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

REPORT NO.: 50-160/OL-97-02

FACILITY DOCKET NO.: 50-160

FACILITY LICENSE NO.: R-97

FACILITY: Georgia Institute of Technology

EXAMINATION DATES: April 10, 1996

EXAMINER: Paul Doyle, Chief Examiner

SUBMITTED BY: _____ 5/22/97
Paul Doyle, Chief Examiner Date

SUMMARY:

On April 10,1996, the NRC administered a retake written examination (Section B only) to one Reactor Operator candidate and one Senior Reactor Operator candidate, in the Region II offices. Both candidates had passed operating tests and sections A and C of written examinations adminstered during the week of November 13, 1995. The Senior Reactor Operator candidate passed and the Reactor Operator candidate failed their respective examinations. The NRC examiner discussed the written examination per telephone call, the facility had no comments for NRC resolution.

Results:

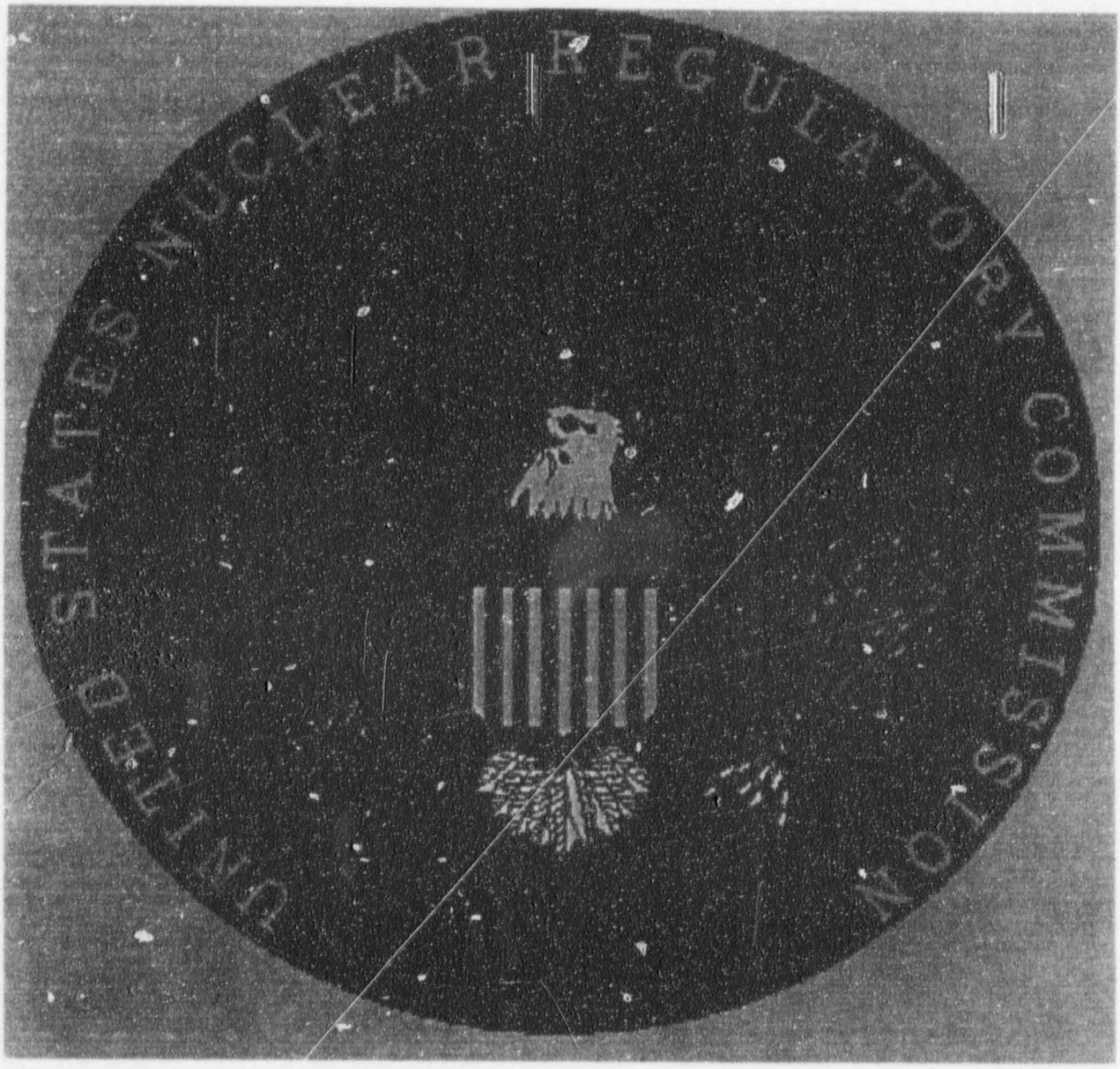
	RO (Pass/Fail)	SRO (Pass/Fail)	Total (Pass/Fail)
NRC Grading:	0/1	1/0	1/1

