

August 23, 2011

Dr. Jeffrey Geuther, Manager  
KSU Nuclear Reactor Facility  
Department of Mechanical and  
Nuclear Engineering  
112 Ward Hall  
Kansas State University  
Manhattan, KS 66506-5204

SUBJECT: KANSAS STATE UNIVERSITY - NRC ROUTINE, ANNOUNCED INSPECTION  
REPORT NO. 50-188/2011-201

Dear Dr. Geuther:

On July 18-21, 2011, the U.S. Nuclear Regulatory Commission (NRC, the Commission) conducted an inspection at the Kansas State University Nuclear Reactor Facility (Inspection Report No. 50-188/2011-201). The inspection included a review of activities authorized for your facility. The enclosed report presents the results of that inspection.

This inspection was an examination of 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. 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 concern or noncompliance with NRC requirements was 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 (PARS) component of NRC's document system (Agencywide Document Access and Management System (ADAMS)). ADAMS is accessible from the NRC Web site at (the Public Electronic Reading Room) <http://www.nrc.gov/reading-rm/adams.html>.

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](mailto:Gary.Morlang@nrc.gov).

Sincerely,

**/RA/**

Johnny H. Eads, Jr., 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/encl: See next page

Kansas State University

Docket No. 50-188

cc:

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

Docket No: 50-188

License No: R-88

Report No: 50-188/2011-201

Licensee: Kansas State University

Facility: TRIGA Mark II Research Reactor

Location: Manhattan, Kansas

Dates: July 18-21, 2011

Inspector: Gary (Mike) Morlang  
Taylor Lichatz (Trainee)

Approved by: Johnny Eads, Jr., Chief  
Research and Test Reactors Oversight Branch  
Division of Policy and Rulemaking  
Office of Nuclear Reactor Regulation

## EXECUTIVE SUMMARY

Kansas State University  
TRIGA Mark II Research Reactor Facility  
NRC Inspection Report No. 50-188/2011-201

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: experiments; health physics; effluents and environmental monitoring; design changes; committees, audits and reviews, and 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 (NRC) requirements.

### Experiments

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

### Health Physics

- The radiation safety program is commensurate with Title 10 of the *Code of Federal Regulations* (10 CFR) Part 20 requirements, Technical Specifications, and Procedures.

### Environmental Protection

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

### Design Changes

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

### Committees, Audits, and Reviews

- The Reactor Safety Committee provided the oversight required by the Technical Specifications.

### Transportation

- Due to the nature of the licensee operations, there is typically no shipment of reactor licensed radioactive material.

### Follow-up on Previously Identified Issues

- Unresolved Item 50-188/2007-202-01 was discussed and closed.
- Inspector Follow-up Item 50-188-2009-201-01 was discussed and closed.

## REPORT DETAILS

### Summary of Facility Status

The Kansas State University's (KSU, the licensee's) 1250 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. Experiments

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

In order to verify that any modifications to the facility were consistent with Technical Specifications (TS) 3.6 requirements, procedures, and Title 10 of the *Code of Federal Regulations* (10 CFR) Section 50.59 requirements, the inspectors reviewed selected aspects of:

- TS for Kansas State University TRIGA Reactor dated March 13, 2008
- KSU TRIGA Mark II Experiment 1 dated April 07, 2011
- KSU TRIGA Mark II Console Logbooks dated June 21, 2010 to July 19, 2011
- KSU TRIGA Mark II By-Product Logbook dated October 2010-Present
- Reactor Safety Committee (RSC) Meeting Minutes from November 23, April 1, and July 12, 2011

##### b. Observations and Findings

The licensee maintained a file of existing experiments some of which required approval of the RSC. The new TS issued March 13, 2008, with the license renewal require any new experiments to be approved by the RSC. Experiment 1, entitled "Isotope Production", was reviewed and approved.

From a random sampling of forms and console logbooks for experiments performed since the previous inspection, the inspectors found that there were minor omissions, but no significant items were noted. Overall, experiments were being reviewed and performed in accordance with TS requirements and the licensee's written procedures.

