

TECH SPECS  
DOCKET 50-170



ARMED FORCES RADIOBIOLOGY RESEARCH INSTITUTE  
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March 27, 2018

U.S. Nuclear Regulatory Commission  
Document Control Desk  
Washington, DC 20555-0001

Sir:

Enclosed is the 2017 Annual Operating Report required by the technical specifications for the Armed Forces Radiobiology Research Institute reactor (license R-84, docket 50-170).

Should you need any further information, please contact me at (301) 295-9247.

Enclosure:  
as

WALTER D. TOMLINSON  
Acting Reactor Facility Director

cc:  
U.S. Nuclear Regulatory Commission  
ATTN: Al Adams, NRR/DLP/PRLB  
Mail Stop 12-D20  
Washington, DC 20555-0001

ADZO  
NRR

Armed Forces Radiobiology Research Institute  
AFRI TRIGA Reactor Facility

1 January 2017 - 31 December 2017

To satisfy the requirements of  
U.S. Nuclear Regulatory Commission License No. R-84 (Docket No. 50-170),  
Technical Specification 6.6.a.

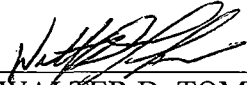
Prepared by  
Harry H. Spence  
Reactor Staff

Submitted by  
Walter D. Tomlinson  
Acting Reactor Facility Director

Armed Forces Radiobiology Research Institute  
8901 Wisconsin Avenue  
Bethesda, MD 20889-5603

## Submission of 2017 Annual Report

I declare under penalty of perjury that this report is true and correct.

  
WALTER D. TOMLINSON  
Acting Reactor Facility Director

3/28/2018  
Date

# 2017 ANNUAL REPORT

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# 2017 ANNUAL REPORT

## INTRODUCTION

The Armed Forces Radiobiology Research Institute (AFRRI) reactor facility was shut down the entire year undergoing installation of a new instrumentation and control system by contractors from General Atomics. This installation and testing is expected to continue for several months into 2018. There were no unscheduled shutdowns during 2017.

The 2017 annual reactor audit required by the reactor technical specifications was conducted by Mr. Jere Jenkins in February 2018. Mr. Jenkins was formerly with the Purdue University reactor facility. During the audit he verbally indicated that he had not found any major discrepancies in reactor operations and those conclusions are reflected in his written report.

A comprehensive NRC inspection of reactor facility operations and security was conducted by Mr. Johnny Eads during January 2017. One minor violation was identified concerning vehicle parking under the AFRRI reactor Physical Security Plan. The AFRRI response to the violation was submitted as required.

There were two RRFSS membership changes during the year. There was one reactor staff arrival and no staff departures during the year.

The remainder of this report is written in the format designated in the Technical Specifications for the AFRRI TRIGA Reactor Facility. Items not specifically required are presented in the General Information section. The following sections correspond to the required items listed in Section 6.6.a. of the Technical Specifications.

## GENERAL INFORMATION

All personnel held the listed positions throughout the year unless otherwise specified.

Key AFRRI personnel (as of 31 December 2017) are as follows:

1. AFRRI Director – L. Andrew Huff, Col, USAF  
Radiation Sciences Department (RSD) Head - Stephen I. Miller (SRO)  
Radiation Safety Officer – Daniel Shaw
2. Reactor Facility Director and Facility Radiation Manager - Stephen I. Miller (SRO)
3. Reactor operations personnel:  
Reactor Operations Supervisor – Walter D. Tomlinson (SRO)  
SRO Training Coordinator – Walter D. Tomlinson (SRO)  
Maintenance Specialist - Walter D. Tomlinson (SRO)  
Records Administration Specialist - Harry H. Spence

NOTE: Mr. Spence formerly held a SRO license at the AFRRI reactor and retired in June 2013. He returned as an unlicensed part-time staff member in February 2016.

