

U. S. NUCLEAR REGULATORY COMMISSION
OPERATOR LICENSING INITIAL EXAMINATION REPORT

REPORT NO.: 50-005/OL-96-02

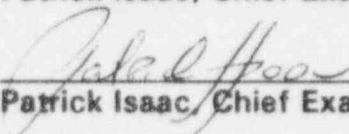
FACILITY DOCKET NO.: 50-005

FACILITY LICENSE NO.: R-2

FACILITY: Pennsylvania State University

EXAMINATION DATES: September 09, 1996

EXAMINER: Patrick Isaac, Chief Examiner

SUBMITTED BY:  09/24/96
Patrick Isaac, Chief Examiner Date

SUMMARY:

During the week of September 9, 1996, the NRC administered a retake of section B of the written examination to one Senior Reactor Operator (SRO) candidate.

The SRO candidate passed the examination.

ENCLOSURE 1

REPORT DETAILS

1. Examiners:

Patrick Isaac, Chief Examiner

2. Results:

	RO PASS/FAIL	SRO PASS/FAIL	TOTAL PASS/FAIL
Written	N/A	1/0	1/0
Operating Tests	N/A	N/A	N/A
Overall	N/A	1/0	1/0

3. Exit Meeting:

Patrick Isaac, NRC, Chief Examiner
Terry Flinchbaugh, PSBR Operations Manager

Mr. Flinchbaugh commented on the lack of a correct answer to question B.004 which the Chief Examiner agreed to delete from the examination. Mr. Isaac thanked Mr. Flinchbaugh for his cooperation in the administration of the examination.

U. S. NUCLEAR REGULATORY COMMISSION
NON-POWER REACTOR LICENSE EXAMINATION

FACILITY: Pennsylvania State Univ.

REACTOR TYPE: TRIGA III

DATE ADMINISTERED: 96/09/09

CANDIDATE: _____

INSTRUCTIONS TO CANDIDATE:

Answers are to be written on the exam page itself, or the answer sheet provided. Write answers one side ONLY. Attach any answer sheets to the examination. Points for each question are indicated in parentheses for each question. A 70% is required to pass the examination. Examinations will be picked up one (1) hour after the examination starts.

CATEGORY VALUE	% OF TOTAL	CANDIDATE'S SCORE	% OF CATEGORY VALUE	CATEGORY
19.00	100.00			B. NORMAL AND EMERGENCY OPERATING PROCEDURES AND RADIOLOGICAL CONTROLS
19.00				
		FINAL GRADE	%	

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

Candidate's Signature

ENCLOSURE 2

ANSWER SHEET

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 ____

002 a b c d ____

003 a b c d ____

~~004 a b c d ____~~

DELETED

005 a b c d ____

006 a b c d ____

007 a b c d ____

008 a b c d ____

009 a b c d ____

010 a b c d ____

011 a b c d ____

012 a b c d ____

013 a b c d ____

014 a b c d ____

015 a b c d ____

016 a b c d ____

017 a b c d ____

018 a b c d ____

019 a b c d ____

(***** END OF CATEGORY B *****)
(***** 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 neither received nor 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 candidate 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. The point value for each question is indicated in [brackets] after the question.
8. If the intent of a question is unclear, ask questions of the examiner only.
9. When turning in your examination, assemble the completed examination with examination questions, examination aids and answer sheets. In addition turn in all scrap paper.
10. 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.
11. To pass the examination you must achieve a grade of 70 percent or greater in each category.
12. There is a time limit of one (1) hour for completion of the examination.
13. When you have completed and turned in you examination, leave the examination area. If you are observed in this area while the examination is still in progress, your license may be denied or revoked.

QUESTION: 001 (1.00)

The ALARA program at PSU limits the TEDE to individual members of the public, as a result of licensee activities, to:

- a. 50 rems/year
- b. 5 rems/year
- c. 0.5 rems/year
- d. 0.1 rem/year

QUESTION: 002 (1.00)

In the event the safety limit is exceeded, whose authorization is needed to resume reactor operation?

- a. NRC
- b. PSRSC
- c. Director
- d. SRO on duty

QUESTION: 003 (1.00)

Which one of the following does NOT require NRC approval for changes?

- a. License
- b. Emergency Procedures
- c. Requalification Plan
- d. Emergency Plan

(***** CATEGORY B CONTINUED ON NEXT PAGE *****)

QUESTION: 004 (1.00) **DELETED**

Which one of the following activities requires a Radiation Work Permit (RWP)?

- a. A radioactive spill in the Co-60 lobby is being cleaned under the supervision of a Health Physicist.
- b. Entry into a potential highly contaminated area while performing actions in accordance with EP-11, Unauthorized Intrusion Procedure.
- c. The reactor is being operated with an experiment in the NBL.
- d. An experiment, under a UIC authorization which does not call for a RWP, is being removed from the pool for disposal.