##### c. Conclusion

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

## 2. Health Physics and Environmental Protection

### a. Inspection Scope (IP 69001)

The inspector reviewed the following to verify compliance with 10 CFR Part 20 requirements:

- KSU Annual Report to USNRC, April 2009 to March 2010, dated April 30, 2010
- Radiation Safety Manual for KSU, dated August 2007
- Personnel dosimetry records
- Test and Maintenance Procedure 13, Portable Radiation Meter Calibration, dated March 14, 2008
- Test and Maintenance Procedure 20, Liquid Scintillation Assay Methods dated March 14, 2008
- Test and Maintenance Procedure 3-1, Remote Area Monitor Calibration dated January 27, 1987
- Test and Maintenance Procedure 8, Calibration of Continuous Air Monitor, dated March 14, 2008
- Landauer Report for Nuclear Reactor Facility Personnel for 2010 and year to date for 2011
- Nuclear Reactor Facility Monthly Radiation and Smear Surveys, January 2010 to present
- Semi Annual Audit Reports for 2009 and 2010

### b. Observations and Findings

The inspectors 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, practices for handling and storing radioactive material or contaminated equipment.

The inspectors reviewed records of monthly radiation surveys and smears performed by the reactor staff and health physics technicians, and found them to be generally low and in line with facility postings and readings of instruments observed by the inspectors. One monthly area radiation survey had not been completed. No unmarked radioactive material was found in the facility. A copy of the current NRC Form 3, "Notice to Radiation Workers" required by 10 CFR Part 19 was posted at the entrance to the Control Room and Reactor Bay.

Dosimetry results were reviewed by the inspectors, the maximum dose received in calendar year 2010 was 220 mrem, the maximum dose to date in calendar year 2011 was 39 mrem.

The Environmental Health and Safety personnel have the responsibility and facilities for the calibration of all portable radiation detectors on the campus. The calibration records of selected devices were reviewed. The facility had purchased a new neutron ball portable detector. The detector could not be

calibrated by licensed personnel and had to be returned to the vendor for calibration.

The inspectors reviewed the annual report for the March 2009 to March 2010 period. There was one liquid discharge from the reactor bay sump. All isotope levels were below 10 CFR Part 20, Appendix B limits. The Ar-41 release for the year 2010 was documented at  $4.86 \times 10^{-11}$  micro curies/ml.

c. Conclusion

The radiation safety program is commensurate with 10 CFR Part 20 requirements, TS, and Procedures.

**3. Design Changes**

a. Inspection Scope (IP 69001)

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

- KSU Annual Report to USNRC, April 2009 to March 2010, dated April 30, 2010
- TS for Kansas State University TRIGA Reactor dated March 13, 2008
- Annual 10 CFR 50.59 Reports for 2010 and 2011
- Console Log Books from November 19, 2010 to present
- 10 CFR 50.59 Evaluation Reports for 2010 and 2011 to date
- Standard Operating Procedure 5, Attachment 2, Evaluation of Change, and Program Effectiveness dated July 5, 2006
- RSC Annual Operating Report dated July 13, 2011

b. Observations and Findings

The licensee had performed a 10 CFR 50.59 evaluation for two facility modifications, and four procedure changes during since the last inspection in this area. The facility modifications included a digital strip chart recorder and the installation of hand rails at the 12 foot level of the reactor tank.

A diesel electric generator had been installed to provide emergency power to the building connected to the reactor facility. The diesel generator is housed inside the fenced area around the reactor building. The diesel generator does not supply power to any of the reactor safety equipment.

c. Conclusion

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

#### **4. Committees, Audits and Reviews**

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

The inspectors reviewed the following to ensure that audits and reviews stipulated in TS by the RSC:

- TS for Kansas State University TRIGA Reactor dated March 31, 2008
- KSU TRIGA Mark II 2010 Annual Report dated April 30, 2011
- RSC Quarterly Meeting minutes from November 23, 2010 and April 1, 2011
- RSC Special Committee Meeting dated July 12, 2011 on the June 24, 2011 Unusual Event

##### **b. Observations and Findings**

The inspectors verified that the RSC conducted meetings at the required frequency with a quorum present, pursuant to TS requirements. The inspectors followed-up on the June 24, 2011 Unusual Event with the high cesium-137 and iodine readings. It was determined that the air monitoring system 4 iodine detector failed high and was found to have two chips that were bad. It was determined that the RSC convened a meeting in accordance with TS and procedures.

