

July 9, 2009

Mr. Paul M. Whaley, 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 NUCLEAR REACTOR FACILITY - NRC
ROUTINE, ANNOUNCED INSPECTION REPORT NO. 50-188/2009-201

Dear Mr. Whaley:

On June 22-25, 2009, the U.S. Nuclear Regulatory Commission (NRC, the Commission) conducted an inspection at the Kansas State University Nuclear Reactor Facility (Inspection Report No. 50-188/2009-201). 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* Part 2.390 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 Greg Schoenebeck at 301-415-6345 or by electronic mail at Greg.Schoenebeck@nrc.gov.

Sincerely,

/RA/

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

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

Enclosure:
As stated

cc: See next page

Kansas State University

Docket No. 50-188

cc:

Office of the Governor
State of Kansas
Topeka, KS 66612

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Test, Research, and Training
Reactor Newsletter
University of Florida
202 Nuclear Sciences Center
Gainesville, FL 32611

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

Docket No: 50-188

License No: R-88

Report No: 50-188/2009-201

Licensee: Kansas State University

Facility: TRIGA Mark II Research Reactor

Location: Manhattan, Kansas

Dates: June 22-25, 2009

Inspectors: Gregory M. Schoenebeck
Gary (Mike) Morlang

Approved by: Johnny Eads, Chief
Research and Test Reactors Branch B
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. 50-188/2009-201

The primary focus of this routine, announced inspection was the onsite review of selected aspects of the Kansas State University (the licensee) Class II research reactor facility safety programs including: organization and staffing; operations logs and records; procedures; experiments; health physics; design changes; committees, audits and reviews; maintenance logs and records; and transportation. 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.

Organization and Staffing

- The organization and staffing was consistent with TS requirements.

Operations Logs and Records

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

Procedures

- Procedure administrative review, revision, adherence to, and implementation satisfied Technical Specification 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 10 CFR 20 requirements, Technical Specifications, and Procedures.

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 RSC provided the oversight required by the Technical Specifications.

Maintenance Logs and Records

- Maintenance was performed and logs and records maintained consistent with Technical Specification and licensee procedure requirements.

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 was left open for further investigation.

REPORT DETAILS

Summary of Facility Status

The Kansas State University's (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. Since the inspection was performed during the summer recess, laboratory experiments were not scheduled and the reactor was operated only for short sample irradiations. In addition to the routine inspection considerations, this inspection also considered two unique events; changes associated with a March 13, 2008, license amendment for an increased licensed reactor power level and recovery from the June 12, 2008, tornado. During the performance based aspect of the inspection, the reactor was operated to support this area.

1. Organization and Staffing

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

The inspectors reviewed the following to verify compliance with the organization and staffing requirements in Technical Specification (TS) Section 6.1:

- K-State Reactor organizational structure and staffing
- Technical Specifications for Kansas State University TRIGA Reactor dated March 2008
- Reactor console logbooks covering operations in 2007 and year-to-date in 2009

b. Observations and Findings

Since the last inspection (NRC Inspection Report No. 50-188/2008-201, ADAMS # ML082390745) the organizational structure and the responsibilities of the reactor management and staff had not changed. The Reactor Manager (RM) is the same person that fills the position of Reactor Supervisor (RS) designated in the TS. The RM and one student are qualified Senior Reactor Operators (SROs) and seven students are qualified as Reactor Operators (ROs). Review of records verified that management responsibilities were administered as required by TS and applicable procedures. The inspector observed reactor operations on two occasions and noted the shift staffing of the licensee satisfies the requirements for TS.

c. Conclusions

The organization and staffing was consistent with TS requirements.

2. Operations Logs and Records

a. Inspection Scope (IP 69001)

The inspector reviewed selected aspects of the following to ensure that the operations program was being implemented as required in TS Section 6:

- Reactor console Log Books, dated from November 2007 to May 1, 2009
- KSU Operator Licenses (current), various dates
- KSU TRIGA Mark II Daily Checklist (Rev March 2008), dated from March 21, 2008 to June 24, 2009
- KSU Annual Report to USNRC, April 2008 to March 2009, dated April 30, 2009
- March 19, 2008 Startup Report

b. Observations and Findings

Reactor operations were carried out following written procedures and TS requirements. The inspector observed the performance of the required checklist for operation of the reactor. Additionally, a reactor start-up to power was observed. The inspector noted that the licensed operator on duty was knowledgeable and competent. The inspector verified that reactor operating characteristics, and other TS and procedure required entries, were recorded on the appropriate forms and logs. A review of the forms and logs indicated that TS operational limits had not been exceeded. The inspector determined that reactor operations were carried out in accordance with written procedures and TS requirements.

