April 15, 2011

Dr. Samuel Frimpong, Chair
Mining and Nuclear Engineering
226 McNutt Hall
Missouri University of Science and Technology
Rolla, MO 65409-0450

SUBJECT: EXAMINATION REPORT LETTER NO. 50-123/OL-11-02, MISSOURI UNIVERSITY OF SCIENCE AND TECHNOLOGY

Dear Dr. Frimpong:

During the week of March 21, 2011, the U.S. Nuclear Regulatory Commission (NRC) administered operator licensing examinations at your Missouri University of Science and Technology Reactor. The examination was conducted according to NUREG-1478, "Operator Licensing Examiner Standards for Research and Test Reactors," Revision 2. Examination questions and preliminary findings were discussed at the conclusion of the examination with those members of your staff identified in the enclosed report.

In accordance with Title 10, Section 2.390 of the Code of Federal 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 Agencywide Documents Access and Management System (ADAMS). ADAMS is accessible from the NRC Web site at http://www.nrc.gov/reading-rm/adams.html (the Public Electronic Reading Room). The NRC is forwarding the individual grades to you in a separate letter which will not be released publicly. If you have any questions concerning this examination, please contact Mr. John T. Nguyen at (301) 415-4007 or via internet e-mail John.Nguyen@nrc.gov.

Sincerely,

/RA/

Johnny H. Eads, Jr., Chief
Research and Test Reactors Oversight Branch
Division of Policy and Rulemaking
Office of Nuclear Reactor Regulation

Docket No. 50-123

Enclosures:
1. Examination Report No. 50-123/OL-11-02
2. Written examination with facility comments

cc: see next page

April 15, 2011

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Mining and Nuclear Engineering
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cc: See next page
DISTRIBUTION w/ encls.:
PUBLIC PROB r/f JEads
ADAMS ACCESSION #: ML110960197

OFFICE	PROB:CE		IOLB:LA		PROB:BC	
NAME	JNguyen		CRevelle		JEads	
DATE	3/28/2011		4/8/2011		4/15/2011	

OFFICIAL RECORD COPY

cc:

Bill Bonzer
Missouri University of Science and Technology
Nuclear Reactor Facility
1870 Miner Circle
Rolla, MO 65409-0630

Homeland Security Coordinator
Missouri Office of Homeland Security
P.O. Box 749
Jefferson City, MO 65102

Planner, Dept of Health and Senior Services
Section for Environmental Public Health
930 Wildwood Drive, P.O. Box 570
Jefferson City, MO 65102-0570

Deputy Director for Policy
Department of Natural Resources
1101 Riverside Drive
Fourth Floor East
Jefferson City, MO 65101

A-95 Coordinator
Division of Planning
Office of Administration
P.O. Box 809
State Capitol Building
Jefferson City, MO 65101

Test, Research, and Training
Reactor Newsletter
University of Florida
202 Nuclear Sciences Center
Gainesville, FL 32611

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

REPORT NO.: 50-123/OL-11-02

FACILITY DOCKET NO.: 50-123

FACILITY LICENSE NO.: R-79

FACILITY: Missouri University of Science and Technology

SUBMITTED BY: **/RA/** 3/28/2011
John T. Nguyen, Chief Examiner Date

SUMMARY:

During the week of March 21, 2011, the NRC administered retake written examinations to two Reactor Operator (RO) license candidates and administered operating examination to one Senior Reactor Operator - Upgrade (SRO-U) license candidate. All license candidates passed all applicable portions of their examinations.

REPORT DETAILS

1. Examiner: John T. Nguyen, Chief Examiner

2. Results:

	RO PASS/FAIL	SRO PASS/FAIL	TOTAL PASS/FAIL
Written	2/0	0/0	2/0
Operating Tests	N/A	1/0	1/0
Overall	2/0	0/0	3/0

3. Exit Meeting:

Bill Bonzer, MSTR, Reactor Manager
Craig Reisner, MSTR, Senior Reactor Operator
John Nguyen, NRC, Examiner

The NRC Examiner thanked the facility for their support in the administration of the examinations. The facility licensee had no comments on the written examination except the comments presented during the administrative of the examination, which have been incorporated into the examination included as Enclosure 2 to this report.

