

October 9, 2002

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: NRC ROUTINE, ANNOUNCED INSPECTION REPORT NO. 50-188/2002-201

Dear Mr. Whaley:

This letter refers to the inspection conducted on September 9-13, 2002, 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, no safety concerns or noncompliance of NRC requirements were identified. No response to this letter is required.

In accordance with 10 CFR 2.790 of the NRC's "Rules of Practice," 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 (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 Mr. Thomas Dragoun at 610-337-5373.

Sincerely,

*/RA/*

Patrick M. Madden, Section Chief  
Research and Test Reactors Section  
Operating Reactor Improvements Programs  
Division of Regulatory Improvement Programs  
Office of Nuclear Reactor Regulation

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

Enclosure: NRC Inspection Report No. 50-188/2002-201  
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  
P.O. Box 748  
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: 50-188/2002-201

Licensee: Kansas State University

Facility: TRIGA MK-II

Location: Manhattan, Kansas

Dates: September 9 - 13, 2002

Inspector: Thomas F. Dragoun

Approved by: Patrick M. Madden, Section Chief  
Research and Test Reactors Section  
Operating Reactor Improvements Programs  
Division of Regulatory Improvement Programs  
Office of Nuclear Reactor Regulation

## EXECUTIVE SUMMARY

Kansas State University  
Report No: 50-188/2002-201

The primary focus of this routine, announced inspection was the on-site review of selected aspects of the licensee's research reactor operation including: organization and staffing; reactor operations; surveillances; procedures; radiation protection programs including effluent controls; status of previously identified items; and the security program.

### Organization and Staffing

- The staffing during reactor operations was in compliance with the requirements specified in the Technical Specification Section H.

### Logs and Records

- Record keeping satisfied the requirements stipulated in the license.

### Surveillance and Limiting Conditions for Operation

- The reactor was operated within the Limiting Conditions for Operations specified in the Technical Specification.

### Radiation Protection Program

- An acceptable radiation protection program was documented and implemented to ensure compliance with NRC radiation safety requirements.

### Physical Security

- The security controls for the special nuclear materials satisfied the regulatory requirements. The licensee was planning security upgrades as a self initiative in response to potential terrorists attacks.

## REPORT DETAILS

### **Summary of Plant Status**

The licensee's 250 kilowatt TRIGA Mark II research reactor has been operated in support of educational demonstrations, experiments, reactor operator training, and periodic equipment surveillances. The reactor was not operated during the inspection. An application for renewal of the reactor license, scheduled to expire on October 16, 2002, was submitted to the NRC during this inspection. Housekeeping was good except in areas where asbestos remediation was in progress.

#### **1. Organization, and Staffing**

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

The inspector reviewed the following regarding the licensee's organization and staffing to ensure that the requirements of Technical Specification (TS) Section H(4) and H(5) Amendment 14, dated April 18, 2001, were being met:

- management responsibilities
- staffing requirements for safe operation of the research reactor facility
- reactor console withstanding records for October 2001 to September 2002

##### b. Observations and Findings

Through discussions with the Reactor Manager the inspector determined that management responsibilities and the organization at the facility had not changed since the previous NRC inspection in August 2000 (Inspection Report No. 50-188/2000-201). The Reactor Manager was a full-time University staff position and the Reactor Supervisor position was filled by a graduate student. The licensed staff consists of four Senior Reactor Operators (SRO) and two Reactor Operators (RO). Records indicated that the TS staffing requirements during operation of the reactor were satisfied.

##### c. Conclusions

The staffing during reactor operations was in compliance with the requirements specified in the TS Section H.

