March 22, 2004

Mr. Sean O'Kelly, Associate Director
Nuclear Engineering Teaching Laboratory
University of Texas
10100 Burnet Road
Austin, TX 78758

SUBJECT: INITIAL EXAMINATION REPORT NO. 50-602/OL-04-01, UNIVERSITY OF TEXAS

Dear Mr. O'Kelly:

During the week of February 23, 2004, the NRC administered initial examinations to employees of your facility who had applied for a license to operate your University of Texas reactor. The examination was conducted in accordance with NUREG-1478, "Non-Power Reactor Operator Licensing Examiner Standards," Revision 1. At the conclusion of the examination, the examination questions and preliminary findings were discussed with those members of your staff identified in the enclosed report.

In accordance with 10 CFR 2.790 of the Commission's regulations, a copy of this letter and the enclosures will 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/index.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 Mr. Warren Eresian at 301-415-1833 or internet e-mail wje@nrc.gov.

Sincerely,

/RA/

Patrick M. Madden, Section Chief
Research and Test Reactors Section
Operating Reactor Improvements Program
Division of Regulatory Improvement Programs
Office of Nuclear Reactor Regulation

Docket No. 50-602

Enclosures: 1. Initial Examination Report No. 50-602/OL-04-01
2. Examination and answer key

cc w/encls: Please see next page

cc:

Governor's Budget and
Planning Office
P.O. Box 13561
Austin, TX 78711

Bureau of Radiation Control
State of Texas
1100 West 49th Street
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Dr. William Vernetson
Test, Research, and Training
Reactor Newsletter
University of Florida
202 Nuclear Sciences Center
Gainesville, FL 32611

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DISTRIBUTION w/encls.:
PUBLIC
AAdams, PM
Facility File (EBarnhill) (O6-F2)

DISTRIBUTION w/o encls.:
RNRP/R&TR r/f
WEresian
PMadden

ADAMS EXAMINATION PACKAGE ACCESSION NO.: ML040710527
ADAMS INITIAL EXAMINATION REPORT ACCESSION NO.: ML040710532 **TEMPLATE NO.: NRR-074**

OFFICE	RNRP:CE		IROB:LA		RNRP:SC	
NAME	WEresian:rdr		EBarnhill		PMadden	
DATE	03/ 11 /2004		03/ 12 /2004		03/ 15 /2004	

C = COVER **E = COVER & ENCLOSURE** **N = NO COPY**

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

REPORT NO.: 50-602/OL-04-01

FACILITY DOCKET NO.: 50-602

FACILITY LICENSE NO.: R-129

FACILITY: University of Texas

EXAMINATION DATES: February 23-24, 2004

EXAMINER: Warren Eresian, Chief Examiner

SUBMITTED BY: ***/RA/*** 03/ 11 /2004
Warren Eresian, Chief Examiner Date

SUMMARY:

During the week of February 23, 2004, the NRC administered operator licensing examinations to one Senior Reactor Operator (Upgrade) candidate and one Senior Reactor Operator (Instant) candidate. All candidates passed the examinations.

ENCLOSURE 1

REPORT DETAILS

1. Examiner: Warren Eresian, Chief Examiner

2. Results:

	RO PASS/FAIL	SRO PASS/FAIL	TOTAL PASS/FAIL
Written	**N/A**	**1/0**	**1/0**
Operating Tests	**N/A**	**2/0**	**2/0**
Overall	**N/A**	**2/0**	**2/0**

3. Exit Meeting:

Mr. Sean O'Kelly, Associate Director
Mr. Michael Krause
Warren Eresian, NRC Chief Examiner

The NRC thanked the facility staff for their cooperation during the examination. There were no comments on the written examination. No generic concerns were noted.

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

FACILITY: University of Texas

REACTOR TYPE: TRIGA

DATE ADMINISTERED: 02/23/2004

REGION: 4

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% in each category is required to pass the examination.

Examinations will be picked up two (2) hours after the examination begins.

CATEGORY VALUE	% OF TOTAL	CANDIDATE'S SCORE	% OF CATEGORY VALUE	CATEGORY
20	50	_____	_____	B. NORMAL/EMERGENCY PROCEDURES AND RADIOLOGICAL CONTROLS
20	50	_____	_____	C. FACILITY AND RADIATION MONITORING SYSTEMS
40				

CANDIDATE'S SCORE _____

FINAL GRADE % _____

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

_____
Candidate's Signature

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 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 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.

