U. S. NUCLEAR REGULATORY COMMISSION

Docket No: 50-188

License No: R-88

Report No: 50-188/99-201

Licensee: Kansas State University

Facility: TRIGA MK-II

Location: Manhattan, Kansas

Dates: August 30 - September 2, 1999

Inspector: Thomas M. Burdick

Approved by: Ledyard B. Marsh, Director
Events Assessment, Generic Communications and
Non-Power Reactors Branch
Division of Regulatory Improvement Programs
Office of Nuclear Reactor Regulation

EXECUTIVE SUMMARY

This routine, announced inspection included onsite review of selected aspects of the operations program, organizational structure and functions program, design control program, review and audit program, radiation protection program, environmental protection program, operator requalification program, maintenance program, surveillance program, fuel handling program, experimental program, procedural control program, emergency preparedness program, safeguards program, security program, and transportation program since the last NRC inspection of this program.

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

ORGANIZATIONAL STRUCTURE AND FUNCTIONS

The facility staff and Reactor Safety Committee (RSC) encountered some significant changes since the last inspection.

OPERATIONS

Facility operations had been increasing since the last inspection. This did not affect the facility's good safety record.

DESIGN CONTROL

No changes occurred that required technical specification changes or introduced unreviewed safety questions.

REVIEW AND AUDIT

The licensee had conducted audits at the required frequency and documented their findings.

RADIATION PROTECTION

Exposure due to reactor operations was minimal.

ENVIRONMENTAL PROTECTION

The licensee ensured that their facility had little impact on the environment.

OPERATOR REQUALIFICATION

Licensed operators were actively involved in their retraining program as required.

MAINTENANCE

The licensee maintained the facility in good operating condition and kept required records.

SURVEILLANCE

Required surveillance was completed and documented at the prescribed intervals. Problems were recorded and corrective actions were prompt.

FUEL HANDLING

The licensee conducted fuel handling according to requirements and carefully planned and recorded all movements.

EXPERIMENTS

The licensee had been busy since the last inspection with increased use of the experimental facilities.

PROCEDURES

Most of the licensee's required procedures were consolidated into individual documents whereas fuel handling guidance was found in several places.

EMERGENCY PREPAREDNESS

The licensee had conducted the required drills, exercises, and training to ensure readiness.

SAFEGUARDS

The licensee kept complete and accurate count of their authorized special nuclear material (SNM).

SECURITY

The licensee's program has been removed from the license requirements yet remains in affect to satisfy 10 CFR 73.67.

TRANSPORTATION

All of the reactor facility transfers of radioactive materials were handled by the state-licensed campus safety organization.

Report Details

Summary of Plant Status

Since the last inspection the reactor was operated intermittently to support experiments, education, operator training, surveillance, and service work.

1. ORGANIZATIONAL STRUCTURE AND FUNCTIONS

a. Scope (69001)

The inspector reviewed selected aspects of:

- organization and staffing
- qualifications
- management responsibilities
- administrative controls

b. Observations and Findings

The organizational structure and staffing had changed since the last inspection. The Department of Nuclear Engineering had merged with the Mechanical Engineering Department. With Amendment 12 of the Technical Specifications (TS), the new Department Head position for Mechanical and Nuclear Engineering (MNE) was approved by the NRC to chair the RSC. As of July 1, 1999, the Reactor Manager position was vacated and the MNE is searching for a replacement. The facility has three licensed senior reactor operators remaining on the staff.

The organizational structure and staffing at the facility and as reported in the Annual Report was as required by Technical Specification. Qualifications of the staff met Technical Specification requirements. Review of records verified that management responsibilities were administered as required by Technical Specifications and applicable procedures.

c. Conclusions

The organizational structure and functions were consistent with Technical Specification requirements.

2. OPERATIONS

a. Scope (69001)

The inspector reviewed selected aspects of:

- operational logs and records
- staffing for operations
- selected operational, startup, or shutdown activities

b. Observations and Findings

The operating logs and records were clear and provided an indication of operational activities. This included documentation of events, and resolution or tracking of events. The logs and records indicated that shift staffing, including on-call personnel, was as required by Technical Specifications. Logs and records also showed that operational conditions and parameters were consistent with license and Technical Specification requirements.

(Closed) Non-Cited Violation 50-188/97201-03: Failure of licensed operator to control reactor console key. The licensee identified the problem and corrected it acceptably.

c. Conclusions

The operations program satisfied Technical Specification requirements.

