
*Wall, H., Supervisor Operator Initial Training

Other licensee employees contacted included instructors, engineers, technicians, operators, and office personnel.

NRC Personnel
*Patterson, C., Senior Resident Inspector

*Attended exit interview

2. Discussion

2.1 Summary

NRC examiners conducted regular, announced operator licensing initial examinations during the period December 4-8, 1995. Examiners administered examinations under the guidelines of the Examiner Standards (ES), NUREG-1021, Revision 7. Four Limited Senior Reactor Operator (LSRO) candidates received written and operating examinations. The operating test included actual movement of a single blade guide in the Unit 1 spent fuel pool (SFP) to and from Fuel Prep Machine (FPM) "A". Three candidates passed the examination and one candidate failed.

2.2 Candidate Performance

The written examination was analyzed to identify areas of poor candidate knowledge. The examiner found two questions where three of the four candidates missed the question. The first question (LSRO #49) involved a hypothetical work schedule. The candidates were to apply facility administrative requirements for working overtime to identify periods in the schedule where overtime restrictions were exceeded. All three candidates who missed the question found only one period that exceeded the restrictions when actually two periods existed. The second question (LSRO #52) placed the candidates in a situation where Reactor Pressure Vessel (RPV) level was rapidly decreasing immediately after starting to move a spent fuel assembly from the core to the SFP. All three candidates who missed the question continued to moved the assembly from the vessel to the SFP. In this situation, the correct response would be to return the

assembly to the RPV and lower it at least to below the vessel flange. Additionally, at least two candidates missed 11 other questions (LSRO #2, #14, #18, #21, #25, #33, #44, #47, #53, #56, and #58). Given the small number of exam candidates, the examiners evaluated the fact that 50% of the candidates missed these questions with caution and no definite conclusions were not made. However, it should be noted that two candidates only marginally passed (grade of 80%-82%) the written examination. A facility evaluation of these questions against the LSRO training program may be appropriate.

The examiners also identified several generic weaknesses during the walk-through examination. All candidates initially had difficulty in operating the FPM. This machine is raised and lowered by a motor controlled by a foot pedal on the refuel floor. Apparently, the pedal operated opposite to how the candidates were trained because each one raised the machine when they were actually attempting to lower the machine. Three of the candidates failed to implement supplied procedural guidance of OFH-11J, "Fuel Support Removal and Reinstallation", when presented with an alternate-path Job Performance Measure (JPM) for a stuck fuel support piece. Most of the candidates had difficulty in judging component dimensions and positioning through 20 feet of SFP water. For example, several candidates had a problem determining whether the fuel prep machine was up or down. The candidates failed to use other SFP visual cues to improve depth perception and to place pool component locations in perspective. Poor lighting in the pool did not help the situation. Several lights were burnt out or had broken support brackets. Finally, all candidates had difficulty locating the local leak detection indicators for the fuel pool, reactor well, and dryer separator pit during a JPM where a fuel pool cooling common alarm was received.

The actual movement of a simulated fuel assembly took much longer to conduct (approximately one hour per candidate) than expected. The examiners were unable to conclude whether this was due to candidate unfamiliarity with the task, poor lighting conditions discussed above, candidate nervousness in the exam environment, or poor JPM development. The NRC will be looking at ways to reduce this time commitment for future exams.

2.3 Reference Materials

The reference materials for this examination were poorly organized and incomplete. They were not properly bound and indexed as requested in NRC's corporate notification letter dated August 10, 1995. Once the examiners identified these problems, the facility training staff was prompt and diligent in attending to additional examination material requirements.

3. Exit Interview

At the conclusion of the site visit, the examiners met with representatives of the plant staff listed in paragraph 1 to discuss the results of the examinations. The licensee did not identify as proprietary any material provided to, or reviewed by the examiners. Dissenting comments were not received from the licensee.

CP&L

Carolina Power & Light Company
PO Box 10429
Southport NC 28461-0429

William R. Campbell
Vice President
Brunswick Nuclear Plant

DEC 1 4 1995

SERIAL: BSEP 95-0639

Mr. Stewart D. Ebneter
Regional Administrator
ATTENTION: Mr. T. A. Peebles
U. S. Nuclear Regulatory Commission
101 Marietta Street, N. W., Suite 2900
Atlanta, GA 30323

BRUNSWICK STEAM ELECTRIC PLANT, UNIT NOS. 1 AND 2
DOCKET NOS. 50-325 AND 50-324/LICENSE NOS. DPR-71 AND DPR-62
COMMENTS ON THE LIMITED SENIOR REACTOR OPERATOR EXAMINATION
ADMINISTERED AT BRUNSWICK ON DECEMBER 7 AND DECEMBER 8, 1995

Dear Mr. Ebneter:

This letter provides the NRC Staff with Carolina Power & Light Company's (CP&L) comments on the Limited Senior Reactor Operator license examination administered at Brunswick on December 7 and December 8, 1995. Carolina Power & Light Company's post-examination review of the written test shows the answer key for the following two (2) questions should be revised as noted.

QUESTION #6 The Unit 2 Core has been partially de-fueled and RHR loop "A" is operating in the shutdown cooling mode.

Which one of the following problems can be caused by a high shutdown cooling flow rate?

A. A fuel nose piece may be lifted or blown off its seat when removing the last fuel assembly from a fuel cell.

B. A blade guide may be blown out of alignment with the fuel cell when attempting to insert a blade guide into the reactor core. **(THIS IS THE CORRECT ANSWER PER THE ANSWER KEY.)**

ENCLOSURE 2

C. An incore instrument string may vibrate against the surrounding core components when the moisture separator has been removed. **(This answer should also be considered correct. Reference the attached 2 OP-17 section 5.4.2 CAUTION just prior to step 69.)**

D. A control rod may vibrate against the supporting blade guides when all fuel assemblies are removed from the fuel cell.

QUESTION #43 During a refuel outage, LPRM removal is in progress.

Which one of the following methods must be used to verify that the instrument handling tool has properly engaged an LPRM prior to raising the monorail hoist?

A. Grasp the cable and raise it slightly, then gently release it several times.**(This should also be considered a correct answer. The method for lifting the tool to check for proper seating on the top guide and for verifying proper engagement of the tool with an LPRM are essentially the same. We recognize that the procedure states that you "lift the instrument handling tool by hand", when in fact you must grasp and lift the cable to verify tool engagement. (We are changing our procedure to clarify this step). In a classroom test environment, the candidate has been asked to make a distinction between grasping a cable (which you can get your hands on) and raising it, versus lifting an instrument handling tool by hand (when in fact you cannot reach the tool by hand, you have to use the cable). If you watched the actual performance of each task from the refuel floor, in both cases you would see the candidate grasp the cable and lift to verify proper seating or engagement.**

B. Grasp the cable and raise it slightly, then observe for leakage from the water seal cap.

C. Lift the instrument handling tool by hand approximately 6 inches . **(THIS IS THE CORRECT ANSWER PER THE ANSWER KEY.However , for the reason explained above, we recommend this be counted as a second correct answer.)**

D. Lift the instrument handling tool by hand and observe that the centering rings do not catch on the underside of the top guide.

Carolina Power & Light Company hereby request the NRC Staff to review the comments provided by Brunswick training personnel and, if acceptable, revise the answer key for the Limited Senior Reactor Operator License Examinations administered at Brunswick on December 7 and December 8, 1995.

Please refer any questions regarding this submittal to Mr. Hal Wall at (910) 457-2213.

Sincerely,

William R Campbell

William R. Campbell

SHC/shc

Attachments

cc: Mr. D. C. Payne, NRC Region II - Operations Branch
Mr. D. C. Trimble, Jr., NRR Project Manager - Brunswick Units 1 and 2
Mr. C. A. Patterson, NRC Senior Resident Inspector - Brunswick Units 1 and 2
The Honorable H. Wells, Chairman - North Carolina Utilities Commission
NRC Document Control Desk

CAUTION

The RPV should NOT be cooled down below a temperature of 70°F until reactor vessel head closure studs have been detensioned.

66. Start desired Loop A(B) RHR pump. _____

67. Immediately throttle open RHR HX 2A(2B) Bypass Valve, E11-F048A(B), and establish RHR total flow rate between 4500 and 6500 gpm. _____

68. If Reactor Recirculation Pump A(B) Discharge Bypass Valve, B32-F032A(B), is closed, then perform the following:

    a. Bump open Reactor Recirculation Pump A(B) Discharge Bypass Valve, B32-F032A(B), as needed to maintain a recirculation loop heatup rate below 100°F/hr. _____

    b. When reactor recirculation loop temperature is approximately equal to reactor vessel temperature, then fully open Reactor Recirculation Pump A(B) Discharge Bypass Valve, B32-F032A(B). _____

CAUTION

IF any of the four fuel assemblies surrounding each in-core instrumentation string have been removed and NOT replaced with blade guides, THEN failure to limit RHR total flow to less than 6500 gpm may cause damage to in-core instrumentation from flow induced vibration.

69. If an RHR total flow rate between 5000 and 10,000 gpm is desired, then throttle open RHR HX 2A(2B) Bypass Valve, E11-F048A(B), to establish desired flowrate. _____

CAUTION

RHR service water flow rate of 6000 gpm should NOT be exceeded until RPV pressure is at or below 75 psig.