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

FACILITY:	Missouri University of Science and Technology (Rolla)
REACTOR TYPE:	MTR
DATE ADMINISTERED:	3/22/2011
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
16.00	33.3	_____	_____	A. REACTOR THEORY, THERMODYNAMICS AND FACILITY OPERATING CHARACTERISTICS
16.00	33.3	_____	_____	B. NORMAL AND EMERGENCY OPERATING PROCEDURES AND RADIOLOGICAL CONTROLS
16.00	33.3	_____	_____	C. FACILITY AND RADIATION MONITORING SYSTEMS
48.00		_____ FINAL GRADE	_____ %	TOTALS

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

_____
Candidate's Signature

ENCLOSURE 2

A. RX THEORY, THERMO & FAC OP CHARS

ANSWER SHEET

Multiple Choice (Circle or X your choice)
If you change your Answer, write your selection in the blank.

A01 a b c d ___

A02 a b c d ___

A03 a b c d ___

A04 a b c d ___

A05 a b c d ___

A06 a b c d ___

A07 a b c d ___

A08 a b c d ___

A09 a b c d ___

A10 a b c d ___

A11 a b c d ___

A12 a b c d ___

A13 a b c d ___

A14 a b c d ___

A15 a b c d ___

A16 a b c d ___

(***** END OF CATEGORY A *****)

B. NORMAL/EMERG PROCEDURES & RAD CON

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.

B01 a b c d ___

B02 a b c d ___

B03 a b c d ___

B04 a b c d ___

B05 a b c d ___

B06 a b c d ___

B07 a b c d ___

B08 a b c d ___

B09 a b c d ___

B10 a b c d ___

B11 a b c d ___

B12 a b c d ___

B13 a b c d ___

B14 a b c d ___

B15 a b c d ___

B16 a b c d ___

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

C. PLANT AND RAD MONITORING SYSTEMS

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.

C01 a b c d ___

C02 a b c d ___

C03 a b c d ___

C04 a b c d ___

C05 a ___ b ___ c ___ d ___

C06 a b c d ___

C07 a b c d ___

C08 a b c d ___

C09 a ___ b ___ c ___ d ___

C10 a b c d ___

C11 a b c d ___

C12 a b c d ___

C13 a b c d ___

C14 a b c d ___

C15 a b c d ___

(***** END OF CATEGORY C *****)
(********** 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 (3) hours for completion of the examination.

EQUATION SHEET

$\dot{Q} = \dot{m}\, c_p\, \Delta T$

$\dot{Q} = \dot{m}\, \Delta h$

$\dot{Q} = UA\, \Delta T$

$$SUR = \frac{26.06\ (\lambda_{eff}\rho)}{(\beta - \rho)}$$

$SUR = 26.06/\tau$

$P = P_0\ 10^{SUR(t)}$

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

$$P = \frac{\beta(1-\rho)}{\beta-\rho} P_o$$

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

$\rho = (Keff-1)/Keff$

$\rho = \Delta Keff/Keff$

$\bar{\beta} = 0.007$

$DR_1D_1^2 = DR_2D_2^2$

$Cp\ (H20) = 0.146\ \frac{kw}{gpm \cdot {}^\circ F}$

$\lambda_{eff} = 0.1/sec$

$SCR = S/(1-Keff)$

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

$$M = \frac{(1-Keff)_0}{(1-Keff)_1}$$

$M = 1/(1-Keff) = CR_1/CR_0$

$SDM = (1-Keff)/Keff$

$I = I_o\ e^{-ux}$

$\ell^* = 1 \times 10^{-4}$ seconds

$\bar{\tau} = \ell^*/(\rho-\beta)$

$R = 6\ C\ E\ n$

$$T_{1/2} = \frac{0.693}{\lambda}$$

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

$P = S / (1 - Keff)$

---

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 BTU = 778 ft-lbf

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

931 Mev = 1 amu

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

QUESTION **A.1** [1.0 point]

Which ONE of the following is the MAIN reason for operating with thermal neutrons instead of fast neutrons?

a. Increased neutron efficiency since thermal neutrons are less likely to leak out of the core than fast neutrons.

b. Neutron absorption in non fuel material increases exponentially as neutron energy increases.

c. The fission cross section of the fuel is much higher for thermal energy neutrons than fast neutrons.

d. Moderator temperature coefficient becomes positive as neutron energy increases.

