

# **ANNUAL TECHNICAL REPORT**

**STATE UNIVERSITY OF NEW YORK AT BUFFALO**  
**BUFFALO MATERIALS RESEARCH CENTER**

License R-77

Docket 50-57

Calendar Year 1998

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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 1998 calendar year. The Facility remained in Possession Only License status throughout the year. All required surveillance's were completed.

## **2. MAJOR MAINTENANCE**

Natural Gas Powered Emergency Back-up Generator- University mechanics performed major maintenance on the generator.

## **3. CHANGES TO FACILITY**

- ***Underground Waste Tank Fencing-*** A large construction project on campus in the area of the facility led to the installation of fencing around the underground waste tank vault. This was constructed in order to prevent construction vehicles from driving over the waste tanks and their associated piping.
- ***Heat and Smoke Detector Addition-*** Heat and smoke detectors were installed throughout the entire facility in an effort to upgrade fire detection and response capabilities. The facility was originally constructed with only a few heat detectors and pull stations. This system was added to the existing facility security system.
- ***Makeup Demineralizer Re-piping-*** A valve line-up change was made to the emergency pool-fill system. This change required that we obtain makeup water from a different source. A new source was identified and University Facilities plumbers effected the re-piping.

## **4. 50.59 CHANGES**

There were no experiments or changes to the facility pursuant to 10 CFR 50.59 during 1998.

## **5. RADIOACTIVE EFFLUENTS**

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

There were two controlled discharges to the sanitary sewer during 1998. The total volume of water released was 59,100 liters, containing a total of 0.765 millicuries of radioactivity. One release was from the 10,000 gallon above ground waste storage tank referred to as 10K Tank. The other was from the original underground waste tank system referred to as Tank #1. Tables 1 and 2 contain the discharge information specific to each 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 3 summarizes the total discharges for the year.

### **5.2 Airborne Releases**

There were no airborne radioactive releases during 1998 other than natural background resulting from radon and its daughter products.

## **6. ENVIRONMENTAL RADIOLOGICAL SURVEYS**

### **6.1 Routine Surveys**

The direct radiation levels outside the BMRC reactor building are frequently monitored adjacent to the "truck door" access area and on the roof of the above ground 10,000 gallon liquid waste holding tank vault. Environmental TLD's and/or film badges are used to monitor integrated radiation levels in these areas as well as by the front door entrance to the facility and on a fence by the cooling tower. The minimum sensitivity for the TLD's is 10 mRem for the 3 months the monitor is posted in the field and the minimum sensitivity for the film badges is 10 mRem/month. The results from these dosimeters for 1998 were below the minimum sensitivities except for a total exposure of 20 mRem for the year on the Truck Door TLD, 5 mRem for the year on the Cooling Tower TLD, and 40 mRem for the year on the Truck Door film badge.

During 1998 the quarterly environmental TLD monitors and the monthly film badges were migrated to the newer Luxel badge technology. The Luxel badges have a minimum sensitivity of 1 mRem per month. By utilizing the newer technology, the minimum monitor sensitivity was improved from 10 mRem to 3 mRem per quarter for quarterly monitors and from 10 mRem to 1 mRem per month for monthly monitors. Monthly film badges and Luxel badges were placed in the same monitoring sites in order to verify the consistency between the two different types of monitors.

Semi-annual "tell-tale" samples were drawn and analyzed from the sampling well tubes adjacent to the underground liquid waste tanks. These analyses detected no radioactivity in excess of background.

## **7. RADIATION EXPOSURES**

### **7.1 External Dosimetry**

Dosimetry records were maintained for a total of 9 staff members and authorized facility entrants. Dosimeters provide X, beta, and gamma exposure monitoring, and for selected personnel neutron detecting films are also employed. TLD rings are used to measure extremity dose for selected personnel. All dosimeters are processed by a NVLAP certified vendor.

As with the environmental dosimeters, personnel dosimeters were also migrated to the Luxel technology during 1998. The Luxel badges have a minimum sensitivity of 1 mRem per month while as compared to 10 mRem per month minimum sensitivity for the older style badges. As a result of this greater sensitivity, some small doses are indicated on the exposure tables that in previous years would have been listed as non-measurable.

The maximum annual whole body dose to an individual during 1998 was 0.039 Rem which was received by the individual who performs survey meter and area and effluent monitor calibrations. The maximum extremity dose to an individual was 0.200 Rem which was received by the same individual.

The University Police perform walkthrough security tours of the building at least once every eight-hour shift during off-hours and holidays. The patrol officers wear one of two University Police dosimeter packs located in the building reception area when they perform these walkthroughs. One of these dosimeters recorded an annual dose of 4 mRem under the Luxel sensitivity. The other recorded no measurable dose.

