December 27, 2001

Dr. William Vernetson, Director
Nuclear Facilities
102 Nuclear Reactor Bldg.
Department of Nuclear Engineering Sciences
University of Florida
Gainesville, FL 32611-8300

SUBJECT: INITIAL EXAMINATION REPORT NO. 50-83/OL-02-01

Dear Dr. Vernetson:

During the week of November 19, 2001, the NRC administered examinations to an employee of your facility who had applied for a license to operate your University of Florida Reactor. The examination was conducted in accordance with NUREG-1478, "Non-Power Reactor Operator Licensing Examiner Standards," Revision 1.

In accordance with 10 CFR 2.790 of the Commission's regulations, a copy of this letter and the enclosures will be available electronically for public inspection in the NRC Public Document Room or from the Publicly Available Records (PARS) component of NRC's document system (ADAMS). ADAMS is accessible from the NRC Web site at (the Public Electronic Reading Room) http://www.nrc.gov/NRC/ADAMS/indesx.html. The NRC is forwarding the individual grades to you in a separate letter which will not be released publicly. Should you have any questions concerning this examination, please contact Patrick Isaac at 301-415-1019 or via Internet E-mail at pxi@nrc.gov.

Sincerely,

/RA/

Eugene V. Imbro, Acting Chief
Operational Experience and Non-Power Reactors Branch
Division of Regulatory Improvement Programs
Office of Nuclear Reactor Regulation

Docket No. 50-83

Enclosures:
1. Initial Examination Report No. 50-83/OL-02-01
2. Examination and answer key

cc w/enclosures:
Please see next page

cc:

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

REPORT NO.: 50-83/OL-02-01

FACILITY DOCKET NO.: 50-83

FACILITY LICENSE NO.: R-56

FACILITY: University of Florida

EXAMINATION DATES: 11/19/2001

EXAMINER: Patrick Isaac, Chief Examiner

SUBMITTED BY: ***/RA/*** 12/03/2001
Patrick Isaac, Chief Examiner Date

SUMMARY:

During the week of November 19, 2001, NRC administered a retake of Section A of the Operator Licensing Examinations to one Reactor Operator (RO) candidate. The candidate passed the examinations.

REPORT DETAILS

1. Examiners:

   Patrick J. Isaac

2. Results:

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

ENCLOSURE 1

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

FACILITY: University of Florida

REACTOR TYPE: ARGONAUT

DATE ADMINISTERED: 2001/11/19

CANDIDATE: ____________________________

INSTRUCTIONS TO CANDIDATE:
Answers are to be written on the answer sheet provided. Attach all answer sheets to the examination. Point values are indicated in parentheses for each question. A 70% in each category is required to pass the examination. Examinations will be picked up three (3) hours after the examination starts.

CATEGORY VALUE	% OF TOTAL	CANDIDATE'S SCORE	% OF CATEGORY VALUE		CATEGORY
20.00	**100**	________	____	**A.**	**REACTOR THEORY, THERMODYNAMICS AND FACILITY OPERATING CHARACTERISTICS**
20.00		________ **FINAL GRADE**	____%		**TOTALS**

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

____
Candidate's Signature

ENCLOSURE 2

ENCLOSURE 2

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.

001 a b c d ___

002 a b c d ___

003 a b c d ___

004 a b c d ___

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 ___

020 a b c d ___

(***** END OF CATEGORY A *****)
(***** 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 three (1) hour for completion of the examination.

*QUESTION (A.1) [1.0]
With the reactor on a constant period, which of the following requires the SHORTEST time to occur?

A reactor power change going from:

a. 1% power to 6% power.

b. 5% power to 15% power.

c. 30% power to 40% power.

d. 40% power to 60% power.

*QUESTION (A.2) [1.0]
While critical, a control blade has been withdrawn to increase power.

Select the reactivity coefficient that provides the most significant negative reactivity insertion to turn power following completion of rod motion. (Assume no other operator actions are taken.)

a. Moderator temperature coefficient

b. Fuel temperature coefficient

c. Pressure coefficient

d. Void coefficient

*QUESTION (A.3) [1.0]
Select the percentage of all neutrons produced in the reactor that are Delayed Neutrons.

a. 0.065%

b. 0.1%

c. 0.65%

d. 1.0%

*QUESTION (A.4) [1.0]
A moderator is required to:

a. absorb excess high-energy neutrons.

b. reduce the amount of excess core reactivity.

c. absorb excess thermal neutrons.

d. provide the media for the slowing-down of neutrons.

*QUESTION (A.5) [1.0]
The greatest hazard from a short reactor period occurs when reactor power is:

a. at the Point of Adding Heat.

b. close to source counts.

c. close to 1%.

d. at 100%.