QUESTION **A.2** [1.0 point]

A reactor is subcritical with a K_{eff} of 0.955. Which ONE of the following is the MINIMUM reactivity ($\Delta K/K$) that must be added to produce PROMPT criticality? Given $\beta eff=0.007$

a. 0.007

b. 0.047

c. 0.054

d. 0.064

QUESTION **A.3** [1.0 point]

The effective neutron multiplication factor, K_{eff}, is defined as:

a. absorption/(production + leakage)

b. (production + leakage)/absorption

c. (absorption + leakage)/production

d. production/(absorption + leakage)

QUESTION **A.4** [1.0 point]

Two critical reactors at low power are identical except that Reactor 1 has a beta fraction of 0.0075 and Reactor 2 has a beta fraction of 0.0065. An equal amount of positive reactivity is inserted into both reactors. Which ONE of the following will be the response of Reactor 1 compared to Reactor 2?

a. The resulting power level will be lower.

b. The resulting power level will be higher.

c. The resulting period will be longer.

d. The resulting period will be shorter.

QUESTION **A.5** [1.0 point]

A reactor is slightly supercritical with the following values for each of the factors in the six-factor formula:

Fast fission factor =	1.03	Fast non-leakage probability =	0.84
Resonance escape probability =	0.96	Thermal non-leakage probability =	0.88
Thermal utilization factor =	0.70	Reproduction factor =	1.96

A control rod is inserted to bring the reactor back to critical. Assuming all other factors remain unchanged, the new value for the thermal utilization factor is:

a. 0.698

b. 0.702

c. 0.704

d. 0.708

QUESTION **A.6** [1.0 point]

Reactor power is increasing by a factor of 10 every minute. The reactor period is:

a. 65 seconds.

b. 52 seconds.

c. 26 seconds.

d. 13 seconds.

Section A Rx Theory, Thermo & Fac. Operating Characteristics

Question **A.7** [1.0 point]

Which ONE of the following elements will slow down fast neutrons most quickly, i.e. produces the greatest energy loss per collision.

a. Oxygen-16

b. Uranium-238

c. Hydrogen-1

d. Boron-10

Question **A.8** [1.0 point]

The reactor is STARTED UP following a SHUTDOWN. Which ONE of the following statements is true about xenon?

a. The concentration of ^{135}Xe will increase due to increase nuclear flux

b. The concentration of ^{135}Xe will increase due to decay of ^{135}Cs

c. The concentration of ^{135}Xe will decrease due to the burnout of the ^{135}Xe inventory.

d. The concentration of ^{135}Xe will remain constant due to equilibrium of xenon burnout and xenon production.

QUESTION **A.9** [1.0 point]

Which **ONE** of the following conditions will **DECREASE** the shutdown margin of a reactor?

a. Increase moderator temperature (Assume negative temperature coefficient).

b. Insertion of a negative reactivity worth experiment.

c. Burnout of a burnable poison.

d. Fuel depletion.

QUESTION **A.10** [1.0 point]

During a reactor startup, as K_{eff} approach criticality, the value of 1/M:

a. decreases toward one.

b. decreases toward zero.

c. increases toward one.

d. increase toward infinitive.

QUESTION **A.11** [1.0 point]

Given the following data, which ONE of the following is the closest to the half-life of the material?

ACTIVITY	TIME
2400 cps	0
1757 cps	10 min.
1286 cps	20 min.
941 cps	30 min.
369 cps	60 min.

a. 11 minutes

b. 22 minutes

c. 44 minutes

d. 51 minutes

Section A Rx Theory, Thermo & Fac. Operating Characteristics

QUESTION **A.12** [1.0 point]

Given the following core reactivity data when the reactor is at critical:

Control Rod	Total Worth (%dk/k)	Worth Removed (%dk/k)
Safety Rod 1	2.70	1.68
Safety Rod 2	3.20	2.60
Safety Rod 3	2.60	1.52
Regulating Rod	0.40	0.40

Which ONE of the following is the calculated core excess reactivity of the reactor?

a. 2.70 %dk/k

b. 3.00 %dk/k

c. 5.70 %dk/k

d. 6.20 %dk/k

QUESTION **A.13** [1.0 point]

Which ONE of the following is an example of beta decay?

a. $_{35}Br^{87} \rightarrow {}_{33}As^{83}$

b. $_{35}Br^{87} \rightarrow {}_{35}Br^{86}$

c. $_{35}Br^{87} \rightarrow {}_{34}Se^{86}$

d. $_{35}Br^{87} \rightarrow {}_{36}Kr^{87}$

QUESTION **A.14** [1.0 point]

You are performing a fuel load and predicting criticality using a 1/M curve. You stop for lunch. After lunch you recommence using the count rate at that time as a new initial count rate C_o. You load additional elements into the core and the inverse count rate ratio continues to decrease. As a result of changing the initial count rate:

a. criticality will occur with the same number of elements loaded as if there were no change in the initial count rate.

b. criticality will occur earlier (i.e., with fewer elements loaded.)

c. criticality will occur later (i.e., with more elements loaded.)

d. criticality will be completely unpredictable.