6. Print your name in the upper right-hand corner of the answer sheets.

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

8. Partial credit may be given. Therefore, ANSWER ALL PARTS OF THE QUESTION AND DO NOT LEAVE ANY ANSWER BLANK. NOTE: partial credit will NOT be given on multiple choice questions.

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

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

11. When you are done and have turned in your examination, leave the examination area as defined by the examiner. 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)

Which ONE of the following would be an initiating condition for a Non-Reactor Specific Emergency?

a. Damage to building reactor systems or facility utilities.

b. > 20 mr/hr at operations boundary from unknown source.

c. Nearby, threatening, or impending natural disaster.

d. Discovery of forced entry or SNM theft.

QUESTION: 002 (1.00)

Which ONE of the following requires the direct supervision (i.e., presence) of a Senior Reactor Operator?

a. Control rod calibrations.

b. Fuel temperature calibrations.

c. Pulsing the reactor.

d. Performance of a Class A experiment.

QUESTION: 003 (1.00)

The Safety System channels required to be operable in <u>all</u> modes of operation are:

a. fuel element temperature scram (550°C), reactor high power scram (1.1 MW), and manual scram.

b. fuel element temperature scram (550°C) and manual scram.

c. manual scram and reactor high power scram (1.1 MW).

d. reactor high power scram (1.1 MW), loss of high voltage scram, and fuel element temperature scram (550°C).

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

QUESTION: 004 (1.00)

Match the 10 CFR Part 55 requirements listed in Column A for an actively licensed operator with the correct time period from Column B. Column B answers may be used once, more than once, or not at all.

	Column A	Column B	
a.	License Expiration	1.	1 year
b.	Medical Examination	2.	2 years
c.	Requalification Written Examination	3.	3 years
d.	Requalification Operating Test	4.	6 years

QUESTION: 005 (1.00)

"The total worth of the transient rod shall be limited to 2.8% ΔK/K, and the total withdrawal time for the rod shall not exceed 15 seconds." This is an example of a:

a. safety limit.

b. limiting safety system setting.

c. limiting condition for operation.

d. surveillance requirement.

QUESTION: 006 (1.00)

Half-way through a 6 hour reactor operation you discover that the normal ventilation exhaust damper has been blocked open by a student performing experiments. You cannot move the damper because it is damaged. Which one of the following actions should you take?

a. Immediately secure reactor operations and comply with the requirements for reportable events.

b. Continue with reactor operations. Up to one week is allowed to repair the damper.

c. Continue with reactor operations. The CAM will offer adequate protection.

d. Immediately secure reactor. This event is not reportable if the damper is repaired within 48 hours.

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

QUESTION: 007 (1.00)

You have entered the control room to begin your shift. The reactor is operating, and the outgoing operator has logged off the system. Which ONE of the following statements is TRUE?

a. The reactor will scram if you do not log onto the system within 2 minutes after the outgoing operator has logged off.

b. If you do not log in, control rods can only be inserted, and not withdrawn.

c. If you do not log in, the reactor will automatically switch to the AUTO mode if it is not already in AUTO.

d. If you do not log in within 5 minutes, a new Prestart Check must be performed.

QUESTION: 008 (1.00)

With regard to Radiation Work Permits (RWPs), which ONE of the following statements is NOT TRUE?

a. An RWP is issued for a specific time period, and may expire prior to the completion of work.

b. All personnel who work under an RWP must read and sign it.

c. If the potential for personnel exposure exceeds 100 mrem, the RWP must be approved by the ALARA committee.

d. The RWP is closed out by the person (or persons) who actually perform the work.

QUESTION: 009 (1.00)

In accordance with the Technical Specifications, which ONE condition below is NOT permissible when the reactor is operating?

a. Shutdown Margin = 2.8% ΔK/K.

b. Scram time = 1 second.

c. Pool water conductivity = 6.5 micromho/cm.

d. Reactivity worth of a single secured experiment = 1% ΔK/K.

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

QUESTION: 010 (1.00)

A radiation survey of an area reveals a general radiation reading of 1 mrem/hr. However, there is a small section of pipe which reads 10 mrem/hr at one (1) meter. Assuming that the pipe is a point source, which ONE of the following defines the posting requirements for the area in accordance with 10CFR Part 20?

a. Restricted Area.

b. Radiation Area.

c. High Radiation Area.

d. Grave Danger, Very High Radiation Area.