##### **c. Conclusion**

The RSC provided the oversight required by the TS.

#### **5. Transportation**

##### **a. Inspection Scope (IP 86740)**

The inspectors interviewed licensee personnel and determined that no shipments of radioactive material had been conducted under the R-88 license. The inspectors also reviewed the following

- KSU Annual Report to USNRC, April 2009 to March 2010, dated April 30, 2010

##### **b. Observations and Findings**

By nature of its operations, the licensee does not typically conduct waste transfer to or from the R-88 license. Most material transfer occurs within the scope of the broad byproduct (state) materials license under the direction of the campus RSO.

c. Conclusion

Due to the nature of the licensee operations, there is typically no shipment of reactor licensed radioactive material.

**6. Follow-up on Previously Identified Issue**

a. Inspection Scope (IP 92701)

The inspectors reviewed progress on an unresolved item (URI) from a previous inspection, 50-188/2007-202-01, "Storage of reactor waste at campus decay-in-storage facility." Additionally, the inspectors reviewed progress on an inspector follow-up (IFI) from a previous inspection, 50-188/2009-01-01, "Corrective action to address reactor trips associated with operator error.

b. Observations and Findings

The inspectors observed that the reactor licensed waste that had been stored at an off-site waste storage building had been returned to the reactor facility. Therefore this item will be closed.

The inspectors reviewed the console logs and noted only 3 operator error trips in 2009 and 6 operator error trips in 2011. This is down from 13 trips noted during the previous inspection. This item was discussed with the Reactor Manager and will be closed.

c. Conclusion

URI 50-188/2007-202-01 and IFI 50-188/2009-201-01 were discussed and are considered closed.

**7. Exit Interview**

The inspectors presented the inspection results to licensee management at the conclusion of the inspection on July 21, 2011. The inspectors described the areas inspected and discussed in detail the inspection observations. No dissenting comments were received from the licensee. The licensee acknowledged the observations presented and did not identify as proprietary, any of the material provided to or reviewed by the inspectors during the inspection.

## **PARTIAL LIST OF PERSONS CONTACTED**

### Licensee

R. Bridges	Head of Radiation Safety Office, Environmental Health and Safety Division and Campus Radiation Safety Officer
M. Jones	Senior Reactor Operator
J. Smith	Senior Reactor Operator
J. Geuther	Reactor Manager
M. Marietta	Reactor Operator
J. Porter	Reactor Operator
C. Whitten	Reactor Operator

## **INSPECTION PROCEDURES USED**

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

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

### OPENED

None

### CLOSED

50-188/2007-202-01	URI	Storage of reactor waste at campus decay-in-storage facility
50-188/2009-201-01	IFI	Corrective action to address reactor trips associated with operator error

### DISCUSSED

50-188/2007-202-01	URI	Storage of reactor waste at campus decay-in-storage facility
50-188/2009-201-01	IFI	Corrective action to address reactor trips associated with operator error

**PARTIAL LIST OF ACRONYMS USED**

10 CFR	Title 10 of the <i>Code of Federal Regulations</i>
ADAMS	Agency-wide Document Access Management System
IFI	Inspector Follow-up Item
IP	Inspection Procedure
KSU	Kansas State University
NRC	U. S. Nuclear Regulatory Commission
Rev.	Revision
RO	Reactor Operator
RSC	Reactor Safety Committee
SRO	Senior Reactor Operator
TS	Technical Specifications
URI	Unresolved Item