1.2.3 Actuate the ENGAGE switch on the pendant control to place the instrument handling tool slide roller in the extended position. The lower slide will be in the retracted position.

1.2.4 Operate the monorail hoist and lower the instrument handling tool down to the designated LPRM position, oriented so that the roller on the roller slide points toward the LPRM to be removed (pointing towards the intersection of the plates of the top guide).

1.2.5 Lower the instrument handling tool until the roller slide is resting on the top guide. Take up any slack in the cable. Do not raise the roller slide more than 1/8 inch above the top guide. Support the weight of the tool on the cable.

1.2.6 To be sure the tool has seated properly on the top guide, grasp the cable and raise it slightly and then gently release it. By doing this several times, you should be able to feel the roller resting solidly on the top guide.

1.2.7 Actuate the DISENGAGE button on the pendant control.

1.2.8 Refueling Floor Supervisor Verification: Verify the slide has straddled the LPRM assembly plunger.

1.2.9 Notify Control Room Operator of LPRM to be removed.

1.2.10 Capture the LPRM assembly to be removed by actuating the ENGAGE button on the pendant control.

1.2.11 Notify the Technical Director under the vessel PRIOR to removing the LPRM so that the valve on the water seal cap may be opened.

1.2.12 To verify proper engagement, lift the instrument handling tool slowly four to six inches by hand.

CAUTIONS: 1. The water being drained from the LPRM seal caps will be highly radioactive. Health Physics should monitor the seal cap during this step and all personnel shall be as far away as possible during the time water is flowing.

2. Continuous observation of the LPRM is required to prevent the 1.4-inch diameter centering rings from catching the underside of the top guide.

NRC RESOLUTION OF FACILITY COMMENTS

Question #6

NRC Resolution:

Comment accepted. The reference provided by the facility warns operators of damage to in-core instrumentation from high shutdown cooling flow induced vibration. The answer key was modified to accept both "b" and "c" as correct answers.

Question #43

NRC Resolution:

Comment noted but recommendation to allow both "a" and "c" as correct answers was not accepted. During post examination discussions, the facility noted that all candidates eliminated answers "c" and "d" because an operator cannot physically touch the handling tool once it is attached to the LPRM. So their choice was narrowed down to answers "a" and "b". The Facility Comments proposed giving credit for "a" since it was the most correct answer between "a" and "b" and approximately reflected the action that should be taken. The NRC disagreed with this logic. The procedure did not call for the tool to be "raised slightly" as specified in answer "a" but for it to be raised 4 to 6 inches (step 1.2.12 of OFH-16). Also, the procedure step did not call for it to be done "several times" as specified in answer "a" but only once. As discussed below, a proposed facility procedure change request still would not require these actions. Thus answer "a" is not a correct answer.

The NRC acknowledges that answer "c" was not completely accurate either. Though this answer was nearly verbatim from the FH procedure step, it was not technically correct since the operator could not physically touch the instrument handling tool which would be many feet under water. The operator would actually use the monorail cable to do this.

A procedure change request dated 12/15/95 was submitted by the facility to correct the wording problem of the procedure. The NRC noted that the change request only added wording to clarify that the operator should grasp the (monorail) cable to lift the instrument handling tool to verify proper engagement. The procedure would still require the operator to lift the cable once, four to six inches. Since neither "a" or "c" are fully correct, no correct answer exists. The question was eliminated from the examination and all candidate test scores were adjusted appropriately.

Brunswick ISRO
50-325, 324/95-302
12/4-8/95
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Nuclear Regulatory Commission
Operator Licensing
Examination

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Official Use Only category on
date of examination.

U. S. NUCLEAR REGULATORY COMMISSION

LSRO WRITTEN EXAMINATION

APPLICANT INFORMATION

Name:	
Date: **12/08/1995**	Region: **II**
Facility/Unit: **Brunswick Units 1 & 2**	Reactor Type: **BWR-GE4**

INSTRUCTIONS

Use the answer sheets provided to document your answers. Staple this cover sheet on top of the answer sheets. Points for each question are indicated in parentheses after the question. The passing grade requires a final grade of at least 80 percent. Examination papers will be picked up 3 hours after the examination starts.

All work done on this examination is my own. I have neither given nor received aid.

_____
Applicant's Signature

RESULTS

Test Value	60.00 Points
Applicant's Score	_____ Points
Applicant's Grade	_____ Percent

EQUATION SHEET

$f = ma$

$w = mg$

$v = s/t$

$s = V_o t + \frac{1}{2} at^2$

$a = (V_f - V_o)/t$

$V_f = V_o + at$

$E = mc^2$

$KE = \frac{1}{2} mv^2$

$PE = mgh$

$w = \theta/t$

$W = \nu \Delta P$

$A = (\Pi D^2)/4$

$\Delta E = 931\ \Delta m$

$\dot{m} = V_{av} A \varphi$

$\dot{Q} = \dot{m} C_p \Delta t$

$\dot{Q} = UA\Delta t$

$Pwr = W_f \Delta h$

$P = P_o 10^{sur(t)}$

$P = P_o e^{t/T}$

$SUR = 26.06/T$

$SUR = 26\varphi/\ell^* + (\beta - \varphi)T$

$T = \ell/(\varphi - \beta)$

$A = \lambda N$

$A = A_o e^{-\lambda t}$

$\lambda = \ln 2/t_{\frac{1}{2}} = 0.693/t_{\frac{1}{2}}$

$I = I_o e^{-\Sigma x}$

$I = I_o e^{-\mu x}$

$I = I_o\ 10^{-x/TVL}$

$TVL = 1.3/\mu$

$HVL = -0.693/\mu$

$SCR = S/(1 - K_{eff})$

$CR_x = S/(1 - K_{effx})$

$CR_1(1 - K_{eff1}) = CR_2(1 - K_{eff2})$

$M = 1/(1 - K_{eff}) = CR_1/CR_o$

$M = (1 - K_{effo})/(1 - K_{eff1})$

$SDM = (1 - K_{eff})/Keff$

$\ell^* = 10^{-4}$ seconds

$\bar{\lambda} = 0.1$ seconds^{-1}

$I_1 d_1 = I_2 d_2$

$I_1 d_1^2 = I_2 d_2^2$

$R/hr = (0.5\ CE)/d^2$ (meters)

$R/hr = 6\ CE/d^2$ (feet)

$T = (\ell^*/\varphi) + [(\beta - \varphi)/\bar{\lambda}\varphi]$

$T = (\beta - \varphi)/(\bar{\lambda}\varphi)$

$\varphi = (K_{eff}^{-1})/K_{eff} = \Delta K_{eff}/K_{eff}$

$\varphi = [(\ell^*/(T\ K_{eff})] + [\bar{\beta}_{eff}/(1 + \bar{\lambda}T)]$

$P = (\Sigma \phi V)/(3 \times 10^{10})$

$\Sigma = \delta N$

Cycle efficiency = (Net work out)/(Energy in)

Water Parameters

1 gal. = 8.345 lbm.

1 gal. = 3.78 liters

1 ft^3 = 7.48 gal.

Density = 62.4 lbm/ft^3

Density = 1 gm/cm^3

Heat of vaporization = 970 Btu/lbm

Heat of fusion = 144 Btu/lbm

1 Atm = 14.7 psi = 29.9 in Hg.

1 ft. H_2O = 0.4335 lbf/in.

Miscellaneous Conversions

1 Curie = 3.7×10^{10} dps

1 kg = 2.21 lbm

1 hp = 2.54×10^3 Btu/hr

1 mw = 3.41×10^6 Btu/hr

1 in = 2.54 cm

$^\circ F = 9/5\,^\circ C + 32$

$^\circ C = 5/9(^\circ F - 32)$

1 Btu = 778 ft-lbf

A N S W E R S H E E T

Multiple Choice (Circle or X your choice)

If you change your answer, write your selection in the blank.

MULTIPLE CHOICE

001	a	b	c	d	___	023	a	b	c	d	___
002	a	b	c	d	___	024	a	b	c	d	___
003	a	b	c	d	___	025	a	b	c	d	___
004	a	b	c	d	___	026	a	b	c	d	___
005	a	b	c	d	___	027	a	b	c	d	___
006	a	b	c	d	___	028	a	b	c	d	___
007	a	b	c	d	___	029	a	b	c	d	___
008	a	b	c	d	___	030	a	b	c	d	___
009	a	b	c	d	___	031	a	b	c	d	___
010	a	b	c	d	___	032	a	b	c	d	___
011	a	b	c	d	___	033	a	b	c	d	___
012	a	b	c	d	___	034	a	b	c	d	___
013	a	b	c	d	___	035	a	b	c	d	___
014	a	b	c	d	___	036	a	b	c	d	___
015	a	b	c	d	___	037	a	b	c	d	___
016	a	b	c	d	___	038	a	b	c	d	___
017	a	b	c	d	___	039	a	b	c	d	___
018	a	b	c	d	___	040	a	b	c	d	___
019	a	b	c	d	___	041	a	b	c	d	___
020	a	b	c	d	___	042	a	b	c	d	___
021	a	b	c	d	___	043	a	b	c	d	___
022	a	b	c	d	___	044	a	b	c	d	___
						045	a	b	c	d	___

A N S W E R S H E E T

Multiple Choice (Circle or X your choice)

If you change your answer, write your selection in the blank.