#### **2. Reactor Operations Logs and Records**

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

The inspector reviewed the following to ensure that the logs and records were maintained as stipulated in license condition 3. C. "Records" parts (1) - (5):

- console logs for October 15, 2001 to September 9, 2002

- records of liquid waste discharged to the sewer between August 1, 2000 to September 15, 2002
- Form "Maintenance and Surveillance Report for the Month of: \_\_\_\_\_", dated June 1996. Data for January 2002 to date
- Daily checklist form "KSUTMII - 3" dated July 1994. Data for April 30, 2002 to September 6, 2002
- Procedure No. 26, "Fuel Handling Procedure" date January 31, 2001

b. Observations and Findings

Logs and records were clear, well organized, and readily retrievable. The data recorded was as specified in the TS and within the limits specified for the parameter.

During the last NRC inspection in August 2000, the inspector noted that the names of the three reactor operators required to move fuel were not recorded. The licensee revised step 3 of Procedure No. 26 to require logging the names. Licensee action for Inspector Follow-up Item 50-188/2000-201-01 was complete and satisfactory

c. Conclusions

Record keeping satisfied the requirements stipulated in the license.

**3. Surveillance and Limiting Conditions for Operation**

a. Inspection Scope (IP 69001)

The inspector reviewed the following to ensure that the surveillance requirements and limiting conditions for operations (LCO) specified in TS Sections B, C, D, and E were met:

- console logs for October 15, 2001 to September 9, 2002
- Form "Maintenance and Surveillance Report for the Month of: \_\_\_\_\_", dated June 1996. Data for January 2002 to date
- Daily checklist form "KSUTMII - 3" dated July 1994. Data for April 30, 2002 to September 6, 2002
- Table titled "K-State Technical Specifications and Implementing Mechanisms" dated April 9, 2002

b. Observations and Findings

During the last NRC inspection, the inspector noted that the TS prescribes surveillances to verify some, but not all LCO. In response, the RM created a table that relates each LCO to a surveillance, procedure, acceptance criteria, scheduled frequency, action for out of specification results, and location of the appropriate records. The table demonstrated that LCOs concerning the basic design of the facility are not periodically reverified. For example, the TS

Section B requirement that the free volume in the reactor bay to be approximately 144,000 cubic feet was not periodically verified and determined that this was a fixed volume by design and did not need to be periodically reverified. However, the remaining LCO parameters were verified by a surveillance or checklist. The inspector reviewed the records for TS Section C, Reactor Pool, for the period April to August 2002 and found them to be complete. Similar data was available for other systems in TS Sections D to F. Licensee action regarding Inspector Follow-up Item 50-188/2000-201-02 was complete and satisfactory.

c. Conclusions

The reactor was operated within the Limiting Conditions for Operations specified in the TS.

**4. Radiation Protection Program**

a. Inspection Scope (IP 69001)

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

- Document, "Radiation Protection Program, KSU Nuclear Reactor Facility, Mechanical and Nuclear Engineering Department, Kansas State University", approved by the Reactor Safeguards Committee on May 7, 2002
- Procedure No. 20, "Liquid Scintillation Assay Methods", dated January 19, 1987
- Procedure No. 21, "Alpha Particle Assay of Reactor Liquids", dated August 3, 1989. Data for August 7, July 19, June 25, May 13, April 26, March 6, February 15, and January 23, 2002
- Radiation survey procedure "12.4, Experiment 3 - Radiation Survey of Reactor", dated February 12, 1969
- Procedure No. 3-2, "Annual Remote Area Monitor Calibration, RMS II" dated October 3, 1990. Data for 2001 and 2002
- Procedure No. 8, "Calibration of Continuous Air Monitor", dated July 2, 1999. Data for 2001 and 2002
- Procedure No. 13, "Portable Radiation Survey Meter Calibration" dated December 1986. Data for 2001 and 2002
- Procedure No. 14, "Pocket Dosimeter Calibration" dated February 13, 1987. Data for 2001 and 2002
- Procedure No. 19, "Gamma Ray Assay of Reactor Samples" dated January 27, 1987
- Personnel dosimetry monthly results for 2001 and 2002 to date

b. Observations and Findings

A tour of the reactor facility indicated that there were no high radiation or surface contaminated areas. Containers of radioactive material and radiation areas were properly labeled and controlled. A frisker was located at the exit from the

controlled area and was properly used. Dosimetry requirements for entry into the locked controlled area included a thermoluminescent dosimeter (TLD) and an electronic dosimeter. The TLD was provided by a National Voluntary Laboratory Accreditation Program (NAVLAB) certified vendor. The electronic dosimeter was calibrated by a vendor (SAIC). The electronic dosimeter system was capable of reading any encoded identification such as a drivers license or student identification card to identify an individual entering the area. Monthly dosimetry records for the whole body badge and finger rings indicated that exposures were well below the NRC limits.

