

March 9, 2007

Mr. Paul M. Whaley, Manager
KSU Nuclear Reactor Facility
Department of Mechanical and
Nuclear Engineering
112 Ward Hall
Manhattan, KS 66506-5204

SUBJECT: NRC ROUTINE, ANNOUNCED INSPECTION REPORT NO. 50-188/2007-201

Dear Mr. Whaley:

This letter refers to the inspection conducted on February 13 to 15, 2007, at your Nuclear 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, the NRC has identified a violation of NRC regulations that was evaluated as having very low safety significance. This violation is being treated as a Non-Cited Violation (NCV), consistent with Section VI.A of the Enforcement Policy. The NCV is described in the subject inspection report. If you contest the violation or significance of the NCV, you should provide a response within 30 days of the date of this inspection report, with the basis for your denial, to the Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington DC 20555-0001, with copies to the Director, Office of Enforcement, United States Nuclear Regulatory Commission, Washington, DC 20555-0001 and the NRC Inspector. 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. 50-188
License No. R-88

Enclosure: NRC Inspection Report No. 50-188/2007-201
cc w/enclosure: See next page

Kansas State University

Docket No. 50-188

cc:

Office of the Governor
State of Kansas
Topeka, KS 66612

Mayor of Manhattan
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Manhattan, KS 66502

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: 50-188/2007-201

Licensee: Kansas State University

Facility: TRIGA Mark II

Location: Manhattan, Kansas

Dates: February 13-15, 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

Kansas State University Nuclear Reactor Facility NRC Inspection Report No.: 50-188/2007-201

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; logs and records of operations, surveillance, maintenance and fuel handling; requalification training; experiments; emergency planning; transportation; and follow-up on an issue from a previous inspection.

The licensee's programs were acceptably directed toward the protection of public health and safety, and in compliance with NRC requirements.

Organization and Staffing

- The organization and staffing were consistent with Technical Specification requirements.

Operations Logs and Records

- The operating logs and records were being maintained in accordance with applicable requirements.

Requalification Training

- The licensee was effectively administering the requalification training program.

Surveillance and Limiting Conditions for Operation

- The licensee was found to be generally adhering to Technical Specification surveillance and Limiting Condition for Operation requirements; however, a Non-Cited Violation is being issued for the failure to perform one surveillance on a timely basis.

Experiments

- Experiments appeared to be reviewed in accordance with Technical Specification but documentation of the review was insufficient. This issue will be re-inspected in a subsequent inspection.

Emergency Planning

- The licensee demonstrated emergency preparedness in their coordinated response to a complex scenario simulated for their annual drill.

Maintenance Logs and Records

- The licensee was performing maintenance consistent with Technical Specification requirements.

Fuel Handling Logs and Records

- Fuel handling and the logs and records of fuel movements were consistent with Technical Specification requirements.

Transportation

- The licensee occasionally transports radioactive material but has not done so in recent years under the R-88 reactor license.

Follow-up on Previous Issues

- Given the corrective action and evidence of effective implementation, unresolved issue 50-188/2006-201-01 was closed.

REPORT DETAILS

Summary of Plant Status

The licensee's 250 kilowatt (kW) 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 surveillance. During the inspection the reactor was operated in support of ongoing work and operator training.

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) Section H. Administrative Requirements:

- Kansas State University (KSU) TRIGA Mark II Reactor organizational structure and staffing
- management and staff responsibilities and qualifications
- staffing requirements for the safe operation of the facility
- Reactor Console Logbooks covering operations in 2006 and year-to-date in 2007
- KSU TRIGA Mark II Operations, Test and Maintenance Procedures
- KSU TRIGA Mark II Reactor Administrative Plan.

b. Observations and Findings

The KSU Nuclear Reactor Facility (NRF) organizational structure and the responsibilities of the reactor management and staff had not changed since the last inspection (see NRC Inspection Report No. 50-188/2006-201). The person with the title RM is the person that fills the position of Reactor Supervisor (RS) designated in the TS. The RM and four students are qualified Senior Reactor Operators (SROs) and five student staff members who are all qualified as Reactor Operators (ROs). The inspector attended a meeting of the RM and his staff where upcoming operational activities were planned.

The KSU staff's qualifications satisfied the training and experience requirements stipulated in the TS. The operations log and associated records confirmed that shift staffing met the minimum requirements for duty personnel. Review of records verified that management responsibilities were administered as required by TS and applicable procedures.

c. Conclusion

The organization and staffing were consistent with TS requirements.

