January 23, 2008

John Williams, Director
Nuclear Reactor Laboratory
1127 East James E. Rogers Way
P.O. Box 210020
Tucson, AZ 85721-0020

SUBJECT: UNIVERSITY OF ARIZONA - NRC ROUTINE INSPECTION REPORT NO. 50-113/2008-201

Dear Dr. Tolbert:

This letter refers to the inspection conducted on January 8-10, 2008, at The University of Arizona Nuclear Reactor Laboratory. The inspection included a review of activities authorized for your facility. The enclosed report presents the results of this inspection.

The inspection examined 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. The inspector reviewed selected procedures and records, observed activities, and interviewed personnel. Based on the results of this inspection, no findings of significance were identified.

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 Mr. Kevin M. Witt at 301-415-4075.

Sincerely,

**/RA/**

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

Docket No. 50-113
License No. R-52

Enclosure: NRC Inspection Report No. 50-113/2008-201

cc w/encl. Please see next page

cc:

Office of the Mayor
P.O. Box 27210
Tucson, AZ 85726-7210

Director, Arizona Radiation Regulatory Agency
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Test, Research and Training
Reactor Newsletter
202 Nuclear Sciences Center
University of Florida
Gainesville, FL 32611

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ACCESSION NO.: ML080160110 TEMPLATE #: NRR-106

| OFFICE | PRTB | | PRTB:LA | | PRTB:BC | |
|---|---|---|---|---|---|---|
| NAME | KWitt kw | | EBarnhill eb | | JEads jhe | |
| DATE | 1/16/08 | | 1/17/08 | | 1/23/08 | |

OFFICIAL RECORD COPY

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

| | |
|---|---|
| Docket No: | 50-113 |
| License No: | R-52 |
| Report No: | 50-113/2008-201 |
| Licensee: | The University of Arizona |
| Facility: | Nuclear Reactor Laboratory |
| Location: | Tucson, Arizona |
| Dates: | January 8-10, 2008 |
| Inspector: | Kevin M. Witt |
| Accompanied by: | John T. Nguyen (NRC Project Manager) |
| Approved by: | Johnny Eads, Branch Chief<br>Research and Test Reactors Branch B<br>Division of Policy and Rulemaking<br>Office of Nuclear Reactor Regulation |

# EXECUTIVE SUMMARY

The University of Arizona
Nuclear Reactor Laboratory
Inspection Report No. 50-113/2008-201

The primary focus of this routine, announced inspection included onsite review of selected aspects of the licensee's Class II research and test reactor safety programs including: organization and staffing, operation logs and records, requalification training, surveillance and limiting conditions for operation, design changes, committees, audits and reviews, emergency planning, and maintenance logs and records.

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.

## Operation Logs and Records

- Operational activities were consistent with applicable Technical Specification and procedural requirements.

## Requalification Training

- The licensee was meeting the requalification program requirements to ensure the effectiveness of all licensed operators.

## Surveillance and Limiting Conditions for Operation

- The licensee's program for completing surveillance inspections satisfied Technical Specification and licensee administrative controls.

## Design Changes

- Based on the records reviewed, the inspector determined that the licensee's design change program was being implemented as required.

## Committees, Audits and Reviews

- Review and oversight functions required by the Technical Specifications were acceptably completed by the Reactor Committee.

## Emergency Planning

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

Maintenance Logs and Records

- Maintenance logs, records, and performance satisfied Technical Specification and procedure requirements.

# REPORT DETAILS

## Summary of Plant Status

The licensee's 100 kilowatt Training Research Isotope Production General Atomics (TRIGA) Mark I research reactor has been operated in support of experiments, reactor operator training, and periodic equipment surveillances. During the inspection, the reactor was operated in support of on-going 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 organization and staffing requirements in Technical Specification (TS) Section 6.1:

- staff qualifications and management responsibilities
- staffing requirements for the safe operation of the reactor
- selected portions of the operations logbooks for the past twelve months
- organizational structure and staffing
- administrative controls
- TS for The University of Arizona Research Reactor (UARR), Amendment No. 18, dated April 9, 2001
- Reactor Committee (RC) meeting minutes, dated August 29 and December 11, 2006, and March 7, May 10, August 30 and December 10, 2007
- Operating Logbook Number (No.) 47 & 48, dated from January 4, 2006, to present
- UARR Procedure, UARR 100, "Administrative and Operating Procedures," dated May 6, 1999
- Annual Report for License R-52, Docket 50-113, dated August 25, 2007

b. Observations and Findings

The UARR organizational structure and the responsibilities of the reactor management and staff had not changed since the last inspection (see NRC Inspection Report No. 50-113/2006-201). Current UARR staff consisted of the Facility Director (FD), Reactor Supervisor (RS) and one student staff member, all of whom are licensed Senior Reactor Operators (SROs). There is also an electrical technician who is responsible for maintenance of reactor systems. All positions were filled with qualified personnel and a review of the applicable records verified that staffing was as required by TS Section 6.1 and the licensee's procedures. The inspector noted that the staffing at the facility was acceptable to support the ongoing activities.

