March 15, 2007

Colonel Patricia Lillis-Hearne, Director
Armed Forces Radiobiology
Research Institute
National Naval Medical Center
8901 Wisconsin Avenue
Bethesda, MD 20889-5603

SUBJECT: NRC ROUTINE, ANNOUNCED INSPECTION REPORT NO. 50-170/2007-201

Dear Colonel Lillis-Hearne:

This letter refers to the inspection conducted on February 22-28, 2007, at your Research Reactor Facility. The inspection included a review of activities authorized for your facility. The enclosed report presents the results of that inspection.

Areas examined during the inspection are identified in the report. Within these areas, the inspection consisted of selective examinations of procedures and representative records, interviews with personnel, and observations of activities in progress. Based on the results of this inspection, no safety concerns or noncompliance with NRC requirements were identified. However, one inspector followup item was identified which will be revisited in a future inspection. No response to this letter is required.

In accordance with 10 CFR 2.390 of the NRC's "Rules of Practice," a copy of this letter and its enclosure will be made available electronically for public inspection in the NRC Public Document Room or from the NRC's document system (ADAMS), accessible from the NRC Web site at http://www.nrc.gov/reading-rm/adams.html.

Should you have any questions concerning this inspection, please contact Marcus H. Voth at 301-415-1210.

Sincerely,

/RA/

Johnny Eads, Branch Chief
Research and Test Reactors Branch B
Division of Policy and Rulemaking
Office of Nuclear Reactor Regulation

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

Enclosure: NRC Inspection Report No. 50-170/2007-201
cc w/enclosure: See next page

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

Docket No:	50-170
License No:	R-84
Report No:	50-170/2007-201
Licensee:	Armed Forces Radiobiology Research Institute
Facility:	AFRRI Reactor Facility
Location:	Bethesda, Maryland
Dates:	February 22-28, 2007
Inspector:	Marcus H. Voth
Approved by:	Johnny Eads, Branch Chief Research and Test Reactors Branch B Division of Policy and Rulemaking Office of Nuclear Reactor Regulation

EXECUTIVE SUMMARY

Armed Forces Radiobiology Research Institute
AFRRI Research Reactor Facility
NRC Inspection Report No.: 50-170/2007-201

The primary focus of this routine, announced inspection was the on-site review of selected aspects and activities since the last NRC inspection of the licensee's Class II non-power reactor safety programs including: organization and staffing, operations and maintenance logs and records, procedures, health physics, effluents and environmental monitoring, design changes, committees, audits and reviews, transportation, and follow-up on previous open items.

The licensee's programs were acceptably directed toward the protection of public health and safety. No matters of non-compliance with NRC requirements were identified.

Organization and Staffing

- The organization and staffing were consistent with Technical Specification requirements with the exception of a documented reporting chain between the Radiation Protection Officer and the AFRRI Director, the topic of an inspector follow-up item.

Operations Logs and Records

- The logs and records of operation were consistent with Technical Specification requirements.

Procedures

- Procedural control and implementation satisfied Technical Specification requirements.

Health Physics

- The licensee was conducting an effective health physics program so as to minimize radiation exposure.

Effluents and Environmental Monitoring

- Licensee releases of radioactive gases and liquids to the environment were minimal as measured at the point of release and confirmed by measurements in the environment.

Design Changes

- The licensee's design change program was being implemented as required.

Committees, Audits and Reviews

- Review and oversight functions were executed in accordance with Technical Specification requirements.

Maintenance Logs and Records

- The licensee has implemented a means of tracking maintenance requirements and completes them within the required frequencies.

Transportation

- Regulatory and license requirements were met in the transportation activity reviewed.

Follow-up on Previous Open Items

- Inspector Follow-up Item 50-170/2006-201-01 (IFI) concerning the safety oversight committee structure was closed.

REPORT DETAILS

Summary of Plant Status

The licensee's 1 megawatt (MW) Training Research Isotope Production General Atomics (TRIGA) Mark II research reactor has been operated in support of educational demonstrations, experiments, reactor operator training, and periodic equipment surveillances.

1. Organization and Staffing

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

The inspector reviewed the following to verify compliance with the staffing requirements in Technical Specifications (TS) Sections 6.1 and 6.2:

- administrative controls
- management responsibilities and staff qualifications
- staffing requirements for the safe operation of the facility
- Armed Forces Radiobiology Research Institute (AFRRI) Reactor Facility organization
- staffing and staff qualifications
- management responsibilities as delineated in the TS
- TS for the AFRRI Reactor Facility, Amendment No. 24, dated June 27, 2001

b. Observations and Findings

The inspector compared the AFRRI Reactor Facility organizational structure and the responsibilities of the reactor management and staff to the requirements of TS Sections 6.1 and 6.2. Figure 1 of the TS, Organization of Personnel for Management and Operation of the AFRRI Reactor, shows the AFRRI Radiation Protection Officer (RPO) reporting to the Director of AFRRI. TS 6.1.2 states "The Director, AFRRI, shall have license responsibility for the reactor facility." The inspector found that a recent organizational change had eliminated the reporting line from the RPO to the AFRRI Director.

