

December 6, 2001

Dr. Dale Klein
Reactor Administrator
The University of Texas
at Austin
Pickle Research Campus, Building 159
Mail Code R9000
Austin, TX 78712-1024

SUBJECT: NRC INSPECTION REPORT NO. 50-602/2001-201

Dear Dr. Klein:

This refers to the inspection conducted on August 6 to 10, 2001, at your University of Texas TRIGA Mark-II Reactor. The enclosed report presents the results of that inspection.

Various aspects of your reactor operations and security programs were inspected, including selective examinations of procedures and representative records, interviews with personnel, and observations of the facility.

Based on the results of this inspection, no safety concern or noncompliance with Nuclear Regulatory Commission (NRC) requirements was 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 placed in the NRC Public Document Room on the ADAMS System. Your cooperation is appreciated. Should you have any questions concerning this inspection, please contact Mr. Stephen Holmes at 301-415-8583.

Sincerely,

/RA/

Patrick M. Madden, Section Chief
Non-Power Reactor and Financial Section
Operational Experience, and
Non-Power Reactors Branch
Division of Regulatory Improvement Programs
Office of Nuclear Reactor Regulation

Docket No. 50-602
License No. R-129

Enclosure: NRC Inspection Report No. 50-602/2001-201

cc w/enclosure: Please see next page

University of Texas

Docket No. 50-602

cc:

Governor's Budget and
Planning Office
P.O. Box 13561
Austin, TX 78711

Bureau of Radiation Control
State of Texas
1100 West 49th Street
Austin, TX 78756

Mr. Roger Mulder
Office of the Governor
P.O. Box 12428
Austin, TX 78711

Dr. Carl A. Beard, Director
Nuclear Engineering Teaching
Laboratory
The University of Texas at Austin
Balcones Research Center
Building No. 159
Austin, TX 78712

Mr. William Vernetson
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: 50-602

License No: R-129

Report No: 50-602/2001-201

Licensee: University of Texas

Facility: University of Texas TRIGA Mark-II Reactor

Location: Pickle Research Campus, Bldg. 159
10100 Burnet Road
Austin, TX 78758

Dates: August 6 to 10, 2001

Inspector: Stephen W. Holmes, Reactor Inspector

Approved by: Patrick M. Madden, Chief
Non-Power Reactor and Financial Section
Operational Experience, and
Non-Power Reactors Branch
Division of Regulatory Improvement Branch
Office of Nuclear Reactor Regulation

EXECUTIVE SUMMARY

This routine, announced inspection included onsite review of selected aspects of the Organizational Structure and Functions Program, Review and Audit Program, Radiation Protection Program, Radiation Protection Postings, Radiation Protection Surveys, Personnel Dosimetry, Calibration of Radiation Monitoring and Counting Equipment, Effluent Monitoring and Release, Environmental Protection Program, Procedures Program, Emergency Preparedness Program, Safeguards Program, and Transportation Program since the last NRC inspection in these areas.

ORGANIZATIONAL STRUCTURE AND FUNCTIONS

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

REVIEW AND AUDIT

The review and audit program satisfied TS requirements.

RADIATION PROTECTION PROGRAM

The radiation protection program (RPP) satisfied the requirements of 10 CFR 19.12, 10 CFR 20.1101, and licensee training procedures.

RADIATION PROTECTION POSTINGS

Radiological postings satisfied regulatory requirements.

RADIATION PROTECTION SURVEYS

Surveys were performed and documented as required by 10 CFR Part 20, TS, and licensee procedures.

PERSONNEL DOSIMETRY

The personnel dosimetry program was acceptably implemented and doses were in conformance with licensee and 10 CFR Part 20 limits.

CALIBRATION OF RADIATION MONITORING EQUIPMENT

Portable survey meters, radiation monitoring, and counting lab instruments were being maintained according to TS and industry/equipment manufacturer standards and licensee procedures.

EFFLUENT MONITORING AND RELEASE

The effluent monitoring and release program satisfied NRC requirements.

ENVIRONMENTAL PROTECTION

Environmental monitoring satisfied the RPP requirements.

PROCEDURES

The procedural control and implementation program satisfied TS requirements.