*QUESTION (A.6) [1.0]
The primary purpose of the installed neutron source is to:

a. compensate for neutrons absorbed in non-fuel materials in the core.

b. generate neutrons to start the fission chain reaction for each startup.

c. provide a means to allow reactivity changes to occur in a subcritical reactor.

d. generate a neutron source level sufficient to monitor reactivity changes in a shutdown reactor.

*QUESTION (A.7) [1.0]
You perform two initial startups a week apart. Each of the startups has the same starting conditions, (core burnup, pool and fuel temperature, and count rate are the same). The only difference between the two startups is that during the SECOND one you stop for 10 minutes to answer the phone. For the second startup compare the critical rod height and count rate to the first startup.

	Rod Height	Count Rate
a.	Higher	Same
b.	Lower	Same
c.	Same	Lower
d.	Same	Higher

*QUESTION (A.8) [1.0]
The reactor was shutdown after two complete days at full power.

How long will it take for the MAXIMUM Xenon poison effect to occur?

a. 4 to 6 hours

b. 8 to 12 hours.

c. 35 to 45 hours.

d. 65 to 72 hours.

*QUESTION (A.9) [1.0]
If reactor power doubles in 30 seconds, the period is:

a. 21 sec.

b. 34 sec.

c. 43 sec.

d. 52 sec.

*QUESTION (A.10) [1.0]
Which of the following describes reactor power response during and after a partial control blade withdrawal with the reactor power remaining below the point of adding heat?
(Assume the initial Keff = 1.0)

a. Power will rapidly increase (prompt jump) then gradually increase at a slower rate.

b. Power will rapidly increase (prompt jump) then gradually decrease to the original value.

c. Power will rapidly increase (prompt jump) then gradually establish a stable higher value.

d. Power will increase at a steady rate until automatic protective action is initiated.

*QUESTION (A.11) [1.0]
Select the reason for the 80 second period following a Rx scram.

a. U-235 has a greater affinity for source neutrons than fission neutrons.

b. The fuel temperature coefficient adds positive reactivity that offsets scram reactivity until the fuel is cool.

c. Longest lived delayed neutron precursors provide sufficient neutron generation to slow the power decrease.

d. Amount of negative reactivity added on a scram is limited to the shutdown margin.

*QUESTION (A.12) [1.0]
Which of the following is most affected by withdrawal of a control blade?

a. Reproduction Factor

b. Resonance Escape Probability

c. Thermal Non Leakage Probability

d. Thermal Utilization Factor

*QUESTION (A.13) [1.0]
Select the statement that describes the influence of delayed neutrons on the neutron life cycle.

a. Increased average neutron generation time.

b. Decreased probability of fissioning U-238.

c. Decreased margin to prompt criticality.

d. Increased time to thermalize.

*QUESTION (A.14) [1.0]
Which of the following neutron sources would be expected to increase in strength over core life?

a. Photo-Neutron source

b. Alpha-Neutron source

c. Spontaneous fission

d. Cosmic interaction

*QUESTION (A.15) [1.0]
Identify the neutron type whose average energy level is in equilibrium with its surroundings.

a. Thermal

b. Epithermal

c. Resonant

d. Fast

*QUESTION (A.16) [1.0]
Which of the following would be the most efficient neutron moderator?

A material that has a:

a. low density and high mass number.

b. high density and low mass number.

c. low density and low mass number.

d. high density and high mass number.

*QUESTION (A.17) [1.0]
Which of the following does NOT affect the Effective Multiplication Factor (Keff)?

a. the moderator-to-fuel ratio.

b. the current time in core life.

c. the physical dimensions of the core.

d. the strength of installed neutron sources.

*QUESTION (A.18) [1.0]
During fuel loading, which of the following will have NO EFFECT on the shape of a 1/M plot? (Assume all sources are the same size.)

a. The location of the sources in the core

b. The initial source count rate.

c. The order of fuel assembly placement.

d. The moderator temperature.