QUESTION: 011 (1.00)

“The reactivity of an experiment shall be measured before an experiment is considered functional.” This is an example of a:

a. safety limit.

b. limiting safety system setting.

c. limiting condition for operation.

d. surveillance requirement.

QUESTION: 012 (1.00)

In accordance with the Technical Specifications, which ONE situation below is permissible when the reactor is operating?:

a. One control rod inoperable but fully inserted in the core.

b. Pool water depth = 5.0 meters.

c. A fueled experiment containing 400 millicuries of I-133 and 400 millicuries of I-135.

d. Maximum reactivity insertion rate of a standard control rod = 0.12%ΔK/K.

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

QUESTION: 013 (1.00)

Two point sources have the same Curie strength. Source A's gammas have an energy of 1 Mev, while Source B's gammas have an energy of 2 Mev. You obtain a reading from the same GM tube 10 feet from each source. Concerning the two readings, which ONE of the following statements is true?

a. The reading from Source B is four times that of Source A.

b. The reading from Source B is twice that of Source A.

c. Both readings are the same.

d. The reading from Source B. is half that of Source A.

QUESTION: 014 (1.00)

Which ONE of the following statements define the Technical Specifications term "Channel Test?"

a. The adjustment of a channel such that its output corresponds with acceptable accuracy to known values of the parameter which the channel measures

b. The qualitative verification of acceptable performance by observation of channel behavior

c. The introduction of a signal into a channel for verification of the operability of the channel

d. The combination of sensors, electronic circuits and output devices connected to measure and display the value of a parameter

QUESTION: 015 (1.00)

Which ONE of the following is the 10 CFR 20 definition of TOTAL EFFECTIVE DOSE EQUIVALENT (TEDE)?

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 the body.

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

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

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

QUESTION: 016 (1.00)

Two inches of shielding reduce the gamma exposure in a beam of radiation from 400 mR/hr to 200 mR/hr. If you add an additional four inches of shielding what will be the new radiation level? (Assume all reading are the same distance from the source.)

a. 25 mR/hr

b. 50 mR/hr

c. 75 mr/hr

d. 100 mr/hr

QUESTION: 017 (1.00)

Which one of the following statements concerning the Fuel Temperature Limiting Safety System Setting is FALSE?

a. The trip level provides a margin of 400 °C for in any condition of operation.

b. The LSSS prevents the safety limit from being reached.

c. The LSSS is not applicable in the pulse mode because of the relatively long time constant of the fuel temperature channel.

d. Two redundant temperature thermocouple sensors monitor the fuel temperature LSSS.

QUESTION: 018 (1.00)

In accordance with the Technical Specifications, which ONE situation below is permissible when the reactor is operating?

a. One control rod inoperable but is in its fully withdrawn position.

b. The reactor power trip setpoint is set at 1.010 kW.

c. The Transient Rod withdrawal time is 18 seconds.

d. One fuel temperature measuring channel is inoperable.

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

QUESTION: 019 (1.00)

Match each of the following actions in Column A with the correct term from the Technical Specifications in Column B. Only one term from Column B may be used for each action in Column A.

Column A	Column B
a. Immersing a thermometer in an ice bath, then in boiling water and noting the readings.	1. Channel Check
b. Placing a source next to a radiation detector and observing meter movement.	2. Channel Test
c. Performing a determination of reactor power with a heat balance, then adjusting a power meter to correspond to the heat balance.	3. Channel Calibration
d. Observing the overlap between two different neutron detectors as power increases.	

QUESTION: 020 (1.00)

Class C experiments require the direction of a(n)_____, Class B experiments require the direction of a(n) _____, and Class A experiments require the direction of a(n)_____.

a. senior operator; reactor operator; experimenter.

b. experimenter; senior operator; reactor operator.

c. reactor operator, senior operator, experimenter.

d. experimenter; reactor operator; senior operator.

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

QUESTION: 001 (1.00)

A three-way solenoid valve controls the air supplied to the pneumatic cylinder of the transient rod. De-energizing the solenoid causes the valve to shift to:

a. open, admitting air to the cylinder.

b. close, admitting air to the cylinder.

c. open, removing air from the cylinder.

d. close, removing air from the cylinder.