QUESTION: 005 (1.00)

An irradiated sample provides a dose rate of 200 mr/hr at 3 ft. Approximately how far from the sample must a Radiation Area sign be posted?

- a. 5 ft.
- b. 8 ft.
- c. 20 ft.
- d. 50 ft.

(***** CATEGORY B CONTINUED ON NEXT PAGE *****)

QUESTION: 006 (1.00)

Which one of the following radiation detector types, does not have an output intensity (current or pulse height) proportional to the incident radiation energy; i.e., if the incident energy increases, the output intensity does not increase?

- a. Ion Chamber
- b. GM
- c. Proportional Counter
- d. Scintillation

QUESTION: 007 (1.00)

A reactor sample has a disintegration rate of 5×10^{12} disintegrations per second. Each disintegration emits a .6 Mev gamma. What is the dose rate expected 5 feet from the above sample (assume point source)?

- a. 7 R/hr
- b. 19 R/hr
- c. 135 R/hr
- d. 162 R/hr

(***** CATEGORY B CONTINUED ON NEXT PAGE *****)

QUESTION: 008 (1.00)

Which one of the following statements meets the definition of a "Channel Test" per the Technical Specifications?

- a. Immersing a temperature detector in an ice bath, then in boiling water, noting correct output.
- b. Verifying the instrument loop is in service and capable of carrying out its intended function.
- c. Performing a precise determination of reactor power, then adjusting reactor power meters to correspond to the correct power level.
- d. Confirming the Linear Percent Power and Log N channels follow each other during startup.

QUESTION: 009 (1.00)

The primary source of radiation release to the environment through the ventilation system during reactor operation is:

- a. Nitrogen-16 from activation of pool water
- b. Argon-41 from the activation of air
- c. Nitrogen-16 from pool water evaporation
- d. Argon-41 from activation of pool water

(***** CATEGORY B CONTINUED ON NEXT PAGE *****)

QUESTION: 010 (1.00)

Which one of the following is the MINIMUM amount of time a licensed operator must perform his/her licensed duties to maintain proficiency?

- a. Four hours per month
- b. Four hours per quarter
- c. Six hours per month
- d. Six hours per quarter

QUESTION: 011 (1.00)

A system or component is defined as "operable" by Technical Specifications if:

- a. a channel check has been performed.
- b. it is capable of performing its intended function.
- c. it has no outstanding testing requirements.
- d. a functional test has been performed.

(***** CATEGORY B CONTINUED ON NEXT PAGE *****)

QUESTION: 012 (1.00)

Which one of the following is a definition for "Emergency Planning Zone" (EPZ)?

- a. The geographical area that is beyond the site boundary where the Reactor Director has direct authority over all activities.
- b. The area beyond the site boundary at which Protective Action Guide (PAG) could be exceeded.
- c. A room within Room 117 in the Academic Projects Building which contains emergency supplies and equipment for use during a emergency.
- d. The reactor building which incorporates the reactor bay, Co-60 facility and all rooms and laboratories housed therein.

QUESTION: 013 (1.00)

Which ONE of the following would be classified as an OPERATIONAL EVENT?

- a. A person discovers that a high radiation area is not properly protected (10CFR20).
- b. Reactor scrammed due to an "Interlock Validation Failure" signal.
- c. A rabbit inserts 0.13% delta K/K.
- d. Following insertion of a pulse, fuel temperature reaches 1165 °F.

(***** CATEGORY B CONTINUED ON NEXT PAGE *****)

QUESTION: 014 (1.00)

In accordance with SOP-9, "Pneumatic Transfer Systems Operation," which ONE of the following actions is the reactor operator required to take if a damaged Rabbit I capsule is returned from the reactor core?

- a. Begin an immediate shutdown of the reactor.
- b. Manually scram the reactor.
- c. Close the CO2 supply valve to the pneumatic tube.
- d. Flip the RABBIT I Fan control switch to the ON position.

QUESTION: 015 (1.00)

Which one of the following action levels is defined as an "Unusual Event"?

- a. TEDE of 15 mrem over a 24 hour period at the reactor site boundary.
- b. Radiation level of 20 mrem in 1 hour at the reactor site boundary.
- c. Loss of pool water at a rate of 500 gpm.
- d. An explosion that could damage the operation of the reactor.

(***** CATEGORY B CONTINUED ON NEXT PAGE *****)

QUESTION: 016 (1.00)

Which one of the following statements describes the basis for the T.S. that limits operating the PSBR less than 70 megawatt hours of energy in any seven (7) consecutive days?

- a. To prevent fuel damage, during pulsing operations, due to the buildup of internal hydrogen pressure.
- b. To prevent the fuel element from exceeding 1150°C under any operating condition.
- c. To ensure that 10CFR20 App. B, Effluent Concentrations, limits are not exceeded.
- d. To prevent the buildup of fission product gases and subsequent cladding failure in the event of a LOCA.

