ARMED FORCES RADIOBIOLOGY RESEARCH INSTITUTE
8901 WISCONSIN AVENUE
BETHESDA, MARYLAND 20889-5603

March 25, 2014

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

Sir:

Enclosed is the 2013 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) 295-9245.

STEPHEN I. MILLER
Reactor Facility Director

Enclosure:
as

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

A020
NRR

Armed Forces Radiobiology Research Institute
AFRRI TRIGA Reactor Facility

1 January 2013 - 31 December 2013

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

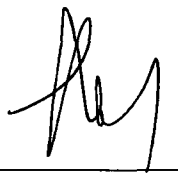
Prepared by
Ian A. Gifford
Reactor Operations Supervisor

Submitted by
Stephen I. Miller
Reactor Facility Director

Armed Forces Radiobiology Research Institute
8901 Wisconsin Avenue
Bethesda, MD 20889-5603
Telephone: (301) 295-1290

Submission of 2013 Annual Report

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



3/28/14

STEPHEN I. MILLER Date
Reactor Facility Director

2013 ANNUAL REPORT

TABLE OF CONTENTS

2013 ANNUAL REPORT

INTRODUCTION

The Armed Forces Radiobiology Research Institute (AFRRI) reactor facility was available for irradiation services only a part of the year due to several maintenance and calibration issues, as well as significant reduction in staff availability resulting from mandatory Department of Defense furloughs and the government shutdown. The reactor was unavailable for regular operations from the beginning of the calendar year until 25 June 2013. While steady-state operations were restored at that time, pulsing operations remain unavailable awaiting installation of a new pulse ion chamber and calibration of the pulsing circuits.

There was one reactor modification during the year discussed in Section I. There were no unscheduled shutdowns during 2013.

The 2013 annual reactor audit required by the reactor technical specifications was conducted by Mr. Jere Jenkins in December 2013. Mr. Jenkins is an executive committee member of the National Organization of Test, Research, and Training Reactors (TRTR) and former Reactor Facility Director (RFD) at Purdue University. 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 organization and staffing, operations logs and records, requalification training, surveillance and limiting conditions for operation, emergency planning, maintenance logs and records, and fuel handling logs and records was conducted by Mr. Ossy Font and Mr. Patrick Isaac in March 2013. No safety concerns or noncompliance with NRC requirements were identified.

There was one RRFSS membership change during the year discussed in the General Information section. There was one reactor staff departure 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.b. 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 2013) are as follows:

1. AFRRI Director – L. Andrew Huff, Col, USAF (as of 09 March)

   Radiation Sciences Department (RSD) Head - Stephen I. Miller (SRO)

   Radiation Safety Officer - Anna M. J. Teachout

2 Reactor Facility Director and Facility Radiation Manager - Stephen I. Miller (SRO)

3. Reactor operations personnel:

   Reactor Operations Supervisor – Ian A. Gifford (SRO)

   SRO Training Coordinator – Ian A. Gifford (SRO)

   Maintenance Specialist - Walter D. Tomlinson (SRO)

   Records Administration Specialist – Ian A. Gifford (SRO)

4. Other Senior Reactor Operators:
   None

5. Operator candidates:
   Ralph Marro, CDR, USN
   Jason Jacot, SFC, USA
   Robert McMahon, MAJ, USA (as of 09 January)
   David Manzanares, SSG, USA (as of 11 February)

6. Newly licensed operators:
   None

7. Additions to staff during 2013:
   Robert McMahon, MAJ, USA (as of 09 January)
   David Manzanares, SSG, USA (as of 11 February)

8. Departures during 2013:
   Harry Spence (SRO) (as of 28 June)

9. There was one change to the Reactor and Radiation Facilities Safety Subcommittee (RRFSS) during 2013. Mr. Harry Spence was appointed as a regular member as of 01 July. Dr. Ian

Gifford replaced Mr. Spence as RRFSS recorder.

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 2013.

Regular members are:
Radiation Safety Officer - Anna Teachout
Reactor Facility Director and Facility Radiation Manager – Stephen Miller
Reactor Operations Specialist - Seymour Weiss
Health Physics Specialist - Joe Pawlovich
Reactor Operations Specialist – Harry Spence

Chairman and Director's Representative – CAPT David Lesser, USN

Special nonvoting member - David Lake, Montgomery County Government (Department of Environmental Protection)

Recorder – Ian Gifford

Two meetings were held in 2013:

06 June

05 December

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

In May 2013, the secondary coolant pump was replaced. The replacement pump meets or exceeds all characteristics of the previous pump and was tested following installation to ensure proper function. The RRFSS was notified of the change during the June 2013 meeting. The design change did not require a change to the Technical Specifications nor did it meet any of the criteria described in Section 50.59(c)(2) of 10 CFR Part 50.