4. Other Senior Reactor Operators:  
None
5. Operator candidates:  
Sacha T. Moore, SFC, USA  
Joshua A. Molgaard, MAJ, USA (as of 14 August)
6. Newly licensed operators:  
None
7. Additions to staff during 2017:  
Joshua A. Molgaard, MAJ, USA (as of 14 August)
8. Departures during 2017:  
None
9. There were two change to the Reactor and Radiation Facilities Safety Subcommittee (RRFSS) during 2017. Mr. Leo Bobek replaced Mr. Vince Adams as an outside member on 30 November and Mr. David Lake resigned as the nonvoting Montgomery County representative

also on 30 November. Mr. Lake's position is no longer required under the renewed reactor license.

In accordance with the requirements set forth in Section 6.2.1.1. of the Technical Specifications for the AFRRI TRIGA Reactor Facility, the RRFSS consisted of the following members as of 31 December 2017.

Regular members are:

Radiation Safety Officer: - Daniel Shaw

Reactor Facility Director and Facility Radiation Manager - Stephen I. Miller

Reactor Operations Specialist – Leo Bobek

Health Physics Specialist - Joe Pawlovich

Chairman and Director's Representative – Dr. David Lesser

Recorder - Harry H. Spence

Two meetings were held in 2017:

20 June

30 November

# SECTION I

## **Changes in the Facility Design, Performance Characteristics, Administrative Procedures, Operational Procedures, Results of Surveillance Tests and Inspections**

A summary of changes to the facility design, performance characteristics, administrative procedures, and operational procedures as well as the results of surveillance testing are provided in this section.

### **A. DESIGN CHANGES**

There was one design change to the reactor facility during 2017 that was reviewed and approved under provisions of 10 CFR 50.59:

14 June – A toggle switch was installed to permit remote testing of the reactor exhaust damper flow failure closure system as required by section 4.4 (3) of the new Technical Specifications. This installation was designed and tested to ensure that its installation or operation would not increase the likelihood of a malfunction or consequences of a malfunction of a SSC important to safety or create the possibility of a different type of accident than previously evaluated. Any failure of the remote test switch would simply leave the facility with the exhaust dampers closed thereby limiting release of radioactive effluents to the environment as designed.

### **B. PERFORMANCE CHARACTERISTICS**

There were no changes to the performance characteristics of the core during 2017. Sufficient fuel elements were withdrawn from the core before beginning the instrumentation upgrade to ensure that the reactor could not become critical at any time during the upgrade.

### **C. ADMINISTRATIVE PROCEDURES**

There were no changes to the Administrative Procedures during 2017.

### **D. OPERATIONAL PROCEDURES**

There were two changes to the Operational Procedures during 2017:

09 January – Changes were made to the Weekly Instrument Checklist to ensure compliance with the new Technical Specifications and to ensure that all weekly surveillance requirements would still be met during the instrumentation upgrade when the normal reactor console would not be available. Several obsolete checks that had no bearing on potential reactor accidents or malfunctions were also removed.

13 June – Surveillance Procedure S010 was changed so that required fuel measurement/inspection could be performed during the instrumentation upgrade while there was no functional reactor console. The former procedure specified that a SRO must monitor



the reactor power level “on console” during fuel movement. The new procedure allows a SRO to monitor the power level from the reactor deck using a remote readout from the same in-core chamber and calibrated power-monitoring channel as before. The only difference is the location of the monitoring SRO who is still in communication with the personnel moving fuel.

## E. RESULTS OF SURVEILLANCE TESTS AND INSPECTIONS

All maintenance and surveillance tasks during 2017 were accomplished as normally scheduled during the year except those tasks involving the reactor instrumentation, control rod drives, or other related components. All tasks deferred during the instrumentation upgrade will be accomplished before the reactor is returned to normal operation.

There were no reactor malfunctions during 2017.

The 2017 annual reactor audit required by the reactor technical specifications was conducted by Mr. Jere Jenkins in February 2018. Mr. Jenkins was formerly with the Purdue University reactor facility. During the audit he verbally indicated that he had not found any major discrepancies in reactor operations and those conclusions are reflected in his written report.

A comprehensive NRC inspection of reactor facility operations and security was conducted by Mr. Johnny Eads during January 2017. One minor violation was identified concerning vehicle parking under the AFRRI reactor Physical Security Plan. The AFRRI response to the violation was submitted as required.