046 a b c d ___

MULTIPLE CHOICE

047 a b c d ___

048 a b c d ___

049 a b c d ___

050 a b c d ___

051 a b c d ___

052 a b c d ___

053 a b c d ___

054 a b c d ___

055 a b c d ___

056 a b c d ___

057 a b c d ___

058 a b c d ___

059 a b c d ___

060 a b c d ___

(********** END OF EXAMINATION **********)

NRC RULES AND GUIDELINES FOR LICENSE EXAMINATIONS

During the administration of this examination the following rules apply:

1. Cheating on the examination means an automatic denial of your application and could result in more severe penalties.

2. After the examination has been completed, you must sign the statement on the cover sheet indicating that the work is your own and you have not received or given assistance in completing the examination. This must be done after you complete the examination.

3. Restroom trips are to be limited and only one applicant at a time may leave. You must avoid all contacts with anyone outside the examination room to avoid even the appearance or possibility of cheating.

4. Use black ink or dark pencil ONLY to facilitate legible reproductions.

5. Print your name in the blank provided in the upper right-hand corner of the examination cover sheet and each answer sheet.

6. Mark your answers on the answer sheet provided. USE ONLY THE PAPER PROVIDED AND DO NOT WRITE ON THE BACK SIDE OF THE PAGE.

7. Before you turn in your examination, consecutively number each answer sheet, including any additional pages inserted when writing your answers on the examination question page.

8. Use abbreviations only if they are commonly used in facility literature. Avoid using symbols such as < or > signs to avoid a simple transposition error resulting in an incorrect answer. Write it out.

9. The point value for each question is indicated in parentheses after the question.

10. Show all calculations, methods, or assumptions used to obtain an answer to any short answer questions.

11. Partial credit may be given except on multiple choice questions. Therefore, ANSWER ALL PARTS OF THE QUESTION AND DO NOT LEAVE ANY ANSWER BLANK.

12. Proportional grading will be applied. Any additional wrong information that is provided may count against you. For example, if a question is worth one point and asks for four responses, each of which is worth 0.25 points, and you give five responses, each of your responses will be worth 0.20 points. If one of your five responses is incorrect, 0.20 will be deducted and your total credit for that question will be 0.80 instead of 1.00 even though you got the four correct answers.

13. If the intent of a question is unclear, ask questions of the examiner only.

14. When turning in your examination, assemble the completed examination with examination questions, examination aids and answer sheets. In addition, turn in all scrap paper.

15. Ensure all information you wish to have evaluated as part of your answer is on your answer sheet. Scrap paper will be disposed of immediately following the examination.

16. To pass the examination, you must achieve a grade of 80% or greater.

17. There is a time limit of three (3) hours for completion of the examination.

18. When you are done and have turned in your examination, leave the examination area (EXAMINER WILL DEFINE THE AREA). If you are found in this area while the examination is still in progress, your license may be denied or revoked.

QUESTION: 001 (1.00)

Fuel loading is in progress. At the start of your shift, average SRM reading was 20 counts per second, and the reactor engineer calculated that K-effective was 0.90 at that time. After core loading is complete, average SRM reading is 100 counts per second.

Which one of the following states the current K-effective?

a. 0.95

b. 0.96

c. 0.97

d. 0.98

QUESTION: 002 (1.00)

Select the choice below that completes the following statement.

The fuel support piece of a NONPERIPHERAL fuel assembly transmits the weight of the fuel assembly to the:

a. core plate and down to the core shroud

b. core plate and down to the core support structure

c. control rod guide tube and down to the control rod drive housing support

d. control rod guide tube and down to the reactor vessel bottom head

QUESTION: 003 (1.00)

A fuel assembly is suspended on the refueling grapple.

Which one of the following describes the fuel assembly components that support the weight of the fuel assembly?

a. 2 fueled standard rods on each side

b. 4 non-fueled standard corner rods

c. 2 fueled tie rods on each side

d. 4 non-fueled corner tie rods

QUESTION: 004 (1.00)

Which one of the following describes the design and function of the fuel channel spacer buttons?

a. Spacer buttons on the bottom end of the channel establish a gap to maintain a constant fuel assembly bypass flow.

b. Spacer buttons on the top end of the channel provide room for the control rod to pass between adjacent fuel assemblies.

c. Spacer buttons are riveted at equidistances along the length of the channel to prevent the channel from bowing into the path of the control rod.

d. Spacer buttons are riveted at equidistances along the length of the channel to act as a bearing surface and guide for the control rod.

QUESTION: 005 (1.00)

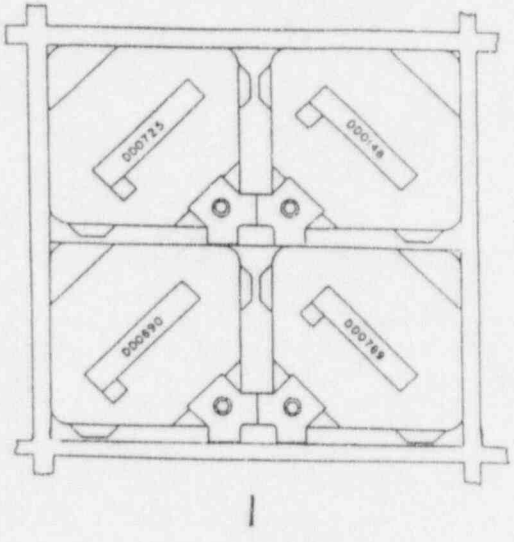
Which one of the following figures depicts the correct orientation of a fuel cell during the reloading of fuel into the core?

a. 1

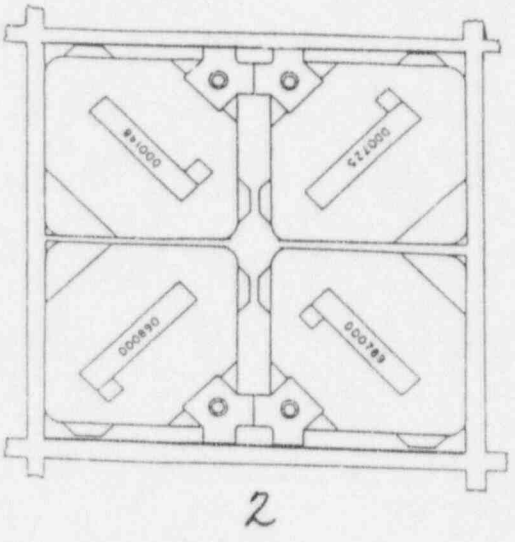
b. 2

c. 3

d. 4



1



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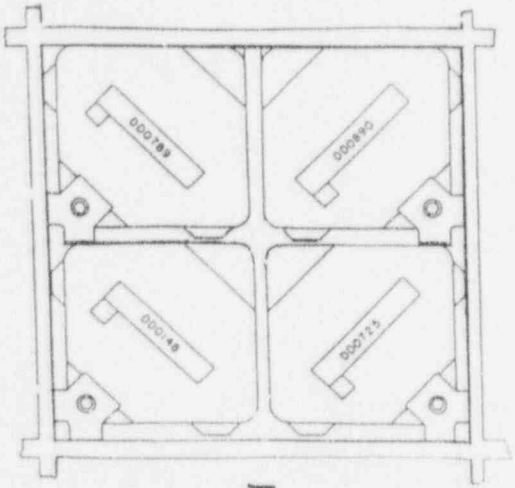

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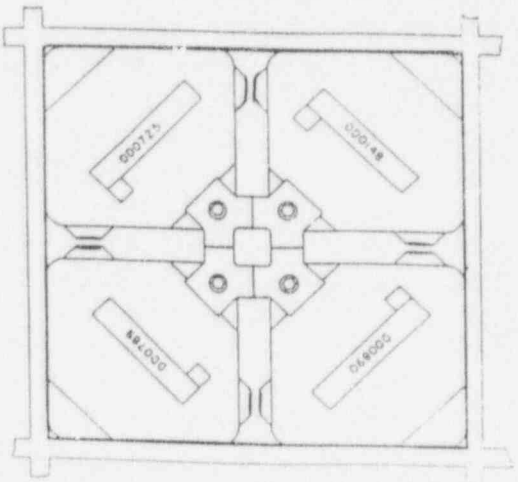

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QUESTION: 006 (1.00)

The unit 2 core has been partially de-fueled and RHR loop "A" is operating in the shutdown cooling mode.

Which one of the following problems can be caused by a high shutdown cooling flow rate?

a. A fuel nosepiece may be lifted or blown off its seat when removing the last fuel assembly from a fuel cell.

b. A blade guide may be blown out of alignment with the fuel cell when attempting to insert a blade guide into the reactor core.

c. An incore instrument string may vibrate against the surrounding core components when the moisture separator has been removed.

d. A control rod may vibrate against the supporting blade guides when all fuel assemblies are removed from the fuel cell.

QUESTION: 007 (1.00)

A refueling outage is nearing completion, and all rods are inserted. Initially, the core keff is equal to 0.97.

If a fuel shuffle results in the addition of +0.0250 dk, which one of the following is the shutdown margin?

a. 0.0309 dk/k

b. 0.0250 dk/k

c. 0.0150 dk/k

d. 0.0059 dk/k

QUESTION: 008 (1.00)

The fuel pool cooling and cleanup demineralizers are designed to remove radioactive materials from the fuel pool and the reactor coolant.