EMERGENCY PREPAREDNESS

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

SAFEGUARDS

With the exception of three "pins", the licensee was in compliance with all other possession and use limits and had acceptably controlled and inventoried all special nuclear material (SNM), including the "pins", as required.

TRANSPORTATION

Radioactive material was transferred to the campus in accordance with 10 CFR 30.41-Transfer of Byproduct Material, Reactor License Section 2.c, and campus and licensee procedures.

REPORT DETAILS

Summary of Plant Status

During the inspection the reactor was operated several days a week to support education, operator training, surveillance, service work, and experiments.

1. ORGANIZATIONAL STRUCTURE AND FUNCTIONS

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

The inspector reviewed selected aspects of:

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

b. Observations and Findings

The health physics (HP) organizational structure and staffing had not functionally changed since the last inspection. The reactor HP staff consisted of one full time health physicist, new this February, and with a halftime student position to be filled starting with the fall semester. The campus HP staffing consisted of the Radiation Safety Officer (RSO) and three technical staff members. The RSO is also a member of the Nuclear Reactor Safety Committee (NRSC). They provided support to the reactor HP staff, in addition to having responsibility for the state license. The reactor staff performed most HP functions at the reactor. Coordination of HP activities between the staffs were acceptable. Staffing was as reported in the Annual Report and as required by TS Section 6.1.1 Structure.

c. Conclusions

The organizational structure and functions were consistent with TS requirements.

2. REVIEW AND AUDIT

a. Inspection Scope (IP 69001)

The inspector reviewed selected aspects of:

- NRSC minutes
- As Low As Reasonably Achievable (ALARA) Committee Minutes
- safety and audit records
- reflector repair
- SNM possession limit error

b. Observations and Findings

The NRSC and ALARA committee meeting schedules and memberships satisfied TS Section 6.1 Review and Audit requirements and the ALARA Committee's procedural rules. Review of the minutes indicated the committees provided guidance, direction and oversight, and ensured suitable use of the reactor. The minutes provided a record of the safety oversight of reactor operations.

The NRSC minutes and audit records showed that safety reviews and individual audits had been completed at the required frequency for the functional areas specified by TS Section 6.2.4 Audit Functions. Topics of the safety reviews were also consistent with TS requirements to provide guidance, direction, and oversight, and to ensure acceptable use of the reactor.

The inspector noted that the Licensee's safety reviews of its License, TS, Safety Corrective Actions Program and Operator Requalification, Emergency and Security Plan, and its audit findings appeared acceptable and that the licensee responded and took the appropriate corrective actions. The safety review and audit personnel qualifications were consistent with TS Section 6.2.4 Audit Functions and the NRSC charter.

Operations logs, Health Physic surveys and records, and NRSC minutes showed that review and supervision of the reflector venting operation was safety centered. The NRSC investigation of the SNM possession limit error was timely and was safety and security focused.

c. Conclusions

The review and audit program satisfied TS requirements.

3. **RADIATION PROTECTION PROGRAM**

a. Inspection Scope (IP 69001)

The inspector reviewed selected aspects of:

- The RPP
- ALARA reviews
- Reactor and Campus RSO Involvement/Review of the RPP
- Radiation Protection Training

b. Observations and Findings

The RPP had not changed since the last inspection. The licensee reviewed the RPP at least annually in accordance with 10 CFR 20.1101(c). This review and oversight was provided by the reactor and university staffs as outlined in multiple parts of TS Section 6 Administrative Controls and licensee procedures.

Records confirmed that the RSO specifically reviewed and approved RPP changes, experiments, and radiation protection related events/conditions as required by TS and licensee procedures.

Individual training records and interviews of two staff members confirmed that radiation workers and other personnel were trained in radiation protection practices commensurate for the facility and their work. This training met the requirements of 10 CFR 19.12 Instructions to Workers.

c. Conclusions

The RPP satisfied the requirements of 10 CFR 19.12, 10 CFR 20.1101, and licensee training procedures.