Exit Meeting:

No exit meeting was held.

ENCLOSURE 1

United States Nuclear Regulatory Commission
Operator Licensing Examination
w / answer key



Georgia Institute of Technology
4/1/96

ENCLOSURE 2

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 three (3) hours 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 (B.1) [1.0]
Contamination swipes measure the loose contamination over a 100 cm^2 area. Which one of the following contamination levels requires shoe covers and latex or plastic gloves but not lab coats or coveralls to be worn?

a. 10 dpm , Transuranic (TRU)

b. 1,000 dpm β-γ

c. 30,000 dpm Nat U, U^{235}, U^{238}

d. 300 dpm α (TRU)

QUESTION (B.2) [1.0]
A survey instrument with a window probe was used to measure an irradiated experiment. The results were 100 millirem/hr window open and 60 millirem/hr window closed. What was the gamma dose?

a. 100 millirem/hr

b. 60 millirem/hr

c. 40 millirem/hr

d. 140 millirem/hr

QUESTION (B.3) [1.0]
Which one of the following is NOT a PRIMARY indication for the operator to verify that the shim-safety blades have scrammed?

a. Blade down indicating light

b. Dial indicator for shim-safety blades

c. De-energized clutch indication

d. -80 second reactor period

QUESTION (B.4) [1.0]
While the reactor is operating during normal working hours, a large fire is noted in the containment building. As the reactor operator, you conduct a code ABLE, turn "off" all switches to pumps/control drives, leave the scene of the fire and isolate containment. Once others have been notified of the fire, the proper response for NNRC personnel is to immediately evacuate the NNRC.

a. A minimum of six (6) NNRC personnel will re-enter the building and proceed to make a general survey of the building.

b. The Emergency Director (ED) **ALONE** shall attempt to re-enter the building and make a determination about the best way to recover from the fire.

c. The Emergency Director and two (2) 'other' personnel will re-enter the building, then go to the Emergency Command Center (ECC) and proceed to make a general survey of the building.

d. One HP and the Hot-Cell operator will re-enter the building, then go to the Emergency Command Center (ECC). They will proceed to make a specific survey of containment. Once the survey is complete, the Emergency Director (ED) shall note recovery options.

QUESTION (B.5) [2.0, 0.5 each]
Match each of the following actions with its correct term from Technical Specifications; Channel Check, Channel Test, or Channel Calibration. (Only one term per action. Term may be used more than once.)

a. Immersing temperature detector in an ice bath, then in boiling water, noting correct output.

b. Replacing a Resistance temperature detector with precision variable resistor and verifying or adjusting for correct output over entire range of meter.

c. Performing a precise determination of reactor power, then adjusting reactor power meters to correspond to correct power.

d. Placing a source next to a radiation detector and observing meter movement.

QUESTION (B.6) [2.0, 0.5 each]
Match each of the following specifications taken from technical specifications with the correct value. (Note values from column B may be used more than once, or not at all.)