QUESTION: 002 (1.00)

The fuel-moderator elements are:

a. 20% enriched uranium clad with zirconium.

b. 8.5% enriched uranium clad with stainless steel.

c. 20% enriched uranium clad with stainless steel.

d. 8.5% enriched uranium clad with zirconium.

QUESTION: 003 (1.00)

Pool water conductivity is measured at the:

a. outlet of the coolant system heat exchanger.

b. outlet of the purification system filter.

c. discharge of the purification system pump.

d. discharge of the coolant system pump.

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

QUESTION: 004 (1.00)

A diffuser nozzle is located a short distance above the top grid plate and directs water downward over the core. The purpose of this diffuser is to:

a. enhance heat transfer across all fuel elements in the core.

b. ensure consistent water chemistry in the core.

c. better distribute heat throughout the pool.

d. reduce the dose rate at the pool surface from N-16.

QUESTION: 005 (1.00)

Carbon Dioxide is used in the pneumatic transfer system because:

a. it is more compressible than compressed air, which minimizes the pressure required to move samples.

b. it does not retain moisture.

c. it minimizes the production of Argon-41.

d. it is a better neutron absorber than compressed air, thus inserting negative reactivity in the event of a leak.

QUESTION: 006 (1.00)

Which ONE of the following is the purpose of the ½-inch aluminum safety plate suspended beneath the lower grid plate?

a. Prevents the control rods from dropping out of the core if the mechanical connections fail.

b. Provides structural support for the lower grid plate and the suspended core.

c. Provides a catch plate for small tools and hardware dropped while working on the core.

d. Prevents fuel rods from dropping out of the core.

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

QUESTION: 007 (1.00)

With reference to the heat exchanger in the coolant system, differential pressure is measured between the cooling system inlet and secondary outlet. The purpose of this measurement is to:

a. alarm when the secondary outlet pressure exceeds the cooling system inlet pressure.

b. alarm when the cooling system inlet pressure exceeds the secondary outlet pressure.

c. provide an alarm if the secondary system pump discharge pressure exceeds the cooling system pump suction pressure.

d. measure the difference in flow rate of the primary and secondary loops.

QUESTION: 008 (1.00)

In order to prevent radiation streaming through a beam port, each beam port contains:

a. an inner shield plug and an outer shield plug.

b. a lead-filled shutter and a lead-lined door.

c. a step (or steps) to provide for divergence of the radiation beam.

d. a removable cover plate.

QUESTION: 009 (1.00)

Which ONE of the following describes the action of the rod control system to drive the magnet draw tube down after a dropped rod?

a. Deenergizing the rod magnet initiates the rod down motion of the draw tube.

b. Actuation of the MAGNET DOWN limit switch initiates the rod down motion of the draw tube.

c. Actuation of the ROD DOWN limit switch initiates the rod down motion if the rod drive is withdrawn.

d. Resetting the scram signal initiates the rod down motion of the draw tube.

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

QUESTION: 010 (1.00)

Which ONE of the following conditions will prevent rod withdrawal?

a. Compensating voltage is 20% lower than normal.

b. The reactor operator selects pulse mode and attempts to withdraw the shim rod.

c. Rods are being pulled for a reactor startup. Source count 1.4 cps.

d. The demineralizer inlet temperature is 40°C.

QUESTION: 011 (1.00)

A control rod is partially withdrawn from the core. At this point, the source level, for some unknown reason, drops below the minimum count. As a result:

a. the control rod cannot be withdrawn any further.

b. the control rod cannot be moved in any direction.

c. the control rod can only be inserted by means of a SCRAM.

d. the control rod can only be inserted by placing the key switch in the “OFF” position.

QUESTION: 012 (1.00)

The Argon Purge System receives inputs from two air suction points. They are:

a. the reactor bay and beam port manifold.

b. the pool surface and reactor bay.

c. the pool surface and beam port manifold.

d. the reactor bay and control room.

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

QUESTION: 013 (1.00)

Which ONE of the following conditions is NOT required in order to place the reactor into the PULSE mode?

a. The transient rod is all the way down.

b. Reactor power is less than 1 kW.

c. Air is applied to the transient rod drive.

d. The system is in the Steady State Mode.

QUESTION: 014 (1.00)

For the neutron monitoring system channels listed in Column I, select the appropriate detector type from Column II. Items in Column II may be used once, more than once, or not at all.

	Column I		Column II
a.	NM-1000.	1.	Fission chamber
b.	NP-1000	2.	Compensated ion chamber
c.	NPP-1000	3.	Uncompensated ion chamber
d.	Pulse channel.		