4. **RADIATION PROTECTION POSTINGS**

a. Inspection Scope (IP 69001)

The inspector reviewed selected aspects of:

- radiological signs and posting
- facility and equipment during tours

b. Observations and Findings

Caution signs, postings and controls to radiation areas at the Nuclear Reactor Teaching Laboratory (NRTL) reactor were as required in 10 CFR Part 20, Subpart J for the hazards present. Experimental setups at beam ports and the facilities fuel storage pits were also marked and posted as required by Subpart J. During the inspection, the inspector noted that licensee personnel observed the indicated precautions for access to the radiation areas. Current copies of NRC Form-3 were posted in appropriate areas in the facility as were current notices to workers required by 10 CFR Part 19.

c. Conclusions

Radiological postings satisfied regulatory requirements.

5. **RADIATION PROTECTION SURVEYS**

a. Inspection Scope (IP 69001)

The inspector reviewed selected aspects of:

- routine surveys and monitoring
- survey and monitoring procedures

b. Observations and Findings

Weekly, monthly, quarterly, and other periodic contamination and radiation area surveys were performed as required by Facility Operating License Section 2.C, 10 CFR 20 Subpart F-Surveys and Monitoring, and NRTL HP procedures. These were conducted by the reactor staff. All surveys were annotated on a detailed map with additional information as to time, date, and person performing the survey. Results were evaluated and corrective actions taken and documented when readings/results exceeded set action levels, prior to exceeding regulatory limits.

c. Conclusions

Surveys were performed and documented as required by 10 CFR Part 20, TS, and licensee procedures.

6. **PERSONNEL DOSIMETRY**

a. Inspection Scope (IP 69001)

The inspector reviewed selected aspects of:

- licensee procedures
- dosimetry records

b. Observations and Findings

The campus dosimetry program covered the NRTL. Dosimetry was issued to staff and visitors as outlined in licensee procedures. The issuing criteria met or exceeded the requirements of 10 CFR 20.1502 for individual monitoring. During the inspection the inspector observed that visitors and staff wore their dosimetry as required.

The licensee used a National Voluntary Laboratory Accreditation Program accredited vendor to process personnel thermoluminescent dosimetry. The licensee investigated doses above set administrative limits. The licensee's dosimetry program for declared pregnant women satisfied 10 CFR 20.1208 requirements. Radiological exposure records showed that occupational doses and doses to the public were within 10 CFR Part 20 limitations with most indistinguishable from background.

c. Conclusions

The personnel dosimetry program was acceptably implemented and doses were in conformance with licensee and 10 CFR Part 20 limits.

7. **CALIBRATION OF RADIATION MONITORING EQUIPMENT**

a. Inspection Scope (IP 69001)

The inspector reviewed selected aspects of:

- maintenance and calibration of radiation monitoring equipment
- periodic checks, quality control, and test source certification records

b. Observations and Findings

The calibration and periodic checks of the portable survey meters, radiation monitoring, and counting lab instruments were performed in-house by the licensee's staff and offsite by certified contractors. Calibration procedures and biannual, annual and semiannual calibration frequencies satisfied TS Section 4.3.3 Radiation Protection Systems and 10 CFR 20.1501(b) requirements and American National Standards Institute N323 "Radiation Protection Instrumentation Test and Calibration" or the manufacturers recommendations. Calibration and check sources were traceable to the National Institute of Standards and Technology. The sources geometry matched those used in actual analyses.

The Licensees portable neutron meter calibration procedure had been updated to allow the use of any type of certified neutron source to calibrate their neutron meters. Inspector Follow-up Item 50-602/99-201-01 is closed.

The inspector randomly checked the calibration of two count rate meters, one ion chamber, two constant air monitors and the hand and foot monitor. All were in calibration. Calibration records were in order.

c. Conclusions

Portable survey meters, radiation monitoring, and counting lab instruments were being maintained according to TS and industry/equipment manufacturer standards and licensee procedures.

8. **EFFLUENT MONITORING AND RELEASE**

a. Inspection Scope (IP 69001)

The inspector reviewed selected aspects of:

- release records
- counting and analysis program
- annual reports

b. Observations and Findings

The program for the monitoring, storage and release of radioactive liquid and gases was consistent with 10 CFR 20.1302-Compliance with dose limits for individual members of the public and 10 CFR 20 Subpart K-Waste Disposal.

