August 28, 2017

Mr. Max Nager, Reactor Supervisor
Kansas State University
Nuclear Reactor Facility
Department of Mechanical and
Nuclear Engineering
112 Ward Hall
Kansas State University
Manhattan, KS 66506-5204

SUBJECT: KANSAS STATE UNIVERSITY – U.S. NUCLEAR REGULATORY COMMISSION ROUTINE, ANNOUNCED INSPECTION REPORT NO. 50-188/2017-201

Dear Mr. Nager:

From August 7-10, 2017, the U.S. Nuclear Regulatory Commission (NRC) conducted an inspection at the Kansas State University Nuclear Reactor Facility. The inspection included a review of activities authorized for your facility. The enclosed report presents the results of that inspection.

The inspection examined activities conducted under your license as they relate to safety and compliance with the Commission's rules and regulations and with the conditions of your license. The inspector reviewed selected procedures and records, observed various activities, and interviewed 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 and its enclosure will be available electronically for public inspection in the NRC Public Document Room or from the Publicly Available Records component of 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 Gary Morlang at 301-415-4092 or by electronic mail at Gary.Morlang@nrc.gov.

Sincerely,

/RA/

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

Docket No. 50-188
License No. R-88

Enclosure:
As stated

cc: w/enclosure: See next page

SUBJECT: KANSAS STATE UNIVERSITY – U.S. NUCLEAR REGULATORY COMMISSION ROUTINE INSPECTION REPORT NO. 50-188/2017-201 DATED: AUGUST 28, 2017

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

Docket No.	50-188
License No.	R-88
Report No.	50-188/2017-201
Licensee:	Kansas State University
Facility:	TRIGA Mark II Research Reactor
Location:	Manhattan, Kansas
Dates:	August 7-10, 2017
Inspector:	Gary Morlang
Approved by:	Anthony J. Mendiola, Chief Research and Test Reactors Oversight Branch Division of Policy and Rulemaking Office of Nuclear Reactor Regulation

Enclosure

EXECUTIVE SUMMARY

Kansas State University
TRIGA Mark II Research Reactor Facility
Nuclear Regulatory Commission
Inspection Report No. 50-188/2017-201

The primary focus of this routine, announced inspection was the onsite review of selected aspects of the Kansas State University (the licensee's) Class II research reactor facility safety programs including: (1) operations logs and records; (2) experiments; (3) health physics and environmental protection; (4) design changes; (5) committees, audits, and reviews; and (6) transportation of radioactive material. The licensee's programs were acceptably directed toward the protection of public health and safety, and were in compliance with the U.S. Nuclear Regulatory Commission requirements (NRC).

Operations Logs and Records

- Operations Logs and records were maintained in accordance with procedures and technical specifications (TSs).

Experiments

- Experiments were being reviewed and performed in accordance with TS requirements and the licensee's written procedures.

Health Physics and Environmental Protection

- The radiation safety program was conducted in compliance with Title 10 of the *Code of Federal Regulations* (10 CFR) Part 20, "Standards for Protection against Radiation," requirements, TSs, and licensee procedures.

- Effluent monitoring satisfied license and regulatory requirements and releases were within the specified regulatory and TS limits.

Design Changes

- The review and evaluation of changes to the facility and procedures satisfied NRC requirements as specified in 10 CFR 50.59, "Changes, tests and experiments."

Committees, Audits, and Reviews

- The Reactor Safety Committee provided the oversight required by the TSs.

Transportation

- Due to the nature of the licensee operations, no shipments had been made from the reactor facility under the reactor license during the past 2 years.

REPORT DETAILS

Summary of Facility Status

The Kansas State University's (KSU's or the licensee's) 1,250-kilowatt reactor continued to be operated in support of the University's academic program in nuclear engineering laboratory instruction and research. The reactor was operated only for short sample irradiations during the inspection.

1. Operations Logs and Records

a. Inspection Scope (Inspection Procedures (IPs) 69001)

The inspector reviewed selected parts of the following reactor operations records to verify that the requirements of technical specification (TS) Section 6.10, "Plant Operating Records," were being met:

- TSs for KSU TRIGA Nuclear Reactor, dated March 13, 2008, amended April 2011
- KSU TRIGA Mark II Console Logbooks, dated July 20, 2015, to present Daily Checklists, dated July 10, 2015, to present
- KSU TRIGA Mark II Reactor Startup and Secured Checklist, dated July 10, 2015
- Test and Maintenance Procedure Number (No.) 28, "Temperature Channel Calibration," dated March 14, 2008
- 2015 Annual Operating Report for KSU TRIGA Mark II Nuclear Reactor Facility dated 13 January 2016
- 2016 Annual Operating Report for KSU TRIGA Mark II Nuclear Reactor Facility dated 26 January, 2017
- Operating Procedure No. 16, "Pulsed Operation," dated 16 August 2016

b. Observations and Findings

The inspector noted in the operating logs that there were 13 inadvertent scrams in 2015 and 6 inadvertent scrams in 2016. This is an increase from the last inspection in this area but still significantly below the numbers years ago when numerous electrical problems were present. Detailed operator training and equipment upgrades both contributed to the improvement.

