



**University at Buffalo**  
*The State University of New York*

Environment, Health & Safety Services

March 30, 2010

**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 a copy of the 2009 Annual Facility Technical Report for the Buffalo Materials Research Center (BMRC) 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: Ted Smith, U.S.N.R.C. Project Manager  
Ted Carter, U.S.N.R.C. Project Manager  
Mark Roberts, U.S.N.R.C. Inspector Region 1  
Kevin Thompson, Reactor Decommissioning Safety Committee Chair  
Joseph Raab, EH&S Director  
Mike Dupre, Associate Vice President for University Facilities  
Jeff Slawson, Radiation Safety Officer  
Mark Adams, Operations Manager

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**STATE UNIVERSITY OF NEW YORK AT BUFFALO**

**BUFFALO MATERIALS RESEARCH CENTER**

**ANNUAL TECHNICAL**  
**REPORT**

License R-77

Docket 50-57

Calendar Year 2009

Submitted by:

David R. Vasbinder  
Director

March 30, 2010

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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 2009 calendar year. All required surveillance was completed.

## **2. MAJOR MAINTENANCE**

Several routine maintenance activities were undertaken in the BMRC. However, there were no maintenance activities undertaken in 2009 that would qualify as major maintenance.

## **3. 10CFR 50.59 CHANGES**

There were no 50.59 reviews performed during the 2009 calendar year.

## **4. RADIOACTIVE EFFLUENTS**

### **4.1 Controlled Discharges to the Sanitary Sewer**

There were four controlled discharges to the sanitary sewer system in 2009. The only one of these releases that contained detectable levels of radioactivity was the fourth release on December 3<sup>rd</sup>. The total volume of water released was 99,900 liters, containing a total of approximately 0.0112 millicuries of radioactivity. All four releases were from the 10,000 gallon above ground waste storage tank (referred to as 10K Tank). Tables 1, 2, 3, and 4 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, occurred during 2009.

## **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.

Global Dosimetry Solutions dosimeters were used to monitor integrated radiation levels in five exterior areas around the facility and four locations within the building itself. These dosimeters are replaced with a new badge every month and the previous month's badge is sent to the dosimetry vendor for

processing. The vendor is NVLAP certified. The minimum photon sensitivity for the dosimeters is 5 mrem.

Table 5 lists the cumulative annual summary of the environmental radiation dose equivalent from the environmental badges located around the facility. The maximum cumulative annual deep dose equivalent reading was 19 mRem on the dosimeter (# 2116) located on the roof of the vault containing the above ground waste holding tank.

Table 6 lists cumulative annual summary of the radiation dose equivalent from the area dosimetry badges located within the building. The maximum cumulative annual deep dose equivalent reading was 55 mRem on the dosimeter (# 1624) located on the bridge located directly above the reactor pool.

Monthly "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**

External dosimetry records were maintained for a total of six staff members and other authorized facility entrants. Film dosimeters provide x-ray, 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 Dosimetry Solutions, 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.

During 2009 no monitored individual received a measurable whole body deep dose equivalent or extremity dose.

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 2009.

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 2009.

Tables 7 and 8 provide summaries of personnel whole body and extremity dose for 2009.

## **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. In calendar year 2009, very low levels of contamination were occasionally detected during these surveys. This radioactivity was detected in areas and on items previously known to be contaminated.

## **8. MISCELLANEOUS**

- The Reactor Decommissioning Safety Committee convened three times during calendar year 2009. This meets the annual requirement in Facility Technical Specifications for a minimum of two committee meetings. The meetings were held on May 29<sup>th</sup>, August 28<sup>th</sup>, and October 23rd, 2009.

**University at Buffalo  
Buffalo Materials Research Center**

**Table 1 -- Waste Tank Release to Sanitary Sewer**

Release Number: 2009-01  
 From: 10K Tank  
 Month: January

Volume Released: 7800 gal.  
 2.96E+07 ml  
 Date of Release: 1/15/09

Nuclide	Tank ( $\mu\text{Ci/ml}$ )	Monthly Limit ( $\mu\text{Ci/ml}$ )	Release ( $\mu\text{Ci/ml}$ )	Percent of Monthly Limit
Unidentified Beta	Non- detectable	2E-08	0	0