Through the review of logs, the annual report, and interviews with the licensed operators, it was determined that several inadvertent trips (including those occurring during the NE 250 course) were attributed to operator error with respect to maintaining the NMP-1000, multi-range power monitor, locked manually into a specific range while power increased to the trip level. As indicated in the KSU annual report, dated April 24, 2009, the licensee corrective action is to address this issue during the annual requalification program training. The inspector discussed this issue with the RM, and designated this as an Inspector Follow-up Item (IFI) 50-188/2009-201.

c. Conclusions

Operational activities were consistent with applicable TS and procedural requirements.

3. Procedures

a. Inspection Scope (IP 69001-02.03)

The inspectors reviewed the following to ensure that the requirements of TS Section 6.3, Operating Procedures, were being met concerning written procedures:

- Technical Specifications for Kansas State University TRIGA Reactor dated March 2008
- KSU TRIGA Mark II Operation, Test, and Maintenance Procedures, "OP-15 Reactor Startup", dated March 14, 2008
- KSU TRIGA Mark II Operation, Test, and Maintenance Procedures, "OP-16 Reactor Shutdown", dated March 14, 2008
- KSU Reactor Management Orders, "SOT-1 Instrument and Equipment Checkout", dated August 13, 2007

b. Observations and Findings

Oversight and review of procedure implementation was provided by licensee management and the Reactor Safeguards Committee. All procedures are current. During a reactor startup, procedure implementation was conducted satisfactorily, and was adhered to properly.

c. Conclusions

Procedure administrative review, revision, adherence to, and implementation satisfied Technical Specification requirements.

4. Experiments

a. Inspection Scope (IP 69001)

In order to verify that any modifications to the facility were consistent with TS 3.6 requirements, procedures, and 10 CFR 50.59 regulations, the inspector reviewed selected aspects of:

- Technical Specifications for Kansas State University TRIGA Reactor dated March 2008
- KSU TRIGA Mark II Experiments 1-48
- Startup Report for the March 19, 2008 KSU Reactor License, dated May 16, 2008

b. Observations and Findings

The licensee maintained a file of existing experiments some of which had been approved by the Reactor Safeguards Committee. The new technical

specifications issued March 13, 2008, with the license renewal require any new experiments to be approved by the Reactor Safeguards Committee. No new experiments were reviewed for approval since the previous inspection.

From a random sampling of forms for experiments performed since the previous inspection the inspectors found that experiments were being reviewed and performed in accordance with TS requirements and the licensee's written procedures.

c. Conclusions

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

5. Health Physics

c. Inspection Scope (IP 69001)

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

- KSU Annual Report to USNRC, April 2008 to March 2009, dated April 30, 2009
- Radiation Safety Manual for KSU, dated August 2007
- Personnel dosimetry records
- Waste Disposal Log for August 27, 2007 to July 30, 2008
- 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 8, Calibration of Continuous Air Monitor, dated March 14, 2008
- Landauer Report for Nuclear Reactor Facility Personnel dated June 18, 2008 through June 18, 2009
- NRF Monthly Radiation Surveys, August 2007 to June 2009

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. 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, most staff member doses being minimal.

The EHS 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. One portable radiation device was found to be out of calibration. Once located the device was taken out of service. The remainder of the portable radiation detectors had tags that were current and in accordance with the calibration records that were reviewed.

The inspectors reviewed the annual report for the March 2008 to March 2009 period. There were no liquid radioactive effluent releases during the period. The Ar-41 release for the period was documented at 5.45 curies. The radiation exposure for the 6 licensed individuals for the period averaged 6.44 mrem.

c. Conclusions

The radiation safety program is commensurate with 10 CFR 20 requirements, Technical Specifications, and Procedures.

