



UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
WASHINGTON, D.C. 20555-0001

March 14, 2019

Captain John Gilstad, Director  
Armed Forces Radiobiology  
Research Institute  
National Naval Medical Center  
8901 Wisconsin Avenue  
Bethesda, MD 20889-5603

SUBJECT: ARMED FORCES RADIOBIOLOGY RESEARCH INSTITUTE – U.S. NUCLEAR  
REGULATORY COMMISSION ROUTINE INSPECTION REPORT  
NO. 05000170/2019201

Dear Captain Gilstad:

From February 12-14, 2019, the U.S. Nuclear Regulatory Commission (NRC) conducted an inspection at the Armed Forces Radiobiology Research Institute reactor facility. The enclosed report documents the inspection results which were discussed on February 14, 2019, with you and members of your staff.

The inspection examined activities conducted under your license as they relate to public health and safety, by confirming compliance with the Commission's rules and regulations and with the conditions of your license. Within these areas, the inspection consisted of selected examination of procedures and representative records, observations of activities, and interviews with personnel. Based on the results of this inspection, no findings of non-compliance were identified. No response to this letter is required.

In accordance with Title 10 of the *Code of Federal Regulations*, Section 2.390, "Public inspections, exemptions, requests for withholding," a copy of this letter, its enclosure, and your response (if any) will be available electronically for public inspection in the NRC Public Document Room or from the NRC's document system (Agencywide Documents Access and Management System (ADAMS)). ADAMS is accessible from the NRC Web site at <http://www.nrc.gov/reading-rm/adams.html> (the Public Electronic Reading Room).

J. Gilstad

- 2 -

Should you have any questions concerning this inspection, please contact Michael Takacs at 301-415-2042 or by e-mail at [Michael.Takacs@nrc.gov](mailto:Michael.Takacs@nrc.gov).

Sincerely,

*/RA/*

Anthony J. Mendiola, Chief  
Research and Test Reactors Oversight Branch  
Division of Licensing Projects  
Office of Nuclear Reactor Regulation

Docket No. 50-170  
License No. R-84

Enclosure:  
As stated

cc: See next page

Armed Forces Radiobiology Research Institute

Docket No. 50-170

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SUBJECT: ARMED FORCES RADIOBIOLOGY RESEARCH INSTITUTE – U.S. NUCLEAR  
REGULATORY COMMISSION ROUTINE INSPECTION REPORT  
NO. 05000170/2019201 DATE: MARCH 14, 2019

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**U.S. NUCLEAR REGULATORY COMMISSION**  
**OFFICE OF NUCLEAR REACTOR REGULATION**

Docket No.: 50-170

License No.: R-84

Report No.: 05000170/2019201

Licensee: Armed Forces Radiobiology Research Institute

Facility: AFRRRI Reactor Facility

Location: Bethesda, MD

Dates: February 12-14, 2019

Inspectors: Michael Takacs  
Kevin Roche

Approved by: Anthony J. Mendiola, Chief  
Research and Test Reactors Oversight Branch  
Division of Licensing Projects  
Office of Nuclear Reactor Regulation

Enclosure

## EXECUTIVE SUMMARY

Armed Forces Radiobiology Research Institute  
Research Reactor Facility  
NRC Inspection Report No. 05000170/2019201

The primary focus of this routine, announced inspection included the onsite review of selected aspects of the Armed Forces Radiobiology Research Institute (AFRRI or the licensee) Class II research reactor facility safety programs, including: (1) organization and staffing, (2) operations logs and records, (3) requalification training, (4) surveillance and limiting conditions for operation, (5) emergency planning, (6) maintenance logs and records, and (7) fuel handling logs and records. The licensee's programs were acceptably directed toward the protection of public health and safety, and in compliance with U.S. Nuclear Regulatory Commission (NRC) requirements.

### Organization and Staffing

- The licensee's organization and staffing were in compliance with the requirements specified in technical specification (TS) 6.1.

