



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

March 28, 2002

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 2001 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: Marvin Mendonca, Project Manager USNRC

Tom Dragoun, USNRC Inspector

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

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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 2001

Submitted by:

David R. Vasbinder
Director

March 28, 2002

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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 2001 calendar year. The facility remained in Possession Only License status throughout the year. All required surveillance was completed.

2. MAJOR MAINTENANCE

The Control Deck Pratt Damper bladder was replaced in May. The electrical systems for the Pratt Dampers in the sub-basement were rebuilt in September. The lower airlock door gasket was replaced in October.

3. 10CFR 50.59 CHANGES

There were no 50.59 reviews performed during the 2001 calendar year.

4. RADIOACTIVE EFFLUENTS

4.1 Controlled Discharges to the Sanitary Sewer

There were two controlled discharges to the sanitary sewer in 2001. The total volume of water released was 63,800 liters, containing a total of approximately 0.32 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 releases during 2001, 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 $\mu\text{Ci/cc/cpm}$ are used to determine the concentration of an airborne release from the counts per minute recorded on the stack gas or building air effluent monitor chart recorders.

The building air sensitivity and the stack gas sensitivity determinations were performed in July 2001. The sensitivities of both monitors were in agreement with previous annual determinations. Table 4 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 vendor is a NVLAP certified vendor. 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 dose equivalent reading was 25 mrem on the dosimeter (# 2116) 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.

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 a NVLAP certified vendor. These dosimeters are replaced on a bi-monthly basis and sent to the vendor for processing.

The ICN 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 sources.

During 2001 no monitored individual received a measurable whole body deep dose equivalent. The maximum extremity shallow dose equivalent to an individual was 0.108 rem, which was received by an individual who performs radiation survey meter, area, and effluent monitor calibrations. Dosimeters for the May and June bi-monthly monitoring period were lost in transit prior to processing. All monitored personnel estimated their exposures. The estimations were reported to the dosimetry vendor and added to lifetime dose equivalent records. This administrative dose assignment was reviewed and approved by the Radiation Safety Office.

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 did not record any annual deep dose equivalent during this year.

Four visitor dosimeter packs are also available. These packs are issued to visitors who may need to enter into areas requiring exposure monitoring. None of these visitor dosimeters recorded any measurable deep dose equivalent in 2001.

Tables 6 and 7 provide summaries of personnel whole body and extremity dose for calendar year 2001.

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 2001, 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. The individual in this position, Mr. Lou Henry, resigned from his position in July. The University at Buffalo is in the process of searching for his replacement. In the interim, the BMRC Director reports directly to the Associate Vice President for University Facilities. In addition, the BMRC Operations Manager, Mr. Scott Barnes, resigned in November. Mr. Mark Adams, a Senior Reactor Operator, and the previous Operations Manager re-assumed the position of Operations Manager at that time.
- The annual emergency preparedness exercise was conducted on October 30, 2001. The drill included off site participants and consisted of the rescue of an “injured” individual from the Pump Room in the sub basement portion of the facility.
- A Safety and Compliance Inspection was performed by the Nuclear Regulatory Commission with respect to Special Nuclear Materials License SNM-273 on June 5th. Based on the inspector’s findings, no violations were identified.
- Security Events-- During 2001, 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.
- Following the events of September 11th, the NRC and FBI 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. 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 at scheduled meetings and in formal response to the Nuclear Regulatory Commission. These measures are not specifically identified in this report for security reasons.
- The required review of the radiation protection program was performed by the Reactor Decommissioning Safety Committee during meetings on August 20, 2001 and December 17, 2001. Surveillance records including task lists, monthly contamination surveys, and radiation exposure results were reviewed by the Committee members.
- The Reactor Decommissioning Safety Committee convened twice during calendar year 2001. This meets the minimum requirement in Facility Technical Specifications for committee meetings.

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Buffalo Materials Research Center**

Table 1 -- Waste Tank Release to Sanitary Sewer

Release Number: 01-01
From: 10K Tank
Month: March

Amount Released: 9500 gal.
3.61E+07 ml
Date of Release: 3/23/01

Nuclide	Tank ($\mu\text{Ci/ml}$)	Monthly Limit ($\mu\text{Ci/ml}$)	Release ($\mu\text{Ci/ml}$)	Percent of Monthly Limit
Unidentified Beta	2.87E-07	1E-07	1.2E-09	1.2E+00

TOTAL 2.87E-07 $\mu\text{Ci/ml}$

Total of Limit Released: 1.19 %

Total of Activity Released: 10.36 μCi

Year to Date Activity Released 10.36 μCi

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Table 2 -- Waste Tank Release to Sanitary Sewer

Release Number: 01-02
From: Tank #1
Month: December

Amount Released: 7300 gal.
2.77E+07 ml
Date of Release: 12/20/01

Nuclide	Tank ($\mu\text{Ci/ml}$)	Monthly Limit ($\mu\text{Ci/ml}$)	Release ($\mu\text{Ci/ml}$)	Percent of Monthly Limit
Cs-137	1.39E-07	1E-05	4.4E-10	4.4E-03
Unidentified Beta	1.09E-05	1E-07	3.5E-08	3.5E+01

TOTAL 1.11E-05 $\mu\text{Ci/ml}$

Total of Limit Released: 35.04 %

Total of Activity Released: 307.53 μCi

Year to Date Activity Released 317.89 μCi

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Table 3 -- 2001 Yearly Releases to the Sanitary Sewer

Nuclide	Quantity Released (Ci)	Average Annual Concentration ($\mu\text{Ci/ml}$)
Cs-137	3.85E-06	1.39E-07
Unidentified Beta	3.12E-04	4.89E-06

TOTAL 0.32 mCi

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Table 4 -- 2001 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
Kr-85	Stack Gas	1.2	1.3E-14	5E-4	2.7E-9

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**Table 5 -- 2001 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	1	1	M	M	M	M	M	1
April	M	M	M	M	M	M	M	4
May	M	M	M	M	M	M	M	4
June	M	M	1	M	M	M	1	6
July	M	M	M	M	M	M	M	M
August	M	M	M	M	M	M	M	3
September	1	M	M	M	M	M	1	3
October	M	M	1	M	M	M	M	4
November	M	M	1	M	M	M	M	M
December	M	M	1	M	M	M	M	M
Cumulative Total	2	1	4	M	M	M	2	25

M = Minimal, less than 1 mrem.

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Table 6 -- 2001 Whole Body Dose Equivalent Summary

Total Whole Body Dose (rem)	BMRC Staff	University Police	Visitor	Fuel Handler Dosimeter
None Measurable	9	1	4	0
0.001 to 0.010	0	0	0	0
0.011 to 0.100	0	0	0	1
> 0.100	0	0	0	0

Table 7 -- 2001 Extremity Dose Equivalent Summary

Total Extremity Dose (rem)	BMRC Staff
None Measurable	8
0.010 to 0.100	0
> 0.100	1