

December 19, 2008

Dr. M. Gottfredson  
Executive Vice Chancellor and Provost  
University of California - Irvine  
Irvine, CA 92697-2025

SUBJECT: NRC INSPECTION REPORT NO. 50-326/2008-201

Dear Dr. Gottfredson:

This letter refers to the inspection conducted on December 2 to 4, 2008, at your University of California - Irvine 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 concern or noncompliance of Nuclear Regulatory Commission (NRC) requirements was identified. 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 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 Marcus Voth at 301-415-1210.

Sincerely,

**/RA/**

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

Docket No. 50-326  
License No. R-116

Enclosure: NRC Inspection Report No. 50-326/2008-201  
cc w/ enclosure: See next page

University of California - Irvine

Docket No. 50-326

cc w/enclosures:

Dr. Donald Blake, Chair  
Department of Chemistry  
University of California, Irvine  
Irvine, CA 92697-2025

Dr. George E. Miller  
Department of Chemistry  
University of California, Irvine  
Irvine, CA 92697-2025

Test, Research and Training  
Reactor Newsletter  
202 Nuclear Sciences Center  
University of Florida  
Gainesville, FL 32611

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DATE	12/18/08	12/18/08	12/19/08

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

Docket No: 50-326

License No: R-116

Report No: 50-326/2008-201

Licensee: The Regents of the University of California

Facility: University of California - Irvine  
Nuclear Reactor Facility

Location: Department of Chemistry  
University of California, Irvine  
Irvine, CA

Dates: December 2 to 4, 2008

Inspector: Marcus H. Voth

Approved by: Johnny H. Eads, Branch Chief  
Research and Test Reactors Branch B  
Division of Policy and Rulemaking  
Office of Nuclear Reactor Regulation

## EXECUTIVE SUMMARY

University of California - Irvine  
Nuclear Reactor Facility  
NRC Inspection Report No. 50-326/2008-201

The primary focus of this routine, announced inspection was the onsite review of selected aspects of the University of California - Irvine Class II research reactor facility safety programs including organization and staffing; operations logs and records; requalification training; surveillance and limiting conditions for operation; emergency planning; maintenance logs and records; fuel handling logs and records; and follow-up on previously identified items since the last NRC inspection of these areas. 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 licensee's organization and staffing was in compliance with the requirements specified in the Technical Specifications.

### Operations Logs and Records

- Within the scope of this review, the licensee's operations record keeping program conformed to Technical Specification requirements.

### Requalification Training

- The reactor operator met the requirements of the Operator Requalification Program.

### Surveillance and Limiting Conditions for Operation

- Within the scope of the inspection, all operations were found to be in compliance with the limiting conditions for operation and surveillances requirements as stated in the Technical Specifications.

### Emergency Planning

- The emergency preparedness program was conducted in accordance with the Emergency Plan.
- An inspector follow-up item was closed based on action taken since the previous inspection.

### Maintenance Logs and Records

- The licensee maintained adequate records documenting principal maintenance activities.

### Fuel Handling Logs and Records

- Fuel handling, inspection, and reporting activities were conducted in accordance with Technical Specification and regulatory requirements.

## REPORT DETAILS

### Summary of Facility Status

The University of California - Irvine (UCI) Nuclear Reactor Facility (NRF) 250 kilowatt TRIGA Mark-I research reactor continued to be operated in support of graduate and undergraduate research and laboratory instruction. During the inspection alarm checks were observed but no reactor operations were performed.

### 1. Organization and Staffing

#### a. Inspection Scope (Inspection Procedure (IP) 69001-02.01)

The inspector reviewed the following regarding the licensee's organization and staffing to ensure that the requirements of Section 6.1, Organization, of the UCI NRF Technical Specifications (TS), Amendment No. 6 to License No. R-116, dated November 17, 2000, were being met:

- UCI NRF Annual Report for July 1, 2007 through June 30, 2008, submitted September 2, 2008
- UCI NRF Standard Operating Procedures (SOP), Rev. 3, Approved March 2000
- Reactor Logbook #38, June 20, 2006 to June 5, 2008
- Reactor Logbook #39, June 24, 2008 to present
- University of California - Irvine, Nuclear Reactor Facility organizational structure and staffing

#### b. Observations and Findings

Through discussions with licensee representatives, the inspector determined that the management structure at the facility had not changed since the previous NRC inspection. The only NRC-licensed reactor operator on the staff, the Reactor Administrator who was also performing the duties of the Reactor Supervisor, held an NRC Senior Reactor Operator (SRO) license. At the time of the inspection there were no designated reactor operator trainees. The Radiation Safety Officer continued to be actively involved in radiation protection oversight of the reactor and a Health Physics Specialist continued to provide independent audits of reactor operations, making periodic reports to the Reactor Operations Committee. The Radiation Safety Officer and the Health Physics Specialist, members of the Environmental Health and Safety Department, provided backup to the Reactor Administrator as knowledgeable emergency call-in respondents in the event of a radiation incident at the reactor.