Gaseous releases were monitored and calculated using the Environmental Protection Agency COMPLY code. Records were acceptable and showed gaseous releases well within the annual dose constraint of 10 CFR 20.1101(d) and 10 CFR Part 20, Appendix B concentrations as well as TS 3.3.3 limits.

Radioactive liquid releases were infrequent and were monitored and released when below 10 CFR Part 20, Appendix B limits. Records since the last inspection reviewed through

July 2001, confirmed that releases met 10 CFR 20.2003 and 10 CFR Part 20, Appendix B limits. ALARA principles were acceptably implemented to minimize radioactive releases. Monitoring equipment was acceptably maintained and calibrated. Records were current and acceptably maintained.

c. Conclusions

Based on the records reviewed, the effluent monitoring and release program satisfied NRC requirements.

9. **ENVIRONMENTAL PROTECTION**

a. Inspection Scope (IP 69001)

The inspector reviewed selected aspects of:

- the environmental monitoring program
- environmental records
- procedures
- annual reports

b. Observations and Findings

The environmental monitoring program consists of six quarterly TLD dosimeters placed at selected locations adjacent to the NETL building. Dosimetry results since the last inspection were below the vendors minimum reportable quantity of 10 mRem for x- and gamma rays, and 40 mRem for energetic beta particles.

c. Conclusions

Based on the records and procedures reviewed, the environmental monitoring satisfied the radiation protection program requirements.

10. **PROCEDURES**

a. Inspection Scope (IP 69001)

The inspector reviewed selected aspects of:

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

b. Observations and Findings

HP procedures were available for those tasks and items required by TS Section 6.3 Operating Procedures, the Facility Operating License, and facility directives. The licensee

controlled changes and temporary changes to procedures, and associated review and approval processes by use of administrative procedures.

Training of personnel on procedures and subsequent changes to procedures was acceptable. The inspector observed personnel conducting radiation surveys, issuing dosimetry, and conducting instrument checks in accordance with applicable procedures.

Some procedures were detailed to the point of listing survey instruments by make and specific model number as opposed to type or use. Although not prohibited, this itemization is not required by TS, the Facility Operating License, NRC requirements, or recommended by industry standards.

As a follow-up to the Rotary Specimen Rack (Lazy Susan) Deflagration Event (see NRC Inspection Report No. 50-602/99-201, Section 15) the licensee committed to institute a rotary specimen rack procedure change requiring a ten-minute air purge prior to retrieval of samples and a routine inspection of the sample-handling tool cable. The inspector confirmed that this change had been made and through interviews with staff that it was being followed. Inspector Follow-up Item 50-602/99-201-02 is closed.

c. Conclusions

Based on the procedures and change records reviewed and observations of staff during the inspection, the procedural control and implementation program satisfied TS requirements.

11. **EMERGENCY PREPAREDNESS**

a. Inspection Scope (IP 69001)

The inspector reviewed selected aspects of:

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

b. Observations and Findings

The 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. E-Plan implementing procedures were reviewed and revised as needed to employ the E-Plan effectively.

Emergency plan supplies, radiation monitoring and sampling instrumentation and emergency equipment were being maintained, controlled and inventoried as required by the E-Plan. Through review of E-plan training, drill, and critique records and interviews with licensee personnel, it was determined that emergency responders were knowledgeable of

the proper actions to take in the event of an emergency. The inspector also confirmed that agreements with outside response organizations had been updated and maintained as necessary.

Emergency drills had been conducted as required by the E-Plan, with the latest one on November 16, 2000. The 2000 drill involved anti-nuclear protesters causing a disturbance. The overall review of the drill indicated that the drill went well and improvement was noted in response and lifesaving actions. 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, evaluated, and implemented as appropriate. 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.

c. Conclusions

The emergency preparedness program was conducted and implemented in accordance with the E-Plan.