	Column A	Column B
a.	Minimum Shutdown Margin with most reactive shim-safety blade fully withdrawn.	1. 0.01 Δk/k
b.	Minimum subcriticality during core loading changes	2. 0.015 Δk/k
c.	Minimum shutdown margin with most reactive remaining shim-safety blade fully withdrawn before you may remove another shim-safety blade.	3. 0.0275 Δk/k
d.	Amount of negative reactivity added by draining the reflector.	4. 0.119 Δk/k

QUESTION (B.7) [1.0]
During operations at 2.5 Megawatts, you (the observing reactor operator) notice that the reactor period is fluctuating on one of the channels with no corresponding changes in power or rod position. The reactor operator bypasses the fluctuating channel. Was this allowed by technical specifications?

a. No. Technical specifications require two channels for reactor period trip at all times. You must tell the Reactor Operator to scram the reactor.

b. Yes. Technical specifications only require the reactor period trips during startup. Once you have established 1 decade overlap, the period channels are no longer required.

c. Yes. Technical specifications allow the bypassing of certain channels (1 of 12) for up to eight (8) hours for test, repair and/or calibration.

d. Yes. The period meter is not a Technical Specifications required scram.

QUESTION (B.8) [1.0]
An experimenter wishes to irradiate three specimens with reactivity worths of 0.25% Δk/k, 0.30% Δk/k and 0.55% Δk/k. Can these specimens be placed in the reactor as UNSECURED experiments and why (why not).

a. Yes. The sum of the three specimens is less than 2.5% Δk/k.

b. No. The sum of the three specimens is greater than 1.0% Δk/k.

c. Yes. Each specimen is less than 0.6% Δk/k.

d. No. One of the specimens is greater than 0.4% Δk/k.

QUESTION (B.9) [1.0]
Which one of the following conditions requires the operator to initiate a reactor shutdown as a first action (prior to alarm verification)?

a. D_2O Leak alarm

b. H_2O High Radiation alarm

c. ECCS Alarm

d. Regulating Rod Low Limit Alarm

QUESTION (B.10) [1.0]
Five of ten Area Radiation Monitors are required to be in operation during Mode 2. Which one of the following correctly specifies what locations must be monitored by the operational monitors?

a. Any one on control room level; any two on main floor; any two in basement.

b. Any two on control room level; any one on main floor; two in basement, one of which must be in process room.

c. Any one on control room level; any two on main floor; two in basement, one of which must be in process room.

d. Any one on control room level; two on main floor, one of which must be in bio-med facility, any two in basement.

QUESTION (B.11) [1.0]
Which one of the following conditions is a violation of a Technical Specification Limiting Safety System setting in Mode 2?

a. Reactor Power is 5.25 Megawatts

b. Reactor Coolant Flow is 1550 gpm

c. Reactor inlet temperature is at 119°F

d. Reactor outlet temperature is 130°F

QUESTION (B.12) [1.0]
Which one of the following is the correct method for the use of a hand-held probe when performing a personnel frisk? The probe should be ...

a. held lightly in contact with the surface being frisked, and the probe moved slowly.

b. held lightly in contact with the surface being frisked, and the probe moved quickly.

c. held an inch away from surface being frisked and the probe moved slowly.

d. held an [illegible] surface being frisked and the probe moved quickly.

QUESTION (B.13) [1.0]
Which one of the following is the 10 CFR 20 definition of Total Effective Dose Equivalent?

a. The sum of the deep dose equivalent and the committed effective dose equivalent.

b. The dose that your whole body receives from sources outside your body.

c. The sum of external deep dose and the organ dose.

d. The dose to a specific organ or tissue resulting in an intake of radioactive material.

QUESTION (B.14) [1.0]
Today is October 1, 1997. You are preparing to relieve the Reactor Operator. In the previous quarter you stood the following watches:

DATE	Start Time	Stop Time
July 1, 1997	12:30 pm	2:30 pm
Aug. 5, 1997	12:00 n	12:45 pm
Sep. 8, 1997	12:15 pm	1:00 pm

Which one of the following is your action?

a. None. Relieve the watch

b. Stand four hours of watch under the direction of a licensed Operator.

c. Stand six hours of watch under the direction of a licensed Operator.

d. Complete an NRC approved requalification training program.

QUESTION (B.15) [1.0]
You are the prime reactor operator standing watch on back-shift. The observing operator is the Senior Reactor Operator and there is also a reactor operator trainee in the control room. You receive a message concerning an emergency in your family. What action(s) should you take before leaving?

a. Call another Reactor operator to relieve you, you may leave only after your relief arrives in the control room.

b. Call another Reactor operator to relieve you, turn over the watch to the trainee, you may leave as long as the relieving RO is only 30 minutes away.

c. Turn over the watch to the trainee, who will operate the reactor under the direct supervision of the Senior Reactor Operator.

d. Turn over the watch to the Senior Reactor Operator, who may remain as the observing operator, with the trainee operating the reactor under direct supervision.

