



University at Buffalo
The State University of New York
Occupational and Environmental Safety Services

March 27, 2003

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 2002 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 Facility Technical Specification Requirement 15.1. If you have any questions or wish further information, please contact me at (716) 829-3301.

Sincerely,

David R. Vasbinder
Director, Buffalo Materials Research Center

Cc: Daniel Hughes, Project Manager USNRC

Tom Dragoun, USNRC Inspector

Joseph Raab, Director Occupational and Environmental Safety
Roger McGill, Chairman Reactor Decommissioning Safety Committee
Mike Dupre, Associate Vice President for University Facilities
Mark Pierro, Radiation Safety Officer
Jeff Slawson, Radiation Safety Manager
Mark Adams, Operations Manager

A020



University at Buffalo
The State University of New York
Occupational and Environmental Safety Services

ANNUAL TECHNICAL **REPORT**

STATE UNIVERSITY OF NEW YORK AT BUFFALO
BUFFALO MATERIALS RESEARCH CENTER

License R-77

Docket 50-57

Calendar Year 2002

Submitted by:

David R. Vasbinder
Director

March 27, 2003

<u>TABLE OF CONTENTS</u>	<u>Page</u>
1. Introduction	3
2. Major Maintenance	3
3. 10 CFR 50.59 Reviews or Changes	3
4. Radioactive Effluents	3
5. Environmental Radiation Surveys	4
6. Radiation Exposures.....	5
7. Radiation and Contamination Surveys	5
8. Miscellaneous	6
Table 1 - Waste Tank Release to Sanitary Sewer	7
Table 2 - Waste Tank Release to Sanitary Sewer	8
Table 3 - 2002 Yearly Releases to the Sanitary Sewer	9
Table 4 - 2002 Airborne Releases.....	10
Table 5 – 2002 Cumulative Summary of Environmental Radiation Dose Equivalent.....	11
Table 6 - 2002 Whole Body Dose Equivalent Summary	12
Table 7 - 2002 Extremity Dose Equivalent Summary	12

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 2002 calendar year. The facility remained in Possession Only License status throughout the year. All required surveillance was completed.

2. MAJOR MAINTENANCE

Maintenance activities undertaken during 2002 included:

- The flow gauge on the Underground Waste System was replaced with a new flow gauge and totalizer (2/22/02).
- Twin air compressors were installed in the Control Air System, replacing the old system compressors (5/21/02).
- A new transfer pump for the 1000 Gallon Radioactive Storage Tank was installed, replacing an older pump (7/8/02).
- The manual release valve on the inner Gamma Deck airlock door was replaced (7/26/02).
- The pneumatic actuator for the Building Exhaust fume hoods was replaced (7/26/02).
- The airlock gasket for the Control Deck outer door was replaced (9/12/02).

3. 10CFR 50.59 CHANGES

There were no 50.59 reviews performed during the 2002 calendar year.

4. RADIOACTIVE EFFLUENTS

4.1 Controlled Discharges to the Sanitary Sewer

There were two controlled discharges to the sanitary sewer in 2002. The total volume of water released was 61,300 liters, containing a total of approximately 0.011 millicuries of radioactivity. The first release was from the 10,000 gallon above ground waste storage

tank (referred to as 10K Tank) and the second release was from the old underground waste storage tank (Tank #1). Tables 1 and 2 contain the discharge information specific to the releases including comparisons to the monthly average concentration in 10 CFR Part 20, Appendix B, Table 3 "Releases to Sewers" and the sum of the fractions. Table 3 summarizes the total discharge for the year.

4.2 Airborne Releases

The only airborne radioactive release during 2002, other than natural background resulting from radon and its daughter products, was the result of determining the sensitivity of the building air effluent monitor. The sensitivity determination, performed annually, is based on the injection of a known quantity of Kr-85 gas. The monitor sensitivity, calculated in units of $\mu\text{Ci/cc/cpm}$, is used to determine the concentration of an airborne release from the counts per minute recorded on the building air effluent monitor chart recorders.

The building air sensitivity determination was performed in November 2002. The sensitivity was in agreement with previous annual determinations. Table 4 shows the amounts of Kr-85 released from the test 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 liquid waste holding tank vault.

Landauer Luxel dosimeters are used to monitor integrated radiation levels in eight areas around the facility. These dosimeters are replaced with a new badge every month and the previous month's sent to the dosimetry vendor for processing. The vendor is NVLAP certified. The minimum photon sensitivity for the dosimeter is 1 mrem. Table 5 lists the cumulative summary of the environmental radiation dose equivalent around the facility. The maximum cumulative annual deep dose equivalent reading was 8 mrem on the dosimeter (# 2116) located on the roof of the vault containing the above ground 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.

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 levels.

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 when necessary. All dosimeters are processed by ICN, a NVLAP certified vendor. These dosimeters are replaced on a bi-monthly basis.

The film dosimeters have a minimum sensitivity of 10 mrem for both beta and photon radiation. A separate neutron sensitive dosimeter (with a minimum sensitivity of 20 mrem per monitoring period) is available and is worn by personnel during manipulations involving the reactor fuel or plutonium - beryllium (PuBe) sources.

During 2002 no monitored individual received a measurable whole body deep dose equivalent. The maximum extremity shallow dose equivalent to an individual was 0.044 rem. Both individuals who received measurable extremity dose performed radiation survey meter, area, and effluent monitor calibrations.

