

July 9, 2002

Mr. David Vasbinder, Director
Buffalo Materials Research Center
State University of New York
Rotary Road
Buffalo, NY 14214-3096

SUBJECT: INITIAL EXAMINATION REPORT NO. 50-057/OL-02-01, SUNY (BUFFALO)

Dear Mr. Vasbinder:

During the week of June 24, 2002, the NRC administered an initial examination to employees of your facility who had applied for a license for your State University of New York at Buffalo facility. The examinations were conducted in accordance with NUREG-1478, "Non-Power Reactor Operator Licensing Examiner Standards, Revision 2 "DRAFT." 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 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/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 Paul Doyle at (301) 415-1058 or via Internet E-mail pvd@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. 50-057

Enclosures: 1. Initial Examination Report
No. 50-057/OL-02-01
2. Examination with comments
included

cc w/enclosures:
Please see next page

State University of New York
at Buffalo

Docket No. 50-57

cc:

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DISTRIBUTION w/ encls.:

PUBLIC RORP/R&TR r/f
DHughes Facility File (EBarnhill)

PMadden

ADAMS ACCESSION #: ML021840732

TEMPLATE #:NRR-074

OFFICE	RORP/R&TR:CE		IEHB:LA	E	RORP/R&TR:SC	
NAME	PDoyle:rd		EBarnhill		PMadden	
DATE	07/ 05 /2002		07/ 09 /2002		07/ 09 /2002	

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

REPORT NO.: 50-057/OL-02-01

FACILITY DOCKET NO.: 50-057

FACILITY LICENSE NO.: R-77

FACILITY: State University of New York (Buffalo)

EXAMINATION DATES: June 25, 2002

SUBMITTED BY: /RA/
Paul Doyle, Chief Examiner

6/28/2002
Date

SUMMARY:

On June 25, 2002, the NRC administered a Senior Reactor Operator Limited to Fuel Handling examination to two license candidates at the State University of New York at Buffalo facility.

REPORT DETAILS

1. Examiners: Paul Doyle, Chief Examiner

2. Results:

	RO PASS/FAIL	SRO PASS/FAIL	TOTAL PASS/FAIL
Written	0/0	2/0	2/0
Operating Tests	0/0	2/0	2/0
Overall	0/0	2/0	2/0

3. Exit Meeting:
Paul Doyle, NRC, Examiner
Mark Adams, University at Buffalo, Reactor Supervisor

During the exit meeting the examiner thanked Mr. Adams for his support in the administration of the examination. Mr. Adams submitted his comments on the written examination which have been incorporated into the examination enclosed with this report.

ENCLOSURE 1

STATE UNIVERSITY OF NEW YORK
AT BUFFALO



SENIOR REACTOR OPERATOR LIMITED
TO FUEL HANDLING EXAMINATION
WITH ANSWER KEY
JUNE 25, 2002

ENCLOSURE 2

QUESTION (1)[1.0]

Which ONE of the following is the correct definition of a **CHANNEL CHECK**?

- a. The combination of sensor, line, amplifier, and output devices which are connected for the purposes of measuring the value of a parameter.
- b. An adjustment of the channel such that its output corresponds with acceptable accuracy to known values of the parameter which the channel measures.
- c. A qualitative verification of acceptable performance by observation of channel behavior. This verification, where possible, shall include comparison of the channel with other independent channels or systems measuring the same variable.
- d. The introduction of a signal into the channel for verification that it is operable.

QUESTION (2)[1.0]

While working in an area marked "**Caution, Radiation Area**," you discover your dosimeter is off scale and leave the area. Assuming you had been working in the area for 45 minutes, what is the maximum dose you would have received?

- a. 3.8 mr
- b. 35.6 mr
- c. 75 mr
- d. 100 mr

QUESTION (3)[1.0]

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

- a. ${}_{35}\text{Br}^{87} \rightarrow {}_{33}\text{As}^{83}$
- b. ${}_{35}\text{Br}^{87} \rightarrow {}_{35}\text{Br}^{87}$
- c. ${}_{35}\text{Br}^{87} \rightarrow {}_{34}\text{Se}^{86}$
- d. ${}_{35}\text{Br}^{87} \rightarrow {}_{36}\text{Kr}^{87}$

QUESTION (4)[1.0, ¼ each]

Identify whether for each of the following conditions a Radiation Work Permit (RWP) would be **REQUIRED** or **NOT**.