QUESTION **A.15** [1.0 point]

Which one of the following statements correctly describes the property of a **GOOD MODERATOR**?

a. It slows down fast neutrons to thermal energy levels via a large number of collisions.

b. It reduces gamma radiation to thermal energy levels via a small number of collisions.

c. It slows down fast neutrons to thermal energy levels via a small number of collisions.

d. It reduces gamma radiation to thermal energy levels via a large number of collisions.

QUESTION **A.16** [1.0 point]

The primary reason a neutron source is installed in the reactor is to …

a. allow for testing and irradiation of experiments when the core is shutdown.

b. supply the neutrons required to start the chain reaction for subsequent reactor startups.

c. provide a neutron level high enough to be monitored for a controlled reactor startup.

d. increase the excess reactivity of the reactor which reduces the frequency for refueling.

(***** END OF CATEGORY A *****)

Question **C.1** [1.0 point]

The following graph (Figure 1 attached) for the Safety rod depicts:

a. the integral worth curve

b. the differential worth curve

c. the Rod Drop curve for control rod worth calibration

d. the Rod Drop curve for control rod time measurement

Question **C.2** [1.0 point]

The gas used to move pneumatic tube “rabbit” samples into and out of the reactor is …

a. N_2

b. Air

c. CO_2

d. H_2

Question **C.3** [1.0 point]

The automatic controller will shift from automatic to manual, without operator action, anytime the difference between power level and demand exceeds the ± __% variation limit.

a. 1

b. 2

c. 3

d. 4

Question **C.4** [1.0 point]

A signal for Bridge Motion Scram comes from the:

a. Startup channel

b. Micro-switch

c. Linear channel

d. Safety channel

Question **C.5** [1.0 points, 0.25 each]

Match the purification system conditions listed in column A with their respective causes listed in column B. Each choice is used only once.

Column A	Column B
a. High Radiation Level at demineralizer.	1. Channeling in demineralizer.
b. High Radiation Level downstream of demineralizer.	2. Fuel element failure.
c. High flow rate through demineralizer.	3. High temperature in demineralizer system
d. High pressure upstream of demineralizer.	4. Clogged demineralizer

Question **C.6** [1.0 point]

The MSTR fuel plates consist of …

a. U_3Si_2-Al fuel meat and is enriched to about 20% of U_{235}

b. U_3O_2-Al fuel meat and is enriched to about 30% of U_{235}

c. U_3Si_2-Al fuel meat and is enriched to about 30% of U_{235}

d. U_3O_2-Al fuel meat and is enriched to about 20% of U_{235}

Section C Facility and Radiation Monitoring Systems

Question **C.7** [1.0 point]

Which ONE of the following methods is used to compensate for gamma radiation in a Compensated Ion Chamber?

a. Pulses smaller than a height (voltage) are stopped by a pulse-height discriminator circuit from entering the instrument channel's amplifier.

b. The chamber contains two concentric tubes one of which detects both neutrons and gammas the other only gammas, the signals are added electronically to subtract the gamma signal, leaving only the signal due to neutrons.

c. The signal travels through a Resistance-Capacitance (RC) circuit, converting the signal to a power change per time period effectively deleting the signal due to gammas.

d. A compensating voltage equal to a predetermined "source gamma level" is fed into the pre-amplifier electronically removing source gammas from the signal. Fission gammas are proportional to reactor power and therefore not compensated for.

Question **C.8** [1.0 point]

Which ONE of the following is the isotope when a fuel leak occurs, more than 90% of it will be soluble within the reactor pool water?

a. I^{131}

b. Cs^{131}

c. Kr^{88}

d. Xe^{131}

Question **C.9** [2.0 points, 0.5 each]

Match the input signals listed in column A with their respective responses listed in column B. (Items in column B is to be used more than once or not at all.)