2. Operations Logs and Records

a. Inspection Scope (IP 69001)

The inspector reviewed the following to verify that operations were being conducted in accordance with regulatory and license requirements:

- Reactor Console Logbooks covering 2006 to the present with emphasis to the period December 9, 2006 to February 14, 2007
- KSU TRIGA Mark II Operations, Test, and Maintenance Procedures Manual
- Completed checklists and records of past operations.

b. Observations and Findings

The inspector observed that reactor operations were conducted using a procedures manual consisting of 27 approved procedures. Critical data were recorded in the console logbook or on special log sheets or checklists copied from masters in the operating procedures. The records reviewed and operations observed were consistent with TS requirements. Console logbook entries were legible, complete, clear and concise.

c. Conclusion

The operating logs and records were being maintained in accordance with applicable requirements.

3. Requalification Training

a. Inspection Scope (IP 69001)

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

- Requalification Program, Rev. 2, October 8, 1974
- 2006 examination file
- attendance records for 2006 refresher training
- 2006 training material on the subjects of NRC regulations, design and operating characteristics, emergency preparedness, radiation protection, experiments, procedures, limiting conditions for operation (LCOs), and accident analysis
- routing of required reading information for ROs and SROs
- individual RO and SRO training records
- individual RO and SRO medical files.

b. Observations and Findings

The licensee administers requalification examinations annually, even though it is only required biennially. The exam is prepared and administered by the RM; the Radiation Safeguards Committee (RSC) in turn certifies the RM. To maintain competent in reactor operations, operators are given periodic refresher training, they are required to perform reactor manipulations throughout the cycle, they must review the emergency and abnormal operating procedures, and they are required to review changes to the facility, operating procedures, or the license. The inspector reviewed records indicating that these requirements were being met.

Because most of the licensed reactor operators are students who may leave campus for summers, internships, etc., the licensee was effectively administering an in-house suspension process whereby operators are not allowed to operate the reactor upon their return to the reactor unless they have updated their training requirements.

c. Conclusion

The licensee was effectively administering the requalification training program.

4. Surveillance and Limiting Conditions for Operation (LCOs)

a. Inspection Scope (IP 69001)

The inspector reviewed the following to verify implementation of Surveillance and LCO requirements:

- Technical Specifications
- KSU TRIGA Mark II Operation, Test and Maintenance Procedures
- Reactor Console Logbooks covering 2006 to the present with emphasis to the period December 9, 2006 to February 14, 2007
- Daily checklist file for the year 2006
- "Maintenance and Surveillance for the Month of _____ for 2006."

b. Observations and Findings

The licensee maintained a checklist for surveillance and maintenance required daily and another list for that required less frequently. The latter was a computer-based reference system that listed the required frequency, the date last done, and a recommended date that it should be done; activities due in the month of the printout were displayed in bold and ones overdue were highlighted. The printout included TS requirements as well as preventative maintenance and other routine scheduled activities not necessarily required by the license. The inspector performed a spot check to verify that TS requirements were listed appropriately on this form.

The inspector found that TS E.14, semi-annual (not to exceed eight months) inspection, cleaning and lubrication of the transient rod drive was performed on May 12, 2004, and again on February 21, 2005, but not in the nine intervening months. Since that time the surveillance has consistently been done in compliance with the TS frequency. The licensee explained that the missed surveillance occurred at a time of high work demand; the inspector verified that it was an isolated event and not indicative of a recurring problem. This event is therefore considered a Non-Cited Violation (NCV), consistent with Section VII.B.6 of the NRC Enforcement Policy (50-188/2007-201-01).

c. Conclusion

The licensee was found to be generally adhering to TS surveillance and LCO requirements; however, an NCV is being issued for the failure to perform one surveillance on a timely basis.

5. Experiments

a. Inspection Scope (IP 69001)

The inspector reviewed the following to verify compliance with requirements in TS Section I. Experiments:

- KSU TRIGA Mark II File of Approved Experiments
- Form KSU TRIGA Mark II - 2 File, Requests for Operations Forms
- Reactor Console Logbooks covering 2006 to the present with emphasis to the period December 9, 2006 to February 14, 2007.

b. Observations and Findings

TS I.1 requires that prior to performing any reactor experiment the RS, and if appropriate the Radiation Safety Officer (RSO), must evaluate the proposed experiment. In addition, TS I.2 requires that the RSC consider new experiments and the consequences of failure. The licensee had approved 45 experiments, the last one being approved in 2000. Approvals were sufficiently broad that the RS evaluation could consider most new requests within the envelope of an approved experiment.