c. Conclusions

The organization and staffing were 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 Sections 3, 4, and 6:

- staffing for reactor operations
- RC meeting minutes, dated August 29 and December 11, 2006, and March 7, May 10, August 30 and December 10, 2007
- Operating Logbook No. 47 & 48, dated from January 4, 2006, to present
- Annual Report for License R-52, Docket 50-113, dated August 25, 2007
- Memorandum for the Record from the Reactor Supervisor, "Unintentional Reactor Scram on July 16, 2007," dated September 15, 2007
- UARR 100, "Administrative and Operating Procedures," dated May 6, 1999
- UARR 129, "Procedures for the Conduct of Operating Personnel in the Control Room and Reactor Room," dated July 6, 1994
- UARR 147, "Instructions for Staff Members During Operation of the University of Arizona TRIGA Reactor," dated November 3, 1998
- UARR 150, "Reactor Operational Rules," dated September 6, 2000
- UARR 151, "Instructions for Daily Surveillance of Reactor Instrumentation, Safety Systems, Area Monitors, and Continuous Air Monitor," dated December 7, 2000
- UARR 152, "Preliminary Checklist," dated November 3, 1998
- UARR 153, "Critical Approach Checklist," Revision (Rev.) 1, dated December 11, 2006
- UARR 154, "Pulsing Checklist," dated November 3, 1998
- Completed UARR 152 forms, dated from January 4, 2006, to present
- Completed UARR 153 forms, dated from January 4, 2006, to present
- Completed UARR 154 forms, dated from January 4, 2006, to present

b. Observations and Findings

Reactor operations were carried out following written procedures and TS requirements. 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. Operations records confirmed that shift staffing met the minimum requirements for duty personnel. The inspector determined that reactor operations were carried out following written procedures. During review of the operations logs, the inspector noted that there was one unintentional scram during the inspection period. A further investigation determined that the linear power level was not indicating properly on the console chart recorder, which caused the operator to believe that the reactor power was below the maximum level, when the actual power level reached the scram point. The licensee stated that the potential for a repeat occurrence of the same situation is statistically improbable and cleared the reactor for continued routine operation. When a scram occurs, the root cause analysis is completed by an SRO before the resumption of operations.

c. Conclusions

Operational activities were consistent with applicable TS and procedural requirements.

## 3. Requalification Training

a. Inspection Scope (IP 69001)

The inspector reviewed selected portions of the following to ensure that the NRC approved Requalification Program was being acceptably implemented:

- operator physical examination records
- qualified operator licenses and expiration dates
- Operating Logbook No. 47 & 48, dated from January 4, 2006, to present
- "Operator and Senior Operator Requalification Program for the University of Arizona Research Reactor," Rev. 1, dated September 15, 1989
- UARR 129, "Procedures for the Conduct of Operating Personnel in the Control Room and Reactor Room," dated July 6, 1994
- Form T-10, "TRIGA Reactor Operator Requalification Program," dated January 1998
- Completed T-10 forms for current operators, dated from January 1, 2006, to December 31, 2007

b. Observations and Findings

Current licensed operators consisted of three SROs. The licensee's requalification program is described in the program submitted to the NRC. The inspector reviewed the requalification program records for all of the licensed operators at the facility. The FD and RS are responsible for the implementation of the requalification program and administer all tests. Records showed that the requirements in the requalification program were being followed. The inspector verified that physical examinations of the operators were conducted biennially as required. Records showed that annual operating tests and biennial written examinations were sufficiently being completed by the qualified operators as stipulated in the program. The number of hours in the facility performing licensed duties was recorded on the training records to ensure that all operators met the required minimum number of hours operating the reactor. The inspector confirmed that the requalification program was being administered in a manner that sufficiently maintains the effectiveness of all licensed operators.

c. Conclusions

The licensee was meeting the requalification program requirements to ensure the effectiveness of all licensed operators.