AFRRI had been made a part of the Uniformed Services University of the Health Sciences (USUHS) headed by the USUHS President; the Director of AFRRI reported to the USUHS President. Radiation protection services for AFRRI had recently been consolidated with those of USUHS. The RPO overseeing the radiation protection program for AFRRI reported to the USUHS Assistant Vice President for Environmental Health and Safety who reported to the USUHS President. While there was no documented chain of command between the RPO and Director, individuals involved acknowledged that should the need exist, communications would follow that path.

TS 6.1.1 allows for flexibility with the words, "Organizational changes may occur, based on Institute requirements, and they will be depicted on internal

documents." However, the licensee had not documented an alternative chain of command from the RPO to the AFRRI Director. The licensee was made aware of this matter early in the inspection and began immediate discussions toward resolution. This will be designated an Inspection Follow-up Item (IFI) for consideration at a subsequent time. (IFI 50-170/2007-201-01)

Currently there are only two licensed reactor operators, the Reactor Facility Director (RFD) and the Reactor Operations Supervisor (ROS). Operations are restricted to one day per week for lack of operators. The licensee is currently preparing four staff members to become licensed operators; the inspector verified that the licensee is conducting the appropriate training. One of the trainees is civilian and three are military, subject to rotation after three to four years at AFRRI. TS required staffing requirements were being met.

c. Conclusion

The organization and staffing were consistent with TS requirements with the exception of a documented reporting chain between the RPO and Director, which is the topic of an inspector follow-up item.

2. Operations Logs and Records

a. Inspection Scope (IP 69001)

The inspector reviewed the following to verify compliance with regulatory and license requirements:

- Reactor Console Logbooks #128 (October 20, 2005 to November 1, 2006) and #129 (November 2, 2006 to present)
- Daily Operating Startup Checklist, Procedure 8, Tab B, Rev. November 22, 2006
- K-Excess, Procedure 8, Tab D, Rev. January 16, 1992
- Daily Operating Shutdown Checklist, Procedure 8, Tab I, Rev. November 22, 2006
- Daily Safety Checklist, Procedure 8, Tab B
- Weekly Operational Instrumentation Checklist, Procedure 8, Tab H, Rev. November 22, 2006

b. Observations and Findings

The inspector observed a reactor checkout and reactivity check at five watts utilizing "Daily Operating Startup Checklist" and "K-Excess" procedures, respectively. While the operator was thoroughly familiar with the procedure and had committed it to memory, he was methodical in following it and documenting readings. The inspector found procedures to be well written and conducive to the operator's needs. The inspector selected at random checklists completed over the past year and found them to be of similar quality to the ones he observed being performed.

The inspector reviewed selected portions of recent console logbook entries including fuel inspection on October 27, 2005 and a startup on November 7, 2005. He also verified that the required staffing was recorded at all times, with the Senior Reactor Operator (SRO) and Health Physicist (HP) on call designated by name in the reactor log,

c. Conclusion

The logs and records of operation were consistent with TS requirements.

3. Procedures

a. Inspection Scope (IP 69001)

The inspector reviewed the following to verify that the licensee was complying with the requirements of TS Section 6.3:

- AFRRI Procedure Manual
- Writing and Modifying Procedures, Procedure 0
- Maintenance Procedures, Procedure 3, Rev. December 1, 1994

b. Observations and Findings

The inspector reviewed the licensee's system of procedures which addresses each of the TS requirements. While a system for preparing and revising procedures exists, the stable operation has resulted in a mature set of procedures requiring relatively few changes. The inspector verified that revisions were made to procedures as a result of recent facility changes.

c. Conclusions

Procedural control and implementation satisfied TS requirements.

4. Health Physics

a. Inspection Scope (IP 69001)

To verify compliance with NRC regulations and license conditions, the inspector reviewed selected aspects of:

- Personnel Exposure Records for 2006
- Radiation Area Monitor Calibration Records for 2006
- Reactor Pool Water Analysis Records for 2006
- Reactor Secondary Water Analysis Records for 2006
- Continuous Air Monitor Calibration Records for 2006
- Reactor and LINAC Area Routine survey Records for 2006
- facility TLD records for 2006
- radiation warning postings throughout the facility
- postings for radiation workers throughout the facility

- Refresher Training Records for 2006
- Supervised User Training Records for 2006
- Principle Investigator/Scientific Investigator Training Records for 2006
- AFRRI General Employee Briefing Records for 2006

b. Observations and Findings

During a tour of the facility the inspector verified that postings for radiation workers were in compliance with the requirements of 10 CFR Part 19, posting of radiation warning signs were in accordance with 10 CFR Part 20, portable and fixed radiation detectors indicated current calibration status, and overall housekeeping was good.