TOTAL  
CONCENTRATION      Less than  
detectable       $\mu\text{Ci/ml}$

Total of Limit Released: 0.00 %

Total of Activity Released: 0.00  $\mu\text{Ci}$

Year to Date Activity Released: 0.00  $\mu\text{Ci}$

**University at Buffalo  
Buffalo Materials Research Center**

**Table 2 -- Waste Tank Release to Sanitary Sewer**

Release Number: 2009-02  
 From: 10K Tank  
 Month: March

Volume Released: 6300 gal.  
 2.39E+07 ml  
 Date of Release: 3/26/09

Nuclide	Tank ( $\mu\text{Ci/ml}$ )	Monthly Limit ( $\mu\text{Ci/ml}$ )	Release ( $\mu\text{Ci/ml}$ )	Percent of Monthly Limit
Unidentified  Beta	Less than detection limit	2E-08	0	0

TOTAL  
CONCENTRATION

Less than  
detectable

$\mu\text{Ci/ml}$

Total of Limit Released: 0.00 %

Total of Activity Released: 0.00  $\mu\text{Ci}$

Year to Date Activity Released 0.00  $\mu\text{Ci}$



**University at Buffalo  
Buffalo Materials Research Center**

**Table 3 -- Waste Tank Release to Sanitary Sewer**

Release Number: 2009-03  
 From: 10K Tank  
 Month: August

Volume Released: 6500 gal.  
 2.47E+07 ml  
 Date of Release: 8/21/09

Nuclide	Tank ( $\mu\text{Ci/ml}$ )	Monthly Limit ( $\mu\text{Ci/ml}$ )	Release ( $\mu\text{Ci/ml}$ )	Percent of Monthly Limit
Unidentified  Beta	Less than detection limit	2E-08	0	0

TOTAL  
CONCENTRATION      Less than  
detectable       $\mu\text{Ci/ml}$

Total of Limit Released: 0.00 %

Total of Activity Released: 0.00  $\mu\text{Ci}$

Year to Date Activity Released 0.00  $\mu\text{Ci}$

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Buffalo Materials Research Center**

**Table 4 -- Waste Tank Release to Sanitary Sewer**

Release Number: 2009-04  
From: 10K Tank  
Month: December

Volume Released: 5700 gal.  
2.17E+07 ml  
Date of Release: 12/3/09

Nuclide	Tank ( $\mu\text{Ci/ml}$ )	Monthly Limit ( $\mu\text{Ci/ml}$ )	Release ( $\mu\text{Ci/ml}$ )	Percent of Monthly Limit
Unidentified Beta	2.56E-07	2E-08	3.2E-09	1.6E+01
Ag-108m	2.60E-07	9E-05	3.2E-09	3.6E-03

TOTAL  
CONCENTRATION 5.16E-07  $\mu\text{Ci/ml}$

Total of Limit Released: 15.99 %

Total of Activity Released: 11.17  $\mu\text{Ci}$

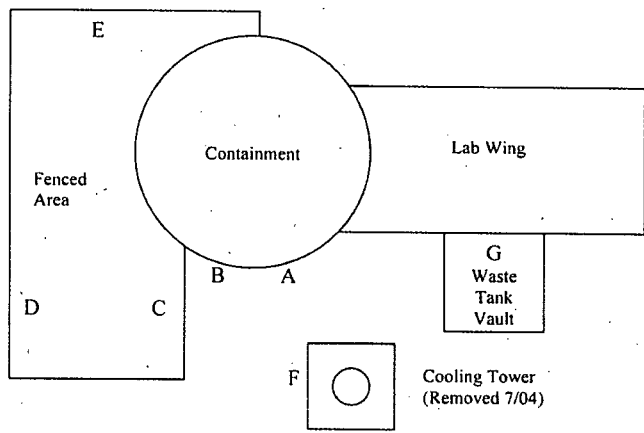
Year to Date Activity Released 11.17  $\mu\text{Ci}$

**University at Buffalo  
Buffalo Materials Research Center**

**Table 5 -- 2009 Cumulative Summary of Environmental Radiation Dose Equivalent (mrem)**

Monthly Monitoring Period	B	C	D	E	G	Control Average
	Truck Door Outside 2118	Fence 1 2120	Fence 2 2121	Fence 3 2122	Waste Vault 2116	
January	0	0	0	0	0	22
February	0	0	0	0	2	15
March	0	1	0	0	0	15
April	0	0	0	0	4	14
May	0	0	0	0	0	13
June	0	0	0	0	0	16
July	0	0	1	0	4	12
August	3	2	2	2	2	13
September	0	0	1	0	1	13
October	1	2	1	1	3	11
November	0	0	0	0	0	15
December	0	0	1	0	3	16
Total	4	5	6	2	19	

Dose equivalent reported is subtracted from control average.



