November 23, 2009

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

SUBJECT: UNIVERSITY OF CALIFORNIA – IRVINE, NRC ROUTINE INSPECTION REPORT NO. 50-326/2009-201

Dear Dr. Gottfredson:

On October 26-29, 2009, the U.S. Nuclear Regulatory Commission (NRC, the Commission) conducted an inspection at the University of California - Irvine Nuclear Reactor Facility (Inspection Report No. 50-326/2009-201). The enclosed report presents the results of that inspection.

This inspection was an examination of 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. 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 NRC requirements was identified. No response to this letter is required.

In accordance with Title 10 of the *Code of Federal Regulations* (10 CFR) Section 2.390 "Public inspections, exemptions, requests for withholding," a copy of this letter 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 (Agencywide Document Access and Management 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 Greg Schoenebeck at 301-415-6345

Sincerely,

/RA/
Johnny H. Eads, 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:
As stated
cc: See next page

cc:

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

Docket No:	50-326
License No:	R-116
Report No:	50-326/2009-201
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:	October 26-29, 2009
Inspector:	Gregory M. Schoenebeck
Approved by:	Johnny H. Eads, 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. 50-326/2009-201

The primary focus of this routine, announced inspection was the onsite review of selected aspects of the University of California - Irvine (the licensee's) Class II research reactor facility safety programs including procedures; experiments; health physics; design changes; committees, audits and reviews; transportation; and follow-up on previously identified items since the last U. S. Nuclear Regulatory Commission (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.

Procedures

- The inspector determined that appropriate procedures were in effect, being followed, and were generally being updated as necessary.

Experiments

- Experiments were being reviewed and performed in accordance with Technical Specification requirements and the licensee's written procedures.

Health Physics

- The inspector verified that the licensee's radiation protection program was effective in minimizing radiation doses to individuals through training, notices to workers, radiation monitoring and surveys, and calibrated equipment. Effluent monitoring satisfied license and regulatory requirements and releases were within the specified regulatory limits.

Design Changes

- No new changes, tests, or experiments subject to Title 10 of the *Code of Federal Regulations* Part 50.59 reporting were performed since the previous inspection

Committees, Audits and Reviews

- The Reactor Operations Committee provided the oversight required by the Technical Specifications.

Transportation

- Radioactive material shipments were made according to procedures and regulatory requirements.

Follow-up

- The inspector follow-up item (IFI) 50-326/2007-201-02 was discussed and closed. IFIs 50-326/2009-01 through 50-326/2009-03 were opened.

REPORT DETAILS

Summary of Facility Status

The University of California - Irvine (UCI, the licensee) 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, the reactor was operated to support the observation of a reactor startup.

1. Procedures

a. Inspection Scope (IP 69001)

The inspector reviewed the following to ensure that the requirements of Technical Specification (TS) Section 6.3, Operating Procedures, were being met concerning written procedures:

- UCI NRF Standard Operating Procedures, Rev. 3, Approved March 2000
- UCI NRF SOP Section 4.1, "Reactor Operations"
- UCI NRF SOP Section 4.2, "Reactor Log"
- UCI NRF SOP Section 4.3, "Reactor Power Calibration"
- UCI NRF SOP Section 4.4, "Reactor Control Logs and Drive Surveillances"
- Technical Specifications for the University of California, Irvine TRIGA MK I Nuclear Reactor, Rev. 1998
- UCI NRF Console Logbook #39
- UCI NRF Console Logbook #38
- Daily Startup Checklists, various 2008 and 2009, Approved August 21, 2008
- Shutdown Checklist, UC Irvine, various 2008 and 2009, Approved December 14, 2003

b. Observations and Findings

The inspector reviewed the licensee's written procedures and revisions to procedures. The Standard Operating Procedure (SOP) manual was organized to address the full scope of activities conducted at the UCI NRF.

In some instances, such as the section which outlines the organizational staffing of the facility, the procedures were inconsistent with the Technical Specifications (TS). It was also noted that there were numerous "pen and ink" changes to the console room control copy procedures which was hard to differentiate which are draft, which had been approved, and which are being currently implemented.

The inspector discussed the issue of consistency with procedural adherence and implementation with the Reactor Supervisor (RS). It was determined that the procedures are being overhauled to correspond with the relicensing effort at the facility. The RS was fully cognizant of the need to have consistent and current procedures at the reactor facility. The inspector has opened an Inspector Follow-

up Item (IFI) 50-326/2009-201-01 to follow-up on the licensee commitment for addressing and updating the procedures consistent with the license renewal.

c. Conclusions

The inspector determined that appropriate procedures were in effect, being followed, and were generally being updated as necessary.

