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March 25, 2013

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

Sir:

Enclosed is the 2012 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:
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A020
NRR

Armed Forces Radiobiology Research Institute
AFRRI TRIGA Reactor Facility

1 January 2012 - 31 December 2012

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
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Submitted by
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Reactor Facility Director

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Submission of 2012 Annual Report

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

MAR 2 5 2013

STEPHEN I. MILLER
Reactor Facility Director

Date

2012 ANNUAL REPORT

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2012 ANNUAL REPORT

INTRODUCTION

The Armed Forces Radiobiology Research Institute (AFRRI) reactor facility was available for irradiation services for only part of the year due to several maintenance and calibration issues. The reactor was unavailable for any regular operations from 08 November 2011 until 29 June due to failure of an AIO-16 board. Pulsing operations were also not available until 30 August awaiting calibration and certification of the pulsing circuits by General Atomics representatives. The reactor then became nonoperational again beginning on 17 December because of problems with the NPP power supply and relays. Each of these issues will be discussed in further detail in Section IV.

There were no major reactor modifications or projects during the year. There were no unscheduled shutdowns during 2012.

The 2012 annual reactor audit required by the reactor technical specifications was conducted by Mr. Vincent Adams in December 2012. Mr. Adams is a senior reactor operator at the University of Maryland 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. Greg Schoenebeck and Mr. Ossy Font during May 2012. While they had several recommendations for improving reactor operations, no safety concerns or noncompliance with NRC requirements were identified.

There was one RRFSS membership change during the year. There was one reactor staff arrival and two 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.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 2012) 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 - Harry H. Spence (SRO)

   SRO Training Coordinator - Harry H. Spence (SRO)

   Maintenance Specialist - Walter D. Tomlinson (SRO)

   Records Administration Specialist - Harry H. Spence (SRO)

4. Other Senior Reactor Operators:
   Ian Gifford
   Todd Hathaway, MAJ, USA (through 31 July)

5. Operator candidates:
   Nichole Gillespie, SSG, USA (through 18 June)
   Ralph Marro, CDR, USN
   Jason Jacot, SFC, USA (as of 11 September)

6. Newly licensed operators:
   None

7. Additions to staff during 2012:
   Jason Jacot, SFC, USA (as of 11 September)

8. Departures during 2012:
   Nichole Gillespie, SSG, USA (as of 18 June)
   Todd Hathaway, MAJ, USA (SRO) (as of 31 July)

9. There was one change to the Reactor and Radiation Facilities Safety Subcommittee (RRFSS) during 2012. CAPT David Lesser, USN replaced Dr. Christopher Lissner on 13 December.

   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 2012.

Regular members are:
Radiation Safety Officer - Anna M. J. Teachout
Reactor Facility Director and Facility Radiation Manager - Stephen I. Miller
Reactor Operations Specialist - Dr. Seymour Weiss
Health Physics Specialist - Joe Pawlovich

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

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

Recorder - Harry H. Spence

Two meetings were held in 2012:

24 May

13 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

There were no design changes to the reactor facility during 2012.

B. PERFORMANCE CHARACTERISTICS

There were no changes to the performance characteristics of the core during 2012. All fuel elements and control rods remained in place for operations throughout the year.

C. ADMINISTRATIVE PROCEDURES

There were no changes to the Administrative Procedures during 2012.

D. OPERATIONAL PROCEDURES

There were several minor changes to the Operational Procedures during 2012 based on recommendations from the staff's annual procedure review. The proposed changes were reviewed and approved under provisions of 10 CFR 50.59.

E. RESULTS OF SURVEILLANCE TESTS AND INSPECTIONS

All maintenance and surveillance tasks during 2012 were accomplished as normally scheduled during the year except several TS-required calibration tasks normally completed during the annual reactor maintenance shutdown. These tasks could not be completed on time because of ongoing system repairs (see Section IV). No routine reactor operations were conducted until all issues were resolved and all required calibrations were performed.

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

The 2012 annual reactor audit required by the reactor technical specifications was conducted by Mr. Vincent Adams in December 2012. Mr. Adams is a senior reactor operator at the University of Maryland 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. Greg Schoenebeck and Mr. Ossy Font during May 2012. While they had several recommendations for improving reactor operations, 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	299.4
APR	3621.0
MAY	114.9
JUN	1113.0
JUL	293.8
AUG	136.0
SEP	71.9
OCT	7.9
NOV	257.0
DEC	106.7
TOTAL	6021.6

Total energy generated in 2012: 6,021.6 kWh

Total energy on fuel elements: 1,139,139.7 kWh

Total energy on FFCRs*: 406,342.0 kWh

Total pulses this year ≥ $2.00: 0

Total pulses on fuel elements ≥ $2.00: 4,219

Total pulses on FFCRs* ≥ $2.00: 107

Total pulses this year: 13

Total pulses on fuel elements: 12,170

Total pulses on FFCRs*: 2,405

*Fuel-followed control rods

SECTION III

Unscheduled Shutdowns

There were no unscheduled shutdowns during 2012.

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.

08 November 2011 – Symptoms: The AIO-16 board installed on 29 September 2011 failed during calibration as part of the annual reactor maintenance shutdown. The RFD was notified and all regular operations were suspended pending installation and testing of a replacement board. The reactor remained nonoperational until 29 June 2012 because of difficulties obtaining both the replacement parts and technical installation support necessary from General Atomics. Regular steady-state operations resumed on 29 June, but pulsing operations remained suspended until 30 August until full testing and calibration of the pulsing electronic circuitry was completed. Full unrestricted reactor operations resumed on 30 August following completion of all necessary testing and calibrations, including the TS-required tasks that had been postponed from the 2011 annual reactor maintenance period.

17 December 2012 – Symptoms: 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 nonoperational for the rest of 2012.

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.

C. NEW EXPERIMENTS OR TESTS

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

There was one safety evaluation for changes not submitted to the NRC, pursuant to the provisions of 10 CFR 50.59 (see Section I.D. above).

SECTION VI

Summary of Radioactive Effluent Released

A. Liquid Waste: The reactor produced no liquid waste during 2012.

B. Gaseous Waste: There were no particulate discharges in 2012.

The total activity of Argon-41 discharged in 2012 was 2.36 curies. The estimated effluent concentration from the release of Argon-41 represents under 1% of the constraint limit for unrestricted areas (10 CFR 20.1101(d) and Table 2, Appendix B, 10 CFR 20).

Quarterly:	Jan - Mar 2012	0.00 Ci
	Apr - Jun 2012	2.07 Ci
	Jul - Sep 2012	0.14 Ci
	Oct - Dec 2012	0.15 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 2012, was 0.08 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 0.08 millirem, or less than 1% 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.