Which one of the following is the primary source of these radioactive materials?

a. Fission products that diffuse through the fuel cladding.

b. Fission products of tramp uranium that escape from the surface of the fuel cladding.

c. Activation of metal corrosion products by neutron or gamma radiation.

d. Activation of water molecules by photo-neutron reactions.

QUESTION: 009 (1.00)

Core reload is in progress and only a few fuel assemblies remain to be loaded. A fuel assembly has just been loaded into the core. The reactor operator reports that the source range monitors, initially at 10 cps, have increased slowly and stabilized at 16 cps.

Which one of the following describes the condition of the reactor core?

a. slightly supercritical

b. exactly critical

c. initially critical and then subcritical

d. slightly subcritical

QUESTION: 010 (1.00)

Fuel Pool Cooling and Cleanup system is aligned and operating normally. Core de-fueling is in progress.

Which one of the following will cause the LARGEST INCREASE in the heat removal rate from the fuel pool via the heat exchanger of the Fuel Pool Cooling and Cleanup system?

a. Cooling water flow rate to the heat exchanger decreases 5%

b. Fuel pool water level decreases 1 inch

c. Fuel pool water temperature increases 5 degrees

d. Fuel pool water level increases 2 inches

QUESTION: 011 (1.00)

The RPS shorting links have been removed and the Reactor Mode Switch is in REFUEL. All IRMs are on range 3, and no nuclear instruments are bypassed.

Which one of the following sets of nuclear instrument signals will DIRECTLY generate a full reactor scram?

a. APRM "A" indicating 10% and SRM "A" indicating 3 cps

b. SRM "A" indicating 3 cps and SRM "B" indicating 5 cps

c. SRM "A" and SRM "B" both indicating 1 x 10E5 cps

d. APRM "B" downscale and SRM "B" indicating 5 x 10E5 cps

QUESTION: 012 (1.00)

Select the choice below that completes the following statements.

The RPS shorting links have been removed, the Reactor Mode Switch is in REFUEL, and no fuel movement is in progress. Due to special testing, all division "A" IRMs are on range 3 and all division "B" IRMs are on range 8. No nuclear instruments are bypassed. A loss of _____ will result in a _____.

a. +/- 24 VDC; control rod block

b. +/- 24 VDC; reactor scram

c. +/- 125 VDC; control rod block

d. +/- 125 VDC; reactor scram

QUESTION: 013 (1.00)

The unit is in a refueling outage with Reactor Building HVAC aligned normally. SBGT is in the normal standby lineup. Reactor Building Ventilation Exhaust temperature has increased to 140 deg. F and is continuing to increase.

Which one of the following describes an expected equipment response?

a. SBGT fan "A" starts and SBGT fan "B" remains in standby.

b. SBGT primary containment suction damper (F-BFV-RB) receives a close signal.

c. SBGT Reactor Building suction dampers (D/H-BFV-RB) receive a close signal.

d. SBGT purge system inlet damper (I-BFV-RB) receives an open signal.

QUESTION: 014 (1.00)

Which one of the following conditions would indicate a loss of secondary containment integrity?

a. Upon receipt of an isolation signal, one RBHVAC inlet isolation damper is open and operable, and the other inlet isolation damper has failed closed and is latched.

b. Both trains of SBGT are operating, RBHVAC has isolated, SBGT flow rate is 3000 scfm, and Reactor Building pressure is 0.1 inches of water gauge below atmospheric pressure.

c. RBHVAC is operating normally, Reactor Building pressure is 0.4 inches of water gauge below atmospheric pressure, and the inner Reactor Building railroad door cannot be closed.

d. One RBHVAC outlet damper is open and operable while the other RBHVAC outlet damper will not automatically close, but can be locally manually closed within one hour.

QUESTION: 015 (1.00)

Unit 1 is in a refueling outage and a core spiral offload of the fuel assemblies in the quadrant associated with SRM "B" is in progress. During testing of an IRM drive motor, the operator inadvertently withdraws SRM "B". Subsequently, SRM "B" is stuck partially out of the core. Plant conditions and indications are as follows:

SRM "B" rate decreased to a stable 2 cps.
SRMs "A", "C", and "D" are fully inserted.
SRM "A" indicates 12 cps.
SRM "C" indicates 15 cps.
SRM "D" indicates 10 cps.

Which one of the following describes the effect on the core offload?

a. Core spiral offload may continue because 3 SRMs remain operable and only 2 SRMs are required to be operable during a spiral offload.

b. Core spiral offload may continue because all SRMs remain operable and count rate is allowed to drop below 3 cps during a spiral offload.

c. Core spiral offload must stop because no fuel can be withdrawn from the core quadrant associated with SRM "B".

d. Core spiral offload must stop because no fuel can be withdrawn from the core quadrants associated with or adjacent to SRM "B".

QUESTION: 016 (1.00)

Technical Specifications require that at least 20 feet 6 inches of water be maintained over the top of irradiated fuel rods seated in the fuel pool storage racks.

Which one of the following is the basis for this requirement?

a. To ensure a sufficient depth of water above the fuel to reduce fission product releases upon a fuel assembly rupture.

b. To ensure a sufficient depth of water above the core to maintain reasonably low refuel floor area radiation levels.

c. To ensure a sufficient volume of water to prevent an excessive temperature rise in the fuel pool upon a loss of fuel pool cooling during the establishment of alternative cooling.

d. To ensure a sufficient volume of water to prevent an excessive temperature rise in the core upon a loss of shutdown cooling during the establishment of alternative cooling.

QUESTION: 017 (1.00)

Unit 2 is in the refueling condition and the fuel offload is being started. RHR loop "A" is in shutdown cooling with RHR pump "A" running and RHR loop "B" tagged out of service.

If reactor water level decreases to +45 inches due to a leak, which one of the following describes the expected sequence of component responses in RHR loop "A"?

a. Only F009 (shutdown cooling inboard suction) valve closes, LPCI F015A (inboard injection) valve closes, RHR pump "A" trips, RHR pump "C" remains off, then LPCI F015A valve fully opens.

b. Only F009 (shutdown cooling inboard suction) valve closes, RHR pump "A" trips, loop "A" torus suction valves open, RHR pumps "A" and "C" start, then both LPCI injection valves fully open.

c. Both F008 and F009 (shutdown cooling suction valves) close, LPCI F015A (inboard injection) valve closes, RHR pump "A" trips, RHR pump "C" remains off, then LPCI F015A valve fully opens.

d. Both F008 and F009 (shutdown cooling suction) valves close, RHR pump "A" trips, loop "A" torus suction valves open, RHR pumps "A" and "C" start, then both LPCI injection valves fully open.

QUESTION: 018 (1.00)

The Unit 1 reactor vessel head is removed and the Reactor Mode Switch is in REFUEL.

Which one of the following control rod conditions will FIRST result in a control rod block? (Assume all other control rods are fully inserted.)

a. One control rod is selected and withdrawn to position 02 then another rod selection is attempted, a select block is initiated.

b. One control rod is withdrawn to position 14 then a second rod is selected, a withdraw block is initiated.

c. One control rod is withdrawn to position 30 then a second rod is withdrawn beyond position 02, a withdraw block is initiated.

d. One control rod is fully withdrawn and then fully re-inserted, then a second rod selection is attempted, a select block is initiated.

QUESTION: 019 (1.00)

The Unit 2 reactor vessel head is removed.

Which one of the following conditions will result in a control rod block? (Assume all refuel platform hoists are fully raised and unloaded UNLESS otherwise stated.)

a. Mode Switch in STARTUP, refuel platform over the core, and the frame hoist loaded

b. Mode Switch in STARTUP, refuel platform over the fuel pool, and the frame hoist unloaded but NOT fully raised

c. Mode Switch in REFUEL, refuel platform over the fuel pool, and the frame hoist loaded

d. Mode Switch in REFUEL, refuel platform over the core, and the frame hoist unloaded but NOT fully raised

QUESTION: 020 (1.00)

A core offload is in progress on Unit 1. Plant conditions are as follows:

- Unit 1 refuel bridge is over the Unit 1 reactor cavity.
- Auxiliary hoist is loaded to 350 lbs.
- Mode Switch is in REFUEL.
- One control rod is withdrawn to position 04.

Which one of the following describes the operation of the refuel bridge?

a. Bridge will move in the forward direction (toward the fuel pool) OR the reverse direction (toward the reactor core).

b. Bridge will move ONLY in the forward direction.

c. Bridge will move ONLY in the reverse direction.

d. Bridge will NOT move in either direction.

QUESTION: 021 (1.00)

Which one of the following describes the response of the Control Rod Latch Tool if power to the tool is lost?

a. If the tool is DISENGAGED, the actuator link and lifting hook will retract from the extended position.

b. If the tool is DISENGAGED, the actuator link and lifting hook will extend from the retracted position.

c. If the tool is ENGAGED, the actuator link and lifting hook will retract from the extended position.

d. If the tool is ENGAGED, the actuator link and lifting hook will extend from the retracted position.

QUESTION: 022 (1.00)

Which one of the following is the MAXIMUM OPERATING temperature of the fuel pool and the reason for that temperature?

a. 125 deg. F to ensure sufficient radiation shielding for normal refuel floor access.

b. 125 deg. F to maintain the ability of the water to hold entrapped radioactive iodine.

c. 150 deg. F to ensure sufficient radiation shielding for normal refuel floor access.

d. 150 deg. F to maintain the ability of the water to hold entrapped radioactive iodine.