B. PERFORMANCE CHARACTERISTICS

There were no changes to the performance characteristics of the core during 2013.

C. ADMINISTRATIVE PROCEDURES

There were no changes to the Administrative Procedures during 2013.

D. OPERATIONAL PROCEDURES

There were no changes to the Operational Procedures during 2013.

E. RESULTS OF SURVEILLANCE TESTS AND INSPECTIONS

All maintenance and surveillance tasks during 2013 were accomplished as normally scheduled during the year, except several TS-required pulse-related calibration tasks normally completed during the annual reactor maintenance shutdown. These tasks cannot be completed until a new pulse ion chamber is purchased and installed. The replacement pulse ion chamber has arrived and will be installed and tested in 2014. No pulse operations shall be conducted until all required calibrations have been performed.

Malfunctions are detailed in Section IV, Safety-Related Corrective Maintenance.

The 2013 annual reactor audit required by the reactor technical specifications was conducted by Mr. Jere Jenkins in December 2013. Mr. Jenkins is an executive committee member of the National Organization of Test, Research, and Training Reactors (TRTR) and former Reactor

Facility Director (RFD) at Purdue University. 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 organization and staffing, operations logs and records, requalification training, surveillance and limiting conditions for operation, emergency planning, maintenance logs and records, and fuel handling logs and records was conducted by Mr. Ossy Font and Mr. Patrick Isaac in March 2013. No safety concerns or noncompliance with NRC requirements were identified.

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	797.7
APR	37.1
MAY	4932.0
JUN	2057.9
JUL	497.6
AUG	296.4
SEP	258.0
OCT	70.0
NOV	325.6
DEC	155.0
TOTAL	9427.3

Total energy generated in 2013: 9,427.3 kWh

Total energy on fuel elements: 1,148,567.0 kWh

Total energy on FFCRs*: 415,769.3 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: 1

Total pulses on fuel elements: 12,171

Total pulses on FFCRs*: 2,406

*Fuel-followed control rods

SECTION III

Unscheduled Shutdowns

There were no unscheduled shutdowns during 2013.

SECTION IV

Safety-Related Corrective Maintenance

Following are excerpts from the malfunction logbook during the reporting period. The reason for the corrective actions taken, as in all cases, was to return the equipment to its proper operational status.

17 December 2012 – While performing the Daily Operational Startup Checklist, the reactor operator was unable to obtain standard control rod magnet power or transient rod compressed air to raise control rods. The RFD was notified and all operations were suspended pending troubleshooting and repairs. The reactor was not at power at the time and all control rods remained fully inserted. The reactor remained non-operational for the rest of 2012. On 10 January 2013, the NPP power supply and K2 relay were replaced. A test of functionality was performed and normal operations resumed.

12 December 2013 – While performing the Weekly Operational Instrument Checklist, the reactor staff member was unable to turn on the gas stack monitor air pump upon completion of the channel test. After further examination, it was determined that the fuse had blown. Replacement with a new fuse corrected the issue and the pump was turned on. In order to avoid future reliability issues, a new motor was procured and installed.

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 facility changes as described in the FSAR during the year.

B. PROCEDURE CHANGES AS DESCRIBED IN THE FSAR

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

C. NEW EXPERIMENTS OR TESTS

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

SECTION VI

Summary of Radioactive Effluent Released

A. Liquid Waste: The reactor produced no liquid waste during 2013.

B. Gaseous Waste: There were no particulate discharges in 2013.

The total activity of Argon-41 discharged in 2013 was 4.55 curies. The estimated effluent concentration from the release of Argon-41 represents less than 1% of the constraint limit for unrestricted areas (10 CFR 20.1101(d) and Table 2, Appendix B, 10 CFR 20).

Quarterly:	Jan - Mar 2013	0.46 Ci
	Apr - Jun 2013	3.33 Ci
	Jul - Sep 2013	0.54 Ci
	Oct - Dec 2013	0.22 Ci

C. Solid Waste: All solid radioactive waste material was transferred to the AFRRI 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 2013, was 0.1 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 mrem 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 0.1 mrem, or 1% of the 10 mrem 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.