In practice, an experimenter would provide the RM/RS a Request for Operations Form. The RM/RS would approve the experiment for a one month period under the authorization of an approved experiment. The approved Request for Operations Forms were maintained in a file in the control room and operators referred to these forms before doing an experiment to verify that it was approved and to record data regarding the irradiation of an experiment.

The inspector observed that since June of 2006 the RM/RS had not signed these forms. In addition, some of the related information called for on the form was missing (e.g., authorized experiment number under which the experiment was being done, target mass, and byproduct material log). The licensee stated that these un-signed forms were not new experiments but additional samples evaluated under existing authorized experiments in previous months; he was considering a revision to the process and the form. The inspector designated this as follow-up item 50-188/2007-201-02.

c. Conclusion

Experiments appeared to be reviewed in accordance with TS but documentation of the review was insufficient. This issue will be re-inspected in a subsequent inspection.

6. Emergency Planning

a. Inspection Scope (IP 69001)

The inspector reviewed the following to verify compliance regulatory and license requirements and Emergency Plan commitments:

- KSU TRIGA Mark II Emergency Plan, August 2006

- KSU TRIGA Mark II Emergency Plan Procedures, August 8, 2006
- “Operation Mad Scientist,” scenario for emergency drill conducted at KSU TRIGA Mark II on February 14, 2007.

b. Observations and Findings

The licensee had pre-scheduled an emergency drill for February 14, 2007, a day when the inspector was at the reactor facility. The licensee gave the inspector the above information upon his arrival on site the day prior to the drill. The inspector observed the entire drill from the command center and attended the out-briefing of emergency responders before they left the facility.

The drill simulated an individual with knowledge of the reactor building layout entering with two devices. One device detonated, causing a release of resins from the reactor water cleanup system and injuring a staff member nearby. The other device was left in the vicinity. Rescue of the victim was hampered by the potential for the second device detonating as a result of rescue operations. Responders included multiple police jurisdictions, fire fighters, medics, hazmat experts, explosives experts, and state emergency management.

The inspector observed well-coordinated actions among the various parties involved. The implementing procedures appeared to be adequate and personnel were knowledgeable in their respective roles in executing the procedures.

c. Conclusion

The licensee demonstrated emergency preparedness in their coordinated response to a complex scenario simulated for their annual drill.

7. Maintenance Logs and Records

a. Inspection Scope (IP 69001)

The inspector reviewed the following to verify compliance the maintenance requirements of TS H.1.f:

- Reactor Safeguards Committee Semi-Annual Checklist, January 25, 2007
- “Maintenance and Surveillance for the Month of _____” for the year
- KSU TRIGA Mark II Reactor Facility Operations Manual, February 2003
- Reactor Console Logbooks covering 2006 to the present with emphasis to the period December 9, 2006 to February 14, 2007.

b. Observations and Findings

The inspector observed that corrective maintenance was recorded in a designated column of the reactor console logbook. Preventive maintenance was scheduled on the monthly “Maintenance and Surveillance for the Month of_____.” along with surveillance in Section 4 above.

As specified in the Operations Manual, the RSC performs a semi-annual inspection of the reactor facility. The inspector reviewed the RSC inspection

checklist, last performed January 25, 2007, and signed by all six RSC members. The inspector also observed maintenance conditions during his tour of the facility and noted that the licensee was attentive to maintenance needs.

c. Conclusion

The licensee was performing maintenance consistent with TS requirements.

8. Fuel Handling Logs and Records

a. Inspection Scope (IP 69001)

The inspector reviewed the following to verify compliance with TS requirements for periodic fuel inspection (TS D.6) and written instructions (TS H.1.d):

- KSU TRIGA Mark II Operation, Test and Maintenance Procedures, Number 26 - Fuel Handling Procedure, Rev. February 29, 2000
- Reactor Console Logbooks covering 2006 to the present with emphasis on April 28, 2006 fuel moves
- KSU TRIGA Mark II Miscellaneous Procedures, Accounting Procedures for Special Nuclear Material
- Fuel Element Inspection Data Sheet for Core No. II-21, April 28, 2006, Latent Pulse No. 436.

b. Observations and Findings

The inspector reviewed records of fuel handling activities and verified that the licensee was maintaining written instructions in accordance with TS requirements. Fuel handling and inspection was done as required. Fuel moves were documented and accountability of material was maintained.

c. Conclusion

Fuel handling and the logs and records of fuel movements were consistent with TS requirements.