QUESTION: 015 (1.00)

When the PULSE mode is selected on the control panel:

a. all scrams are bypassed.

b. the gain of the NM-1000 is changed to 2000 MW full scale.

c. the NPP-1000 is disabled.

d. the NM-1000 and NP-1000 scrams are bypassed.

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

QUESTION: 016 (1.00)

Which ONE of the following statements correctly describes the purpose of the potentiometer in the control rod drive assembly?

a. Provides rod position indication when the electromagnet engages the connecting rod armature.

b. Provides a variable voltage to the rod drive motor for regulating control rod speed.

c. Provides potential voltage as required for resetting the electromagnet current.

d. Provides the potential voltage to relatch the connecting rod to the electromagnet.

QUESTION: 017 (1.00)

How does the ventilation system respond to a high radiation alarm from the air particulate monitor?

a. The supply fan continues to operate, while the return fan stops. Supply and return dampers remain open.

b. Both the supply and return fans stop, and supply and return dampers close.

c. If the ventilation system was not running prior to the high radiation alarm, it automatically starts. If running, continues to operate.

d. The return fan continues to operate, while the supply fan stops.

QUESTION: 018 (1.00)

Bulk pool water temperature is limited to 48 degrees C in order to ensure that:

a. nucleate boiling does not occur on fuel element surfaces.

b. the expansion of pool water at high temperatures does not reduce the moderating capability of the coolant.

c. demineralizer resins are not damaged.

d. activation of pool water impurities is limited.

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

QUESTION: 019 (1.00)

In order to prevent leakage of primary coolant into the secondary system, a positive pressure difference is maintained between the heat exchanger:

a. tube inlet and tube outlet.

b. shell inlet and shell outlet.

c. shell outlet and tube inlet.

d. shell inlet and tube outlet.

QUESTION: 020 (1.00)

The temperature of the water in the secondary side of the heat exchanger is controlled by:

a. a temperature controller which allows some of the cooling water to bypass the heat exchanger.

b. varying the speed of the secondary coolant (chill water) pump.

c. a flow control valve at the outlet of the secondary pump.

d. a flow control valve at the outlet of the heat exchanger.

(*****END OF CATEGORY C*****)
(*****END OF EXAMINATION*****)

B. NORMAL/EMERGENCY PROCEDURES & RADIOLOGICAL CONTROLS

ANSWER: 001
C.
REFERENCE:
Procedure Plan-E, Emergency Response.

ANSWER: 002
D.
REFERENCE:
ADMN-6, Authorization of Experiments.

ANSWER: 003
B.
REFERENCE:
UT-TRIGA Reactor Technical Specifications, Section 3.2.3.

ANSWER: 004
A,4; B,2; C,2; D,1
REFERENCE:
10 CFR 55

ANSWER: 005
C.
REFERENCE:
UT-TRIGA Reactor Technical Specifications, Section 3.1.3.

ANSWER: 006 (1.00)
A.
REFERENCE:
Technical Specifications, Section 3.3.2.a

ANSWER: 007
A.
REFERENCE:
UT-TRIGA Training Manual, Vol. II, Control Console Operator's Manual, page 3-1.

ANSWER: 008
D.
REFERENCE:
HP-7, Radiation Work Permits.

ANSWER: 009
C.
REFERENCE:
UT-TRIGA Reactor Technical Specifications, Section 3.3.1.c.

ANSWER: 010
C.
REFERENCE:
10 mrem/hr at 1 meter (100 cm.) = 111.1 mrem/hr. at 30 cm.

ANSWER: 011
D.
REFERENCE:
UT-TRIGA Reactor Technical Specifications, Section 4.1.1.

ANSWER: 012
D.
REFERENCE:
UT-TRIGA Reactor Technical Specifications, Section 3.2.1c.

ANSWER: 013
C.
REFERENCE:
GM tubes cannot distinguish between energies.

ANSWER: 014 (1.00)
C.
REFERENCE:
UT-TRIGA Reactor Technical Specifications, Section 1.0

ANSWER: 015 (1.00)
A.
REFERENCE:
10 CFR 20.1003, Definititions

ANSWER: 016 (1.00)
B.
REFERENCE:
Nuclear Power Plant Health Physics and Radiation Protection

ANSWER: 017 (1.00)
C.
REFERENCE:
SOP II, REACTOR OPERATIONS, C.6, and 10 CFR 50.36

ANSWER: 018 (1.00
B.
REFERENCE:
UT-TRIGA Reactor Technical Specifications, Section 3.2

ANSWER: 019
A,2; B,2; C,3; D,1.
REFERENCE:
UT-TRIGA Reactor Technical Specifications, Definitions.

