



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

January 14, 2021

Colonel Mohammad Naeem, Director
Armed Forces Radiobiology
Research Institute
4301 Jones Bridge Road
Bethesda, MD 20814

SUBJECT: ARMED FORCES RADIOBIOLOGY RESEARCH INSTITUTE – NUCLEAR
REGULATORY COMMISSION ROUTINE AND FOLLOWUP INSPECTION
REPORT NO. 05000170/2020201

Dear Colonel Naeem:

From September 29, 2020, to October 1, 2020, the U.S. Nuclear Regulatory Commission (NRC) staff conducted an inspection at the Armed Forces Radiobiology Research Institute reactor facility. The purpose of this inspection was to conduct a review of activities authorized for your facility and to follow-up on actions taken by your predecessor, Captain John Gilstad, in response to the NRC's reactive inspection associated with the lost fission chamber. The enclosed report documents the results of this inspection, which were discussed on October 1, 2020, with you and members of your staff.

The inspection examined activities conducted under your license as they relate to public health and safety, and to confirm 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 significance 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).

Should you have any questions concerning this inspection, please contact Mr. Michael Takacs at (301) 415-2042, or electronic mail at Michael.Takacs@nrc.gov.

Sincerely,

/RA/

Travis L. Tate, Chief
Non-Power Production and Utilization Facility
Oversight Branch
Division of Advanced Reactors and Non-Power
Production and Utilization Facilities
Office of Nuclear Reactor Regulation

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

Enclosure:
As stated

cc: w/enclosures: See next page

Armed Forces Radiobiology Research Institute

Docket No. 50-170

cc:

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Test, Research and Training
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Attention: Ms. Amber Johnson
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4418 Stadium Drive
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Manager
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Annapolis, MD 21401

Mr. Walter Dale Tomlinson
Reactor Facility Director
Armed Forces Radiobiology Research Institute
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SUBJECT: ARMED FORCES RADIOBIOLOGY RESEARCH INSTITUTE – NUCLEAR
REGULATORY COMMISSION ROUTINE AND FOLLOWUP INSPECTION
REPORT NO. 05000170/2020201 DATED: JANUARY 14, 2021

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

Docket No: 50-170

License No: R-84

Report No: 05000170/2020201

Licensee: Armed Forces Radiobiology Research Institute

Facility: Armed Forces Radiobiology Research Nuclear Reactor

Location: Bethesda, MD

Dates: September 29 – October 1, 2020

Inspector: Michael Takacs

Approved by: Travis L. Tate, Chief
Non-Power Production and Utilization Facility
Oversight Branch
Division of Advanced Reactors and Non-Power Production
and Utilization Facilities
Office of Nuclear Reactor Regulation

Enclosure

EXECUTIVE SUMMARY

Armed Forces Radiobiology Research Institute
Armed Forces Radiobiology Research Nuclear Reactor
Inspection Report No. 05000170/2020201

The purpose of this inspection was to conduct both a routine inspection and a follow-up to the reactive inspection performed in November 2019 regarding the lost fission chamber. The routine inspection focused on the onsite review of selected aspects of the Armed Forces Radiobiology Research Institute (AFRRI, the licensee's) Class II research reactor safety programs including: (1) procedures; (2) experiments; (3) health physics; (4) design changes; (5) committees, audits and reviews; and (6) transportation activities. The U.S. Nuclear Regulatory Commission (NRC) staff determined that the licensee's programs were acceptably directed toward the protection of public health and safety and in compliance with NRC requirements. The inspector determined that one inspection follow-up item (IFI) was opened related to the routine inspection. For the follow-up to the reactive inspection, the inspector determined that all three IFIs opened as a result of that inspection had been resolved and are now closed.

Procedures

- Facility procedures were in effect and updated as required by technical specifications (TS). One IFI was opened regarding a change to the logbook entry procedure.

Experiments

- The program to conduct and control experiments met regulatory requirements, TS, and licensee procedures.