QUESTION (B.16) [1.0]
What method is used to accurately measure reactor power?

a. Measure H_2O temperature across and flow rate through primary/secondary heat exchanger.

b. Measure D_2O temperature across and flow rate through primary/secondary heat exchanger.

c. Measure D_2O temperature across and flow rate through reactor.

d. Measure D_2O temperature rise in primary tank with NO forced flow.

QUESTION (B.17) [1.0]
Two (2) inches of lead shielding reduced a gamma radiation beam from 400 mr/hr to 200 mr/hr. If you add **ANOTHER** four (4) inches of lead shielding, what will the new radiation level be?

a. 25 mr/hr

b. 50 mr/hr

c. 75 mr/hr

d. 100 mr/hr

QUESTION (B.18) [1.0]
The reactor is shutdown after having been operating at 3 megawatts for the last 5 hours. Maintenance is to be performed that requires the truck door to be opened. Which one of the following conditions must be met before the truck door is opened?

a. As soon as the reactor is shutdown as defined by Technical Specifications.

b. As soon as the reactor is secured as defined by Technical Specifications.

c. One hour following reactor shutdown.

d. Eight hours following reactor shutdown.

(*** End of Section B ***)
(*** End of Examination ***)

ANSWER (B.1)
b
REFERENCE (B.1)
Radiation Safety Manual, Georgia Institute of Technology, March 17, 1994, p 16 of 30.

ANSWER (B.2)
b
REFERENCE (B.2)
With the window closed beta radiation is shielded, therefore 60 millirem/hr must be due to gamma radiation.

ANSWER (B.3)
d. From old EQB question. Exam administered Jan. 1990
REFERENCE (B.3)
Emergency Implementation Procedures

ANSWER (B.4)
c
REFERENCE (B.4)
NRC Operator Licensing Examination administered April, 1989, also GTRR/NNRC procedure 6040, § 5.2.4.1, "Fire during working hours"

ANSWER (B.5)
a, check b, calibration c, calibration d, test
REFERENCE (B.5)
GTRR Technical Specifications § 1.0 Definitions, pp. 1 & 2.

ANSWER (B.6)
a 1, b 3, c 1, d 3
REFERENCE (B.6)
GTRR Technical Specifications § 3.1, *Reactivity Limits*, p.9, also § 3.2 *Reactor Safety System* p. 12.

ANSWER (B.7)
c
REFERENCE (B.7)
GTRR Technical Specifications Table 3.1. *Required Safety Channels.*

ANSWER (B.8)
d
REFERENCE (B.8)
GTRR § 3.4 *Limitations of Experiments*

ANSWER (B.9)
a
REFERENCE (B.9)
GTRR Procedure 2602, *Response to an Alarm Annunciator,* §§ 5.2.5, p. 3; 5.2.4, p. 3; 5.2.7, p. 4; & 5.2.9, p. 4

ANSWER (B.10)
c
REFERENCE (B.10)
GTRR T.S. Table 3.2, and Procedure 9150 *Operation and Calibration of Area Radiation Monitors* § 5.2.1.1 pp. 2 & 3.

ANSWER (B.11)
b
REFERENCE (B.11)
GTRR Technical Specifications § 2.2.1, p. 7

ANSWER (B.12)
a
REFERENCE (B.12)
GTRR procedure 9280, *Personnel Monitoring*, p. 2

ANSWER (B.13)
a
REFERENCE (B.13)
10 CFR 20.1003 *Definitions*

ANSWER (B.14)
c
REFERENCE (B.14)
10 CFR 55.

ANSWER (B.15)
a
REFERENCE (B.15)
GTRR procedure 2001 *Two Operator Operation*

ANSWER (B.16)
a
REFERENCE (B.16)
Procedure 2015, *Reactor Power Calibration* p. 4 of 4

ANSWER (B.17)
b
REFERENCE (B.17)
2 inches is a ½ thickness. Therefore if you add another 2 inches it will reduce the beam to 100 mr/hr and another 2 inches will reduce it again to 50 mr/hr.