Console operating logs were well maintained and easily cross referenced to other documents.

c. Conclusion

Operating logs and records were being maintained in accordance with procedures and TSs.

2. Experiments

a. Inspection Scope (IP 69001)

In order to verify that any existing experiments and newly proposed experiments met all TS requirements, the inspector reviewed selected aspects of:

- TSs for KSU TRIGA Nuclear Reactor, dated March 13, 2008, amended April 2011
- KSU TRIGA Mark II Experiment 1, dated October 18, 2013
- KSU TRIGA Mark II Console Logbooks, dated July 10, 2015, to present
- KSU TRIGA Mark II By-Product Logbook, dated October 2011, to present
- Reactor Safety Committee (RSC) meeting minutes for 2016 and 2017

b. Observations and Findings

The licensee maintained a file of existing experiments. The facility's TSs, which were issued on March 13, 2008, when the facility's license was renewed, require any new experiments to be approved by the RSC. Two new experiments had been proposed to the RSC since the last inspection.

Experiment #53, Void Coefficient of Reactivity, and Experiment #54, Piercing Beam Port Characterization had both been approved by the RSC.

c. Conclusion

Experiments were being reviewed and performed in accordance with TS requirements and the licensee's written procedures.

3. Health Physics and Environmental Protection

a. Inspection Scope (IP 69001)

The inspector reviewed the following to verify compliance with Title 10 of the *Code of Federal Regulations* (10 CFR) Part 20, "Standards for Protection against Radiation," requirements:

- 2015 Annual Operating Report for KSU TRIGA Mark II Nuclear Reactor Facility dated 13 January 2016
- 2016 Annual Operating Report for KSU TRIGA Mark II Nuclear Reactor Facility dated 16 January, 2017
- Radiation Dosimetry Report for 2016 and 2017 year to date
- Radiation Safety Manual for KSU, dated August 2007
- Test and Maintenance Procedure 13, "General Radiation Detector Calibration and Efficiency Determination," dated 5 December, 2016
- Radiation Protection Program dated December 2011

- Test and Maintenance Procedure 20, “Liquid Scintillation Assay Methods,” dated March 14, 2008
- Test and Maintenance Procedure 3, “Remote Area Monitor Calibration,” dated March 14, 2008
- Nuclear Reactor Facility Monthly Radiation and Smear Surveys, May 2016 to May 2017
- Sump Discharge Calculations for 2015 and 2016
- Semiannual Management Audit Report of Reactor Operations and Radiation Protection from 2015 to 2016

b. Observations and Findings

The inspector toured the facility to interview and observe licensee personnel and practices regarding the use of dosimetry and radiation monitoring equipment, placement of radiological signs and postings, use of protective clothing, and practices for handling and storing radioactive material or contaminated equipment.

The inspector reviewed records of monthly radiation surveys and contamination surveys performed by the reactor staff and health physics technicians, and found the results to be generally low and consistent with facility postings and readings of instruments observed by the inspector. A copy of the current U.S. Nuclear Regulatory Commission (NRC) Form 3, “Notice to Radiation Workers,” was posted as required by 10 CFR Part 19, “Notices, Instructions and Reports to Workers: Inspection and Investigations.”

Dosimetry results were reviewed by the inspector for 2015 and 2016 and found to be well below facility and regulatory limits.

The reactor staff personnel have the responsibility and facilities for the calibration of all portable radiation detectors at the facility. The calibration records of selected devices were reviewed and found to be up to date.

The inspector reviewed the annual reports for the 2015 to 2016 period. There were a total of 7 liquid discharges from the reactor bay sump during those 2 years. All isotope levels were below 10 CFR Part 20, Appendix B limits.

c. Conclusion

The radiation safety program was conducted in compliance with 10 CFR Part 20 requirements, TS, and licensee procedures.