### Operations Logs and Records

- Operational activities were consistent with the applicable TS and facility procedures.

### Requalification Training

- Operator requalification was current and was being performed as required by AFRRI's reactor operator requalification program.

### Surveillance and Limiting Conditions for Operation

- All surveillances were completed in accordance with TS 4.0 and the licensee was in compliance with limiting conditions for operations (LCOs) as specified in TS 3.0.

### Emergency Planning

- The emergency preparedness program was generally conducted in accordance with the AFRRI emergency plan (EP).

### Maintenance Logs and Records

- Maintenance activities were conducted in accordance with the applicable facility procedures.

### Fuel Handling Logs and Records

- Fuel handling and inspection activities were completed and documented as required by the TS and facility procedures.

## REPORT DETAILS

### Summary of Facility Status

The AFRRRI 1.1 megawatt Training, Research, Isotopes, General Atomics (TRIGA) Mark F research reactor, located on the campus of the National Naval Medical Center, normally operated in support of the licensee's mission of research, experiments, education, reactor operator training and periodic equipment surveillance. However, since March of 2018, the reactor has been in a shutdown status in support of the reactor console upgrade project.

### 1. Organization and Staffing

#### a. Inspection Scope (Inspection Procedure (IP) 69001)

To verify that the licensee's organization and staffing were in accordance with AFRRRI TS 6.1, the inspector reviewed selected aspects of the following:

- Organizational structure
- Management responsibilities
- Staffing requirements for safe operation of the research reactor facility
- Reactor Logbook Number 139, December 1, 2016 to present

#### b. Observations and Findings

The licensee's current organizational structure and assignment responsibilities were consistent with those specified in TS 6.1. However, there have been several staff changes in the organizational structure since the last inspection. By letter, dated March 13, 2018, the licensee notified the NRC that on April 2, 2018, the AFRRRI Director (Level 1 management) had been replaced. Also, the licensee notified the NRC by letter, dated September 4, 2018, that the Reactor Facility Director (Level 2 management) had retired on August 31, 2018. The letter also stated that a new Reactor Facility Director had yet to be appointed and that the AFRRRI reactor will not be operated until this position is permanently filled. These notifications are required by Section 6.6.b of the TS. In the interim, the AFRRRI Reactor Operations Supervisor (Level 3 management), who currently holds a senior reactor operator (SRO) license, will be responsible for the safe status of the reactor facility. The inspector noted that in support of future reactor operations, there is currently only one qualified SRO and three reactor operator trainees. The inspector verified that all permanent staff positions were filled with qualified personnel. Review of records verified that management responsibilities were generally administered as required by TS 6.1.2 and applicable procedures.

#### c. Conclusion

The licensee's organization and staffing was in compliance with the requirements specified in TS 6.1.

## 2. Operations Logs and Records

### a. Inspection Scope (IP 69001)

The inspector reviewed selected aspects of the following to verify compliance with TS 2.0, 3.0, and 6.0 and applicable procedure requirements for operation:

- Reactor Logbook Number 139, December 1, 2016 to present
- AFRRRI Operational Procedure 8, "Reactor Operations," dated June 4, 1998
- AFRRRI Operational Procedure 8, Tab A, "Logbook Entry Checklist," dated March 13, 2001
- AFRRRI Operational Procedure 8, Tab B, "Daily Operational Startup Checklist," dated March 12, 2018
- AFRRRI Operational Procedure 8, Tab I, "Daily Operational Shutdown Checklist," dated March 12, 2018
- Daily Operational Startup and Shutdown Checklists, 2017 to present
- AFRRRI 2017 Annual Report

### b. Observations and Findings

The operating logs and records were well maintained and provided a clear indication of operational activities, changes in reactivity, and maintenance actions or malfunctions that had occurred. Logs and records also showed that operational conditions and parameters were consistent with license and TS requirements. Information on the operational status of the facility was recorded in logbooks and on checklists as required by procedure. Operational problems and events noted in the logs were reported, reviewed, and resolved as required. Operations logs and records also documented that shift staffing met the minimum requirements.