**University at Buffalo  
Buffalo Materials Research Center**

**Table 6 -- 2009 Cumulative Summary of BMRC Area Dosimeter Results**

Monthly Monitoring Period	335 Truck Door	1624 Bridge	357 Building Air	356 Stack Gas	Control Average (non-neutron badges)
January	0	5	0	0	22
February	0	3	0	0	15
March	0	4	1	1	15
April	0	6	0	0	14
May	0	2	0	0	13
June	0	6	0	1	16
July	1	8	0	5	12
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September	0	7	0	5	13
October	0	4	0	0	11
November	0	5	0	0	15
December	0	3	0	0	16
Total	1	55	1	13	

Dose equivalent reported is subtracted from control average.

**University at Buffalo  
Buffalo Materials Research Center**

**Table 7 -- 2009 Whole Body Deep Dose Equivalent Summary**

Deep Dose Equivalent (rem)	BMRC Staff	University Police	Visitor	Consultant Staff	Fuel Handler Dosimeter
None Measurable	4	1	4	2	1

**Table 8 -- 2009 Extremity Shallow Dose Equivalent Summary**

Extremity Shallow Dose (rem)	BMRC Staff	Consultant Staff
None Measurable	4	2

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Unidentified  Beta	Non- detectable	2E-08	0	0

TOTAL  
CONCENTRATION      Less than  
                                 detectable       $\mu\text{Ci/ml}$

Total of Limit Released: 0.00 %

Total of Activity Released: 0.00  $\mu\text{Ci}$

Year to Date Activity Released: 0.00  $\mu\text{Ci}$

**University at Buffalo  
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**Table 2 -- Waste Tank Release to Sanitary Sewer**

Release Number: 2009-02  
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Year to Date Activity Released 0.00  $\mu\text{Ci}$

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**Table 4 -- Waste Tank Release to Sanitary Sewer**

Release Number: 2009-04  
 From: 10K Tank  
 Month: December

Volume Released: 5700 gal.  
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Nuclide	Tank ( $\mu\text{Ci/ml}$ )	Monthly Limit ( $\mu\text{Ci/ml}$ )	Release ( $\mu\text{Ci/ml}$ )	Percent of Monthly Limit
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Ag-108m	2.60E-07	9E-05	3.2E-09	3.6E-03

TOTAL 5.16E-07  $\mu\text{Ci/ml}$   
 CONCENTRATION

Total of Limit Released: 15.99 %

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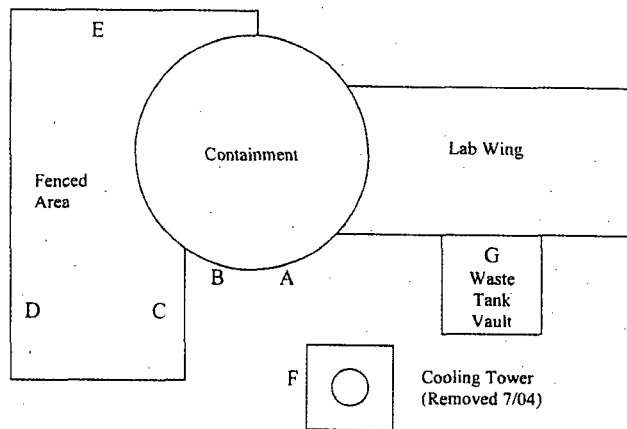
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Buffalo Materials Research Center**

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Monthly Monitoring Period	B	C	D	E	G	Control Average
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Total	4	5	6	2	19	

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Total	1	55	1	13	

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**Table 7 -- 2009 Whole Body Deep Dose Equivalent Summary**

Deep Dose Equivalent (rem)	BMRC Staff	University Police	Visitor	Consultant Staff	Fuel Handler Dosimeter
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**Table 8 -- 2009 Extremity Shallow Dose Equivalent Summary**

Extremity Shallow Dose (rem)	BMRC Staff	Consultant Staff
None Measurable	4	2