University at Buffalo
The State University of New York

Occupational and Enviromental Safety Services

March 29, 2001

Docket 50-57
License R-77

U.S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington D.C. 20555

Dear Sir or Madam:

Enclosed please find two copies of the 2000 Annual Facility Technical Report for the Buffalo Materials Research Center at the State University of New York at Buffalo. This report is submitted pursuant to a Facility Technical Specification Requirement. If you have any questions or wish further information, please contact me at (716) 829-3905.

Sincerely,

David R. Vasbinder
Director, Buffalo Materials Research Center

Cc: Marvin Mendonca, Project Manager USNRC

Tom Dragoun, USNRC Inspector

Lou Henry, Director of Occupational and Environmental Safety Services
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University at Buffalo
The State University of New York
Occupational and Enviromental Safety Services

ANNUAL TECHNICAL REPORT

STATE UNIVERSITY OF NEW YORK AT BUFFALO

BUFFALO MATERIALS RESEARCH CENTER

License R-77

Docket 50-57

Calendar Year 2000

Submitted by:

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Director

March 29, 2001

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TABLE OF CONTENTS Page

1. INTRODUCTION

This report is submitted to the United States Nuclear Regulatory Commission (NRC) pursuant to section 15.1 of Appendix A, of the Technical Specifications (License R-77) for the Buffalo Materials Research Center (BMRC) located at the State University of New York at Buffalo. It summarizes changes to the facility, major maintenance activities, surveillance tests and inspections, radiation surveys, and radioactive effluents for the 2000 calendar year. The facility remained in Possession Only License status throughout the year. All required surveillance's were completed.

2. MAJOR MAINTENANCE

The switchover to the new primary and backup power supply systems for the facility was performed in March. The main power feed to the facility now comes from a substation in the McKay heating plant located adjacent to the BMRC. This system of integrated automatic transfer switches allows for automatic backup power from the University's main 800 kW turbine generator. This eliminates the need for on-site backup power.

The new system has two main power feeds. When one feed is lost, the switch to the second feed is automatic. If both feeds are lost, the system switches to power from the University's turbine generator. The emergency back-up system now supplies emergency power to the entire facility as opposed to the old emergency generator (which was located in BMRC) which only supplied power to essential building systems.

The 10 CFR 50.59 review on this change was approved in late 1999.

3. 10CFR 50.59 CHANGES

There were no 50.59 reviews performed during the 2000 calendar year.

4. RADIOACTIVE EFFLUENTS

4.1 Controlled Discharges to the Sanitary Sewer

There was one controlled discharge to the sanitary sewer in 2000. The total volume of water released was 36,100 liters, containing a total of 0.015 millicuries of radioactivity. The release was from the 10,000 gallon above ground waste storage tank (referred to as 10K Tank). Table 1 contains the discharge information specific to the release including comparison to the monthly average concentration in 10 CFR Part 20, Appendix B, Table

3 "Releases to Sewers" and the sum of the fractions. Table 2 summarizes the total discharge for the year.

4.2 Airborne Releases

The only airborne radioactive releases during 2000, other than natural background resulting from radon and its daughter products, were a result of determining the sensitivities of the stack and building air effluent monitors. The sensitivity determinations, performed annually, are based on injections of known quantities of Kr-85 gas. These monitor sensitivities calculated in units of in μCi/cc/cpm can be used to determine the concentration of an airborne release from the counts per minute recorded on the stack gas or building air effluent monitors.

The building air sensitivity and the stack gas sensitivity determinations were performed in July 2000 and September 2000, respectively. The sensitivities of both monitors were in agreement with previous annual determinations. Table 3 shows the amounts of Kr-85 released from the tests and a comparison to the yearly limits specified in the BMRC Technical Specifications.

5. ENVIRONMENTAL RADIOLOGICAL SURVEYS

5.1 Routine Surveys

The direct radiation levels outside the BMRC reactor building are routinely monitored adjacent to the "truck door" access area and on the roof of the 10,000 gallon liquid waste holding tank vault.