2. Experiments

a. Inspection Scope (IP 69001)

The inspector reviewed the following to verify compliance with TS Section 3.8, Limitations on Experiments:

- UCI NRF SOP Section 2, Experiments, Rev. 3, Approved 2000
- UCI Irradiation Requests, various 2008 and 2009
- Experiment Performance Sheets for Rotary Specimen Rack Irradiation: various 2008 and 2009
- Irradiation Request File, various 2008 and 2009

b. Observations and Findings

The UCI NRF has two experimental procedures approved which were written to provide an umbrella for a broad class of applications. The mission of the UCI NRF is primarily irradiation services to researchers and educational laboratory instruction, new experiments are uncommon. No new experiments were reviewed for approval since the previous inspection. There are procedures for experiment review by the Reactor Operations Committee (ROC).

From a random sampling of forms for experiments performed since the previous inspection the inspectors found that experiments were being reviewed and performed in accordance with TS requirements and the licensee's written procedures.

c. Conclusions

Experiments were being reviewed and performed in accordance with TS requirements and the licensee's written procedures.

3. Health Physics

a. Inspection Scope (IP 69001)

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

- Training Records for UC Irvine Reactor Facility Radioactive Material Handling
- UCI Radiation Safety Manual, Revised December 2008
- Personnel dosimetry records from Global Dosimetry Solutions for 2008 to present
- UCI NRF Annual Report for July 1, 2008 through June 30, 2009
- Radiation Detector Calibration Logbook, 2008 to present
- Form RP20, "Radiation Use Authorization (RUA)", approved February 1998
- Form RP-25, "Health Physics Review for RUA Renewal", approved July 2007
- Radiation Safety Committee Meeting Minutes for 2007 to present
- NRF Radiation Surveys, dated January 31, 2008 to October 14, 2009
- Health Physics Procedure #1-1, "Individual Monitoring for External Radiation Exposure", approved August 6, 1997
- Health Physics Procedure #2-1, "Radiation Protection Surveys of Radioactive Materials Laboratories", approved May 1, 1996
- Health Physics Procedure #2-2, "Formats for Radiation Protection Survey Reports", approved November 12, 1996
- Standard Operating Procedure #5, "UCINRF Radiological Safety Program" Rev. 3, approved 2000

b. Observations and Findings

The inspector toured the facility to review radiation sign postings, interview facility personnel, and observe practices regarding radiation protection and monitoring. A practical evolution was observed as the RS replaced the cartridges for the mechanical CUNO Filter within the primary purification system. During this evolution the RS used approved procedures, applicable anti-contamination clothing, and performed appropriate monitoring surveys. The inspector performed independent surveys to assess the radiation and contamination levels for this evolution, and also independently assessed levels for radiation posting in various areas within the facility. Independent surveys were generally consistent with those obtained in the survey logs for the NRF.

Through interviews, the inspector determined that radiation and contamination monitoring surveillances were performed by the RS on a periodic frequency, where records are audited quarterly by an Office of Environmental Health and Safety (EHS) Health Physics Specialist, including a confirmatory assessment survey for the facility. The inspector noted that the Campus EHS program for the reactor performs a detailed audit and record assessment, and provides feedback for improvement to radiation protection program owners.

On several occasions it was determined that radiation protection surveillances, non-TS related, were not being performed during the specified frequency as required by the Radiation Safety Officer (RSO). After discussion with the RS and the RSO, it was determined that since all the NRF surveillances are conducted by the RS, some are delinquent with periods of heavy activity (e.g., semester

classroom laboratories). The issue of missing/late surveillances was discussed with the RS and RSO and it was determined that the facility would incorporate a process for scheduling activities which would better identify the completion and due dates for the periodic radiation protection surveillances. The inspector opened IFI No. 50-326/2009-201-02 to follow-up on the licensee commitment for developing a process for periodic radiation protection surveillance completion.

c. Conclusions

The inspector verified that the licensee's radiation protection program was effective in minimizing radiation doses to individuals through training, notices to workers, radiation monitoring and surveys, and calibrated equipment. Effluent monitoring satisfied license and regulatory requirements and releases were within the specified regulatory limits.

4. Design Changes

a. Inspection Scope (IP 69001)

The inspector reviewed the following materials to verify compliance with the requirements of 10 CFR Part 50.59:

- UCI NRF Annual Report for July 1, 2008 through June 30, 2009
- UCI NRF Standard Operating Procedures Rev. 3, Approved March 2000

b. Observations and Findings

The licensee reported that since the previous inspection there were no changes made which constituted a change reportable under 10 CFR Part 50.59. Changes to facility design are infrequent; therefore a formal review procedure had not been adopted. The RS and the ROC use the regulation as a guide for reviewing changes if necessary.

c. Conclusions

No new changes, tests, or experiments subject to 10 CFR Part 50.59 reporting were performed since the previous inspection.