#### c. Conclusions

The licensee's organization and staffing was in compliance with the requirements specified in the Technical Specifications.

## 2. Operations Logs and Records

### a. Inspection Scope (IP 69001-02.02)

The inspector reviewed selected parts of the following reactor operations records to verify that the requirements of TS Sections 6.6, Plant Operating Records, and 6.7, Reporting Requirements, were being met:

- UCI NRF Standard Operating Procedures, Rev. 3, Approved March 2000
- Reactor Logbook #38, June 20, 2006 to June 5, 2008
- Reactor Logbook #39, June 24, 2008 to present
- Nuclear Liability Inspection Report, L031108\_176, American Nuclear Insurers, R. Tooker, American Nuclear Insurers, March 28, 2008
- Daily Startup Checklists, December 2, 2007 to December 1, 2008
- Shutdown Checklists, December 2, 2007 to December 1, 2008
- Monthly Maintenance Logs through November 12, 2008
- [Quarterly] Radiation Protection Survey of Radioisotope Laboratories, R. Dento, December 1, 2008

### b. Observations and Findings

The inspector randomly selected TS requirements and verified that each requirement was performed and documented in startup checklists, shutdown checklists, in the reactor logbook, or in the quarterly checks of reactor operations by the UCI Environmental Health and Safety auditor. The UCI NRF procedures specified a records system that was commensurate with the small staff and the number of facility users. Data recorded indicated that the reactor was operated within the envelope of safety parameters established in the reactor license and TS. The licensee's annual report summarized operations and changes to the facility and procedures in accordance with TS requirements.

### c. Conclusions

Within the scope of this review, the licensee's operations record keeping program conformed to Technical Specification requirements.

## 3. Requalification Training

### a. Inspection Scope (IP 69001-02.04)

The inspector reviewed the following to verify that the requirements of 10 CFR 50.55, Operators' Licenses, were being met:

- UC Irvine Nuclear Reactor Facility Operator Requalification Program, Rev.1, April 24, 2000
- Letter from J. Eads (NRC) to G. Miller (UCI), Issuance of Renewed Senior Reactor Operator License SOP-50100-5, September 24, 2006
- NRC Form 396, Certification of Medical Examination for G.E. Miller, June 12, 2007
- Reactor Logbook #38, June 20, 2006 to June 5, 2008

- Reactor Logbook #39, June 24, 2008 to present

b. Observations and Findings

Review of the reactor logbook for the past year indicated that all operations were conducted by the sole licensed operator for the facility. That operator's file contained indication that his license was current and that annual medical examinations were performed and documented on NRC Form 396, Certification of Medical Examination by Facility Licensee. For acceptance criteria regarding the candidate's physical condition the physician used Section 7, Medical Certification and Monitoring of Certified Personnel, of the American Nuclear Society and the American National Standards Institute Standard ANSI/ANS 15.4-1988, Selection and Training of Personnel for Research Reactors.

The licensee's requalification program included the traditional requirement for a Training Coordinator who is exempt from the requirement to take an annual operating test and a biennial written examination. Since the licensee only maintained one licensed individual, the Reactor Administrator/Reactor Supervisor, that same individual was also designated as the Training Coordinator. It was apparent from reviewing the reactor logbook that this individual performed all reactor operations and surveillances, directed or performed all maintenance and facility enhancements, directed and approved all experiments, and processed all licensing actions and procedural changes. Being a long-term SRO in addition to being a Professor Emeritus provided further basis for being exempt from the operating test and written examination.

c. Conclusions

The reactor operator met the requirements of the Operator Requalification Program.