3. **DESIGN CONTROL**

a. Scope (69001)

The inspector reviewed selected aspects of:

- facility design changes and records
- facility configuration

b. Observations and Findings

Records and observations showed that changes at the facility were acceptably reviewed in accordance with 10 CFR 50.59 and applicable licensee administrative controls. None of the changes constituted an unreviewed safety question or required a change to the Technical Specifications.

The licensee's Year 2000 committee has determined that the reactor facility is not vulnerable to Y2K-related problems.

c. Conclusions

The design change program satisfied NRC requirements.

4. **REVIEW AND AUDIT**

a. Scope (69001)

The inspector reviewed selected aspects of:

- safety review records
- audit records
- responses to safety reviews and audits
- review and audit personnel qualifications

b. Observations and Findings

Records showed that the safety reviews were conducted at the Technical Specification required frequency. Topics of these reviews were also consistent with Technical Specification requirements to provide guidance, direction, and oversight, and to ensure acceptable use of the reactor.

The audit records showed that audits had been completed in those areas outlined in the Technical Specifications and at the required frequency.

The inspector noted that the safety reviews and audits and the associated findings were acceptably detailed and that the licensee responded and took corrective actions as needed.

The safety review and audit personnel qualifications satisfied Technical Specification requirements and licensee administrative controls. Further, the number of personnel involved in the safety reviews and audits also satisfied Technical Specification and licensee procedural requirements.

c. Conclusions

The review and audit program satisfied Technical Specification requirements.

5. RADIATION PROTECTION

a. Scope (69001)

The inspector reviewed selected aspects of:

- the Radiation Protection Program
- radiological signs and posting
- routine surveys and monitoring
- dosimetry records
- maintenance and calibration of radiation monitoring equipment
- As Low As Reasonably Achievable (ALARA) reviews

b. Observations and Findings

The radiation protection program had not changed since the last inspection. The licensee reviewed the radiation protection program at least annually in accordance with 10 CFR 20.1101(c). The review included all areas and no weaknesses were reported. The inspector indicated to the licensee that the Environmental Protection Agency "Comply " computer code was acceptable to verify that airborne radioactive emissions were within the limits of 10 CFR 20.1101(d).

NRC Form 3, "Notice to Employees," was posted in accordance with 10 CFR 19.11. Caution signs, postings and controls to radiation areas were as required in 10 CFR 20, Subpart J. Licensee personnel observed the indicated precautions for access to the radiation areas.

Use of dosimeters and exit frisking practices were in accordance with radiation protection requirements. The licensee used a National Voluntary Laboratory Accreditation Program (NVLAP) accredited vendor to process dosimetry. Radiological exposure records showed that occupational doses and doses to the public were within 10 CFR Part 20 limitations. Training records showed that personnel were acceptably trained in radiation protection practices.

Radiation monitoring and survey activities were as required. Equipment used for these activities were maintained, calibrated and used acceptably.

ALARA reviews were acceptably performed as required.

The licensee did not require a respiratory protection program or planned special exposure program.

The licensee indicated that they will consider a modification to their beam port radiography experiment procedure that would require the beam port floor to be a restricted area during beam port operation. This would reflect their existing practice.

(Closed) Non-Cited Violation 50-188/97201-02: Failed Area Radiation Monitor at poolside. The licensee had identified a failed monitor required to be operable and corrected the problem acceptably.

c. Conclusions

The radiation protection program satisfied NRC requirements.

6. ENVIRONMENTAL PROTECTION

a. Scope (69001)

The inspector reviewed selected aspects of:

- the environmental monitoring program
- annual reports
- release records
- counting and analysis program

b. Observations and Findings

Laboratory equipment was maintained and calibrated acceptably. Data indicated that there were no measurable dose above background. This was acceptably documented in the Annual Reports. Observation of the facility found no new potential release paths.

The program for the monitoring and storage of radioactive liquid, gases, and solids was consistent with applicable regulatory requirements. Radioactive material was monitored and released when below acceptable limits or was acceptably transferred to the broad-scope license for disposition. The principles of As Low As Reasonably Achievable were acceptably implemented to minimize radioactive releases. Monitoring equipment was acceptably maintained and calibrated. Records were current and acceptably maintained.

c. Conclusions

The environmental protection program satisfied NRC requirements.