6. 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, the TS, and the licensee's administrative procedures:

- KSU Annual Report to USNRC, April 2008 to March 2009, dated April 30, 2009
- Technical Specifications for Kansas State University TRIGA Reactor dated March 2008
- Annual 50.59 Evaluation Report, dated May 22, 2008

b. Observations and Findings

The licensee had performed a 50.59 evaluation for several facility modifications, including: the addition of another cooling tower, installation of a secondary system drain valve, removal of the rabbit system and electrical system grounding improvements. The modifications had no safety implications for the public or the facility.

Additionally, the facility had made post-tornado repairs to the reactor facility, including: confinement dome replacement, cleaning and painting, and control room ceiling replacement. The changes were considered repairs, vice

modifications, however a 50.59 evaluation had been conducted to determine any safety impact with the confinement dome replacement.

c. Conclusions

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

7. Committees, Audits, and Reviews

a. Inspection Scope (IP 69001)

The inspectors reviewed the following to ensure that the audits and reviews stipulated in TS by the Reactor Safeguards Committee (RSC):

- RSC Post-Tornado Meeting Minutes, June 2008
- KSU TRIGA Mark II Operation, Test, and Maintenance Procedures, "OP-15 Reactor Startup", dated March 14, 2008
- KSU TRIGA Mark II Operation, Test, and Maintenance Procedures, "OP-16 Reactor Shutdown", dated March 14, 2008
- KSU Reactor Management Orders, "SOT-1 Instrument and Equipment Checkout", dated August 13, 2007

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 inspector followed-up on post-tornado activities, and determined that the RSC convened a meeting in accordance with technical specifications and procedures. New procedures were reviewed in accordance with technical specifications.

c. Conclusions

The RSC provided the oversight required by the Technical Specifications.

8. Maintenance Logs and Records

a. Inspection Scope (IP 69001)

To verify that the licensee was complying with the applicable regulations, the inspector reviewed selected aspects of:

- Reactor Logbooks for the period May 23, 2008 to March 18, 2009
- 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 8, Calibration of Continuous Air Monitor, dated March 14, 2008
- Test and Maintenance Procedure 6, Semi-Annual Pulse Rod Drive Cylinder and Air Supply Inspection, dated March 14, 2008
- Test and Maintenance Procedure 3, Annual Remote Area Monitor Calibration, dated March 14, 2008

b. Observations and Findings

The inspectors reviewed the maintenance records related to scheduled and unscheduled preventive and corrective maintenance activities that had occurred during the inspection period. Routine and preventive maintenance was controlled and documented in the appropriate logs. The inspector verified that all maintenance reviewed was conducted in accordance with the requirements of TS Section 4.0. After all reviewed maintenance items were completed, system operational checks were performed to ensure the affected systems were operable before returning them to service

c. Conclusions

Maintenance logs, records, and performance satisfied TS and procedure requirements.

9. 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 inspector also reviewed the following

- KSU Annual Report to USNRC, April 2008 to March 2009, dated April 30, 2009

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. Conclusions

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

10. Follow-up on Previously Identified Issue

a. Inspection Scope (IP 92701)

The inspector 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."

b. Observations and Findings

The inspector interviewed the Reactor Manager and Reactor Safety Officer with regards to the issue. It was determined that reactor licensed waste was being stored at an off-site waste storage building, due to limited space available within the reactor facility, within the purview of the reactor license. However, it is still unclear: 1.) Whether the reactor license identifies the off-site location as an approved radioactive waste storage site; 2.) If the transfer of material was made from the reactor license to the state license which prohibits the transfer of waste onto that license. Therefore this item will be left open pending clarification from the licensee.

c. Conclusion

Unresolved Item 50-188/2007-202-01 was discussed and was left open for further investigation.

14. Exit Interview

The inspector presented the inspection results to licensee management at the conclusion of the inspection on June 25, 2009. The inspector 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 inspector 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	Reactor Support Staff
J. Smith	Reactor Support Staff
B. Walborn	Reactor Support Staff
P. M. Whaley	Reactor Manager

Other Personnel

None

INSPECTION PROCEDURES USED

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

ITEMS OPENED, CLOSED, AND DISCUSSED

OPENED

50-188/2009-201	IFI	Corrective action to address reactor trips associated with operator error
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CLOSED

None

DISCUSSED

50-188/2007-202-01	URI	Storage of reactor waste at campus decay-in-storage facility
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PARTIAL LIST OF ACRONYMS USED

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