



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

March 31, 2004

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 2003 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

Steve Holmes, USNRC Inspector Region 1

Joseph Raab, Director Environment, Health, and Safety
Roger McGill, Chairman Reactor Decommissioning Safety Committee
Mike Dupre, Associate Vice President for University Facilities
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Mark Adams, Reactor Engineer
Harry Miller, Operations Manager

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University at Buffalo
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ANNUAL TECHNICAL **REPORT**

STATE UNIVERSITY OF NEW YORK AT BUFFALO

BUFFALO MATERIALS RESEARCH CENTER

License R-77

Docket 50-57

Calendar Year 2003

Submitted by:

David R. Vasbinder
Director

March 31, 2004

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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 2003 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 2003 included:

- A new pure water make up system was installed to supply the reactor tank with make up water. The system installation and operation was reviewed for safety considerations with respect to 10CFR50.59.
- The Bridge Radiation Monitor detector was replaced due to the physical deterioration of the previously installed detector.
- The Stack Exhaust system was removed due to the overhaul of the University's Steam Plant facility in which this exhaust system is housed. Monitoring systems associated with the system effluents have been removed from service. All effluents from the facility exhaust, and are monitored, through the building exhaust system.
- The attached trailer previously used for additional office space was removed from the facility utilities and security system in preparation for removal.
- Upgrades and additions were made to the facility security systems.

3. 10CFR 50.59 CHANGES

There were no 50.59 reviews performed during the 2003 calendar year.

4. RADIOACTIVE EFFLUENTS

4.1 Controlled Discharges to the Sanitary Sewer

There were three controlled discharges to the sanitary sewer system in 2003. The total volume of water released was 80,600 liters, containing a total of approximately 1.24

millicuries of radioactivity. All three releases were made from the 10,000 gallon above ground waste storage tank (referred to as 10K Tank). Tables 1, 2, and 3 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.

4.2 Airborne Releases

No airborne radioactive releases, other than natural background resulting from radon and its daughter products, were made during 2003. The sensitivities of the air effluent monitors (based on the injection of a known quantity of Kr-85 gas) were not performed. A sensitivity ($\mu\text{Ci/cc/cpm}$) of the building air system will be conducted prior to moving reactor fuel.

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 4 lists the cumulative summary of the environmental radiation dose equivalent around the facility. The maximum cumulative annual deep dose equivalent reading was 7 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 eight staff members and other 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 Global, 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 2003 no monitored individual received a measurable whole body deep dose equivalent. The maximum extremity shallow dose equivalent to an individual was 0.041 rem. This individual received measurable extremity dose performing 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 2003.

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 2003.

Tables 5 and 6 provide summaries of personnel whole body and extremity dose for calendar year 2003.

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 2003, 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 February 7th, March 17th, and December 21st in response to the 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 in conjunction with University Police upgraded security awareness consistent with the guidance for Level 4 at each of these times.
- The NRC issued a written request for licensee specific security and emergency planning information pertaining to security at licensed nuclear facilities. BMRC personnel, in conjunction with University Police, responded to this request. Specific actions taken by the University of Buffalo to increase security and to respond to this request were shared with the Reactor Decommissioning Safety Committee. These measures and the BMRC response are not specifically identified in this report for security reasons.
- The Reactor Decommissioning Safety Committee convened twice during calendar year 2003. This meets the minimum annual requirement in Facility Technical Specifications for committee meetings.

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Table 1 -- Waste Tank Release to Sanitary Sewer

Release Number: 2003-01
From: 10K Tank
Month: January

Amount Released: 9200 gal.
3.50E+07 ml
Date of Release: 1/10/03

| Nuclide | Tank ($\mu\text{Ci/ml}$) | Monthly Limit ($\mu\text{Ci/ml}$) | Release ($\mu\text{Ci/ml}$) | Percent of Monthly Limit |
|----------------------|-------------------------------|---|----------------------------------|--------------------------------|
| Unidentified Beta | 2.36E-10 | 2E-08 | 9.5E-13 | 4.8E-03 |

TOTAL 2.36E-10 $\mu\text{Ci/ml}$

Total of Limit Released: 0.00 %

Total of Activity Released: 0.01 μCi

Year to Date Activity Released 0.01 μCi

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Table 2 -- Waste Tank Release to Sanitary Sewer

Release Number: 2003-02
From: 10K Tank
Month: June

Amount Released: 4000 gal.
1.52E+07 ml
Date of Release: 6/11/03

| Nuclide | Tank ($\mu\text{Ci/ml}$) | Monthly Limit ($\mu\text{Ci/ml}$) | Release ($\mu\text{Ci/ml}$) | Percent of Monthly Limit |
|----------------------|-------------------------------|---|----------------------------------|--------------------------------|
| Unidentified Beta | 2.23E-10 | 2E-08 | 3.9E-13 | 2.0E-03 |

TOTAL 2.23E-10 $\mu\text{Ci/ml}$

Total of Limit Released: 0.00 %

Total of Activity Released: 0.00 μCi

Year to Date Activity Released 0.01 μCi

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Table 3 -- Waste Tank Release to Sanitary Sewer

Release Number: 2003-03
From: 10K Tank
Month: July

Amount Released: 8000 gal.
3.04+07 ml
Date of Release: 7/14/03

| Nuclide | Tank ($\mu\text{Ci/ml}$) | Monthly Limit ($\mu\text{Ci/ml}$) | Release ($\mu\text{Ci/ml}$) | Percent of Monthly Limit |
|----------------------|-------------------------------|---|----------------------------------|--------------------------------|
| H-3 | 3.60E-05 | 1E-02 | 1.3E-07 | 1.3E-03 |
| Ag-108m | 2.10-08 | 9E-05 | 7.4E-11 | 8.2E-05 |
| Cs-137 | 4.48E-08 | 1E-05 | 1.6E-10 | 1.6E-03 |
| Unidentified Beta | 4.74E-06 | 2E-08 | 1.7E-08 | 8.3E+01 |

TOTAL 4.08E-05 $\mu\text{Ci/ml}$

Total of Limit Released: 83.07 %

Total of Activity Released: 1240.42 μCi

Year to Date Activity Released 1240.43 μCi

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**Table 4 -- 2003 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 | 2 |
| February | M | M | M | M | M | M | M | M |
| March | M | M | M | M | M | M | M | 1 |
| April | M | M | M | M | M | M | M | M |
| May | M | M | M | M | M | M | M | M |
| June | M | M | M | M | M | M | M | M |
| July | M | M | Absent | M | M | M | M | 2 |
| August | M | M | M | M | M | M | M | M |
| September | M | M | M | M | M | M | M | M |
| October | M | M | M | M | M | M | M | 2 |
| November | M | M | M | M | M | M | M | M |
| December | M | M | M | M | M | M | M | M |
| Cumulative Total | M | M | M | M | M | M | M | 7 |

M = Minimal (less than 1 mrem).
Absent : Badge lost or stolen

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Table 5 -- 2003 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 6 -- 2003 Extremity Shallow Dose Equivalent Summary

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