ANSWER: 020
D.
REFERENCE:
ADMN-6, Authorization of Experiments.

C. FACILITY AND RADIATION MONITORING SYSTEMS

ANSWER: 001 (1.00)
D.
REFERENCE:
SAR 4.4.8.3.

ANSWER: 002 (1.00)
C.
REFERENCE:
University of Texas SAR, page 4-59.

ANSWER: 003 (1.00)
B.
REFERENCE:
University of Texas SAR, page 5-8.

ANSWER: 004 (1.00)
D.
REFERENCE:
UT-TRIGA Training Manual, Vol. II, Operation Support Systems, page 6.

ANSWER: 005 (1.00)
C.
REFERENCE:
UT-TRIGA Training Manual, Vol. II, Operation Support Systems, page 21.

ANSWER: 006 (1.00)
A.
REFERENCE:
UT-TRIGA Training Manual, Vol. II, Description of TRIGA Mark II Reactor, page 14.

ANSWER: 007 (1.00)
B.
REFERENCE:
UT-TRIGA Training Manual, Vol. II, Reactor Instrumentation and Control Systems, page 36.

ANSWER: 008 (1.00)
C.
REFERENCE:
UT-TRIGA Training Manual, Vol. II, Operation Support Systems, page 24.

ANSWER: 009 (1.00)
C.
REFERENCE:
GA Maintenance Manual

ANSWER: 010 (1.00)
B.
REFERENCE:
Reactor Description, Section 2.1.7

ANSWER: 011 (1.00)
A.
REFERENCE:
UT-TRIGA Training Manual, Vol. II, Description of TRIGA Mark II Reactor, page 31.

ANSWER: 012 (1.00)
C.
REFERENCE:
UT-TRIGA Training Manual, Vol. II, Operation Support Systems, page 13.

ANSWER: 013 (1.00)
C.
REFERENCE:
UT-TRIGA Training Manual, Vol. II, GA Operation and Maintenance Manual, page 28.

ANSWER: 014 (1.00)
A,1; B,3; C,3; D,3.
REFERENCE:
UT-TRIGA Training Manual, Vol.II, Reactor Instrumentation and Control Systems, page 15.

ANSWER: 015 (1.00)
D.
REFERENCE:
UT-TRIGA Training Manual, Vol.II, Reactor Instrumentation and Control Systems, page 31.

ANSWER: 016 (1.00)
A.
REFERENCE:
UT-TRIGA Training Manual, Vol. II, Description of TRIGA Mark II Reactor, page 20.

ANSWER: 017 (1.00)
B.
REFERENCE:
UT-TRIGA Training Manual, Vol. V, Air Confinement System Surveillance.

ANSWER: 018 (1.00)
C.
REFERENCE:
UT-TRIGA Reactor Technical Specifications, Appendix A.3.3.3.1.

ANSWER: 019 (1.00)
C.
REFERENCE:
SAR 5.2.1.

ANSWER: 020 (1.00)
A.
REFERENCE:
SAR 5.2.1.

B. NORMAL/EMERGENCY PROCEDURES AND RADIOLOGICAL CONTROLS

ANSWER SHEET

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 B *****)

C. FACILITY AND RADIATION MONITORING SYSTEMS

ANSWER SHEET

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 C *****)

EQUATION SHEET

$Q = m\ c_p\ \Delta T$

$CR_1\ (1\text{-}Keff)_1 = CR_2\ (1\text{-}Keff)_2$

$P = P_0\ e^{(t/\tau)}$

$\tau = (\ell^*/\rho) + [(\beta\text{-}\rho)/\lambda_{eff}\rho]$

$\lambda_{eff} = 0.1\ seconds^{-1}$

$DR_1 D_1^{\,2} = DR_2 D_2^{\,2}$

$DR = DR_o e^{-\lambda t}$

$DR = 6CiE/D^2$

$\rho = (Keff\text{-}1)/Keff$

$1\ ft^3$ (water) = 7.48 gallons

1 kW = 3413 Btu/hour

1 gallon (water) = 8.34 pounds

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

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