Health Physics

- The radiation protection program was effective in minimizing radiation doses to individuals; radiation surveys were completed and documented as required by TS; postings met regulatory requirements; personnel dosimetry was worn and recorded doses were within the NRC's regulatory limits; radiation safety refresher training was administered annually as required by the radiation protection program; radiation monitoring equipment was maintained and calibrated as required by procedures; and environmental monitoring satisfied regulatory requirements.

Design Changes

- The design change program met regulatory requirements, TS, and licensee procedures.

Committees, Audits and Reviews

- The Reactor and Radiation Facilities Safety Subcommittee (RRFSS) provided the oversight required by TS.

Transportation Activities

- The program for transportation of radioactive materials satisfied regulatory requirements.

Follow-up to the reactive inspection

- All three IFIs opened as a result of the NRC's reactive inspection associated with the lost fission chamber had been resolved by the licensee and are now closed.

REPORT DETAILS

Summary of Facility Status

The AFRRRI 1 megawatt Training, Research, Isotopes, General Atomics Mark II research reactor, located on the campus of the Walter Reed National Military Medical Center, is operated in support of the Institute's mission of research, experiments, education, reactor operator training, and periodic equipment surveillance testing. During the inspection, the reactor was shutdown and secured and had been shutdown since May 2018 in support of the console digital upgrade project.

1. Procedures

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

The inspector reviewed the following to ensure that the requirements of TS Section 6.3 were met concerning written procedures:

- Procedure 8, Tab B, "Daily Operational Startup Checklist," dated March 28, 2019
- Procedure A4, "Special Nuclear Material Accountability," dated April 7, 2020
- Procedure 8, Tab A, "Logbook Entry Checklist," dated February 26, 2001
- Procedure 4, "Reactor ALARA Program," dated October 4, 1994

b. Observations and Findings

The inspector determined that written procedures were available for the activities delineated in TS Section 6.3 and were approved by the RRFSS before they were implemented. The inspector noted that Section 6.C.(2) of Procedure 8, Tab A, stated that logbook entries documenting the addition of make-up water to the reactor pool was at the discretion of the operator. The inspector noted that this was in contrast to page 2-21 of the NRC's safety evaluation report, "Renewal of the Facility Operating License for the Armed Forces Radiobiology Research Institute TRIGA Reactor," dated November 2016 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML16278A347), where it states: "The licensee also stated that it continually monitors the reactor pool for leakage," *and* "Because the licensee continuously monitors the pool water level and logs the frequency and quantity of make-up water, detection of pool water leakage would occur." The reactor facility director (RFD) indicated to the inspector that the frequency and quantity of make-up water added to the reactor pool is always logged. The RFD indicated that the logbook entry procedure would be revised to indicate that operators continuously log the frequency and quantity of make-up water added to the reactor pool. This procedure update will be tracked as IFI 05000170/2020201-1.

c. Conclusion

The inspector determined that the licensee maintained and implemented written procedures in accordance with TS requirements. One IFI was opened regarding an update to the logbook entry procedure to indicate that operators continuously log the frequency and quantity of make-up water added to the reactor pool.

2. Experiments

a. Inspection Scope (IP 69001)

To verify compliance with the licensee's procedures; TS Sections 3.6 and 6.4, and Title 10 of the *Code of Federal Regulations* (10 CFR) 50.59, "Changes, test and experiments," the inspector reviewed selected aspects of:

- reactor operations logbook from October 2019 to present

b. Observations and Findings

The inspector determined, through discussion with the RFD and review of the reactor operations logbook, that no experiments had been conducted since the last inspection.

c. Conclusion

The inspector determined that a program was in place for the conduct of experiments in accordance with TS and NRC regulations.

3. Health Physics

a. Inspection Scope (IP 69001)

The inspector reviewed the following to verify compliance with 10 CFR Part 20, "Standards for Protection against Radiation," requirements:

- AFRRRI annual report to the NRC for 2019
- Procedure 4, "Reactor ALARA Program," dated October 4, 1994
- environmental dosimetry reports from the second quarter of 2019 to the second quarter of 2020
- personnel dosimetry reports from the second quarter of 2019 to the second quarter of 2020
- facility radiological survey and wipe records for 2020
- survey meter calibration records for 2020
- calibration records of area radiation monitors for 2020
- AFRRRI general employee radiation training material (provided annually)

b. Observations and Findings

The inspector toured the facility with the RFD and noted that the use of personnel dosimetry and radiation monitoring equipment, placement of radiological signs and postings, use of protective clothing, and the storage of radioactive material, was in accordance with regulatory requirements, licensee's procedures, and the radiation protection program.