## 4. 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 operation (LCOs) specified in TS Section 4.0 were met:

- Periodic Maintenance Notebook containing the documentation of all maintenance scheduled for the facility

- surveillance, calibration, and test data sheets and records
- Operating Logbook No. 47 & 48, dated from January 4, 2006, to present
- Annual Report for License R-52, Docket 50-113, dated August 25, 2007
- Console and Monitor Calibration Data Notebook, pp. 224-283
- Reactor Up-grade and Instrument Maintenance Log No. 4, pp. 107-142, dated from January 12, 2006, to present
- UARR 102, "Procedure for Semi-annual Visual Inspection of the Transient Rod Drive Cylinder and Air Supply System," dated November 4, 1998
- UARR 122, "Procedures for Measurement of Control Rod Drop Times," dated July 6, 1994
- UARR 125, "Procedures for Power Calibration of the University of Arizona TRIGA Reactor," dated October 22, 1997
- UARR 155, "Monthly Checklist," dated June 7, 1999
- UARR 156, "Annual Checklist," Rev. 9 dated August 30, 2007
- UARR 158, "Annual Test / Test After Maintenance or Modification For Low Water Level Detector," Rev. 2 dated August 30, 2007
- Completed UARR 102 forms, dated June 6 and December 7, 2006, and June 18 and December 5, 2007
- Completed UARR 155 forms, dated from July 1, 2005, to present
- Completed UARR 156 forms, dated from January 2006 to present
- Completed UARR 158 forms, dated May 31, 2006, and June 13 and September 24, 2007

b. Observations and Findings

The inspector noted that daily, monthly, semi-annual and annual checks, tests, and/or calibrations for TS-required surveillance items were completed as required. The LCO verifications were completed on schedule and in accordance with licensee procedures. All of the recorded results were within the TS and procedurally prescribed parameters. The records and logs were noted to be complete and were being maintained as required. The procedures for the surveillances provided clear and concise direction and control of reactor operational tests and surveillances.

The inspector observed the licensee complete a daily checklist for TS required items on January 9, 2008. All of the items on the checklist were carried out appropriately and the personnel conducting the tests did so in a safe and knowledgeable manner. The inspector verified that all of the checks conducted were in compliance with TS required values and parameters.

c. Conclusions

The licensee's program for completing surveillance inspections satisfied Technical Specification and licensee administrative controls.

## 5. Design Changes

a. Inspection Scope (IP 69001)

In order to verify that any modifications to the facility were consistent with 10 CFR 50.59, the inspector reviewed selected aspects of:

- facility design changes and records
- facility configuration and associated records
- Operating Logbook No. 47 & 48, dated from January 4, 2006, to present
- RC meeting minutes, dated August 29 and December 11, 2006, and March 7, May 10, August 30 and December 10, 2007
- Annual Report for License R-52, Docket 50-113, dated August 25, 2007
- Reactor Up-grade and Instrument Maintenance Log No. 4, pp. 107-142, dated from January 12, 2006, to present
- Memo to the Reactor Committee from the Facility Director, "Proposed Modifications to the Rabbit Receiving Station," dated August 22, 2006
- UARR 165, "Procedure for Review of Changes, Tests, and Experiments for The University of Arizona Research Reactor," dated August 31, 2004
- UARR 168, "Procedure for Use of the Rabbit Pulse Timer," Rev. 1 dated August 30, 2006
- UARR 169, "Procedure for Use of the Rabbit with Extended Receiving Station," Rev. 1 dated August 30, 2006

b. Observations and Findings

Through review of applicable records and interviews with licensee personnel, the inspector determined that one change had been initiated and completed at the facility since the last inspection. The Procedure for Review of Changes, Tests, and Experiments at the UARR was required to be completed for all changes at the facility. One change was made to the reactor pneumatic irradiation station to allow for faster sample retrieval and analysis. The inspector reviewed the design change and found that the licensee evaluated all aspects of the change in accordance with the criteria established in 10 CFR 50.59(c)(2). All of the routine and non-routine maintenance conducted during the inspection period with replacement parts were not considered changes. The inspector verified that administrative controls were in place that required the appropriate review and approval of all changes prior to implementation.

c. Conclusions

Based on the records reviewed, the inspector determined that the licensee's design change program was being implemented as required.