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

a. Inspection Scope (IP 69001-02.05)

The inspector reviewed the following to verify compliance with TS Section 3.0, Limiting Conditions for Operation, and to determine if the periodic surveillance tests on safety systems were performed as stipulated in TS Section 4.0, Surveillance Requirements:

- Reactor Logbook #38, June 20, 2006 to June 5, 2008
- Reactor Logbook #39, June 24, 2008 to present
- Daily Startup Checklists, December 2, 2007 to December 1, 2008
- Shutdown Checklists, December 2, 2007 to December 1, 2008
- UCI NRF Standard Operating Procedures, Rev. 3, Approved March 2000

b. Observations and Findings

As noted in regard to logs and records above, the inspector randomly selected TS surveillance requirements and limiting conditions for operation and verified that each requirement was performed and documented in startup checklists, shutdown checklists, in the reactor logbook, or in the quarterly audits of reactor operation.

Surveillances were completed on schedule and in accordance with licensee procedures.

A review of randomly selected procedures indicated that the licensee's written standard operating procedures used effective techniques to verify acceptable performance of the safety equipment. All the recorded results reviewed were within the TS and procedurally prescribed limitations. The records and logs were complete and were being maintained as required. Checks and calibrations were completed as required by TS.

c. Conclusions

Within the scope of the inspection, all operations were found to be in compliance with the limiting conditions for operation and surveillances requirements as stated in the Technical Specifications.

**5. Emergency Planning**

a. Inspection Scope (IP 69001-02.10)

The inspector reviewed the implementation of selected portions of the emergency preparedness program including:

- Environmental Health and Safety (EHS) Emergency Response Team First Quarter Training, [Scenario and Instructions for Tabletop Exercise], February 2008
- UCI EHS Emergency Response Team Radiation Scenario Exercise After Action Report, L. Bogue, March 2007
- UCI EHS Emergency Response Team Radiation Scenario Exercise After Action Report, L. Bogue, December 4, 2008 update to March 2007 document
- UCI EHS Emergency Response Team Response Plan, October 2007, Controlled Copy #38 in NRF Control Room
- UCI NRF SOP Manual, Emergency Call List, March 7, 2007
- UCI NRF SOP Manual, Section 6, Emergency Procedures, Rev. 3
- Emergency Plan for the University of California - Irvine Nuclear Reactor Facility, Rev. 3, May 2000
- Emergency Plan for the University of California - Irvine Nuclear Reactor Facility, Draft Rev. 4, February 2008

b. Observations and Findings

At the UCI campus emergency management was the responsibility of the Environmental Health and Safety Team. The NRF staff worked closely with EHS staff in matters such as emergency preparedness and exercises. A tabletop exercise conducted in February of 2008 fulfilled the annual requirement of the licensee's emergency preparedness program. In addition, the EHS staff received quarterly training to the First Responder Operation level.

By local jurisdiction the Orange County Fire Authority (OCFA) provided fire, ambulance and paramedic service to the UCI campus. UCI EHS provided training regarding radiation and the nuclear reactor to members of the OCFA. The UCI Medical Center near campus was prepared to receive accident victims from a radiation incident at both the UCI research reactor and the nearby San Onofre Nuclear Generating Station. EHS had an agreement letter from the Medical Center on file and a recent outstanding request for an updated letter.

The UCI NRF Emergency Plan had been updated with editorial changes in February of 2008 but remained in draft form. The licensee placed it on the agenda for the winter Reactor Operations Committee meeting to complete the change process.

Inspector Follow-up Item (IFI) 50-326/2007-201-01, Verify action on follow-up items identified following the 2007 emergency drill and subsequent NRC inspection, was opened during the previous NRC inspection. The inspector reviewed this IFI, finding that the licensee had taken action in response to recommended enhancements to their emergency preparedness program post-drill critique, correcting the Emergency Notification List, and referencing the current NRF Emergency Plan in the EHS Emergency Response Team Response Plan. This matter is therefore closed. (IFI 50-326/2007-201-01 is closed.)

c. Conclusions

The emergency preparedness program was conducted in accordance with the Emergency Plan. An inspector follow-up item was closed based on action taken since the previous inspection.

**6. Maintenance Logs and Records**

a. Inspection Scope (IP 69001 and 92701-02.11)

The inspector reviewed the following selected maintenance logs and records to verify compliance with the requirements of TS Section 6.6.2, Principal Maintenance Activities:

- Reactor Logbook #38, June 20, 2006 to June 5, 2008
- Reactor Logbook #39, June 24, 2008 to present
- Letter from G. Miller (UCI) to NRC, Docket 50-326 – Incident Report: Irrigation Water Incursion to Fresh Fuel in Storage, August 18, 2006
- Monthly Maintenance Logs through November 12, 2008
- [Quarterly] Radiation Protection Survey of Radioisotope Laboratories, R. Dento, December 1, 2008

b. Observations and Findings

The inspector reviewed selected portions of the reactor logbooks, monthly maintenance logs, and internal audit reports for the interval of time since the previous inspection. Major maintenance activities were found documented with detail commensurate with the safety significance of the activity.