- a. Dose rate at 1 foot of 3 mR/hr.
- b. Total activity of 1000 μ Ci.
- c. Anticipated removable contamination of 500 dpm/100 cm².
- d. Ambient dose rates and stay times could result in a whole body exposure of 15 mRem.

QUESTION (5)[1.0]

The theoretical minimum number of cold clean fuel assemblies required for criticality is 17. In order to ensure the reactor is shutdown Technical Specification 2.2 limits the number of fuel assemblies on the grid plate to ...

- a. 13
- b. 14
- c. 15
- d. 16

QUESTION (6)[1.0]

In case of a fuel element failure, the Technical Specifications require the Pratt dampers to shut within ...

- a. 5 seconds
- b. 10 seconds
- c. 15 seconds
- d. 30 seconds

QUESTION (7)[2.0, ½ each]

Match each of the surveillances listed with its respective frequency [Weekly (W), Monthly (M), or Quarterly (Q)].

- a. Operability of Bridge and Effluent Radiation Monitors
- b. Pool water pH, Conductivity and Gross β activity.
- c. Reactor Tank Low and High Annunciators.
- d. Pool Temperature Monitor

QUESTION (8)[1.0]

Per Technical Specification 10.2 a minimum distance of _____ inches shall be maintained between the fission plate and any other fissile material.

- a. 8
- b. 12
- c. 16
- d. 20

QUESTION (9)[1.0]

Technical Specification 11.3 requires at least one individual from an Operating Committee roster to be "**ON CALL**" (reachable by phone, pager or radio). This person must remain within a ____ mile radius of the facility.

- a. 1
- b. 5
- c. 10
- d. 50

QUESTION (10) [1.0]

There is a caution associated with filling the primary with water from the makeup tank. "At NO time are isolation valves M-26 (*M/U Storage Tank to C/U demineralizer pump isolation valve*), M-28 (*Demineralizer pump inlet from M/U tank isolation valve*) and ____ to be open at the same time. The third valve is ... (See also Make-up System Drawing provided.)

- a. C-18 (*C/U Demin. System Bypass valve*)
- b. C-19 (*Demin. Inlet filter isolation valve, inlet side*)
- c. C-23 (*Demin pump inlet from primary system isolation valve*)
- d. C-24 (*Demin. Pump discharge vent valve*)

QUESTION (11) [1.0]

Operation procedure 21 contains a warning that "when filling the Makeup Storage tank the pump room must not be left unattended for any reason until filling operations are secured." The purpose of this warning is to

- a. prevent damage to the primary pump motor.
- b. overflowing the 1K waste water system tank.
- c. prevent damage to the N¹⁶ tank.
- d. overflowing the 10k waste water system tank.

QUESTION (12) [1.0]

The reactor bridge monitor fails during fuel movement operations. To continue fuel movements you must replace the bridge monitor with a portable unit which must be frequently monitored and station a watch to ...

- a. frequently monitor the stack gas monitor.
- b. frequently monitor the stack particulate monitor.
- c. frequently monitor the building gas monitor.
- d. initiate manual damper scram if necessary.

QUESTION (13) [1.0]

The Ventilation System will reconfigure for emergency mode on a simultaneous signal from

- a. bridge alarm and building air alarm
- b. bridge alarm and stack air particulate alarm
- c. bridge alarm and stack air gas alarm
- d. building air alarm and stack air gas alarm

QUESTION (14) [1.0]

A Radiation Health Physicist measures the half-thickness value in water for a given gamma source as being equal to 24 inches. Given that the top of the fuel is approximately 20 feet below the surface of the pool, this means that gamma radiation at the surface has been attenuated by a factor of about ...

- a. 20
- b. 100
- c. 200
- d. 1000

QUESTION (15) [1.0]

Which ONE of the following is the definition for “Annual Limit on Intake (ALI)”?