	Column A		Column B
a.	HV loss to Linear Channel	1.	Indication only
b.	Drawer not operation	2.	Indication and rod prohibit
c.	Safety Channel=130% power	3.	Indication and reactor scram
d.	Start up Channel= 2 cps	4.	Indication and rod rundown

Question **C.10** [1.0 point] "< 30 sec" was changed to ">30 sec" during administration of the examination.

Which ONE of the following events will cause the audio/visual (YELLOW) alarms?

a. Log N Low HV < 80%

b. Recorder off

c. Period ~~<~~ >30 sec

d. Safety Channel = 120%

Question **C.11** [1.0 point]

Which ONE of the following is the best description on how the Uncompensated Ion Chamber (UIC) operates?

	Material used in UIC	Interact with	Results
a.	Pu-239 +	neutron	B-10 + alpha -> N-14 + gamma
b.	B-10 +	neutron	B-11 -> Li-7 + alpha
c.	U-235 +	neutron	Fission fragments + gamma
d.	Am-239 +	neutron	Be-9 + gamma -> Li-8 + beta

Question **C.12** [1.0 point]

The Reactor Operator performs the reactor STARUP and the following conditions occur:

(1) The electrical transient causes the reactor scram while the reactor is at 5 watts powers.

(2) The electrical power comes on within 1 minute.

Which ONE of the following is the appropriate action when the electrical power comes on?

a. Continue to perform the startup and there is no need report the result to the SRO on Duty.

b. Secure the reactor, immediately report the result to the SRO on Duty and annotate the scram on the logbook.

c. Secure the reactor, immediately report the result to the NRC and annotate the scram on the logbook.

d Return power to 5 watts, and report the result to the Reactor Manager.

Question **C.13** [1.0 point]

A student operating the reactor attempts to withdraw all four control rods simultaneously. Which

Section C Facility and Radiation Monitoring Systems

ONE of the following describes the correct system response?

a. All four control rods will withdraw.

b. An interlock will prevent all four control rods from withdrawing.

c. The three shim/safety rods will withdraw, an interlock will prevent the regulating rod from withdrawing.

d. The regulating rod will withdraw, an interlock will prevent the three shim/safety rods from withdrawing.

Question **C.14** [1.0 point]

When the configurations of experimental facilities have been changed, the Reactor Operator should…

a. measure the shutdown margin.

b. shutdown the reactor and report results to the US NRC.

c. continue to conduct the experiment since the new configuration NEVER affect the reactor.

d. measure the reactivity worth. If the change results in a reactivity swing of more than 0.2 % Δk/k, measure excess reactivity in both the W and T modes.

Question **C.15** [1.0 point]

Following a loss of building electrical power, the power to Radiation Area Monitor (RAM) located at the reactor bridge:

a. will NOT be lost due to a fast transfer to the Uninterruptible Power Supply (UPS).

b. will NOT be lost due to a fast transfer to the backup of power generator.

c. will be lost, but will be automatically restored when building power returns.

d. will be lost and will not return until building power returns and the power supply is manually reset.