12. **SAFEGUARDS**

a. Inspection Scope (IP 85102)

The inspector reviewed selected aspects of:

- nuclear material accountability program
- nuclear material inventory and locations
- accountability records and reports

b. Observations and Findings

The semiannual inventory of material was reviewed and verified. The material control and accountability program tracked locations and content of fuel and other SNM under the research reactor license. Fuel burn-up related measurements and calculations were acceptably performed and documented. The possession and use of SNM were 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. Fuel inventory and movement records were cross referenced and matched.

By letter dated March 6, 2001, the licensee reported that, through an internal audit, they had identified a violation of their R-129 license possession limit for plutonium.

License R-129 (Amend. 3) allows possession of one gram of plutonium-239 in the form of reference materials. Their previous license, R-92 (Amend. 6, 1970) allowed up to 150 grams of plutonium-239 in sealed "pins." The three subject "pins" were received from Argonne National Laboratory in 1971. With the decommissioning of the old reactor and the building and licensing of the present reactor, all fuel and special nuclear material was transferred to the new location and new license. The "pins" were physically transferred

appropriately and have been stored, inventoried, leak tested, and reported on semiannual materials balance reports as required by 10 CFR Parts 70, 73, and 75, TS Section 5.3.3-Configuration, and licensee SNM procedures.

The licensee's investigation concluded that the necessary amount and form of plutonium was inadvertently left off the application for the new reactor license (R-129). The inspector's review of this event also supports this conclusion.

The licensee immediately notified the NRC as required and has subsequently requested a license amendment to increase the possession limits of Pu 239 to cover the inventory of the pins. This licensee-identified issue is being treated as a Unresolved Item pending the outcome of the license amendment. (URI 50-602/2001-201-01)

c. Conclusions

With the exception of the Unresolved Item, the licensee was in compliance with all other possession and use limits of the research reactor and had acceptably controlled and inventoried all SNM, including the "pins", as required.

13. **TRANSPORTATION**

a. Inspection Scope (IP 86740)

The inspector reviewed selected aspects of:

- radioactive materials shipping procedures
- radioactive materials transportation and transfer records

b. Observations and Findings

Production of solid radioactive waste at the facility was minimal. The amount produced was transferred to the campus and handled under its waste disposal program. All transfers were documented and recorded on the appropriate forms. Radioactive materials produced by the reactor for use by the university staff or outside organizations were also transferred to the users under the campus license. Transfer documentation for solid radioactive waste and materials produced by the reactor was kept on file at the reactor.

c. Conclusions

Radioactive material was transferred to the campus in accordance with 10 CFR 30.41-Transfer of Byproduct Material, Reactor License Section 2.C, and campus and licensee procedures.

14. **EXIT MEETING SUMMARY**

The inspector presented the inspection results to members of licensee management at the conclusion of the inspection on August 10, 2001. The licensee acknowledged the findings

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

*M. Krause	Reactor Supervisor
*S. O'Kelly	Associate Director, NETL
*W. Kitchen	Reactor Health Physicist
D. Klein	Director, NETL
*J. White	Radiation Safety Officer, University of Texas at Austin

* Attended Exit Meeting

INSPECTION PROCEDURE (IP) USED

IP 69001	CLASS II NON-POWER REACTORS
IP 85102	MATERIAL CONTROL AND ACCOUNTING
IP 86740	TRANSPORTATION ACTIVITIES

ITEMS OPENED, CLOSED, AND DISCUSSED

Opened

URI 50-602/2001-201-01	The licensee possessed plutonium-239 in a form and amount in excess of its license limits.
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Closed

IFI 50-602/99-201-01	The licensee would modify their neutron calibration procedures to conform to industry standards.
IFI 50-602/99-201-02	The licensee would institute a routine inspection of the sample-handling tool cable and a rotary specimen rack procedure change requiring a ten-minute air purge prior to retrieval of samples.

PARTIAL LIST OF ACRONYMS USED

ALARA	As Low As Reasonably Achievable
E-Plan	Emergency Plan
HP	Health Physics
NETL	Nuclear Engineering Teaching Laboratory
NRC	Nuclear Regulatory Commission
NRSC	Nuclear Reactor Safety Committee
RSO	Radiation Safety Officer
RPP	Radiation Protection Program
SNM	Special Nuclear Material
TS	Technical Specifications