Four visitor packs are available that contain film badges. These packs are issued to visitors who may need to enter into areas that require monitoring. Two of these dosimeters recorded no measurable dose for 1998. The other two recorded annual doses of 5 and 1 mRem, respectively.

Tables 4 and 5 provide summaries of personnel whole body and extremity dose for calendar year 1998.

## **8. RADIATION AND CONTAMINATION SURVEYS**

### **8.1 Exit Monitoring**

Exit Monitoring is required during 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.

## **8.2 Routine Surveys**

Monthly surveys of the BMRC building were performed by the Health Physics staff. BMRC contamination action levels are 30 DPM/100cm<sup>2</sup> beta for personal items, 200 DPM/100cm<sup>2</sup> beta otherwise. On two occasions contamination in excess of action levels was detected on items or surfaces not labeled or restricted as contaminated. Table 6 provides a summary of levels of contamination detected during building surveys in 1998.

## **9. FACILITY ORGANIZATION**

BMRC submitted a reorganization amendment request to the NRC on June 23, 1998. The reorganization was merely an administrative measure to update several position titles that had changed within the University at Buffalo and requesting a change in the minimum meeting frequency of the Reactor Decommissioning Safety Committee from three times to twice per year. The same individuals, however, continue to serve in those positions

## **10. MISCELLANEOUS**

- Cold Fuel Shipment- The unused Pulstar fuel that was in storage was shipped to North Carolina State University in July following Department of Energy approval of the transfer.
- Security Plan- Revision VI of the plan was submitted under 50.54(p) of 10CFR on January 23, 1998.
- Security Events- During 1998, the NRC and FBI issued notices to facilities concerning potential security threats that indicated needs for increased facility security awareness. BMRC and UB Public Safety personnel worked closely in reviewing these notices and instituting appropriate security measures.
- The annual emergency evacuation exercise was conducted on November 16, 1998.

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**Table 1 98-01 10K Tank**

**BMRC Waste Tank Release to Sanitary Sewer Report**

Release Number: 98-01  
From: 10K Tank  
Month: February

Amount Released: 8050 gal.  
3.06E+07 ml  
Date of Release: 2/20/98

Nuclide	Tank (uCi/ml)	Monthly Limit (uCi/ml)	Release (uCi/ml)	Percent of Monthly Limit
Ag-108m	6.98E-08	9E-05	2.5E-10	2.7E-04
Unidentified Beta	2.14E-06	1E-07	7.6E-09	7.6E+00

TOTAL 2.21E-06

Total of Limit Released: 7.56 %

Total of activity Released: 67.71 uCi

Year to date activity Released 67.71 uCi

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**Table 2 98-02 Tank #1**

**BMRC Waste Tank Release to Sanitary Sewer Report**

Release Number: 98-02  
 From: Old Waste  
 Tank #1  
 Month: Mar-98

Amount Released: 7500 gal.  
 2.85E+07 ml  
 Date of Release: 3/26/98

Nuclide	Tank (uCi/ml)	Monthly Limit (uCi/ml)	Release (uCi/ml)	Percent of Monthly Limit
H-3	6.50E-06	1E-02	2.1E-08	2.1E-04
Co-60	9.80E-07	3E-05	3.2E-09	1.1E-02
Ag-108m	4.50E-07	9E-05	1.5E-09	1.6E-03
Cs-137	1.70E-07	1E-05	5.6E-10	5.6E-03
Unidentified Beta	1.64E-05	1E-07	5.4E-08	5.4E+01

TOTAL 2.45E-05

Total of Limit Released: 53.82 %

Total of activity Released: 697.26 uCi

Year to date activity Released 764.97 uCi

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**Table 3 - 1998 Yearly Releases to the Sanitary Sewer**

Nuclide	Quantity Released (Ci)	Average Annual Concentration (uCi/ml)
H-3	1.85E-04	1.8E-09
Co-60	2.79E-05	2.7E-10
Ag-108m	1.50E-05	1.4E-10
Cs-137	4.85E-06	4.7E-11
Unidentified Beta	5.32E-04	5.1E-09

TOTAL 0.765 mCi

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Table 4 - 1998 Whole Body Exposure Summary

Total Whole Body Dose (Rem)	BMRC Staff	University Police Dosimeters	Visitors Badges	Fuel Handler Badge
None Measurable	2	1	2	1
0.001 to 0.010	6	1	2	0
0.011 to 0.100	1	0	0	0
> 0.100	0	0	0	0

Table 5 - 1998 Extremity Exposure Summary

Total Extremity Dose (Rem)	BMRC Staff
None Measurable	5
0.010 to 0.100	1
0.101 to 0.300	2
> 0.300	0

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**Table 6 - Contamination Detected During Building Surveys in 1998**

<b>Range (dpm)</b>	<b>Number of Occurrences</b>
➤ 5000	0
1001 – 4999	1
501 – 1000	1
200 – 500	0