## 6. Committees, Audits and Reviews

a. Inspection Scope (IP 69009)

The inspector reviewed the following to ensure that the audits and reviews stipulated in TS Section 6.2 were being completed by the RC:

- RC meeting minutes, dated August 29 and December 11, 2006, and March 7, May 10, August 30 and December 10, 2007
- The University of Arizona Reactor Committee Charter, dated April 4, 2003
- Appointment Letters for members of the RC, various dates
- minor and substantive procedural changes and the associated RC approval
- responses to the safety reviews and audits

- Memo to the Reactor Committee from the Reactor Supervisor, “Annual Audit of Emergency Plan and Emergency Procedures,” dated October 2, 2006, and August 15, 2007
- Memo to the Facility Director from the Reactor Supervisor, “Biennial Emergency Plan Audit,” dated February 23, 2007
- Memo to the Reactor Committee from the Reactor Committee Chairman, “Biennial Review and Audit of the Reactor Operator Requalification Program,” dated December 19, 2007
- Memo to the Reactor Committee from the Facility Director, “Proposed Modifications to the Rabbit Receiving Station,” dated August 22, 2006
- UARR 100, “Administrative and Operating Procedures,” dated May 6, 1999
- UARR 159, “Bimonthly Reactor Operations Audit,” Rev. 2 dated December 10, 2007
- UARR 160, “University of Arizona Research Reactor Biennial Emergency Plan Audit,” Rev. 3 dated March 7, 2007
- UARR 165, “Procedure for Review of Changes, Tests, and Experiments for the University of Arizona Research Reactor," dated August 31, 2004
- Completed UARR 159 forms, dated from January 2006 to June 2007
- Completed UARR 160 form, dated February 16, 2007

b. Observations and Findings

The RC is defined in the TSs and the inspector verified that the committee is following all aspects of the requirements. The RC had quarterly meetings as required by TS 6.2.f and a quorum was always present as required. Review of the minutes indicated the RC provided guidance, direction and oversight, and ensured suitable use of the reactor. The minutes provided an acceptable record of RC review functions and of their safety oversight of reactor operations.

Audits of the items required by TS 6.2.b were completed by individuals appointed by members of the RC. Minor issues that were not safety related were noted in the audit reports and meeting minutes and the inspector observed that any safety related items were properly controlled. The inspector noted that the safety reviews and audits, and the associated findings, were acceptably detailed. The licensee immediately responded to all audit findings and ensured that the corrective actions were properly completed.

c. Conclusions

Review and oversight functions required by the TSs were acceptably completed by the RC.

## 7. Emergency Planning

a. Inspection Scope (IP 69001)

To verify that the licensee was implementing and complying with the Emergency Plan (E-Plan) requirements, the inspector reviewed selected aspects of:

- emergency response supplies, equipment and instrumentation
- training records for emergency response personnel

- offsite support and support agreements
- RC meeting minutes, dated August 29 and December 11, 2006, and March 7, May 10, August 30 and December 10, 2007
- E-Plan for the University of Arizona Nuclear Reactor Laboratory, Rev. 9, dated May 2003
- Procedure UARR 101, "Emergency Procedures," Rev. 5, dated December 9, 2004
- Written documentation of Emergency Exercises conducted on April 12, 2006 and June 26, 2007
- Letter of Agreement (LOA) between University of Arizona Police Department (UAPD) and UARR, dated January 12, 2007
- LOA between City of Tucson Fire Department and UARR, dated January 22, 2007
- LOA between University Medical Center (UMC) and UARR, dated January 12, 2007
- LOA between Rural/Metro Southwest Ambulance and UARR, dated March 1, 2007
- LOA between University of Arizona Radiation Control Office and UARR, dated January 3, 2007
- UARR Emergency Notification List, dated January 10, 2007
- State and Federal Emergency Notification List, dated February 7, 2006
- Memo to the UARR from the Radiation Safety Officer, "Radiation Emergency Procedures," dated November 30, 2007
- UARR 101, "Emergency Procedures," Rev. 5, dated December 9, 2004
- UARR 101, "Emergency Procedures Implementing Appendix," dated December 9, 2004

b. Observations and Findings

The inspector verified that the UARR E-Plan was being fully implemented to maintain the emergency preparedness of the reactor. The E-Plan was audited and reviewed as required. E-Plan Implementing Procedures were also reviewed and revised as needed to effectively execute the E-Plan. The licensee was in the process of revising the emergency procedures due to comments received from the last emergency drill. The inspector verified that a list of emergency personnel, management, and offsite agencies was distributed to all personnel as required by the E-Plan. An Emergency Call list was also verified to be available at various locations.

Supplies, instrumentation, and equipment maintained at the facility and at the Emergency Support Center located in Room 104, were being controlled and inventoried as required in the E-Plan. This included inspections and testing of the fire extinguishers at the facility. LOAs with offsite response organizations and support groups had been updated annually and maintained as required. Communications capabilities with these support groups were acceptable and had been tested as required.