*QUESTION (A.19) [1.0]
If the reactor is shutdown with exactly the Technical Specification required shutdown margin, select the value of Keff.

a. .75

b. .80

c. .90

d. .98

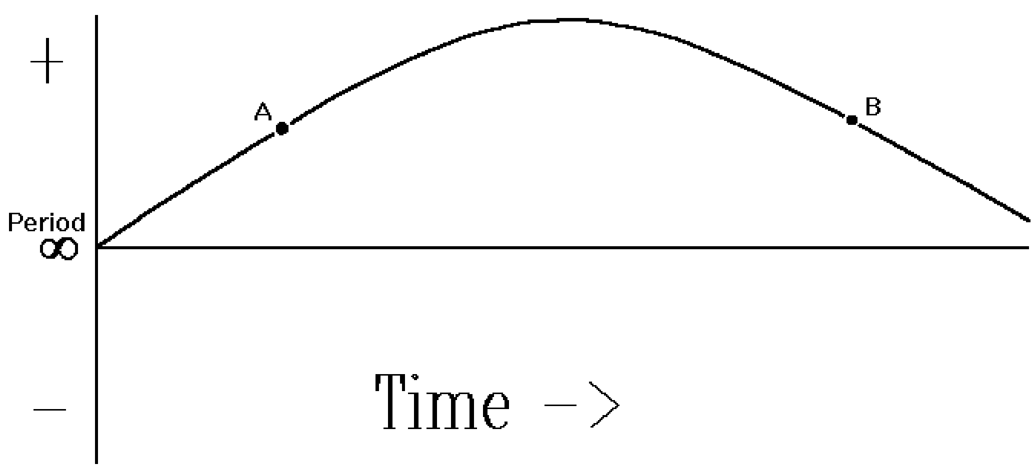
QUESTION: 020 (1.00)
Shown below is a trace of reactor period as a function of time. Between points A and B, reactor power is:

a. continually increasing.

b. increasing, then decreasing.

c. continually decreasing.

d. constant.



ANSWER (A.1)
c.
REFERENCE (A.1)
P2/P1 = e raised to time/period.
The ratio P2/P1 is directly related to the ratio time/period.
The smallest P2/P1 will have the smallest time/ period.
Since period is constant, it follows that the smallest time will result from the smallest P2/P1.
Therefore: 6/1=6 15/5=3 40/30=1.33 60/40=1.5
You don't have to calculate each one if you understand the concept.

ANSWER (A.2)
a.
REFERENCE (A.2)
Training Manual, Reactor Physics, section 9

ANSWER (A.3)
c.
REFERENCE (A.3)
Training Manual, Reactor Physics, pg 8-11

ANSWER (A.4)
d.
REFERENCE (A.4)
"Introduction to Nuclear Engineering", J.R. Lamarsh, 1975, Pages 180-182

ANSWER (A.5)
b.
REFERENCE (A.5)
UFTR Requal Exam Bank Operational Physics section

ANSWER (A.6)
d.
REFERENCE (A.6)
Training manual, UFTR Requal Exam Part II, answer 16, pg 2

ANSWER (A.7)
d.
REFERENCE (A.7)
Burn, R., *Introduction to Nuclear Reactor Operations*, © 1982, § 5.7, pp. 5-28 — 5-38.

ANSWER (A.8)
b.
REFERENCE (A.8)
Training Manual, UFTR Requal Exam, ques, 122 & 123.

ANSWER (A.9)
c.
REFERENCE (A.9)
lnP2/P1=t/T
T = t/(lnP2/P1) = 30sec/ln2 = 30sec/.693 = 43.29

ANSWER (A.10)
a.
REFERENCE (A.10)
Training manual, UFTR Requal exam ques 75

ANSWER (A.11)
c.
REFERENCE (A.11)
Training Manual, reactor Physics, pg 10-8

ANSWER (A.12)
d.
REFERENCE (A.12)
Reactor Training Manual, Reactor Physics, pg 8-4

ANSWER (A.13)
a.
REFERENCE (A.13)
Reactor Training Manual, Rx physics, pg 8-8 thru 8-13

ANSWER (A.14)
a.
REFERENCE (A.14)
Reactor Training Manual, Rx physics, sect 13, Sources for startup

ANSWER (A.15)
a.
REFERENCE (A.15)
Glasstone and Sesonske, 3rd Ed, sect 1.39

ANSWER (A.16)
b.
REFERENCE (A.16)
Glastone and Sesonske, 3rd ed. 1.58

ANSWER (A.17)
d.
REFERENCE (A.17)
Training Manual, Reactor Physics, pg 8-3, sect 1.3

ANSWER (A.18)
b.
REFERENCE (A.18)
UFTR Requal exam Questions, 148 & 149

ANSWER (A.19)
d.
REFERENCE (A.19)
Lecture notes, reactor theory
(k-1)/k = reactivity = shutdown margin = -2% Δk/k= -.02
(k-1)/k= -.02
(k-1) = -.02
k = (1-.02) = .98
check: (.98-1)/98 = -.02 = -.02/.98 = -.02
.0204 = = -.02

ANSWER (A.20)
a
REFERENCE (A.20)
Since the period is always positive, power must be increasing.