Records of personnel training in radiation safety indicated that training had been administered and individuals were examined at a level commensurate with the individual's access to radiation exposure. Instructional material included protection to the fetus, sources for additional information on the subject, and policies for declared pregnant workers.

Records indicated that radiation sources and personnel exposures throughout the facility were minimal and that As Low As Reasonably Achievable (ALARA) practices were in effect. Records indicated that devices used to measure radiation were calibrated regularly using state of the art calibration procedures.

c. Conclusions

The licensee was conducting an effective health physics program so as to minimize radiation exposure.

5. Effluents and Environmental Monitoring

a. Inspection Scope (IP 69001)

The inspector reviewed selected aspects of the following to verify compliance with TS Sections 3.5, 3.8, and 4.5 requirements:

- Liquid Radioactive Effluent Analysis Records (Waste Tanks) for 2006
- Gaseous Radioeffluent Reports for 2006
- Environmental Posted TLD Records for 2006
- Environmental Sample Analysis Records for 2006

b. Observations and Findings

The reactor had not been heavily utilized during the past year so the inspector expected emissions to be minimal. Argon 41, the major gaseous effluent, was determined to be 2.23 Curies for the year 2006 which is 0.0116 percent of the 10 CFR Part 20 limit based on level 2 analysis using the COMPLY computer code. The resulting annual dose was determined to be 0.071 mrem or 0.71 percent of the ALARA constraint level of 10 mrem per year. Environmental TLD monitors read essentially background levels.

The liquid effluent for 2006 was 42.58 percent of the 10 CFR Part 20 limit but analysis of monthly releases showed that reactor effluents were minimal; the major source was legacy waste from a laboratory cleaned during the year.

c. Conclusions

Licensee releases of radioactive gases and liquids to the environment were minimal as measured at the point of release and confirmed by measurements in the environment.

6. Design Changes

a. Inspection Scope (IP 69001)

In order to verify that any modifications to the facility were consistent with 10 CFR 50.59, the inspector reviewed selected aspects of:

- Reactor Facility Modification Records for 2006
- Facility Modification, Administrative Procedure A3, Rev. February 26, 2001

b. Observations and Findings

Through review of applicable records and interviews with licensee personnel, the inspector determined that no changes requiring prior NRC approval had been initiated and/or completed at the facility since the last NRC operations inspection. One change was screened, the replacement of an obsolete area radiation monitor with a newer version. The 50.59 screening found the functions of the new device to be equivalent to the obsolete version so a full 50.59 analysis was not required. Minor changes were required to update a procedure, however.

c. Conclusions

The licensee's design change program was being implemented as required.

7. Committees, Audits, and Reviews

a. Inspection Scope (IP 69001)

The inspector reviewed the following to ensure that the audits and reviews stipulated in TS Section 6.2 were being completed:

- TS 6.2, “Review and Audit - The Reactor and Radiation Facility Safety Committee (RRFSC)”
- Minutes of the RRFSS meetings for 2006

b. Observations and Findings

The inspector verified that the TS 6.2 requirements for the RRFSC are being met through a recently modified committee structure discussed in the previous inspection report. See Inspection Report 50-170/2006-201 and discussion in section 10 of this report on IFI 50-170/2006-201-01.

Minutes of meetings indicate that the committee met at the frequency required by TS with a quorum present. The annual audit of reactor facility activities for 2006 was conducted in January of 2007 but the audit report had not yet been provided to the licensee at the time of the inspection.

c. Conclusions

Review and oversight functions were executed in accordance with TS requirements.

8. Maintenance Logs and Records

a. Inspection Scope (IP 69001)

To verify compliance with TS requirements the inspector reviewed selected aspects of:

- Annual Maintenance Report for Year 2006, February 15, 2007, with the attached output of Son of TRIGA Tracker
- Surveillance Procedure S011, Power Coefficient of Reactivity, Rev. dated November 5, 2003
- Rod Worth Curves Measured December 13-14, 2006
- Maintenance Procedure M003, Transient Rod Air System (Monthly)

b. Observations and Findings

The inspector verified through records that all annual, semi-annual, quarterly and monthly requirements were performed on their respective frequencies. In addition, the inspector verified that the TS surveillance requirement for annual measurement of reactivity was performed per procedure S011; they were done per procedure on March 22, 2006 and November 14, 2006.

c. Conclusions

The licensee has implemented a means of tracking maintenance requirements and completes them within the required frequencies.