University Police Department officers perform routine security tours of the building. The patrol officers wear a University Police dosimeter pack when they perform these walkthroughs. These dosimeters did not record any dose equivalent during 2002.

Four visitor dosimeter packs are also available. These dosimeters are issued to visitors who may need to enter into areas requiring exposure monitoring. None of these visitor dosimeters recorded any measurable dose equivalent in 2002.

Tables 6 and 7 provide summaries of personnel whole body and extremity dose for calendar year 2002.

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 cm² beta for personal items, 200 dpm/100 cm² beta, otherwise. In calendar year 2002, 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

- **Facility Organizational changes** – The Director of BMRC, David Vasbinder, reports to the Director of Occupational and Environmental Safety Services within the University. Mr. Joseph Raab was hired as the new Director of Occupational and Environmental Safety Services in April of 2002.
- In June, two employees successfully completed the NRC administered licensing examination as Senior Reactor Operators – Limited to Fuel Handling.
- **Security Events**-- During 2002, 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 NRC issued several requests for information pertaining to security at licensed nuclear facilities. BMRC personnel and the University Police worked together to respond to these requests for information and to correspondingly implement an increased level of security at the facility when required. Specific actions taken by the University of Buffalo to increase security and to respond to these requests were shared with the Reactor Decommissioning Safety Committee. These measures are not specifically identified in this report for security reasons.
- In September, in response to Homeland Security Threat Level Indicator being raised to Level Orange, the NRC notified licensees that they were requiring licensees to upgrade to NRC Security Level 4. Buffalo Materials Research Center upgraded security awareness consistent with the guidance for Level 4.
- The Reactor Decommissioning Safety Committee convened twice during calendar year 2002. The second meeting was conducted through a conference call of the Committee members specifically to discuss a Risk Assessment being conducted for the facility. This meets the minimum annual requirement in Facility Technical Specifications for committee meetings.

**University at Buffalo
Buffalo Materials Research Center**

Table 1 -- Waste Tank Release to Sanitary Sewer

Release Number: 2002-01
From: 10K Tank
Month: January

Amount Released: 8850 gal.
3.36E+07 ml
Date of Release: 1/11/02

Nuclide	Tank ($\mu\text{Ci/ml}$)	Monthly Limit ($\mu\text{Ci/ml}$)	Release ($\mu\text{Ci/ml}$)	Percent of Monthly Limit
Unidentified Beta	3.17E-07	2E-08	1.2E-09	6.1E+00

TOTAL 3.17E-07 $\mu\text{Ci/ml}$

Total of Limit Released: 6.1 %

Total of Activity Released: 10.66 μCi

Year to Date Activity Released 10.66 μCi

**University at Buffalo
Buffalo Materials Research Center**

Table 2 -- Waste Tank Release to Sanitary Sewer

Release Number: 2002-02
From: Tank #1
Month: April

Amount Released: 7300 gal.
2.77E+07 ml
Date of Release: 4/12/02

Nuclide	Tank ($\mu\text{Ci/ml}$)	Monthly Limit ($\mu\text{Ci/ml}$)	Release ($\mu\text{Ci/ml}$)	Percent of Monthly Limit
Unidentified Beta	2.11E-10	2E-08	6.8E-13	3.4E-03

TOTAL 1.11E-10 $\mu\text{Ci/ml}$

Total of Limit Released: 0.0 %

Total of Activity Released: 0.01 μCi

Year to Date Activity Released 10.67 μCi

**University at Buffalo
Buffalo Materials Research Center**

Table 3 -- 2002 Yearly Releases to the Sanitary Sewer

Nuclide	Quantity Released (Ci)	Average Annual Concentration ($\mu\text{Ci/ml}$)
Unidentified Beta	1.07E-05	1.53E-09

TOTAL 0.011 mCi

**University at Buffalo
Buffalo Materials Research Center**

Table 4 -- 2002 Airborne Releases

Nuclide	System	Quantity Released (μCi)	Annual Concentration ($\mu\text{Ci/ml}$)	Annual Limit ($\mu\text{Ci/ml}$)	Percent of Limit
Kr-85	Building Air	1.2	1.5E-14	7E-7	2.1E-6

**University at Buffalo
Buffalo Materials Research Center**

**Table 5 -- 2002 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	M	M	M	M	M	M	M	M
February	M	M	M	M	M	M	M	M
March	M	M	M	M	M	M	M	M
April	M	M	M	M	M	M	M	6
May	M	M	M	M	M	M	M	2
June	M	M	M	M	M	M	M	M
July	M	M	M	M	M	M	M	M
August	M	M	M	M	M	M	M	M
September	2	M	M	M	M	M	M	M
October	M	M	M	M	M	M	M	M
November	M	M	M	M	M	M	M	M
December	M	M	M	M	M	M	M	M
Cumulative Total	2	M	M	M	M	M	M	8

M = Minimal (less than 1 mrem).

**University at Buffalo
Buffalo Materials Research Center**

Table 6 -- 2002 Whole Body Deep Dose Equivalent Summary

Deep Dose Equivalent (rem)	BMRC Staff	University Police	Visitor	Fuel Handler Dosimeter
None Measurable	8	1	4	1
0.001 to 0.010	0	0	0	0
0.011 to 0.100	0	0	0	0
> 0.100	0	0	0	0

Table 7 -- 2002 Extremity Shallow Dose Equivalent Summary

Extremity Shallow Dose (rem)	BMRC Staff
None Measurable	6
0.010 to 0.100	2
> 0.100	0