The inspector reviewed the personnel and environmental dosimetry records and determined that radiation doses were monitored and reviewed, and that recorded doses were within 10 CFR Part 20 limits. The inspector also reviewed radiation

and contamination survey records for the reactor and noted that radiation levels and contamination swipe results were also within 10 CFR Part 20 limits. The inspector accompanied the health physics technician during the performance of a routine weekly radiation and contamination survey of the reactor bay and noted that the techniques used by the technician during the survey were proper and the survey was conducted and documented in accordance with licensee procedure. The inspector reviewed select portable radiation survey meter calibration records and verified all calibrations were current and that each instrument had a current calibration sticker attached.

The inspector noted through records review and discussion with the RFD that radiation safety refresher training was provided annually to all personnel requiring access to the AFRRRI complex. The inspector also noted that a copy of the current NRC Form 3, "Notice to Employees," was posted at the entrance to the control room and various locations throughout the facility. The inspector determined, through record review and discussion with the RFD, that no radiological liquid or gaseous effluent releases have occurred since May of 2018 following the shut down of the reactor due to the digital console upgrade project.

c. Conclusion

The inspector determined that the radiation protection program was effective in minimizing radiation doses to individuals; surveys were completed and documented as required by TS; postings met regulatory requirements; personnel dosimetry was worn and recorded doses were within the NRC's regulatory limits; radiation safety training was administered annually as required by the radiation protection program; radiation monitoring equipment was maintained and calibrated as required by procedures; and environmental monitoring satisfied regulatory requirements.

4. Design Changes

a. Inspection Scope (IP 69001)

The inspector reviewed the following to verify compliance with TS Section 6.2.4 and 10 CFR 50.59:

- AFRRRI annual report to the NRC for 2019
- reactor operation logbook from October 2019 to the present

b. Observations and Findings

The inspector determined through record review and discussion with the RFD that no changes, tests, or experiments, subject to the requirements of 10 CFR 50.59, were performed since May 2018, following the shut down of the reactor due to the digital console upgrade project.

c. Conclusion

The inspector determined that a design change program was in place in accordance with TS and NRC regulations.

5. Committees, Audits and Reviews

a. Inspection Scope (IP 69001)

The inspector reviewed the following to verify compliance with the requirements of TS Section 6.2:

- minutes of the RRFSC meeting for the meeting held on September 22, 2020
- charter for the RRFSC, dated September 9, 2005
- independent audit of TS, performed December 16-17, 2019

b. Observations and Findings

The inspector verified that the RRFSC composition, meeting quorums, and meeting frequency were all in accordance with TS Section 6.2. The inspector also verified that review functions prescribed under TS Section 6.2.4 were performed by the RRFSC. The inspector also verified that all of the programs specified under TS Section 6.2.5 had been audited and no issues were identified in the report.

c. Conclusion

The inspector determined that the RRFSC provided the oversight required by TS.

6. Transportation Activities

a. Inspection Scope (IP 86740)

The inspector interviewed personnel and reviewed the following to verify compliance with regulatory and licensee procedural requirements for transferring licensed material:

- AFRRRI annual report to the NRC for 2019
- reactor operation logbook from October 2019 to the present

b. Observations and Findings

Through review of applicable records and interviews with licensee personnel, the inspector determined that the licensee had not performed any radioactive material shipments since the last inspection.

c. Conclusion

The inspector determined that the program was in place for transportation of radioactive materials in accordance with regulatory requirements.