Landauer Luxel dosimeters are used to monitor integrated radiation levels in eight areas around the facility. These badges are replaced with a new badge every month and the previous month's sent to the dosimetry vendor for processing. The minimum photon sensitivity for the dosimeters is 1 mrem. Table 4 lists the cumulative summary of the environmental radiation dose equivalent around the facility. The maximum cumulative annual dose equivalent reading was 39 mrem on the dosimeter located on the roof of the vault containing the above ground 10,000 gallon liquid waste holding tank.

The Luxel technology allows for a minimum sensitivity of 1 mrem per monitoring period, as compared to a minimum sensitivity of 10 mrem for the dosimeters used for personnel monitoring. All monthly readings except for the Waste Vault Roof would have been reported as below the former 10 mrem sensitivity.

Semi-annual "tell-tale" samples are drawn and analyzed from the sampling well tubes adjacent to the underground liquid waste holding tanks (Tank #1). These analyses detected no radioactivity in excess of background.

6. RADIATION EXPOSURES

6.1 External Dosimetry

Dosimetry records were maintained for a total of nine staff members and authorized facility entrants. Film dosimeters provide X, beta, and gamma exposure monitoring. Thermoluminescent dosimeter (TLD) rings are used to measure extremity dose for selected personnel. Also, a TLD for neutron detection is available. All dosimeters are processed by a NVLAP certified vendor.

As of September 1st the contract vendor was switched from Landauer Luxel Service to ICN. The ICN film dosimeters have a minimum sensitivity of 10 mrem for both beta and photon radiation. A separate neutron sensitive dosimeter is available to be worn by personnel during manipulations involving the reactor fuel or Plutonium - Beryllium sources.

The maximum annual whole body deep dose equivalent to an individual in 2000 was 0.021 rem, which was received by the individual who performs radiation survey meter, area, and effluent monitor calibrations. The maximum extremity shallow dose equivalent to an individual was 0.034 rem, which was received by the same individual.

The University Police perform security tours of the building at least once every eight-hour shift during off-hours and holidays. The patrol officers wear a University Police dosimeter pack located in the building reception area when they perform these walkthroughs. These dosimeters recorded an annual deep dose equivalent of 3 mrem.

Four visitor dosimeter packs are also available. These packs are issued to visitors who may need to enter into areas requiring exposure monitoring. One of these dosimeters recorded no measurable deep dose equivalent in 2000. The other three recorded annual deep dose equivalents of 1 mrem.

Tables 5 and 6 provide summaries of personnel whole body and extremity dose for calendar year 2000.

7. RADIATION AND CONTAMINATION SURVEYS

7.1 Exit Monitoring

Exit monitoring is required as part of each egress from the reactor containment building and other radioactive materials areas within the BMRC. These surveys occasionally detect radioactive contamination, allowing rapid correction of contamination problems.

7.2 Routine Surveys

The BMRC staff performs monthly radiation and contamination surveys of the BMRC building. BMRC contamination action levels are 30 dpm/100 cm^2 beta for personal items, 200 dpm/100 cm^2 beta, otherwise. In calendar year 2000, no contamination was detected in excess of action levels by these surveys on items, surfaces, or areas not labeled or restricted as contaminated.

8. MISCELLANEOUS

- On June 7, 2000, the University shipped 1381 slugs of natural uranium from a sub-critical assembly to the Oak Ridge Y-12 Plant in Oak Ridge, Tennessee. This shipment contained 2499.7 kg of Uranium including 17.5 kg of U-235.

- The annual emergency preparedness exercise was conducted on November 29, 2000. The drill included off site participants and consisted of an initial table-top exercise followed by a real time action phase.

- Security Events-- During 2000, the NRC and FBI issued notices to facilities concerning potential security threats that indicated the need for increased facility security awareness. BMRC and University Police personnel worked closely in reviewing these notices and instituting appropriate security measures.