QUESTION: 023 (1.00)

The Unit 1 reactor vessel head is removed, fuel is loaded in the core, and the Reactor Mode Switch is in REFUEL.

Which one of the following constitutes a core alteration as defined by Technical Specifications?

a. Movement of an SRM using its normal drive control

b. Movement of a control rod using its normal drive control

c. Installment and removal of an LPRM from the core

d. Installment and removal of a special portable neutron detector

QUESTION: 024 (1.00)

During refueling operations, Unit 2 Technical Specifications require a 24 hour minimum delay time between subcriticality and the movement of fuel.

Which one of the following is the basis for this minimum time requirement?

a. To ensure that the radioactive decay of the short-lived fission products has occurred.

b. To ensure that decay heat load will be within the capacity of the spent fuel pool cooling system.

c. To ensure that decay heat loads will be within the capacity of one shutdown cooling system heat exchanger.

d. To ensure that dissolved fission product gases in the reactor coolant come out of solution before the head is removed.

QUESTION: 025 (1.00)

Unit 2 plant conditions are as follows:

- The reactor vessel head is removed.
- The fuel pool-to-reactor vessel gates are removed.
- Reactor coolant and fuel pool temperatures are 85 deg. F.

Which one of the following sets of conditions will place the reactor in the REFUEL mode of operation per Technical Specifications?

a. Reactor Mode Switch is in REFUEL
No fuel in the reactor vessel
New fuel being unpacked and inspected on the refueling floor
One control rod withdrawn to position 04.

b. Reactor Mode Switch is in REFUEL
No fuel in the reactor vessel
Irradiated fuel being shuffled in the fuel pools
All control rods fully inserted.

c. Reactor Mode Switch is in SHUTDOWN.
Four fuel assemblies surrounding one SRM in the reactor vessel.
All control rods fully inserted.

d. Reactor Mode Switch is in STARTUP.
Four fuel assemblies surrounding one SRM in the reactor vessel.
One control rod withdrawn to position 04.

QUESTION: 026 (1.00)

Unit 1 is in a refueling outage and core de-fueling is in progress.

Which one of the following could result in a Refueling Area Radiation Monitor DOWNSCALE alarm?

a. Decreased reactor cavity level

b. Loss of all vital 120 VDC batteries

c. Loss of all 120 VAC emergency busses

d. Decreased Reactor Building Ventilation flow rate

QUESTION: 027 (1.00)

The refuel bridge operator has lowered a fuel assembly into the reactor core and the SLACK CABLE light has illuminated. The operator has taken the grapple control switch to RELEASE, but after 5 seconds the grapple has not opened.

Which one of the following actions must be taken to reset the grapple control circuit?

a. The grapple control switch must be taken to OVERRIDE.

b. The grapple control switch must be taken to ENGAGE.

c. The mast must be raised to clear the SLACK CABLE light and then re-lowered.

d. The mast position must be JOGGED to ensure the fuel grapple latch is flush with the grapple body.

QUESTION: 028 (1.00)

Which one of the following terms describes the process of determining an instrument's operability by visually comparing its indication to other independent instrument channels measuring the same variable (as defined in Technical Specifications)?

a. Channel Calibration

b. Channel Functional Test

c. Channel Operational Test

d. Channel Check

QUESTION: 029 (1.00)

Which one of the following is a precaution that must be followed when moving a fuel assembly from one fuel pool storage rack to another storage rack using the main hoist?

a. Apply hand pressure to the mast to prevent the channel clip from catching on the fuel pool rack while lowering the assembly into a rack.

b. Raise the mast just high enough to clear the fuel pool racks and reposition the refuel bridge using only the jog speed to minimize wear on the mast.

c. When the mast and grapple are lowered for latching onto the bail handle, align the grapple with hand pressure only, do not jog the position of the refuel bridge to prevent binding of the mast.

d. Follow only the safe load paths for the movement of the refuel bridge in the fuel pool when the grapple is loaded with a new or irradiated fuel assembly to meet FSAR design basis accident assumptions.

QUESTION: 030 (1.00)

Which one of the following states the crew positions that must maintain an independent copy of the Core Component Sequence Sheet during fuel movement?

a. The Refuel Platform Operator and Refueling Floor SRO

b. The Refuel Platform Operator and Nuclear Engineering Technician

c. The Spotter and Refueling Floor SRO

d. The Spotter and Nuclear Engineering Technician

QUESTION: 031 (1.00)

Which one of the following describes how to establish a neutronic bridge of the SRMs?

a. Four fuel assemblies are loaded around at least the minimum required number of operable SRMs.

b. Four fuel assemblies are loaded around each SRM and all SRMs are indicating greater than 6 cps.

c. Fuel assemblies are loaded in a straight line between any two SRMs on opposite sides of the core

d. Fuel assemblies are loaded in a straight line between any two SRMs located in adjacent core quadrants.

QUESTION: 032 (1.00)

A core reload is in progress.

Which one of the following reactivity conditions requires the fuel load to be suspended?

a. While loading the first 4 fuel assemblies around an SRM, the SRM count rate doubles during the insertion of a single assembly.

b. While loading the first 4 fuel assemblies around an SRM, the SRM count rate increases by an overall factor of 5 after all 4 assemblies have been inserted.

c. After the four SRM centered 4-assembly cells are completed, the SRM count rate increases by a factor of 3 during the loading of any single assembly.

d. After the four SRM centered 4-assembly cells are completed, the overall SRM count rate increases by a factor of 4 during fuel loading.

QUESTION: 033 (1.00)

Unit 1 is in a refueling outage and the fuel is being unloaded from the core.

Which one of the following describes the action that must be performed each time that a Core Component Sequence Sheet has been completed?

a. LSRO must sign the completed refuel floor sequence sheet copy signifying that it has been reviewed for correctness.

b. LSRO must sign the next refuel floor sequence sheet copy signifying that proper conditions exist to continue core alterations.

c. On-duty SRO must sign the completed control room sequence sheet signifying that it has been reviewed for correctness.

d. On-duty SRO must sign the next control room sequence sheet signifying that proper conditions exist to continue core alterations.

QUESTION: 034 (1.00)

Which one of the following describes one of the four steps that should be used to verify proper grapple latching of a fuel assembly?

a. Check that the grapple and mast will not rotate greater than 60 degrees in either direction.

b. Check that the engaged light is OFF when the grapple is closed to verify positive latching.

c. Check that the fuel grapple latch is flush with the grapple body when the grapple is closed.

d. Check for the momentary release of air bubbles when the grapple control is placed to the engaged position.

QUESTION: 035 (1.00)

Select the choice below that completes the following statement.

The refuel platform operator may use the hoist override to raise a fuel assembly to the backup hoist override when moving a fuel assembly in the vicinity of the _____ with the permission of the on-duty _____.

a. high density fuel racks; Refuel SRO

b. high density fuel racks; Control Room SRO

c. fuel pool gate seals; Refuel SRO

d. fuel pool gate seals; Control Room SRO

QUESTION: 036 (1.00)

During a core reload, the Grapple Operator has just lowered a fuel assembly into an in-vessel rack and is preparing to RELEASE the grapple. The operator observes that the orange flag on that cavity of the in-vessel rack is NOT visible.

Which one of the following describes the cause of the above condition?

a. The mast has rotated to a position that will cause the grapple to jam if a release is attempted.

b. The mast has been lowered too far to allow visual checks of the fuel assembly's position.

c. The fuel assembly is not properly seated and secured in the fuel cell.

d. The fuel assembly has been inserted into the fuel cell in the incorrect orientation.

QUESTION: 037 (1.00)

Which one of the following is most likely to occur during power operations as a result of incorrectly orienting a fuel assembly in the core during reactor core re-load?

a. Damage to the spring clip retainer

b. Damage to the fuel support nosepiece

c. Reduced flow through the fuel assembly

d. Increased core coolant radioactivity levels

QUESTION: 038 (1.00)

Which one of the following describes an approved operation of the refueling bridge equipment with a fuel assembly loaded on the main hoist while over the reactor core?

a. The main hoist may be raised while moving the trolley at normal speed in either direction.

b. The main hoist may be lowered while moving the bridge at normal speed in either direction.

c. The trolley and the bridge may be simultaneously moved at normal speed in either direction as soon as the fuel assembly has been raised one foot above the core top guide.

d. The trolley and the bridge may be simultaneously moved at normal speed in either direction while the main hoist is in the fully raised position.

QUESTION: 039 (1.00)

The Refuel Bridge Operator has just inserted a fuel assembly into the core and has released the grapple.