## SECTION II

### Energy Generated by the Reactor Core and the Number of Pulses \$2.00 or Larger

| Month | Kilowatt Hours    |
|-------|-------------------|
| JAN   | 0.0               |
| FEB   | 0.0               |
| MAR   | 0.0               |
| APR   | 0.0               |
| MAY   | 0.0               |
| JUN   | 0.0               |
| JUL   | 0.0               |
| AUG   | 0.0               |
| SEP   | 0.0               |
| OCT   | 0.0               |
| NOV   | 0.0               |
| DEC   | 0.0               |
| TOTAL | <u>0.0</u><br>0.0 |

Total energy generated in 2017: 0.0 kWh

Total energy on fuel elements: 1,156,793.7 kWh

Total energy on FFCRs\*: 423,996.0 kWh

Total pulses this year  $\geq$  \$2.00: 0

Total pulses on fuel elements  $\geq$  \$2.00: 4,219

Total pulses on FFCRs\*  $\geq$  \$2.00: 107

Total pulses this year: 0

Total pulses on fuel elements: 12,189

Total pulses on FFCRs\*: 2,424

\*Fuel-followed control rods

## SECTION III

### **Unscheduled Shutdowns**

There were no unscheduled shutdowns during 2017.

## SECTION IV

### **Safety-Related Corrective Maintenance**

There were no reactor malfunctions during 2017.

## SECTION V

### **Facility and Procedure Changes as Described in the Final Safety Analysis Report (FSAR), New Experiments or Tests Performed During the Year**

#### A. FACILITY CHANGES AS DESCRIBED IN THE FSAR

There were no changes to the facility as described in the FSAR.

#### B. PROCEDURE CHANGES AS DESCRIBED IN THE FSAR

There were no changes to procedures as described in the FSAR.

#### C. NEW EXPERIMENTS OR TESTS

No new experiments or tests were performed during the reporting period that were not encompassed by the FSAR.

There were three safety evaluations for changes not submitted to the NRC, pursuant to the provisions of 10 CFR 50.59 (see Sections I.A. and I.D. above).

## SECTION VI

### Summary of Radioactive Effluent Released

- A. Liquid Waste: The reactor produced no liquid waste during 2017.
- B. Gaseous Waste: There were no particulate discharges in 2017.

The total activity of Argon-41 discharged in 2017 was 0.0 curies because the reactor was shut down for the entire year. The estimated effluent concentration from the release of Argon-41 represents 0% of the constraint limit for unrestricted areas (10 CFR 20.1101(d) and Table 2, Appendix B, 10 CFR 20).

|            |                |         |
|------------|----------------|---------|
| Quarterly: | Jan - Mar 2017 | 0.00 Ci |
|            | Apr - Jun 2017 | 0.00 Ci |
|            | Jul - Sep 2017 | 0.00 Ci |
|            | Oct - Dec 2017 | 0.00 Ci |

- C. Solid Waste: All solid radioactive waste material was transferred to the AFRRRI byproduct license; none was disposed of under the R-84 reactor license.

## SECTION VII

### Environmental Radiological Surveys

All environmental sampling of soil and vegetation yielded radionuclide levels within the background range. The radionuclides that were detected were those expected from natural background and from long-term fallout from nuclear weapons testing.

The calculated annual dose, due to Argon-41 release to the environment for 2017, was 0.00 mRem at the location of maximum public exposure. The maximum exposure is calculated at a location 91 meters from the release point as described in the FSAR. Exposure to the general population at the boundary of the Naval Support Activity Bethesda is significantly less due to the diffusion of Argon-41 in the atmosphere. The constraint limit for exposure to the public established under 10 CFR 20.1101(d) is 10 millirem per year. The exposure dose was calculated using COMPLY code, level 2, which is the most conservative level of COMPLY. Emissions due to reactor operations were 0.00 millirem, or 0% of the 10 millirem constraint limit, for the entire year.

The reactor in-plant surveys, specified in Health Physics Procedure (HPP) 3-2, all resulted in readings that were less than the action levels specified in HPP 0-2.

## SECTION VIII

### **Exposures Greater than 25% of 10 CFR 20 Limits**

There were no doses to reactor staff personnel or reactor visitors greater than 25% of 10 CFR 20 occupational and public radiation dose limits.

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