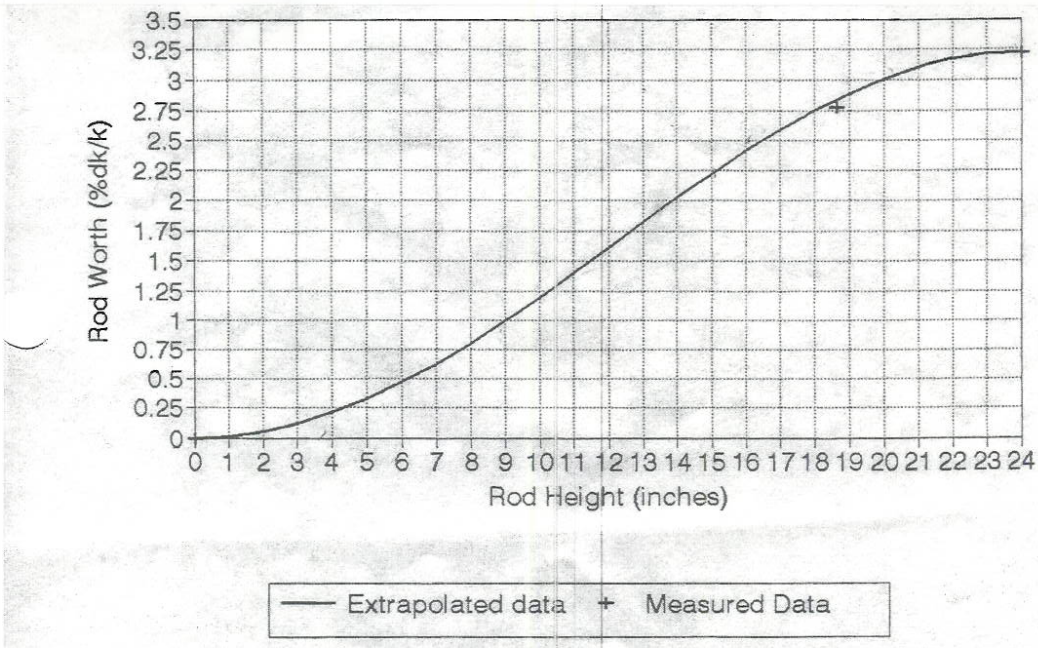

Figure 1 is used for Question C.1

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

Section A Rx Theory, Thermo & Fac. Operating Characteristics

A.1
Answer: c
Reference: Burn, R., *Introduction of Nuclear Reactor Operations*, © 1982, Figure 2.6, page 2-39

A.2
Answer: c
Reference: from k=0.995 to criticality (k=1), $\rho = (k-1)/k = -0.047\ \Delta k/k$ or $0.047\ \Delta k/k$ needs to be added to reach criticality. From criticality to JUST prompt, $\rho = \beta eff$ is required, so minimum reactivity = 0.047+0.007= 0.054

A.3
Answer: d
Reference: Burn, R., *Introduction of Nuclear Reactor Operations*, © 1982, Sec 3.3.1

A.4
Answer: c
Reference: Equation Sheet. $\tau = (\ell^*/\rho) + [(\beta-\rho)/\lambda_{eff}\rho]$

A.5
Answer: a
Reference: Introduction to Nuclear Operation, Reed Burn, 1982, Sec 3.2

A.6
Answer: c
Reference: $P=P_o e^{t/\tau}$ τ = 60 sec/ln(10) = 26.06 sec

A.7
Answer: c
Reference: DOE Handbook Vol. 1 Section 3.0

A.8
Answer: c
Reference: Introduction to Nuclear Operation, Reed Burn, 1982, Sec 8.4.2

A.9
Answer: c
Reference: Standard NRC question

A.10
Answer: b
Reference: Introduction to Nuclear Operation, Reed Burn, 1982, Sec 5.4

A.11
Answer: b
Reference: DOE Handbook Vol. 1 Module 1
$A = A_0 e^{-\lambda T}$, λ = - [ln(369 cps/2400 cps)]/60 min, so λ =3.12 E-2
Half-life = ln(2)/ λ = 22 min.

A.12
Answer: a
Reference:
SDM = $\sum$Total rod worth - $\sum$total rod worth removed = 8.9%dk/k – 6.2%dk/k = 2.7 %dk/k

A.13
Answer: d
Reference: Chart of nuclides

A.14
Answer: a
Reference: DOE Handbook Vol 2, Module 4, pg. 6

A.15
Answer: c
Reference: DOE Handbook, Volume 1, Module 2, Enabling Objective 2.13.

A.16
Answer: c
Reference: DOE Handbook Vol 1, Module 2, pg. 1

Section C Facility and Radiation Monitoring Systems

C.1
Answer: a
Reference: SOP 109, SOP 110

C.2
Answer: a
Reference: SAR § 10.2.3

C.3
Answer: b
Reference: SAR 7.2.2.6

C.04
Answer: b
Reference: SAR 7.2.2.5

C.05
Answer: a, 2; b, 3; c, 1; d, 4;
Reference: Standard NRC cleanup loop question

C.06
Answer: a
Reference: SAR 4.2.1.1

C.07
Answer: b
Reference: Standard NRC question

C.08
Answer: a
Reference: Standard NRC question

C.09
Answer: a(4) b(3) c(1) d(2)
Reference: SAR 7.2

C.10
Answer: b
Reference: SAR 7.2.2

C.11
Answer: b
Reference: NRC Standard Question

C.12
Answer: b
Reference: SOP 102

C.13
Answer: c
Reference: SAR 7.2.2.6

C.14

Answer: d
Reference: SOP 206

C.15
Answer: a
Reference: Walkthrough