- The required audit of the operations program was performed on October 13th. No safety concerns were identified. One area of procedural non-compliance was noted. Radiation readings on Building Survey forms were being documented in black ink rather than red ink as required by "Health Physics Procedure #5 Building Survey Procedure". This has been corrected by issuing a notice to all staff reinforcing this requirement.

- The required review of the radiation protection program was performed on June 6th. The reviewer had two recommendations. The BMRC Operating Committee has reviewed and addressed these recommendations.

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Buffalo Materials Research Center

Table 1 -- Waste Tank Release to Sanitary Sewer

Release Number: 00-01
From: 10K Tank
Month: June

Amount Released: 9500 gal.
3.61E+07 ml
Date of Release: 6/23/00

Nuclide	Tank (μCi/ml)	Monthly Limit (μCi/ml)	Release (μCi/ml)	Percent of Monthly Limit
Cs-137	1.52E-08	1E-05	6.3E-11	6.3E-04
Ag-108m	2.54E-08	9E-05	1.1E-10	1.2E-04
Unidentified Beta	3.78E-07	1E-07	1.6E-09	1.6E+00

TOTAL 4.19E-07 μCi/ml

Total of Limit Released: 1.57 %

Total of Activity Released: 15.1 μCi

Year to Date Activity Released 15.1 μCi

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Table 2 -- 2000 Yearly Releases to the Sanitary Sewer

Nuclide	Quantity Released (Ci)	Average Annual Concentration (μCi/ml)
Ag-108m	9.17E-07	2.54E-08
Cs-137	5.49E-07	1.52E-08
Unidentified Beta	1.37E-05	3.78E-07

TOTAL 0.015 mCi

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Table 3 -- 2000 Airborne Releases

Nuclide	System	Quantity Released (μCi)	Annual Concentration (μCi/ml)	Annual Limit (μCi/ml)	Percent of Limit
K-85	Building Air	2.0	2.5E-14	7E-7	4E-6
K-85	Stack Gas	3.0	3.3E-14	5E-4	7E-9

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Table 4 -- 2000 Cumulative Summary of Environmental Radiation Dose Equivalent (mrem)

Monthly Monitoring Period	335 Truck Door	2122 Fence 3	2121 Fence 2	2120 Fence 1	2119 Truck Door (Right)	2118 Truck Door (Left)	2117 Cooling Tower	2116 Waste Vault
January	1	M	M	M	M	M	M	4*
February	M	M	M	M	M	M	M	M
March	M	M	M	M	M	M	M	3
April	M	M	M	M	M	M	M	2
May	M	M	M	M	M	M	M	M
June	M	M	M	M	M	M	M	3
July	M	M	M	M	1	M	M	10
August**	M	M	M	M	M	M	M	11
September***	M	M	M	M	M	M	M	M
October	M	M	M	M	M	M	M	3
November	M	M	M	M	M	M	M	3
December	M	M	M	M	M	M	M	M****
Cumulative Total	1	M	M	M	1	M	M	39

M = Minimal, less than 1 mrem.

- • Dosimeter missing at 2/01/00 change, Recovered 2/28/00.
- ** Dosimeters in place 7/31/00 to 9/18/00.
- *** Dosimeters in place 9/18/00 to 9/29/00.
- **** Dosimeter missing 1/4/01. Recovered 2/8/01.

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Buffalo Materials Research Center

Table 5 -- 2000 Whole Body Dose Equivalent Summary

Total Whole Body Dose (rem)	BMRC Staff	University Police	Visitor	Fuel Handler Dosimeter
None Measurable	0	0	1	1
0.001 to 0.010	7	1	3	0
0.011 to 0.100	2	0	0	0
> 0.100	0	0	0	0

Table 6 -- 2000 Extremity Dose Equivalent Summary

Total Extremity Dose (rem)	BMRC Staff
None Measurable	7
0.010 to 0.100	1
> 0.100	0