4. Design Changes

a. Inspection Scope (IP 69001)

The inspector reviewed the following to ensure that if design changes were made, they were reviewed and approved in accordance with 10 CFR 50.59, "Changes, tests and experiments," the TS, and the licensee's administrative procedures:

- 2015 Annual Operating Report for KSU TRIGA Mark II Nuclear Reactor Facility dated 13 January 2016
- 2016 Annual Operating Report for KSU TRIGA Mark II Nuclear Reactor Facility dated 16 January, 2017
- TSs for KSU TRIGA Nuclear Reactor, dated March 13, 2008, amended April 2011
- Annual 10 CFR 50.59, Reports for 2015 and 2016
- KSU TRIGA Mark II Console Logbooks, dated July 20, 2015, to present
- RSC Annual Operating Audits for 2015 and 2016

b. Observations and Findings

The licensee had performed a 10 CFR 50.59 evaluation for 4 facility modifications and numerous procedure changes since the last inspection in this area. The facility modifications included items such as installing a seal on the thermal column, differential pressure gauge replacement, continuous air monitor replacement and thermal column winch replacement. All evaluations were completed and submitted to the RSC for final approval.

c. Conclusion

The review and evaluation of changes to facilities and procedures satisfied NRC requirements specified in 10 CFR 50.59.

5. Committees, Audits, and Reviews

a. Inspection Scope (IP 69001)

The inspector reviewed the following to ensure that audits and reviews stipulated in the facility's TS were conducted by the RSC:

- KSU TRIGA Mark II Console Logbooks, dated July 20, 2015, to present
- Technical Specifications for KSU TRIGA Reactor, dated March 31, 2008, amended April 2011
- 2015 Annual Operating Report for KSU TRIGA Mark II Nuclear Reactor Facility dated 13 January 2016
- 2016 Annual Operating Report for KSU TRIGA Mark II Nuclear Reactor Facility dated 16 January, 2017

- RSC twice a year meeting minutes for 2016 and 2017
- Semiannual Management Audit Report of Reactor Operations and Radiation Protection from 2015 and 2016

b. Observations and Findings

The inspector verified that the RSC conducted meetings at the required frequency with a quorum present, pursuant to TS requirements. The RSC conducted the required audits, reviewed and approved procedures and experiments, and provided direct oversight of reactor operations.

c. Conclusion

The RSC provided the oversight required by the TSs.

6. Transportation of Radioactive Material

a. Inspection Scope (IP 86740)

The inspector interviewed licensee personnel and determined that no shipment of radioactive material had been conducted under the Facility Operating License No. R-88 since the last inspection in this area. The inspector also reviewed the following:

- 2015 Annual Operating Report for KSU TRIGA Mark II Nuclear Reactor Facility dated 13 January 2016
- 2016 Annual Operating Report for KSU TRIGA Mark II Nuclear Reactor Facility dated 16 January, 2017
- RSC twice a year meeting minutes for 2015 and 2016

a. Observations and Findings

There were two individuals authorized to ship radioactive material at the university. The inspector verified that these individuals had been properly trained and that their certifications were up-to-date. There had been no shipments of radioactive material since the last inspection in this area.

b. Conclusion

Although the licensee had not shipped any radioactive material, personnel and procedures were in place should the need to ship arise.

7. Exit Interview

The inspector presented the inspection results to licensee management at the conclusion of the inspection on August 10, 2017. The inspector described the areas inspected and discussed in detail the inspection observations. The licensee acknowledged the observations presented and did not identify as proprietary any of the material provided to or reviewed by the inspector during the inspection.

PARTIAL LIST OF PERSONS CONTACTED

Licensee

M. Nager	Reactor Supervisor
R. Bridges	Head of Radiation Safety Office, Environmental Health and Safety Division and Campus Radiation Safety Officer
M. Catanach	Deputy Director, Radiation Safety Office, Environmental Health and Safety
J. Chadwich	Senior Reactor Operator
J. Hewitt	Senior Reactor Operator
R. Seymour	Senior Reactor Operator
S. Kern	Reactor Operator
A. Bahadore	Reactor Manager

INSPECTION PROCEDURES USED

IP 69001	Class II Research and Test Reactors

ITEMS OPENED, CLOSED, AND DISCUSSED

Opened

None

Closed

None

PARTIAL LIST OF ACRONYMS USED

10 CFR	Title 10 of the *Code of Federal Regulations*
IP	Inspection Procedure
KSU	Kansas State University
No.	Number
NRC	U.S. Nuclear Regulatory Commission
RSC	Reactor Safeguards Committee
TS	Technical Specification