The documentation of the drills conducted during the past two years was reviewed. Emergency preparedness and response training was completed on an annual basis. Through drill scenario and record reviews, emergency responders were determined to be knowledgeable of the proper actions to take in case of an emergency. Emergency drills had been conducted annually as required by the E-Plan. Critiques were written

following the drills to document the strengths and weaknesses identified during the exercise. Action items were developed to correct the problems identified. The inspector also met with the UAPD Commander responsible for campus emergency preparedness and discussed the emergency readiness of the appropriate personnel at the UARR. The UAPD Commander was fully confident of their ability to handle emergencies which have been demonstrated through recent campus wide drills, one of which included the UARR.

The inspector visited the UMC to discuss their ability to handle any type of radiation emergency that could occur at the UARR. The inspector determined that there were adequate supplies and equipment available at the UMC to handle a radiation emergency. The inspector observed that the UMC emergency department was undergoing renovations and a temporary injured person decontamination site was ready for emergency use. Through talking with the UMC staff, the inspector noted that the personnel had the appropriate training for the potential hazards. The inspector talked to the UMC safety and emergency preparedness officer about the program used at the hospital to maintain their preparedness. There appeared to be a good working relationship between the licensee and this support group.

c. Conclusions

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

## 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:

- Operating Logbook No. 47 & 48, dated from January 4, 2006, to present
- RC meeting minutes, dated August 29 and December 11, 2006, and March 7, May 10, August 30 and December 10, 2007
- Annual Report for License R-52, Docket 50-113, dated August 25, 2007
- Console and Monitor Calibration Data Notebook, pp. 224-283
- Reactor Up-grade and Instrument Maintenance Log No. 4, pp. 107-142, dated from January 12, 2006, to present
- Reactor Repair and Modification Work Record For Replacement of Filter Cartridges, dated November 28, 2007
- UARR 108, “Procedures for Repair, Modification, Calibration, or Installation of Electronic Equipment in the Console and Control Rod Drive Systems,” dated March 7, 2001
- UARR 109, “General Procedures for the Repair, Modification, Calibration, or Installation of Equipment,” dated March 7, 2001
- UARR 159, “Bimonthly Reactor Operations Audit,” Rev. 2 dated December 10, 2007
- Completed UARR 159 forms, dated from September 2003 to August 2005

b. Observations and Findings

The inspector 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. These documents indicated that all maintenance activities were controlled and documented in accordance with the requirements in 10 CFR 50.59. All maintenance of reactor systems were reviewed and approved by the RS. The inspector verified that all maintenance was conducted in accordance with the requirements of TS section 4.5. After all maintenance items are completed, system operational checks are performed to ensure the affected systems function before returning them to service.

c. Conclusions

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

## 9. Exit Interview

The inspector presented the inspection results to licensee management at the conclusion of the inspection on January 10, 2008. 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 findings presented and did not identify as proprietary any of the material provided to or reviewed by the inspector during the inspection.

## KEY POINTS OF CONTACT

Licensee Personnel

| | |
|---|---|
| T. Bahill | Chair, Reactor Committee |
| K. Carsten | Deputy Director, Radiation Control Office |
| K. Knak | Safety and Emergency Preparedness Officer, University of Arizona University Medical Center |
| G. Mejia | Sergeant, University of Arizona Police Department |
| A. Moden | Research Operations Assistant |
| R. Offerle | Reactor Supervisor |
| B. Seastone | Commander, University of Arizona Police Department |
| D. Silvain | Director, Radiation Control Office |
| L. Tolbert | Vice President for Research, Graduate Studies, and Economic Development |
| J. Williams | Facility Director |

## INSPECTION PROCEDURES USED

| | |
|---|---|
| IP 69001 | CLASS II NON-POWER REACTORS |

## LIST OF ITEMS OPENED, CLOSED, AND DISCUSSED

Opened

None

Closed

None

## LIST OF ACRONYMS USED

| | |
|---|---|
| ADAMS | Agencywide Documents Access and Management System |
| CFR | Code of Federal Regulations |
| E-Plan | Emergency Plan |
| FD | Facility Director |
| IFI | Inspector Follow-up Item |
| IP | Inspection Procedure |
| LCO | Limiting Condition for Operation |
| LOA | Letter of Agreement |
| No. | Number |
| NRC | Nuclear Regulatory Commission |
| RC | Reactor Committee |
| Rev | Revision |
| RS | Reactor Supervisor |
| SRO | Senior Reactor Operator |
| TRIGA | Training Research Isotope Production General Atomics |
| TS | Technical Specification |

| | |
|---|---|
| UAPD | University of Arizona Police Department |
| UARR | University of Arizona Research Reactor |
| UMC | University Medical Center |