7. OPERATOR REQUALIFICATION

a. Scope (69001)

The inspector reviewed selected aspects of:

- the Requalification Program
- operator licenses
- operator training records
- operator physical examination records
- operator examination records
- operator active duty status

b. Observations and Findings

The Requalification Program was maintained up to date. Operator licenses were also current. Records showed that operator training was consistent with the Requalification Program requirements. Physical examinations of the operators were conducted as required. Records showed that written and operating examinations of the operators were acceptably implemented. Logs showed that operators maintained active duty status as required.

c. Conclusions

Operator requalification was conducted as required by the Requalification Program.

8. MAINTENANCE

a. Scope (69001)

The inspector reviewed selected aspects of:

- maintenance procedures
- equipment maintenance records

b. Observations and Findings

Logs indicated that corrective maintenance activities and problems were addressed as required by procedure. Records showed that routine maintenance activities were conducted at the required frequency and in accordance with the Technical Specifications, applicable procedure or equipment manual. Maintenance activities ensured that equipment remained consistent with the Safety Analysis Report and Technical Specification requirements. Further, maintenance activities were consistent with the requirements of 10 CFR 50.59.

c. Conclusions

The maintenance program satisfied NRC requirements.

9. **SURVEILLANCE**

a. Scope (69001)

The inspector reviewed selected aspects of:

- surveillance and calibration procedures
- surveillance, calibration and test data sheets, and records

b. Observations and Findings

Surveillance, test and LCO verifications, and calibrations were completed on schedule and in accordance with licensee procedures. All the recorded results were within the TS and procedurally prescribed parameters. The records and logs reviewed were complete and were being maintained as required. Checks, tests, and calibrations were completed as required by TS.

(Closed) Non-Cited Violation 50-188/97201-01: Rod drop times not measured semiannually. The licensee had identified the missed surveillance and corrected the problem acceptably.

c. Conclusions

The surveillance program satisfied Technical Specification requirements.

10. **FUEL HANDLING**

a. Scope (69001)

The inspector reviewed selected aspects of:

- fuel handling procedures
- fuel handling equipment and instrumentation
- fuel handling and examination records

b. Observations and Findings

Collectively, several related procedures provided a method to move and handle fuel consistent with the provision of the Technical Specifications and the licensee safety analyses. Fuel movement and fuel examination records showed that the fuel was moved and examined as required. Records also show that fuel-handling and monitoring equipment and instrumentation was verified operable prior to use. Personnel were knowledgeable of the procedural and equipment requirements for criticality control and assurance of fuel integrity. Radiological and security precautions were also met in accordance with applicable procedures.

The licensee indicated that they would consider consolidating all fuel handling guidance into one procedure.

c. Conclusions

The fuel handling program satisfied licensee Technical Specification and procedural requirements.

11. **EXPERIMENTS**

a. Scope (69001)

The inspector reviewed selected aspects of:

- experimental program requirements
- procedures
- logs and records
- experimental administrative controls and precautions

b. Observations and Findings

The experiments at the facility were routine procedures that had been in place for several years. No new or unknown-type experiments had been initiated, reviewed, or approved since the last inspection. The experiments were completed with the cognizance of the Reactor Supervisor and a Senior Reactor Operator and in accordance with Technical Specification requirements (e.g., reactivity limitations). The results of the experiments were documented in appropriate experimental logs, data sheets, or records. Engineering and radiation protection controls were implemented as required to limit exposure to radiation.

c. Conclusions

The program for experiments satisfied Technical Specification and procedural requirements.

12. PROCEDURES

a. Scope (69001)

The inspector reviewed selected aspects of:

- administrative controls
- records for changes and temporary changes
- procedural implementation
- logs and records

b. Observations and Findings

Administrative controls of changes and temporary changes to procedures, and associated review and approval processes were as required. Training of personnel on procedures and changes was acceptable. Personnel conducted activities in accordance with applicable procedures. Records showed that procedures for potential malfunctions (e.g., radioactive releases and contaminations, and reactor equipment problems) were implemented as required.

c. Conclusions

The procedural control and implementation program satisfied Technical Specification requirements.