9. Transportation

a. Inspection Scope (IP 86740)

The inspector discussed the licensee's radioactive material transportation practices with the Reactor Manager (RM) and the Radiation Safety Officer (RSO). Since shipments had not been made under the R-88 reactor license in recent years there were no records to inspect.

b. Observations and Findings

The licensee explained that they do very little shipping of radioactive material and when necessary, it is done on the broad byproduct (State) license under the direction of the campus RSO.

The predominant waste-form generated at the reactor is resin from the reactor water cleanup system. The resin is de-watered and transferred from the reactor to a waste storage facility on campus where it is decayed in storage. Late in its storage life the only significant isotope is a small amount of Cobalt-60. There have been no waste shipments for the past seven years. Due to the infrequency and the small quantity, the licensee used a broker for the last waste shipment.

The licensee said that if there was a request to ship irradiated material from the reactor in the future it would likely be done under the State license.

c. Conclusion

The licensee occasionally transports radioactive material but has not done so in recent years under the R-88 reactor license.

10. Followup on Previous Issues

a. Inspection Scope (IP 92701)

The inspector reviewed an unresolved issue from a previous inspection, 50-188/2006-201-01, "Failure to conduct a 10 CFR 50.59 review on a change to the linear power channel prior to implementation and operations," by way of the following:

- KSU TRIGA Mark II Management Order SOM5, Configuration Management: Equipment Changes, Rev. 0, July 6, 2006
- Radiation Safety Committee Semi-Annual Review file for January 2007
- KSU Reactor Review Agenda, January 18, 2007.

b. Observations and Findings

Management Order SOM5 was published immediately following the NRC inspection in which this unresolved issue was first identified. In the semi-annual review file the inspector reviewed six changes to equipment or procedures wherein the licensee had effectively implemented the new management order.

c. Conclusion

Given the corrective action and evidence of effective implementation, unresolved issue 50-188/2006-201-01 is hereby closed.

11. Exit Meeting

The inspection scope and observations were summarized on February 15, 2007, with members of licensee management. The inspector described the areas inspected and discussed in detail the preliminary inspection findings. No dissenting comments were received from the licensee. The licensee did not request that any of the information proposed to be discussed in the inspection report be withheld from public disclosure.

PARTIAL LIST OF PERSONS CONTACTED

Licensee

R. Bridges	Head of Radiation Safety Office, Environmental Health and Safety Division and Campus Radiation Safety Officer
A. Cebula	Senior Reactor Operator
M. Donis	Mechanical and Nuclear Engineering Department Head and Reactor Safeguards Committee Chairman
A. Meyer	Senior Reactor Operator
K. Shultis	Mechanical and Nuclear Engineering Department, Nuclear Program Director and Reactor Safeguards Committee Backup Chairman
P. Whaley	Reactor Manager

INSPECTION PROCEDURES USED

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

ITEMS OPENED, CLOSED, AND DISCUSSED

OPENED:

50-188/2007-201-01	NCV	Failure to perform a surveillance required by TS E.14, transient rod inspection, on a timely basis
50-188/2007-201-02	IFI	Failure to complete Reactor Operation Request Forms for experiments

CLOSED:

50-188/2006-201-01	URI	Failure to conduct a 10 CFR 50.59 review on a change to the linear power channel prior to implementation and operations
50-188/2007-201-01	NCV	Failure to perform a surveillance required by TS E.14, transient rod inspection, on a timely basis

OTHER ITEMS DISCUSSED:

None

LIST OF ACRONYMS USED

ADAMS	Agencywide Document Access and Management System
ALARA	As Low As Reasonably Achievable
CFR	Code of Federal Regulations
IFI	Inspector Follow-up Item
IP	Inspection Procedure
KSU	Kansas State University
kW	KiloWatts
LCO	Limiting Conditions for Operation
NCV	Non-Cited Violation

NRC	Nuclear Regulatory Commission
NRF	Nuclear Reactor Facility
RM	Reactor Manager
RO	Reactor Operator
RS	Reactor Supervisor
RSC	Reactor Safeguards Committee
SRO	Senior Reactor Operator
TS	Technical Specifications
TRIGA	Training Research Isotope Production General Atomics
URI	Unresolved Item