



A. JAMES CLARK
SCHOOL OF ENGINEERING

Amber S. Johnson
Director, Radiation Facilities
4418 Stadium Drive
College Park, Maryland 20742
301-405-7756 TEL
ajohns37@umd.edu
radiation.umd.edu

March 25, 2019

50-166

Document Control Desk
US Nuclear Regulatory Commission
Washington D.C. 20555-0001

RE: Annual Report: January 1, 2018 - December 31, 2018 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, 2018 and ending December 31, 2018 for the MUTR, License No. R-70.

Sincerely,

Amber S. Johnson

Director, Nuclear Reactor and Radiation Facilities

A020

NRR



Annual Operating Report:

January 1, 2018 - December 31, 2018

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

Contents

1	Introduction	2
2	Reactor Usage and Operations	2
3	Surveillance Tests and Inspections	2
3.1	Maintenance Operations	4
4	Changes to Facility and Ongoing Projects	4
5	Environmental Surveys of Surrounding Areas	4
6	Radioactive Release and Discharge to the Environment	5
6.1	Liquid	5
6.2	Gaseous and Argon-41	5
7	Summary of Exposure Received by Facility Personnel and Visitors	6
8	Unscheduled Shutdown/Reportable Occurrences	6
9	Experiments	6
10	Changes in Facility Staff	6
11	Closing Remarks	6

1 Introduction

The Maryland University Training Reactor (MUTR) is an open-pool type, TRIGA conversion licensed for operation at 250 kW thermal power. The reactor is one of the primary components of the University of Maryland Radiation Facilities, part of the Department of Materials Science and Engineering in the A. James Clark School of Engineering. The Radiation Facilities also include an electron linac, a Co-60 panoramic irradiator, and a cyclotron. The MUTR is used for operator training, tours for groups internal and external to the university, neutron and gamma irradiations, and neutron activation analysis experiments for undergraduate lab classes and research.

2 Reactor Usage and Operations

Between January 1, 2018 to December 31, 2018, the MUTR operated for a total of 77 runs, which are categorized as follows:

Operator Training and Requalification	26 runs
Tours, Labs, and Demonstrations	28 runs
Calibration, Maintenance, and Surveillance	17 runs
Irradiations or Activations	4 runs

One of the focuses of the reactor is a training program for undergraduate students to become reactor operators. The majority of the runs for training are in support of this program. Additionally, the reactor is frequently run for tours, for local schools, university classes, summer camps, and government agencies.

The total energy produced during this period was 5.6MWh with a corresponding burnup of 0.29 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
FUEL INSPECTION

Maryland University Training Reactor Annual Operating Report, 2018

PLUG INTERLOCKS
SNM INVENTORIES
ALARA REVIEW
CONTROL ROD WORTH DETERMINATIONS
CONTROL ROD WITHDRAWAL RATES

No equipment or material failures were observed during surveillances, and no significant differences with from last year's surveillances were noted.

3.1 Maintenance Operations

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

1/17/18	Replacement of Shim 2 CRDM Rod Down microswitch and motor
1/17/18	Reseated servo module K2 relay
7/17/18	Replaced Make up water solenoid valve
7/17/18	Removed out of service equipment from the water room
9/18/18	Added microswitch and indicator indicator light for thermal column shutter
9/29/18	Replaced CRDM position indicator power supply
9/29/18	Replaced transistor Q5 and R19 on Wide Range Channel Signal Selector Board
11/26/18	Replaced Primary Coolant Flow Rate display in console

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

4 Changes to Facility and Ongoing Projects

There were no changes to the facility during this time 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.

MONITOR	LOCATION	DOSE (MREM)
2	308 m NE of MUTR	13 ^a
3	1.1 km SW of MUTR	0
4	758 m NW of MUTR	1
5	387 m SE of MUTR	2
6	North, side MUTR fence line	1
7	East, adjacent to MUTR and IRR	2
8	West, adjacent to MUTR	3
9	606 m S of MUTR	4
10	950 m W of MUTR	6
11	South, courtyard adjacent to MUTR	33
12	248 m NW of MUTR	20
14	External to MUTR Lower Entrance South	4

^aDose 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 142.35 hours. EPA CAP88 was utilized to determine the dose in the hallway 1398 from any effluent release is 2.60×10^{-1} 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 was **2** unscheduled shutdowns, one from a reactor Scram, and one from operator error. Neither of these unscheduled shutdowns were the result of any equipment failures

- Run# 4699 Unscheduled shutdown due to inadvertent pressing of Shim 2 release button
- Run# 4739 Manual Scram due to building fire alarm

There were no reportable occurrences during this reporting period.

9 Experiments

During this time the only experiments performed were neutron images and activations in the Thermal Column.

10 Changes in Facility Staff

During this period 1 RO and 1 SRO were removed from the roster.

11 Closing Remarks