- a. The concentration of a radio-nuclide in air which, if inhaled by an adult worker for a year, results in a total effective dose equivalent of 100 millirem.
- b. 10CFR20 derived limit, based on a Committed Effective Dose Equivalent of 5 Rems whole body or 50 Rems to any individual organ, for the amount of radioactive material inhaled or ingested in a year by an adult worker.
- c. The effluent concentration of a radio-nuclide in air which, if inhaled continuously over a year, would result in a total effective dose equivalent of 50 millirem for noble gases.
- d. Projected dose commitment values to individuals, that warrant protective action following a release of radioactive material.

QUESTION (16) [1.0]

Because the BMRC reactor is permanently shutdown, the “traditional” radioactive gases (N^{16} and Ar^{41}) are not present. Instead the radioactive gas which poses the greatest risk would be leakage of fission product gases from damaged fuel elements. The isotope we worry about most is ...

- a. Kr^{85} ($t_{1/2} = 10.7$ years)
- b. Kr^{88} ($t_{1/2} = 2.7$ hours)
- c. Xe^{133} ($t_{1/2} = 2.2$ days)
- d. Xe^{135} ($t_{1/2} = 9.3 \times 10^{19}$ years)

QUESTION (17) [1.0]

You use a **Geiger-Müller detector** at the same distance from two point sources having the **same curie strength**. Source A's gammas have an energy of 1.0 MeV, while Source B's gammas have an energy of 2.0 MeV. Which ONE of the following would you expect for the readings due to each source?

- 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.

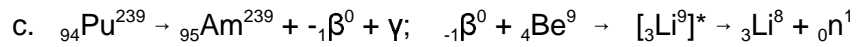
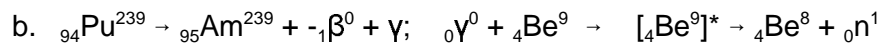
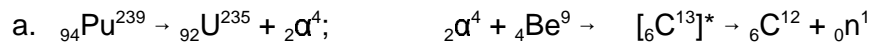
QUESTION (18) [1.0]

During an emergency requiring evacuation, the Emergency Support Center will normally be established ...

- a. in the BMRC reception area.
- b. in the Howe Building.
- c. in Parker Hall.
- d. in Clark Gym.

QUESTION (19) [1.0]

Which ONE of the following reactions correctly describes the generation of neutrons from a Pu-Be source?



ANSWER KEY

(1) c

REF: Technical Specifications § 1, Definitions

(2) c

REF: 10CFR20.1003. Max dose in radiation area is 100 mR/hr. $100 \text{ mR/hr} \times 0.75 \text{ hr} = 75 \text{ mr}$.

(3) a

REF: Physics I pg. 4 of 10.

(4) a, NOT; b, REQUIRED c, NOT d, NOT

REF: 1997 BMRC. Regual Radiation Safety and Control Handout.

(5) c

REF: Technical Specification 2.2.

(6) a

REF: Technical Specification 4.7

(7) a, M; b, W; c, M or W; d, Q 2nd correct answer added per facility comment

REF: Technical Specifications 8.1, 8.2 and 8.4, also OP#11 *Security and Equipment Checklists*, Attachment 2, Weekly Security and Equipment Checklist.

(8) c

REF: Technical Specification 1.2

(9) d

REF: Technical Specification 11.3.

(10) c

REF: Operating Procedure 21 § 9, Adding water to the primary water system.

(11) a or b 2nd answer added per facility comment.

REF: OP #21, § 3.0, 5th bullet.

(12) d

REF: Technical Specification 3.3(3).

(13) a

REF: OP 28, Containment Ventilation System, § VI.

(14) d

$I = I_0 \times (\frac{1}{2})^n$, where n is the number of half-thicknesses (10) $\frac{1}{2}^{10} = 1/1024$

REF: Standard NRC question

(15) b

REF: 10CFR20.1003

ANSWER KEY

(16) a

REF: BMRC Accident Descriptions (Draft 7/27/1998).

(17) c

REF: Standard Radiological Controls question GM tubes are NOT sensitive to energy level.

(18) d

REF: Emergency Procedure #11, Initial Assembly and Assessment.

(19) a

REF: Standard NRC Question Note: The facility has an Antimony-Beryllium source, but due to the permanent shutdown condition this source is no longer required.