ANSWER (B.18)
d
REFERENCE (B.18)
NRC examination administered February 21, 1994 and GTRR Technical Specifications §§ 1.9, 1.10, 1.26 and 3.3.

(*** End of Section B ***)
(*** End of Examination ***)

B.1 b

B.2 b

B.3 d

B.4 c

B.5 a, check b, calibration c, calibration d, test

B.6 a 1, b 3, c 1, d 3

B.7 c

B.8 d

B.9 a

B.10 c

B.11 b

B.12 a

B.13 a

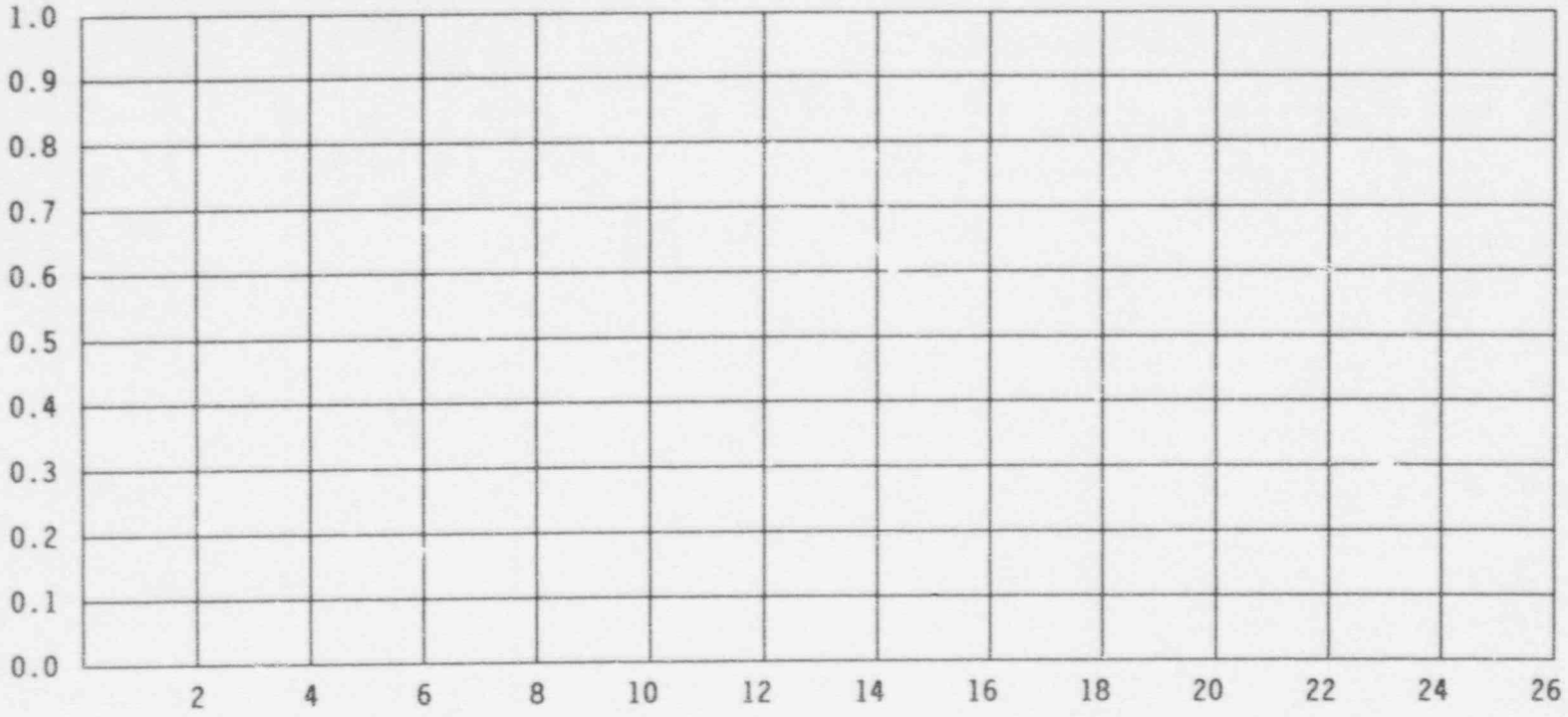
B.14 b

B.15 a

B.16 a

B.17 b

B.18 d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