



INSTITUTE FOR RESEARCH IN  
**ELECTRONICS**  
& **APPLIED PHYSICS**

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Document Control Desk  
United States Nuclear Regulatory Commission  
Washington, D.C. 20555-0001

RE: Annual Report: January 1, 2016 - December 31, 2016 for the Maryland University Training  
Reactor, License No. R-70, University of Maryland.

Enclosed please find the University of Maryland's Annual Report for the period beginning  
January 1, 2016 and ending December 31, 2016 for the MUTR, License No. R-70

I declare under penalty of perjury that the foregoing response is true and correct.

Sincerely,

Timothy W. Koeth

AD2D  
NRR



**Annual Operating Report:**

January 1, 2016 - December 31, 2016

**MUTR Technical Specification 6.7.1**

License No. R-70, Docket No. 50-166

A. James Clark School of Engineering  
Department of Materials Science and Engineering  
University of Maryland, College Park, MD 20742

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## 1 Introduction

The University of Maryland Training Reactor (MUTR) is an open-pool type, TRIGA facility licensed for operation at 250 kW thermal power. The MUTR is primarily used for operator training and tours for groups internal and external to the campus. In addition, the facility provides neutron and gamma irradiations, and neutron activation analysis experiments for undergraduate lab classes and graduate research.

## 2 Reactor Usage

Between January 1, 2016 to December 31, 2016, the MUTR operated for a total of 114 runs, which are categorized as follows:

Operator Training and Requalification	45 runs
Tours, Labs, and Demonstrations	20 runs
Calibration, Maintenance, and Surveillance	16 runs
Irradiations or Activations	33 runs

The total energy produced during this period was 25.48MWh with a corresponding burnup of 1.06 grams of U-235.

## 3 Surveillance Tests and Inspections

All required surveillance tests and inspections were performed at the intervals required by Technical Specification 4.0.

WATER SAMPLE TESTS

AIR SAMPLE TESTS

RADIATION SURVEYS

CONTROL ROD INSPECTION

CONTROL ROD DROP TEST

RAM CALIBRATION

SNM INVENTORIES

ALARA REVIEW

### 3.1 Maintenance Operations

In addition to the above surveillance items, the following maintenance operations were performed on the indicated dates:

3/8/16 Dri-rite replaced  
 4/22/16 Replaced primary resin  
 6/7/16 Dri-rite replaced  
 9/29/16 Dri-rite replaced  
 12/6/15 Replaced PuBe source string  
 12/8/16 Dri-rite replaced

Additional minor maintenance was performed such as light bulb replacement and fine-tuning of equipment as necessary.

### 4 Changes to Facility

There were no significant changes to the facility during this reporting period.

### 5 Environmental Surveys of Surrounding Areas

Environmental surveys include the routine environmental dosimeter measurements at the facility perimeter and the remainder of the locations on campus. Measurements at all points were well within the historical norms.

Environmental Survey Results for the Maryland University Training Reactor July 1, 2015 to June 30, 2016		
MONITOR	LOCATION	DOSE (MREM)
2	308 m NE of MUTR	42 <sup>a</sup>
3	1.1 km SW of MUTR	3
4	758 m NW of MUTR	2
5	387 m SE of MUTR	9
6	North, side MUTR fence line	2
7	East, adjacent to MUTR and IRR	2
8	West, adjacent to MUTR	6
9	606 m S of MUTR	17
10	950 m W of MUTR	9
11	South, courtyard adjacent to MUTR	29
12	248 m NW of MUTR	13

<sup>a</sup>Dose received is attributed to naturally occurring radioactive material (NORM) in the construction bricks of the building.

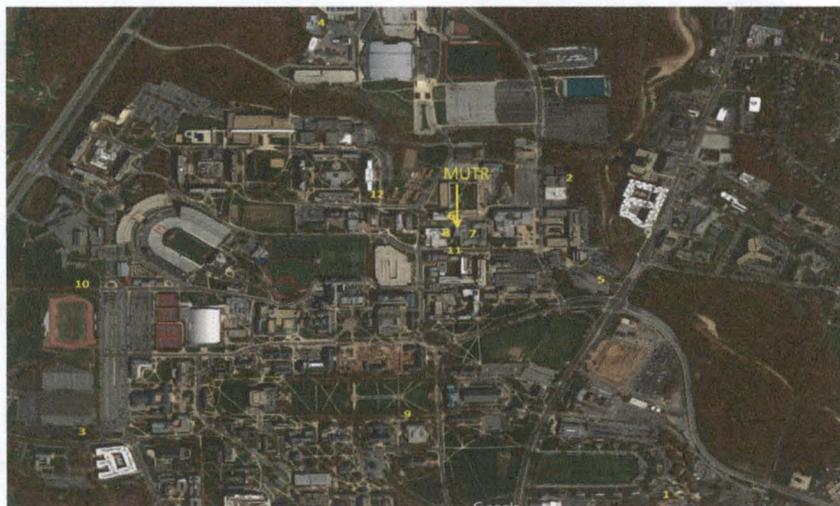


Figure 1: Location of dosimeters and MUTR

## 6 Radioactive Release and Discharge to the Environment

### 6.1 Liquid

The Reactor Storage Sump was not discharged during this reporting period.

### 6.2 Gaseous and Argon-41

The only release from the MUTR to the environment consists of Argon-41 produced from the activation of natural Argon dissolved in pool water and natural Argon present in air within the interstitial spaces of beams and ports. Argon-41 escapes from the pool and spaces into the MUTR reactor building and then leaks to areas outside the building. The two main areas for assessment of public dose due to effluent release are outside the roll-up door on the north side of the reactor building and outside the lower reception room into the hallway 1398.

For this reporting period the reactor was operated for 326.25 hours. EPA CAP88 was utilized to determine the dose outside the roll-up door to be  $1.91 \times 10^{-1}$  mrem. The dose in the hallway 1398 from any effluent release is  $6.04 \times 10^{-4}$  mrem.

## **7 Summary of Exposure Received by Facility Personnel and Visitors**

As part of the annual ALARA audit, facility management reviewed exposure records and found all badged personnel received less than 10% of their annual dose limit. The pocket dosimeters recorded minimal exposure for all guests and service personnel.

## **8 Unscheduled Shutdown/Reportable Occurrences**

During this reporting period, there were 7 unscheduled shutdowns resulting in the reactor SCRAM.

- Run# 4476 Safety 2 High Voltage on January 8, 2016
- Run# 4478 loss of power to Regulating Rod on January 15, 2016
- Run# 4481 period scram on Feb. 10, 2016
- Run# 4506 external scram, undercount on exhaust ram on April 11, 2016
- Run# 4510 AC power glitch on April 14, 2016
- Run# 4560 external scram, undercount on exhaust ram on September 27, 2016
- Run# 4579 noise on wide range channel on November 4, 2016

There were no reportable occurrences during this reporting period.

## **9 Special Experiments**

There were no new special experiments performed during this reporting period.

## **10 Changes in Facility Staff**

During this period, 3 additional ROs, 1 instant SRO, and 1 SRO upgrade were added to the roster. Removed from the roster were 1 RO and 1 SRO.