13. EMERGENCY PREPAREDNESS

a. Scope (69001)

The inspector reviewed selected aspects of:

- the Emergency Plan
- implementing procedures
- emergency response facilities, supplies, equipment and instrumentation
- training records
- offsite support
- emergency drills and exercises

b. Observations and Findings

The Emergency Plan (E-Plan) in use at the reactor and emergency facilities was the same as the version most recently approved by the NRC The E-Plan was audited and reviewed as required. Implementing procedures were reviewed and revised as needed to employ the E-Plan effectively. Facilities, supplies, instrumentation and equipment were being maintained, controlled and inventoried as required in the E-Plan. Through records review and interviews with licensee personnel, emergency responders were determined to be knowledgeable of the proper actions to take in case of an emergency. Agreements with outside response organizations had been updated and maintained as

necessary. Communications capabilities were acceptable with these support groups and had been tested as stipulated in the E-Plan. Emergency drills had been conducted as required by the E-Plan. Off-site support organization participation was also as required by the E-Plan. Critiques were held following the drills to discuss the strengths and weaknesses identified during the exercise and to develop possible solutions to any problems identified. The results of these critiques were documented and filed. Emergency preparedness and response training was being completed as required. Training for off-site and reactor staff personnel was conducted and documented as stipulated by the E-Plan.

They had two staff members certified in hazardous material handling which included respiratory training but this program was not equivalent to the NRC requirements. The licensee indicated that they would remove their self-contained breathing equipment from their emergency locker inventory rather than implement a program for respirator use as permitted by 10 CFR 20.1703.

c. Conclusions

The emergency preparedness program was conducted in accordance with the Emergency Plan.

14. **SAFEGUARDS**

a. Scope (85102)

The inspector reviewed selected aspects of:

- nuclear material inventory and locations
- accountability records

b. Observations and Findings

The inventory of material was verified. The material control and accountability program tracked locations and content of fuel and fission detectors under the research reactor license. The possession and use of special nuclear material (SNM) was limited to the locations and purposes authorized under the license. The material control and accountability forms (DOE/NRC Forms 741 and 742) were prepared and transmitted as required.

c. Conclusions

Special Nuclear Materials were acceptably controlled and inventoried.

15. SECURITY

a. Scope (81401/81431)

The inspector reviewed selected aspects of:

- the Physical Protection Plan
- security systems, equipment and instrumentations
- implementation of the Physical Protection Plan

b. Observations and Findings

The Physical Protection Plan was removed from the license with TS Amendment No. 11. Physical protection systems (barriers and alarms), equipment and instrumentation were as required by 10 CFR 73.67(f). Access control was as required. Implementing procedures were consistent with 10 CFR 73.67(f). Acceptable security response and training was demonstrated through alarm response and drill response in accordance with procedures.

c. Conclusions

Security activities and systems satisfied 10 CFR 73.67 requirements.

16. TRANSPORTATION

a. Scope (86740)

The inspector reviewed selected aspects of:

- radioactive materials transportation and transfer records

b. Observations and Findings

Records showed that the radioactive material for disposal and shipping was transferred to the broad scope license in accordance with licensee requirements.

c. Conclusions

The program for transfer of radioactive materials satisfied NRC requirements.

Partial List of Persons Contacted

J. Thompson	MNE Department Head and RSC Chair
R. Bridges	Radiation Safety Officer and RSC member
T. Etzel	Senior Reactor Operator
S. Sharp	Senior Reactor Operator
D. Tinkler	Senior Reactor Operator

The inspector also contacted other supervisory, technical and administrative staff personnel as well.

Inspection Procedures Used

IP 69001	Class II Non-Power Reactors
IP 81401	Plans, Procedures, and Reviews
IP 81431	Fixed Site Physical Protection of LSNM
IP 85102	Material Control and Accounting
IP 86740	Transportation of Radioactive Materials

Items Opened and Closed

Open

None

Closed

50-188/97201-01	NCV	Rod drop times not measured semiannually
50-188/97201-02	NCV	Failed Area Radiation Monitor at poolside
50-188/97201-03	NCV	Failure of licensed operator to control reactor console key

List of Documents Reviewed

Administrative Procedures
Dosimetry Records
Emergency Procedures
Emergency Plan
Maintenance and Surveillance Records
Maintenance Procedures
Operating Procedures and Records
Reactor Operating License
Safety Analysis Report
Shipping program and procedures
Surveillance Procedures
Technical Specifications
Training Records
Training Program
Various Reports

List of Acronyms Used

ALARA	As Low as Reasonably Achievable
DOE	Department of Energy
NRC	Nuclear Regulatory Commission
RSC	Reactor Safety Committee
SNM	Special Nuclear Material
TS	Technical Specifications

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