Which one of the following describes the MINIMUM action that the Refuel Bridge Operator is required to take to move the bridge through the cattle shoot without fully raising the main hoist?

a. Leave the grapple open and raise the main hoist above 160 inches

b. Leave the grapple open and raise the main hoist above 150 inches

c. Close the grapple and raise the main hoist above 160 inches

d. Close the grapple and raise the main hoist above 150 inches

QUESTION: 040 (1.00)

Which one of the following materials is allowed in the Spent Fuel Pools in accordance with site material control procedures?

a. Teflon tape

b. Copper buckets

c. Plastic ropes

d. Aluminum tools

QUESTION: 041 (1.00)

Which one of the following is the reason that the RHR and Core Spray automatic start features are disabled when the fuel pool gates are removed?

a. To prevent the loss of fuel pool water clarity

b. To prevent tripping the fuel pool cooling and cleanup pumps

c. To prevent overpressurizing the fuel pool cooling surge tanks

d. To prevent overflowing the fuel pool into the ventilation ducts

QUESTION: 042 (1.00)

A Unit 1 refueling outage is in progress. Plant conditions are as follows:

- Reactor cavity is flooded.
- Reactor core has been completely unloaded.
- Unit 1 Fuel Pool gates are installed.
- Unit 1 Fuel Pool Cooling and Cleanup system is operating.

A large rupture has developed in the Unit 1 fuel pool.

Which one of the following describes the high capacity makeup source that is used to provide water through the alternate fuel pool cooling makeup path to re-flood the fuel pool per AOP-38.0, Loss of Fuel Pool Cooling?

a. RHR pumps taking a suction on the CST.

b. RHR pumps taking a suction on the suppression pool.

c. Core Spray pumps taking a suction on the CST.

d. Core Spray pumps taking a suction on the suppression pool.

QUESTION: 043 (1.00)

During a refueling outage, LPRM removal is in progress.

Which one of the following methods must be used to verify that the instrument handling tool has properly engaged an LPRM prior to raising the monorail hoist?

While observing the LPRM:

a. grasp the cable and raise it slightly, then gently release it several times.

b. grasp the cable and raise it slightly, then observe for leakage from the water seal cap.

c. lift the instrument handling tool by hand approximately 6 inches.

d. lift the instrument handling tool by hand and observe that the centering rings do not catch on the underside of the top guide.

QUESTION: 044 (1.00)

The control rod latch tool has been lowered to a control rod and the grapple has been properly positioned.

Which one of the following describes the required sequence of actions for the unlatching of a control rod from the control rod drive mechanism (CRDM)?

a. Raise the hoist one foot while verifying rod position does not change, then direct control room to withdraw the CRDM to the overtravel position.

b. Raise the hoist 1-1/2 inches while verifying rod position does not change, then direct control room to withdraw the CRDM to the overtravel position.

c. Raise the hoist one foot and verify that rod position changes to less than or equal to 46, then direct the control room to withdraw the CRDM to position 48.

d. Raise the hoist 1-1/2 inches and verify that rod position changes to less than or equal to 46, then direct the control room to withdraw the CRDM to position 48.

QUESTION: 045 (1.00)

Which one of the following is the purpose of verifying the Main Hoist JAM interlock is functioning properly per PT 18.1, Refueling Position Interlock Check?

a. To prevent moving an object of greater than 1200 pounds with the main hoist over irradiated fuel assemblies.

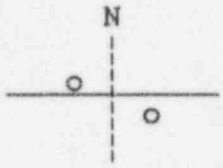
b. To prevent excessive lowering and jamming the main hoist down into the top of a fuel assembly and damaging the fuel.

c. To prevent overloading the main hoist by attempting to raise and transfer an overweight component.

d. To prevent movement of the hoist if bridge and trolley transverse motion causes binding or twisting of the mast.

QUESTION: 046 (1.00)

Due to specific planned maintenance, the Nuclear Engineering Technician has designated that a double blade guide will be placed in a fuel cell in the following orientation.



Which one of the following describes this orientation?

a. Northeast Southwest

b. Northwest Southeast

c. Southwest Northwest

d. Southeast Northeast

QUESTION: 047 (1.00)

Which one of the following maintenance activities may be performed by an operator per OOI-01, Operating Principles and Philosophy?

a. Adjustment of the packing on automatic solenoid operated valves associated with the refueling bridge air system

b. Adjustment of the main hoist mechanical brake clearances to prevent drag during normal operation

c. Addition of grease to the bearings of the refuel bridge and trolley components

d. Addition of lubricating oil to the refueling bridge air compressor

QUESTION: 048 (1.00)

The Unit 2 reactor vessel core has been refueled with new fuel, but the reactor vessel head and the fuel pool gates are still removed. The off-loaded irradiated fuel has been stored in the Unit 2 Fuel Pool. Supplemental fuel pool cooling is in service and fuel pool and reactor water temperatures are 75 deg. F and decreasing slowly.

Which one of the following states the MINIMUM required fuel pool or reactor water temperature and the REASON for the minimum temperature requirement?

a. Maintain reactor water temperature above a minimum of 70 deg. F to ensure adequate shutdown margin of the core and the fuel pool

b. Maintain reactor water temperature above a minimum of 68 deg. F to remain above the nil-ductility temperature of the reactor vessel

c. Maintain fuel pool water temperature above a minimum of 70 deg. F to remain above the nil-ductility temperature of the pool walls

d. Maintain fuel pool water temperature above a minimum of 68 deg. F to ensure adequate shutdown margin of the core and the fuel pool

QUESTION: 049 (1.00)

During a refueling outage, a refueling SRO has worked the following schedule.

- Friday 0800 to 2000
- Saturday 0800 to 2100
- Sunday 0800 to 1600
- Monday 0400 to 1200
- Tuesday 0000 to 0400 and 1600 to 2400
- Wednesday 0800 to 1600 and 2000 to 2400

Which one of the following states ALL the days on which the refueling SRO exceeded the normal allowed number of working hours, per FH-11 and administrative procedures?

a. Only Saturday

b. Only Tuesday

c. Tuesday and Wednesday

d. Saturday and Wednesday

QUESTION: 050 (1.00)

During a refueling outage, an irradiated fuel assembly is accidentally dropped when a fuel preparation machine mechanical failure occurs. The assembly falls onto empty racks and then lodges between the racks and the wall of the fuel pool.

Which one of the following is a condition that must be met to restart fuel handling work?

a. The NRC resident inspector has completed an inspection and the NRC Regional Office's approval has been obtained.

b. Visual inspection reveals that no bubbles are rising from the dropped fuel assembly.

c. Area radiation levels have decreased to no greater than 3 times normal.

d. Inspections and assessments related to the dropped fuel assembly have been completed.

QUESTION: 051 (1.00)

Which one of the following describes a situation in which a caution tag may be used per AI-110, Guidelines for Caution Tags/Labels?

a. To prevent the operation of equipment for which a single interlock designed to prevent radioactive overexposure has failed.

b. To designate surveillance requirements that are not required for current plant conditions.

c. To provide guidance to refuel bridge and hoist operators for temporary departures from procedures due to equipment conditions.

d. To warn the bridge operator to move the bridge and trolley slowly in a specific area of the fuel pool due to short-term installation of special refueling equipment.

QUESTION: 052 (1.00)

During de-fueling, the Bridge Operator has raised a fuel assembly out of the core and has just moved the refuel bridge into the reactor cavity area. Reactor level suddenly begins decreasing at approximately 6 to 12 inches per minute and the Control Room reports that the reactor cavity seal has ruptured.

Which one of the following is the action that should be taken by the refueling operators?

a. Immediately lower the fuel assembly to the lowest possible position in the reactor cavity

b. Return the fuel assembly to the core and at least lower it below the level of the vessel flange

c. Move the fuel assembly to the fuel pool and install the fuel pool-to-cattle shoot gate

d. Move the fuel assembly to the fuel pool and lower it into the nearest empty storage rack

QUESTION: 053 (1.00)

Which one of the following describes the radiation dose term CEDE?

a. The effective deep dose equivalent

b. The corrected total dose equivalent

c. The measurement of the internal dose

d. The measurement of the critical organ dose

QUESTION: 054 (1.00)

Which one of the following states the EMERGENCY TOTAL effective dose equivalent exposure that a worker can receive WITHOUT having specifically volunteered for the exposure?

	Protection of Valuable Property (REM)	Protection of Large Population (REM)
a.	10	75
b.	10	25
c.	25	25
d.	25	75

QUESTION: 055 (1.00)

Select the choice below that completes the following statement.

Manipulation of irradiated components near the fuel pool gates with the shield plugs removed could result in _____.

a. radiation embrittlement of the flexible material that comprises the fuel pool gate seals

b. radiation streaming to the refuel floor and the cavity along the hollow space behind the gate

c. prohibition of refuel bridge movement in this area by the boundary zone controller

d. violation of the safe-load path for movement of components in the fuel pool

QUESTION: 056 (1.00)

A CP&L employee (male) has received the following radiation exposure.

- For the current year 500 mrem
- Lifetime exposure (age 30 years) 10 REM
- For the current quarter 100 mrem

The employee is scheduled to work 1 foot from a hot spot that emits a gamma dose rate of 5 REM/hr at 1 foot. Health Physics plans to install lead aprons as a 3 inch thick curtain between the hot spot and the worker. (The tenth thickness of lead is 2 inches.)

Which one of the following is the MAXIMUM length of time the employee can work in this area without exceeding his UNEXTENDED CP&L dose limit? (Disregard individual work unit ALARA limits.)

a. 6.0 hours

b. 9.5 hours

c. 15.0 hours

d. 28.5 hours

QUESTION: 057 (1.00)

Select the choice below that completes the following statements.