QUESTION: 017 (1.00)

Which ONE of the following defines the initiation and removal of ADMINISTRATIVE TAG-OUT (YELLOW) tags?

- a. An RO or SRO may date, initial the tag, and enter it into the Reactor Log Book, but only an SRO may remove the tag.
- b. Only an SRO may date, initial the tag, and enter it into the Reactor Log Book, but an SRO or Operations Manager may authorize the removal of the tag.
- c. The tag shall be authorized by the Director, Operations Manager or their designate. The tag can only be removed by the Director, Operations Manager, or their designate.
- d. The Operations manager shall authorize the tag and enter it in the Reactor Log Book. The tag can only be removed by an SRO familiar with why the tag was initially placed.

(***** CATEGORY B CONTINUED ON NEXT PAGE *****)

QUESTION: 018 (2.00)

Who (by title) may authorize exposures to emergency team members and radiation workers in excess of normal occupational limits?

- a. Emergency Director
- b. Operations Manager
- c. Health Physicist
- d. Emergency Director with Health Physicist concurrence

QUESTION: 019 (1.00)

Which of the following conditions COMPLETELY satisfies the technical specification definition of "Reactor Secured?"

- a. When the reactor contains insufficient fissile material or moderator present in the reactor and adjacent experiments to attain criticality under optimum available conditions of moderation and reflection.
- b. When all scramable rods have been fully inserted and verified down and the console key has been removed from the console.
- c. When no work is in progress involving core fuel, core structure, installed control rods, or control rod drives unless they are physically decoupled from the control rods and no experiments are in the reactor.
- d. When sufficient control rods are inserted to assure that the reactor is subcritical by at least 1.00 dollar of reactivity, with the fuel and moderator at ambient temperature.

(***** END OF CATEGORY B *****)
(***** END OF EXAMINATION *****)

ANSWER: 001 (1.00)

d

REFERENCE:

AP-16, PSBR ALARA Procedure, pg. A-2

ANSWER: 002 (1.00)

a

REFERENCE:

T.S. 6.5.1 pg. 37

ANSWER: 003 (1.00)

b

REFERENCE:

AP-12 pg. 2 D.1

ANSWER: 004 (1.00) **DELETED**

c

REFERENCE:

AP-17

(***** CATEGORY B CONTINUED ON NEXT PAGE *****)

ANSWER: 005 (1.00)

c

REFERENCE:

10CFR20

ANSWER: 006 (1.00)

b

REFERENCE:

Radiation Protection Handbook

ANSWER: 007 (1.00)

b

REFERENCE:

1 Curie = 3.7×10^{10} dps $\Rightarrow (5 \times 10^{12} \text{ dps}) / 3.7 \times 10^{10} \text{ dps} = 135 \text{ Ci}$

$\Rightarrow \text{DR} = (6 \times 135 \times .6) / 52 = 19 \text{ R/hr}$

(***** CATEGORY B CONTINUED ON NEXT PAGE *****)

ANSWER: 008 (1.00)

a

REFERENCE:

AP-5, PSBR Technical Specifications, pg. 2

ANSWER: 009 (1.00)

b

REFERENCE:

I.amarsh, Intro. to Nuclear Eng., 2nd Ed., pg. 520

ANSWER: 010 (1.00)

b

REFERENCE:

10CFR55

ANSWER: 011 (1.00)

b

REFERENCE:

T.S. 1.1.21

ANSWER: 012 (1.00)

d

REFERENCE:

Emergency Plan pg. 15

(***** CATEGORY B CONTINUED ON NEXT PAGE *****)

ANSWER: 013 (1.00)

b

REFERENCE:

AP-4 page 2

ANSWER: 014 (1.00)

b

REFERENCE:

SOP-9 pg. 2

ANSWER: 015 (1.00)

a

REFERENCE:

EP-1 pg A-5; EP-2

ANSWER: 016 (1.00)

d

REFERENCE:

SAR Section IX,E

(***** CATEGORY B CONTINUED ON NEXT PAGE *****)

ANSWER: 017 (1.00)

c

REFERENCE:

AP-10 pg. 1

ANSWER: 018 (2.00)

a

REFERENCE:

PSBR Emergency Plan Sect. 3.5
EP-1 pg. A-12

ANSWER: 019 (1.00)

a

REFERENCE:

Technical Specification Definition 1.1.28 pg. 5

(***** END OF CATEGORY B *****)
(***** END OF EXAMINATION *****)

ANSWER KEY

MULTIPLE CHOICE

001 d

002 a

003 b

004 c **DELETED**

005 c

006 b

007 b

008 a

009 ✓

010 b

011 b

012 d

013 b

014 b

015 a

016 d

017 c

018 a

019 a

(***** END OF CATEGORY B *****)
(***** END OF EXAMINATION *****)