### c. Conclusion

Operational activities were consistent with the applicable TS and procedural requirements.

## 3. Requalification Training

### a. Inspection Scope (IP 69001)

To verify that the licensee was complying with the requirements of the operator requalification program, the inspector reviewed selected aspects of:

- "Reactor Operator Requalification Program for the Armed Forces Radiobiology Research Institute TRIGA Reactor Facility," revised September 12, 2016
- Effective dates of current operator licenses
- Operator training records maintained on "Requalification Program Checklist," forms in individual folders for each operator
- Medical examination records for the past 2 years
- Operator requalification training lectures for 2018
- Facility written exam, administered in 2018



b. Observations and Findings

The inspector noted that the SRO was the only licensed operator on staff, and that there were three additional staff members who were reactor operator trainees. The inspector verified that the SRO had actively performed the functions of a senior licensed operator for a minimum of 4 hours per calendar quarter. The inspector noted that operators were receiving the required biennial medical examinations.

A review of the logs and records showed that training was being conducted in accordance with the program. Requalification program data, such as attendance at training sessions and completion of written examinations and operation tests, was documented as required. The inspector noted that the required biennial written examination was administered in 2018 as required. Records of quarterly reactor operations, reactivity manipulations, and other operations activities were being maintained.

c. Conclusion

Operator requalification was current and was being performed as required by the AFRRRI reactor operator requalification program.

**4. Surveillance and Limiting Conditions for Operation**

a. Inspection Scope (IP 69001)

To determine that LCOs were met and surveillances were completed as required by TS 3.0 and 4.0, the inspector reviewed selected aspects of the following:

- The 2017 AFRRRI Annual Operating Report
- Malfunction Log from 2017 to present
- Reactor Logbook Number 139, December 1, 2016 to present
- Daily Operational Startup/Shutdown Checklist, 2017 to present
- Calibration procedures for the AFRRRI reactor facility
- Maintenance procedures for the AFRRRI reactor facility
- TRIGA Tracker Report

b. Observations and Findings

Daily, weekly, monthly, quarterly, semi-annual, and other periodic checks, tests, and verifications for the TS required LCOs were being completed as required. The inspector verified that the ventilation system check was performed as required by TS 4.4, and the area radiation monitoring system check was also performed as required by TS 4.5.1. The inspector also reviewed selected portions of the environmental monitoring program records for the following: (1) facility and environmental dosimetry, (2) external sampling of the surrounding soil, water, and vegetation, and (3) gaseous radioactive effluent releases. All environmental monitoring and sampling records indicated that they were analyzed quarterly in accordance with TS 4.5.2, and that all of the data indicated radiation doses to members of the public, in the uncontrolled areas, were within

the limits specified under 10 CFR Part 20, Subpart D, "Radiation Dose Limits for Individual Members of the Public."

The inspector reviewed a random sampling of operational logs and records and determined that they met the required LCOs. The licensee utilizes a computer database, the TRIGA Tracker Report, to track completion of the various required surveillance and LCO verifications. The inspector performed a random sampling of the database to ensure that there were no overdue requirements and cross-referenced the applicable TS to ensure all required surveillances were accounted for in the TRIGA Tracker Report. There were no issues noted.

c. Conclusion

All surveillances were completed in accordance with TS 4.0 and the licensee was in compliance with the LCO requirements in TS 3.0.