CP&L has established administrative limits for annual exposure per NGGM-PM-0021, Radiation Control and Protection Manual. To exceed a dose of _____, approval must be obtained from the _____.

a. 4 Rem; Site Vice President

b. 5 Rem; Site Vice President

c. 3 Rem; Plant Manager

d. 4 Rem; Plant Manager

QUESTION: 058 (1.00)

Which one of the following radiation conditions requires that an area be posted as a VERY HIGH RADIATION AREA?

a. 300 mrem in any hour at 30 centimeters from the radiation source

b. 500 mrem in any hour at 30 centimeters from the radiation source

c. 300 rads in any hour at 1 meter from any surface the radiation penetrates

d. 500 rads in any hour at 1 meter from any surface the radiation penetrates

QUESTION: 059 (1.00)

During a refueling outage, several fuel rods of an irradiated fuel assembly rupture when a bridge and trolley malfunction results in a collision with the fuel pool wall. Due to the damage to the mast and the fuel pool wall, the mast cannot be lowered and the top of the fuel assembly, still suspended on the grapple, is covered by only 6 inches of water.

Which one of the following describes the significant hazard(s) to the personnel on the refuel floor? (Assume the fuel assembly has remained submerged at all times and no fuel pool water has been splashed onto the refuel floor.)

a. General area contamination from the release of Uranium-235 and Uranium-238.

b. Whole body dose due to streaming from the fuel pellets that have fallen to the bottom of the fuel pool.

c. General area contamination from the release of Uranium-235 and Uranium-238 and high airborne activity from the release of radioactive gasses.

d. Whole body dose due to streaming from the fuel assembly and high airborne activity from the release of radioactive gasses.

QUESTION: 060 (1.00)

Fuel is being loaded into the IF-300 Spent Fuel Cask.

Which one of the following is the reason that the peripheral assemblies must be loaded with their bail handles oriented parallel to the wall of the cask?

a. To provide the geometric space for the insertion of 18 assemblies into the cask

b. To provide the proper support for each of the peripheral fuel assemblies

c. To reduce the shine through dose on the outer surface of the cask

d. To enable the lifting device to fit into the cask when the lifting device is near the wall of the cask

(********** END OF EXAMINATION **********)

ANSWER KEY

LIMITED SENIOR REACTOR OPERATOR EXAMINATION

BRUNSWICK UNITS 1 & 2

12/08/1995

ANSWER: 001 (1.00)

d.

REFERENCE:

GE BWR Academics Series, Reactor Theory, Chapter 3
CR1 (1 - Keff1) = CR2 (1 - Keff2)
20 (1 - 0.90) = 100 (1 - Keff2)
Keff2 = 0.98
292008K104 [3.3/3.4]

292008K104 ..(KA's)

ANSWER: 002 (1.00)

d.

REFERENCE:

LOI-CLS-LP-001A, pg 26, Obj. 2.x

290002K111 [2.9/2.9]

290002K111 ..(KA's)

ANSWER: 003 (1.00)

c.

REFERENCE:

LOI-CLS-LP-001-B, pg 15, Obj. 2.h

234000K101 [3.2/3.7]

234000K101 ..(KA's)

ANSWER: 004 (1.00)

b.

REFERENCE:

LOI-CLS-LP-001-B, pg 12, rev 1, obj. 3.e

290002G007 [3.2/3.3]

290002G007 ..(KA's)

ANSWER: 005 (1.00)

d.

REFERENCE:

OENP-24.13, rev 4, pg 12

234000K505 [3.0/3.7]

234000K505 ..(KA's)

ANSWER: 006 (1.00)

b.

REFERENCE:

SRI-CLS-LP-305-C, pg 13, Obj. 12.g

205000A102 [3.3/3.2]

205000A102 ..(KA's)

ANSWER: 007 (1.00)

d.

REFERENCE:

reactivity(r) = (Keff - 1)/Keff
substituting Keff = 0.97, r = -0.03093
final reactivity = -.03093 + 0.0250 = +0.00593
Keff = 1/(1 - (-0.00593)) = 0.9941
SDM = 1 - Keff = 1 - 0.9941 = 0.0059

292002K114 [2.6/2.9]

292002K114 ..(KA's)

ANSWER: 008 (1.00)

c.

REFERENCE:

GE Academic Series
Modified BSEP bank question # 85

291007K103 [2.8/2.9]

291007K103 ..(KA's)

ANSWER: 009 (1.00)

d.

REFERENCE:

GE Academic Series on Reactor Theory
Based on Brunswick exam bank question # 233

292003K101 [2.9/3.0]

292003K101 ..(KA's)

ANSWER: 010 (1.00)

c.

REFERENCE:

GE Academic Series on Heat Transfer

291006K108 [2.9/3.0]

291006K108 ..(KA's)

ANSWER: 011 (1.00)

d.

REFERENCE:

OPS-CLS-SM-003-A, pg 25 and 48,
LOI-CLS-LP-003-A, Obj. 30.a and 6.b
LOI-CLS-LP-009-A, pg 14

212000K411 [3.3/3.5]

212000K411 ..(KA's)

ANSWER: 012 (1.00)

b.

REFERENCE:

LOI-CLS-LP-009-A, pg 13, Obj. 4

215004K602 [3.1/3.3]

215004K602 ..(KA's)

ANSWER: 013 (1.00)

b.

REFERENCE:

OPS-CLS-SM004-B, pg 8

290001A205 [3.1/3.3]

290001A205 ..(KA's)

ANSWER: 014 (1.00)

b.

REFERENCE:

OPS-CLS-SM-004-B, pg 7 and 12
LOI-CLS-LP-004-B, Objective 7
Technical Specification Definitions and 3.6.6.1

290001A302 [3.5/3.5]

290001A302 ..(KA's)

ANSWER: 015 (1.00)

c.

REFERENCE:

LOI-CLS-LP-200-B, pg 41, Objective 5.g and 5.h
Technical Specification 3.9.2

215004G005 [3.2/3.9]

215004G005 ..(KA's)

ANSWER: 016 (1.00)

a.

REFERENCE:

Modified Brunswick Exam Bank Question # 342
Technical Specifications Bases, Section 3.9.9

233000G006 [2.5/3.4]

233000G006 ..(KA's)

ANSWER: 017 (1.00)

c.

REFERENCE:

LOI-CLS-LP-017-A, pg 35, Objective 9, 10, and 14

205000A105 [3.4/3.4]

205000A105 ..(KA's)

ANSWER: 018 (1.00)

a.

REFERENCE:

OPS-CLS-SM-007-A, pg 15 and 16, Figures 6 and 13
LOI-CLS-LP-007-A, Obj. 11

Note: Verify position of second rod to cause rod block with the facility.

201002K402 [3.5/3.5]

201002K402 ..(KA's)

ANSWER: 019 (1.00)

a.

REFERENCE:

OPS-CLS-SM-007-A, pg 16, Figures 6 and 14
LOI-CLS-LP-007-A, Obj. 11 and 14.e

201002K108 [3.2/3.6]

201002K108 ..(KA's)

ANSWER: 020 (1.00)

b.

REFERENCE:

New Lesson: LOI-CLS-LP-305B, pg 43, obj. 21B, Sept 95
(Old lessson: LOI-CLS-LP-305A, pg 18, Obj. 16, Feb 95)

234000A302 [3.1/3.7]

234000A302 ..(KA's)

ANSWER: 021 (1.00)

b.

REFERENCE:

OFH-11L, rev 14, pg 5, step 5.5.10 and 5.5.13

234000A203 [2.8/3.1]

234000A203 ..(KA's)

ANSWER: 022 (1.00)

d.

REFERENCE:

LOI-CLS-LP-013-A, pg 9 and 27, Obj. 10.e

233000K306 [2.9/3.2]

233000K306 ..(KA's)

ANSWER: 023 (1.00)

b.

REFERENCE:

Unit 2 Tech. Specs. Definition, pg 1-2

290002G005 [3.3/4.1]

290002G005 ..(KA's)

ANSWER: 024 (1.00)

a.

REFERENCE:

Technical Specifications 3/4.9.4, pg B 3/4 9-1

295023G004 [2.7/3.8]

295023G004 ..(KA's)

ANSWER: 025 (1.00)

c.

REFERENCE:

Tech. Specs Table 1.2, pg 1-11

290002G005 [3.3/4.1]

290002G005 ..(KA's)

ANSWER: 026 (1.00)

c.

REFERENCE:

OPS-CLS-SM-011-C, rev 3, pg 10, Obj. 6.a

272000A101 [3.2/3.2]

272000A101 ..(KA's)

ANSWER: 027 (1.00)

b.

REFERENCE:

OFH-11A, rev 39, pg 9

234000K502 [3.1/3.7]

234000K502 ..(KA's)

ANSWER: 028 (1.00)

d.

REFERENCE:

Tech Spec Definitions

294001A113 [4.5/4.3]

294001A113 ..(KA's)

ANSWER: 029 (1.00)

a.

REFERENCE:

OFH-11, rev 56, pg 6, precaution 4.17

234000G010 [2.9/3.5]

234000G010 ..(KA's)

ANSWER: 030 (1.00)

c.

REFERENCE:

OFH-11, rev 56, pg 7, precaution 4.32

234000G001 [3.4/3.8]

234000G001 ..(KA's)

ANSWER: 031 (1.00)

c.

REFERENCE:

OFH-11, rev 56, pg 9, precaution 4.41

234000G013 [3.1/3.3]

234000G013 ..(KA's)

ANSWER: 032 (1.00)

c.