9. Transportation

a. Inspection Scope (IP 86740)

The inspector reviewed the packet of records for the November 27, 2006, shipment of a Pu-239 foil:

- Bill of Lading
- Time Advantage Confirmation
- Shipper's Declaration of Dangerous Goods
- Container Inspection Record
- FBT Certification of Compliance
- LANL Authorization Letter
- Container Loading and Closing Instructions, Type A Myers Drums
- Shipping Request

b. Observations and Findings

The licensee reported that the only radioactive material shipment made under the R-84 license since 2004 was done last November. As part of the DOE Off-site Source Recovery project, a 6.8 mCi Pu-239 foil was shipped to the Los Alamos National Laboratory (LANL). The inspector reviewed the documentation for this shipment.

c. Conclusion

Regulatory and license requirements were met in the transportation activity reviewed.

10. Follow-up on Previous Open Items

a. Inspection Scope (IP 92701)

The inspector reviewed the implementation of changes to the safety review committee structure that were newly instituted at the time of the previous inspection.

b. Observations and Findings

Open IFI 50-170/2006-201-01 was created at the previous inspection to verify that the newly formed Radiation Safety Committee (RSC) and Reactor and Radiation Facility Safety Subcommittee (RRFSS) met the intent of the TS requirement for a Reactor and Radiation Facility Safety Committee (RRFSC). The inspector reviewed this matter as reported in section 7 (above) and determined that the revised structure is functioning effectively and meets the intent of the TS requirement; the IFI was therefore closed.

c. Conclusions

Open IFI 50-17-/2006-201-01 concerning the safety oversight committee structure was closed.

11. Exit Meeting

The inspector presented the inspection results to licensee management at the conclusion of the inspection on February 28, 2007. The inspector discussed the observations for each area reviewed and the apparent follow-up item. The licensee acknowledged the findings and did not identify as proprietary any of the material provided to or reviewed by the inspector during the routine inspection.

PARTIAL LIST OF PERSONS CONTACTED

Licensee

W. Adams, CAPT, Radiation Sciences Department Head
K. Allen, MAJ, Reactor Operator Trainee
K. Baldwin, SFC, Reactor Operator Trainee
M. Belson, CPT, Reactor Operator Trainee
M. DeSouza, SSG, Reactor Operator Trainee
J. Ganz, HM1, Health Physicist, Environmental Health and Safety (EHS)
D. Hamilton, LTC, Radiation Safety Officer, EHS
P. Lillis-Hearne, COL, Director, AFRRI
S. Miller, Reactor Facility Director
J. Pommerville, Asst VP for EHS
T. Pellmar, Scientific Director
H. Spence, Reactor Operations Supervisor
W. D. Tomlinson, Reactor Operator Trainee
K. Tracy, SFC, Calibration Technician
B. Wampler, Health Physicist, EHS

INSPECTION PROCEDURES USED

IP 69001	Class II Non-Power Reactors
IP 86740	Transportation
IP 92701	Follow-up

ITEMS OPENED, CLOSED, AND DISCUSSED

OPENED:

50-170/2007-201-01	IFI	Define a chain of command from the Radiation Protection Officer to the AFRRI Director (Licensee) consistent with Technical Specification 6.1

CLOSED

50-170/2006-201-01	IFI	Follow-up to verify the licensee organizes and controls the RRFSS to effectively oversee the facility operations to ensure the public health and safety

DISCUSSED:

None

LIST OF ACRONYMS USED

ADAMS	Agencywide Document Access and Management System
AFRRI	Armed Forces Radiobiology Research Institute
ALARA	As Low As Reasonably Achievable
CFR	Code of Federal Regulations

EHS	Environmental Health and Safety
HP	Health Physics
IFI	Inspector Follow-up Item
IP	Inspection Procedure
LANL	Los Alamos National Laboratory
MREM	Millirem
MW	megawatt
NRC	Nuclear Regulatory Commission
RFD	Reactor Facility Director
ROS	Reactor Operations Supervisor
RPO	Radiation Potection Officer
RRFSC	Reactor and Radiation Facility Safety Committee
RRFSS	Reactor and Radiation Facility Safety Subcommittee
RSC	Radiation Safety Committee
SRO	Senior Reactor Operator
TLD	Thermoluminescent Dosimeter
TS	Technical Specifications
TRIGA	Training Research Isotope Production General Atomics
USUHS	Unifromed Services University of the Health Sciences