**5. Emergency Planning**

a. Inspection Scope (IP 69001)

The inspector reviewed the implementation of selected portions of the emergency preparedness program, including:

- AFRRRI EP, dated December 2003
- AFRRRI emergency drill conducted on December 12, 2018
- AFRRRI emergency supplies
- AFRRRI Emergency Response Guidebook (ERG), dated April 1996

b. Observations and Findings

The inspector reviewed the AFRRRI EP and noted that several documents referenced within the AFRRRI EP were not the current versions (i.e., NRC Regulatory Guide 2.6, "Emergency Planning for Research and Test Reactors," American National Standards Institute/American Nuclear Society (ANSI/ANS)-15.16-2008, "Emergency Planning for Research Reactors," and Environmental Protection Agency 400-R-92-001, "Manual of Protective Action Guides and Protective Action for Nuclear Incidents.") The inspector also reviewed the AFRRRI ERG and noted that this document contained the AFRRRI emergency procedures as referenced in the AFRRRI EP. The inspector noted that the AFRRRI ERG had not been updated since April 1996 and that it contained, or potentially contained, outdated information. This information included: (1) various phone numbers for on-site and off-site emergency response support organizations, (2) reference to an AFRRRI chemical inventory document, dated 1996, on page 43, (3) references to outdated or obsolete ANSI documents on page 2 of Appendix F, and (4) reference to an Environmental Protection Agency decontamination procedure, dated 1985, on page 35. The updates to the AFRRRI ERG by the licensee will be considered as an Inspection Follow-up Item (IFI) and will be reviewed during a subsequent inspection as IFI 05000170/2019201-01.

The inspector also noted that construction was currently being performed in the AFRRRI "N" parking lot. Since this parking lot is depicted as part of the AFRRRI

diagram “Emergency Evacuation Routes and Muster Locations” on page A-3 of the AFRRRI ERG, the licensee will continue to monitor the impact of the construction of the “N” parking lot and, if needed, revise the diagram in the AFRRRI ERG and update its description in the AFRRRI EP. The impact of the parking lot construction will also be considered as an IFI and will be reviewed during a subsequent inspection as IFI 05000170/2019201-02.

The inspector noted that the notification rosters in the control room and at the AFRRRI guard desk were current and reviewed periodically in accordance with licensee procedure. The inspector verified that the four emergency supply boxes were inventoried quarterly and that their radiation survey meters were within their calibration period.

The inspector reviewed the 2018 annual drill report. The scenario was to exercise the licensee’s response to a contaminated, injured staff member. For this drill, AFRRRI exercised its decontamination capability as specified in the AFRRRI ERG. A post exercise review of the drill was conducted by all staff members involved, and all findings and recommendations from participants and drill observers were incorporated into the 2018 AFRRRI drill report. This information was being appropriately tracked by the AFRRRI Exercise Planner and would be applied to future emergency drills as appropriate.

c. Conclusion

Emergency planning was generally conducted in accordance with the AFRRRI EP. The IFIs referenced above will be reviewed during the next scheduled inspection.

**6. Maintenance Logs and Records**

a. Inspection Scope (IP 69001)

To determine that maintenance was being completed as required by the TS and applicable procedures, the inspector reviewed:

- AFRRRI Malfunction Log from 2017 to present
- Reactor Logbook Number 139, December 1, 2016 to present
- Maintenance procedures for the AFRRRI reactor facility
- TRIGA Tracker Report
- Annual Shutdown Maintenance Checklist

b. Observations and Findings

The inspector verified through select records that annual, semi-annual, quarterly, and monthly maintenance requirements were performed on their respective frequencies. Routine and preventive maintenance activities were adequately performed and documented in the TRIGA tracking system. Use of maintenance and malfunction logs satisfied procedural requirements. The inspector noted that when the pool water monitoring system failed its weekly alarm test, the licensee initiated appropriate and immediate compensatory measures until the component was repaired, tested, and returned to service.

c. Conclusion

Maintenance activities were conducted in accordance with the applicable procedures and were acceptable.