REFERENCE:

OFH-11, rev 56, pg 11, Limitation 5.2
SRI-CLS-LP-305-C, pg 12, Obj. 13.d

234000G010 [2.9/3.5]

234000G010 ..(KA's)

ANSWER: 033 (1.00)

d.

REFERENCE:

OFH-11, rev 56, pg 14, step 6.1.9 Note 1
SRI-CLS-LP-305-C, Obj. 15

234000G013 [3.1/3.3]

234000G013 ..(KA's)

ANSWER: 034 (1.00)

c.

REFERENCE:

SRI-CLS-LP-305-C, pg 6, Obj. 3.a
OFH-11A, rev 39, pg 6, precaution 6.1

234000G009 [3.2/3.6]

234000G009 ..(KA's)

ANSWER: 035 (1.00)

a.

REFERENCE:

OFH-11A, rev 39, pg 10, precaution 6.41

234000G001 [3.4/3.8]

234000G001 ..(KA's)

ANSWER: 036 (1.00)

c.

REFERENCE:

OFH-11A, rev 39, pg 19, step 8.6.5, caution
SRI-CLS-LP-305-C, Obj. 3.f

234000K505 [3.0/3.7]

234000K505 ..(KA's)

ANSWER: 037 (1.00)

d.

REFERENCE:

SRI-CLS-LP-305-C, pg 17, Obj. 5

234000K505 [3.0/3.7]

234000K505 ..(KA's)

ANSWER: 038 (1.00)

d.

REFERENCE:

SRI-CLS-LP-305-C, pg 25, Obj. 14.r
OFH-11A, rev 39, pg 7, Precaution 6.11

234000G009 [3.2/3.6]

234000G009 ..(KA's)

ANSWER: 039 (1.00)

b.

REFERENCE:

SRI-CLS-LP-305-C, pg 26, Obj. 23

234000A301 [2.6/3.6]

234000A301 ..(KA's)

ANSWER: 040 (1.00)

d.

REFERENCE:

SRI-CLS-LP-305-C, pg 30, Obj. None located

233000G010 [2.8/2.9]

233000G010 ..(KA's)

ANSWER: 041 (1.00)

d.

REFERENCE:

GP-07, SRI-CLS-LP-E05-C, pg 34, Obj. 14.e

209001G010 [3.4/3.6]

209001G010 ..(KA's)

ANSWER: 042 (1.00)

b.

REFERENCE:

SRI-CLS-LP-305-C, pg 33, Obj. 12.a

233000A202 [3.1/3.3]

233000A202 ..(KA's)

ANSWER: 043 (1.00)

c.

REFERENCE:

SRI-CLS-LP-305-E, pg 6, Obj. 2.a
NOTE: Review/discuss facility's definition of slightly at exam review/when on-site.

290002G013 [3.2/3.2]

290002G013 ..(KA's)

ANSWER: 044 (1.00)

a.

REFERENCE:

OFH-11L, rev 14, pg 6, step 6.8 and 6.9
SRI-CLS-LP-305-E, Obj. 4.a

201003G009 [3.6/3.3]

201003G009 ..(KA's)

ANSWER: 045 (1.00)

c.

REFERENCE:

Modified Brunswick Question Bank # 5506

234000K501 [2.9/3.4]

234000K501 ..(KA's)

ANSWER: 046 (1.00)

b.

REFERENCE:

OFH-11L, rev 14, pg 5

234000G013 [3.1/3.3]

234000G013 ..(KA's)

ANSWER: 047 (1.00)

d.

REFERENCE:

OOI-01, rev 62, pg 13

294001A110 [3.6/4.2]

294001A110 ..(KA's)

ANSWER: 048 (1.00)

d.

REFERENCE:

OOI-01, rev 62, pg 30

233000G005 [2.6/3.4]

233000G005 ..(KA's)

ANSWER: 049 (1.00)

d.

REFERENCE:

OFH-11, rev 56, pg 11, Step 5.7
NOTE: Greater than 12 hours in any 24 hour period exceeds normal allowed working hours.

294001A103 [2.7/3.7]

294001A103 ..(KA's)

ANSWER: 050 (1.00)

d.

REFERENCE:

OPS-CLS-SM-302-J, pg 4, Obj. 6
OFH-11, Limitation 5.6

295023A204 [3.4/4.1]

295023A204 ..(KA's)

ANSWER: 051 (1.00)

d.

REFERENCE:

AI-110, rev 5, pg 4

294001K102 [3.9/4.5]

294001K102 ..(KA's)

ANSWER: 052 (1.00)

b.

REFERENCE:

AOP-5, AOP-38, Fuel Handling Procedure precautions.

295023G007 [2.9/3.6]

295023G007 ..(KA's)

ANSWER: 053 (1.00)

c.

REFERENCE:

LOI-CLS-LP-301A, pg 23

294001K103 [3.3/3.8]

294001K103 ..(KA's)

ANSWER: 054 (1.00)

b.

REFERENCE:

LOI-CLS-LP-301-A, pg 21, Obj. 7
LOI-CLS-LP-102-A, Obj. 11

294001K103 [3.3/3.8]

294001K103 ..(KA's)

ANSWER: 055 (1.00)

b.

REFERENCE:

LOI-CLS-LP-305-A, ELO 46

234000G001 [3.4/3.8]

234000G001 ..(KA's)

ANSWER: 056 (1.00)

b.

REFERENCE:

BSEP exam bank number 5411 states CP&L annual limit = 2 Rem
OPS-FUN-SM-102-A, pg 15 and 16
I = Io 10-x/t
substitute Io = 5 Rem/hr
x = 3 inches
t = 2 inches
I = 158 mrem/hr
Dose limit annually at CP&L = 2 Rem
Therefore, Stay Time = (2000 mrem - 500 mrem) / 158 mrem/hr = 9.5 hrs

294001K104 [3.3/3.6]

294001K104 ..(KA's)

ANSWER: 057 (1.00)

a.

REFERENCE:

NGGM-PM-0002, Rad Control & Protection Manual, rev 25, pg 6-5

294001K104 [3.3/3.6]

294001K104 ..(KA's)

ANSWER: 058 (1.00)

d.

REFERENCE:

NGGM-PM-0002, Rad Control & Protection Manual, rev 25, pg 2-13
(distractor from 2-7)

294001K103 [3.3/3.8]

294001K103 ..(KA's)

ANSWER: 059 (1.00)

d.

REFERENCE:

AOP-5, rev 8, pg 5

295023A201 [3.6/4.0]

295023A201 ..(KA's)

ANSWER: 060 (1.00)

c.

REFERENCE:

OFH-15, rev 17, pg 5 and 6, Steps 5.8 and 5.9

294001K103 [3.3/3.6]

294001K103 ..(KA's)

(********** END OF EXAMINATION **********)

A N S W E R K E Y

MULTIPLE CHOICE

001	d
002	d
003	c
004	b
005	d
006	b
007	d
008	c
009	d
010	c
011	d
012	b
013	b
014	b
015	c
016	a
017	c
018	a
019	a
020	b
021	b
022	d
023	b
024	a
025	c
026	c
027	b
028	d
029	a
030	c
031	c
032	c
033	d
034	c
035	a
036	c
037	d
038	d
039	b
040	d
041	d
042	b
043	c
044	a
045	c

A N S W E R K E Y

046 b

MULTIPLE CHOICE

047 d

048 d

049 d

050 d

051 d

052 b

053 c

054 b

055 b

056 b

057 a

058 d

059 d

060 c

(********** END OF EXAMINATION **********)

S R O E x a m B W R R e a c t o r

O r g a n i z e d b y Q u e s t i o n N u m b e r

QUESTION	VALUE	REFERENCE
001	1.00	9000254
002	1.00	9000255
003	1.00	9000256
004	1.00	9000257
005	1.00	9000258
006	1.00	9000259
007	1.00	9000260
008	1.00	9000261
009	1.00	9000262
010	1.00	9000263
011	1.00	9000264
012	1.00	9000265
013	1.00	9000266
014	1.00	9000267
015	1.00	9000268
016	1.00	9000269
017	1.00	9000270
018	1.00	9000271
019	1.00	9000272
020	1.00	9000273
021	1.00	9000274
022	1.00	9000275
023	1.00	9000276
024	1.00	9000277
025	1.00	9000278
026	1.00	9000279
027	1.00	9000280
028	1.00	9000281
029	1.00	9000282
030	1.00	9000283
031	1.00	9000284
032	1.00	9000285
033	1.00	9000286
034	1.00	9000287
035	1.00	9000288
036	1.00	9000289
037	1.00	9000290
038	1.00	9000291
039	1.00	9000292
040	1.00	9000293
041	1.00	9000294
042	1.00	9000295
043	1.00	9000296
044	1.00	9000297
045	1.00	9000298
046	1.00	9000299
047	1.00	9000300
048	1.00	9000301
049	1.00	9000302

S R O E x a m B W R R e a c t o r

O r g a n i z e d b y Q u e s t i o n N u m b e r

QUESTION	VALUE	REFERENCE
050	1.00	9000303
051	1.00	9000304
052	1.00	9000305
053	1.00	9000306
054	1.00	9000307
055	1.00	9000308
056	1.00	9000309
057	1.00	9000310
058	1.00	9000311
059	1.00	9000312
060	1.00	9000313
	60.00	
	60.00	