The Reactor Manager had the primary responsibility for the radiation protection program at the reactor. A documented radiation safety program and supporting procedures satisfied the requirement in 10 CFR 20.1101(a).

The monthly wipes taken during the survey for surface contamination were analyzed in a different building using liquid scintillation by the campus radiation safety officer. Survey results confirmed the absence of contamination in the accessible areas. A review of the counting equipment indicated that it was properly maintained and generally accepted analytical techniques were used for analyzing contamination..

No solid radioactive waste has been shipped from the facility since 1996. Potentially contaminated liquid waste consisting of condensate from the air conditioners was sampled and discharged to the sewer. Data from August 1, 2000, to date indicated that the discharges satisfied the limits specified in 10 CFR 20 Appendix B. In-line mechanical filters were used to ensure that the solubility requirements in 10 CFR 20.2003 were met.

A licensee calculation in section A.2.4 of the Safety Analysis Report submitted with the license renewal application showed that the population dose would be 2.8 mrem per year from airborne effluent for operation at 500 KW (twice the currently authorized reactor power level). This satisfies the constraint on air emissions specified in 10 CFR 20.1101(d). A previous calculation on May 23, 1967, only concerned the concentration of the activity inside the reactor room.

c. Conclusions

An acceptable radiation protection program was documented and implemented to ensure compliance with NRC regulatory requirements.

**5. Physical Security**

a. Inspection Scope (IP 81431)

The licensee does not have an NRC-approved security plan and none was required. However, the licensee must meet the general provisions of 10 CFR 73.67(f). The inspector accompanied the Reactor Manager on a tour of the facilities existing and proposed security features.

b. Observation and Findings

Access controls, barriers, and intrusion detecting systems were in place. An emergency drill held on June 18, 2002, tested the response by off site agencies to a bomb threat.

Since the 9-11 terrorist attacks, the licensee obtained recommendations from private and military security specialists for upgrading the existing security systems. The department chairman stated that funding recently had been approved for the upgrades.

c. Conclusion

The security controls for the special nuclear materials satisfied the regulatory requirements. The licensee was planning security upgrades as a self initiative in response to potential terrorists attacks.

**6. EXIT MEETING SUMMARY**

The inspector presented the inspection results to licensee management at the conclusion of the inspection on September 13, 2002. The licensee acknowledged the findings presented.

### Partial List of Persons Contacted

R. Bridges	Campus Radiation Safety Officer
M. Hosni	Mechanical and Nuclear Engineering Department Head
M Ohmes	Reactor Supervisor
P. Whaley	Reactor Manager

### Inspection Procedures Used

IP 69001	Class II Non-Power Reactors
IP 81431	Fixed Site Physical Protection of Special Nuclear Material of Low Strategic Significance

### Items Opened and Closed

#### **Open**

none

#### **Closed**

IFI 50-188/2000-201-01	The fuel movement procedure was changed to require recording the names of the operators performing the movement.
IFI 50-188/2000-201-02	A table was created that relates the LCOs to a surveillance procedure.

### List of Acronyms Used

LCO	Limiting Conditions for Operations
NAVLAP	National Voluntary Laboratory Accreditation Program
NRC	Nuclear Regulatory Commission
RM	Reactor Manager
RO	Reactor Operator
RS	Reactor Supervisor
SRO	Senior Reactor Operator
TLD	thermoluminescent dosimeter
TS	Technical Specifications