**7. Fuel Handling Logs and Records**

a. Inspection Scope (IP 69001)

The inspector reviewed the following to verify compliance with the procedural requirements in TS 6.3.e:

- AFRRRI current stainless steel fuel element log book
- Control room reactor fuel inventory map
- Reactor Logbook Number 139, December 1, 2016 to present

b. Observations and Findings

The inspector noted that AFRRRI maintains a current inventory record of all of their fuel elements. Information such as serial number, core position, and power history are adequately maintained and tracked. The inspector reviewed selected records for fuel movements and inspection results of the fuel elements. The inspector also verified that all fuel element locations, depicted on the control room reactor fuel inventory map, matched the information recorded in the fuel element log book.

c. Conclusion

Fuel handling and inspection activities were completed and documented as required by the TS and facility procedures.

**8. Followup**

a. Inspection Scope (IP 92701)

The inspector reviewed the actions taken in response to a previously issued NRC cited violation (VIO).

b. Observation and Findings

VIO 50-170/2017-201-01 – Jurisdiction and control of the AFRRRI “N” parking lot.

During a previous inspection in January 2017, the inspector noted that the licensee had implemented a change to eliminate AFRRRI’s jurisdiction and control of the AFRRRI “N” parking lot without prior NRC approval. The licensee failed to document whether or not the change reduced the effectiveness of the AFRRRI EP, and, if necessary, seek NRC approval for the change to the AFRRRI EP. This resulted in a Severity Level IV violation to the licensee and was cited as VIO 50-170/2017-201-01.

During this inspection, the inspector reviewed the actions taken by the licensee to resolve this issue. Based on the review of a letter submitted to the NRC from the licensee, dated April 25, 2017, and an interview with licensee, the inspector verified that full jurisdiction and control of parking lot "N" was restored to the licensee as originally described in the AFRRI EP.

c. Conclusion

VIO 50-170/2017-201-01 is now considered resolved and closed.

**9. Exit Interview**

The inspector presented the inspection results to licensee management at the conclusion of the inspection on February 14, 2019. The inspector described the areas inspected and discussed the inspection observations. The licensee acknowledged the findings presented and did not identify any of the material provided to or reviewed by the inspector as proprietary.

## **PARTIAL LIST OF PERSONS CONTACTED**

### Licensee Personnel

J. Gilstad	Director, AFRRRI (Captain, U.S. Navy)
W. Tomlinson	Interim Reactor Facility Director (SRO)
H. Spence	Records Administration Specialist
J. Molgaard	Department Head, Radiation Sciences Department (Major, U.S. Army)
S. Moore	Non-Commissioned Officer in Charge (Sergeant First Class, U.S. Army)
K. Wardlow	Health Physics Technician (Petty Officer Second Class, U.S. Navy)

## **INSPECTION PROCEDURES USED**

IP 69001	Class II Research and Test Reactors
IP 92701	Follow-up

## **ITEMS OPENED, CLOSED, AND DISCUSSED**

### Opened

IFI 05000170/2019201-01	The AFRRRI ERG, dated April 1996, contains outdated information and needs to be updated.
IFI 05000170/2019201-02	Review the impact of the "N" parking lot construction to AFRRRI's emergency evacuation routes and muster locations as referenced on page A-3 of the AFRRRI ERG

### Closed

VIO 50-170/2017-201-01	Jurisdiction and control of AFRRRI "N" parking lot
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### Discussed

None

## **LIST OF ACRONYMS USED**

10 CFR	Title 10 of the <i>Code of Federal Regulations</i>
ADAMS	Agencywide Documents Access and Management System
AFRRRI	Armed Forces Radiobiology Research Institute
EP	Emergency Plan
ERG	Emergency Response Guidebook
IFI	Inspection Follow-up Item
IP	Inspection Procedure
LCO	Limiting Condition for Operation
NRC	U.S. Nuclear Regulatory Commission
SRO	Senior Reactor Operator
TS	Technical Specification(s)
TRIGA	Training, Research, Isotopes, General Atomics
VIO	Violation