7. Follow-up to the reactive inspection

a. Inspection Scope (IP 92701)

The inspector interviewed licensee personnel, reviewed records, and toured the facility to verify that the licensee had completed corrective actions associated with the three IFIs documented in the NRC's reactive inspection report regarding the lost fission chamber. The following documents were reviewed by the inspector:

- AFRRRI annual report to the NRC for 2019
- NRC reactive inspection report number 05000170/2019203, date December 30, 2019, regarding the lost fission chamber (ADAMS Accession No. ML19353D025)
- NRC notice of violation to AFRRRI regarding the lost fission chamber, dated March 3, 2020 (ADAMS Accession No. ML20023C341)
- AFRRRI letter to NRC, dated March 30, 2020, "Reply to Notice of Violation Dated March 3, 2020 for Docket No. 50-170, License R-84," (ADAMS Accession No. ML20101H309)
- AFRRRI procedure A4, "Special Nuclear Material Accountability," dated September 2020
- AFRRRI physical security plan (PSP), dated September 2020

b. Observations and Findings

During the tour of the facility with the RFD, the inspector noted that both the radioactive material (RAM) storage cabinet and the 55-gallon shielded drum containing RAM were properly labeled as RAM, and the areas where they were located were properly posted as RAM storage areas. The inspector also noted that the RAM storage cabinet was locked, and the 55-gallon shielded drum was secured with a tamper-indicating seal. Based on these two observations, the inspector determined, as a follow-up to the NRC's reactive inspection report regarding the lost fission chamber, that IFI 05000170/2019203-01 (associated with the labeling and posting of RAM storage containers), and IFI 05000170/2019203-02 (associated with the use of locks or tamper-indicating seals on RAM storage containers), had both been resolved. In addition, the inspector also reviewed the AFRRRI PSP, dated September 2020, and verified that the appropriate change had been made in the PSP to reflect the new process for handling of packages and bags entering the facility. This was also identified as IFI 05000170/2019203-03 in the NRC reactive inspection report, and therefore, the inspector determined that IFI 05000170/2019203-03 had been resolved.

c. Conclusion

The inspector determined that all three IFIs opened in the NRC's reactive inspection report regarding the lost fission chamber had been resolved and are now closed.

8. Exit Interview

The inspector presented the inspection results to licensee management at the conclusion of the inspection on October 1, 2020. The inspector described the areas inspected and discussed the inspection observations. The licensee acknowledged the findings presented and did not identify as proprietary any of the material provided to or reviewed by the inspector during the inspection.

LIST OF PERSONS CONTACTED

Licensee

M. Naeem	Director, AFRRRI (Colonel, U.S. Army)
J. Sanders	Senior Technical Consultant, AFRRRI (Captain, U.S. Navy)
P. Ward-Demo	Chief of Staff, AFRRRI (Colonel, U.S. Army)
O. Makinde	Department Head, Radiation Sciences (Major, U.S. Army)
D. Tomlinson	Reactor Facility Director/Senior Reactor Operator
H. Spence	Contractor
S. Moore	Non-Commissioned Officer in Charge (Master Sergeant, U.S. Army)
J. Sumlin	Radiation Safety Officer
J. Divis	Assistant Radiation Safety Officer (Lieutenant, U.S. Navy)
F. Heinrich	Health Physics Technician

INSPECTION PROCEDURES USED

IP 69001	Class II Research and Test Reactors
IP 86740	Inspection of Transportation Activities
IP 92701	Follow-up

ITEMS OPENED, CLOSED, AND DISCUSSED

Opened

IFI 05000170/2020201-1	Update the logbook entry procedure to indicate that operators continuously log the frequency and quantity of make-up water added to the reactor pool.
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Closed

IFI 05000170/2019203-01	All RAM storage containers (i.e., storage cabinets and 55-gallon shielded drums) need to be properly labeled and the areas where they are located need to be properly posted as RAM storage areas.
IFI 05000170/2019203-02	All RAM storage containers (i.e., storage cabinets and 55-gallon shielded drums) need to be locked or secured with tamper-indicating devices.
IFI 05000170/2019203-03	Revise the language in the PSP to address the change in the process for handling packages and bags entering the facility.

Discussed

None