The inspector reviewed the status of action in response to groundwater incursion into reactor bay below grade storage pits. In August of 2006 the licensee submitted an incident report informing the NRC of a valve failure on the landscape irrigation system for grounds around the building, resulting in an accumulation of groundwater in the low permeability soil in which the reactor building sits. Material was removed from all floor storage pits and a sump pump installed. Water was periodically pumped, sampled and released. No indication of water of reactor origin was found. The only radionuclides observed were radon daughters indicative of surface water percolating into the “bathtub” of pervious soil under the building which replaced the less permeable virgin soil

excavated for building construction. The licensee's letter stated that a final report will be provided. This IFI will therefore be left open pending receipt of the licensee's final report. (IFI 50-326/2007-201-02 remains open.)

c. Conclusions

The licensee maintained adequate records documenting principal maintenance activities.

**7. Fuel Handling Logs and Records**

a. Inspection Scope (IP 69001-02.12)

The inspector reviewed the following to verify compliance with requirements of TS Sections 4.1, Fuel [Surveillance], and 6.6.7, Fuel Inventories and Transfers [Reports]:

- Reactor Logbook #38, June 20, 2006 to June 5, 2008
- Reactor Logbook #39, June 24, 2008 to present
- Fuel History Notebook, a record of the movements of each fuel element
- UCI NRF SOP Section 4.8, "Fuel Element and Control Rod Removal and Measurement, Rev. 3.3.1
- UCI NRF SOP Section 4.10, "Fuel Inventory," Rev. 3, Approved March 2000

b. Observations and Findings

In the December 2007 NRC inspection, as reported in Inspection Report Number 50-326/2007-201, procedures for refueling, fuel movement, and TS required fuel inspections and surveillances were reviewed. Likewise, fuel movement, logbook entries, and data accumulation were found to have been completed as directed by procedures. The required 5-year fuel inspection had been performed the month prior to that inspection. No fuel movements were performed since the 2007 inspection; therefore, there was no new material to inspect during the present inspection.

The inspector verified that the annual fuel inventory and burnup information was submitted in early 2008 in compliance with 10 CFR Part 74 requirements.

c. Conclusions

Fuel handling, inspection, and reporting activities were conducted in accordance with Technical Specification and regulatory requirements.

**8. Exit Interview**

The inspection scope and results were summarized on December 4, 2008, with members of licensee management. The inspector described the areas inspected and discussed in detail the inspection findings. No dissenting comments were received from the licensee.

## **PARTIAL LIST OF PERSONS CONTACTED**

### Licensee

L. Bogue	Emergency Management Coordinator, Environmental Health and Safety
R. Dendo	Radiation Safety Specialist, Environmental Health and Safety
M. Gomez	Director, Environmental Health and Safety
D. Hamano	Radiation Safety Officer, Environmental Health and Safety
G. Miller	Senior Lecturer Emeritus, Chemistry Department, Reactor Administrator and Senior Reactor Operator
A.J. Shaka	Associate Department Head for Facilities, Chemistry Department

## **INSPECTION PROCEDURES USED**

IP 69001	Class II Research and Test Reactors
IP 92701	Follow-up

## **ITEMS OPENED, CLOSED, AND DISCUSSED**

### Opened

None

### Discussed (without closing)

50-326/2007-201-02	IFI	Track resolution and final report of irrigation water incursion of reactor bay below grade storage pits.
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### Closed

50-326/2007-201-01	IFI	Verify action on follow-up items identified following the 2007 emergency drill and subsequent NRC inspection.
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## **PARTIAL LIST OF ACRONYMS USED**

10 CFR	Title 10 to the <i>Code of Federal Regulations</i>
ADAMS	Agencywide Documents Access and Management System
EHS	Environmental Health and Safety
IFI	Inspector Follow-up Item
IP	Inspection Procedure
NRC	Nuclear Regulatory Commission
NRF	Nuclear Reactor Facility
OCFA	Orange County Fire Authority
PARS	Publicly Available Records
Rev	Revision
SOP	Standard Operating Procedure
SRO	Senior Reactor Operator
TS	Technical Specifications
UCI	University of California - Irvine