5. Committees, Audits, and Reviews

a. Inspection Scope (IP 69001)

The inspector reviewed the following to verify compliance with the requirements of TS Section 6.2, Review:

- Reactor Operations Committee, January 16, 2008
- Reactor Operations Committee Meeting, August 28, 2008
- Reactor Operations Committee Meeting, January 27, 2009
- Reactor Operations Committee Meeting, August 10, 2009

- Technical Specifications for the University of California, Irvine TRIGA MK I Nuclear Reactor, Rev. 1998

b. Observations and Findings

The composition of the ROC was verified to be in accordance with TS. A quorum was present at each of the four meetings reviewed and meetings were conducted semi-annually in compliance with TS.

EHS quarterly audits of NRF operational records were conducted. The audit reports were discussed and reviewed by the ROC as specified by TS.

c. Conclusions

The ROC provided the oversight required by theTS.

6. Transportation

a. Inspection Scope (IP 86740)

The inspector interviewed personnel and reviewed the following to verify compliance with regulatory and procedural requirements for transferring licensed material:

- Standard Operating Procedure 5.10, “Transportation of Radioactive Materials” Rev. 3.1 dated May 13, 2005
- UCI TRIGA Reactor Isotope Release Forms, various 2008 and 2009
- UCI Radioactive Sample Shipping Checklist, various 2008 and 2009
- Hazmat Certification Letter, dated September 25, 2007

b. Observations and Findings

The licensee continues to efficiently utilize the corrective actions for response to previous inspection violations (2002 and 2004) involving shipping requirements.

UCI has limited radioactive material transfers, mostly in the form of isotope transfers to private companies and local research universities. The inspector noted that hazardous material training is current for the RS and the RSO. The licensee continues to efficiently utilize the corrective actions (e.g., shipping procedure and checklist) for response to previous inspection violations (2002 and 2004) involving shipping requirements. There were no issues noted involving the records for the transportation of material from the facility.

c. Conclusions

Radioactive material shipments were made according to procedures and regulatory requirements.

7. Follow-up

a. Inspection Scope (IP 92701)

The inspector followed-up on IFI 50-326/2007-201-02 (NRC Inspection Report No.50-326/2007-202, ADAMS ML#0835004151) regarding the status of licensee's action in a final report, providing response to groundwater incursion into the reactor bay below grade storage pits.

b. Observations and Findings

The inspector discussed the events of the groundwater seepage into the reactor bay and determined that on September 4, 2009, a final report was provided to the NRC discussing the temporary measures the facility is utilizing for water incursion mitigation. These measures include using sump pumps for periodic water removal and the use of monitoring wells to assess potential leakage from the facility (e.g., environmental assays). Currently, there is no indicated leakage from the pool or impact to reactor fuel which had been stored in the reactor bay below grade storage pits. Having provided a final report for corrective actions, IFI 50-326/2007-201-02 is considered closed.

The inspector noted that the periodic drainage of water via the sump pump is not a permanent solution. The construction of Rowland Hall, with the NRF in the basement, collects in a "scooped pool" beneath the building. The RS indicated concern to the NRF due to long term potential corrosion to the reactor tank if the water remained stagnant for extensive periods of time. The licensee and members of the ROC have discussed the need for permanently resolving the subsurface water ingress with UCI Chemistry Department Officials, and are pending a decision to resolve this issue. Therefore, the inspector will open IFI 50-326/2009-201-03 to follow-up on the commitment for a permanent resolution to the subsurface water ingress to Rowland Hall and the associated NRF.

c. Conclusions

The inspector follow-up item (IFI) 50-326/2007-201-02 was discussed and closed. The inspector opened IFI 50-326-2009-201-03 to follow-up on the commitment for a permanent resolution to the subsurface water ingress to Rowland Hall and the associated NRF.

8. Exit Interview

The inspection scope and results were summarized on October 29, 2009, 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

G. Miller	Senior Lecturer Emeritus, Chemistry and Reactor Supervisor and Senior Reactor Operator
K. Wolonsky	Associate Dean, Physical Sciences

Other Personnel

R. Dando	Radiation Safety Officer, Environmental Health and Safety
R. Mannix	Radiation Safety Officer, Environmental Health and Safety

INSPECTION PROCEDURES USED

IP 69001	Class II Research and Test Reactors
IP 86740	Transportation
IP 92701	Follow-up

ITEMS OPENED, CLOSED, AND DISCUSSED

Opened

50-326/2009-201-01	IFI	Verify the licensee commitment for addressing and updating the procedures consistent with the license renewal
50-326/2009-201-02	IFI	Track the licensee commitment for developing a process for periodic radiation protection surveillance completion
50-326/2009-201-03	IFI	Follow-up on the commitment for a permanent resolution to the subsurface water ingress to Rowland Hall and the associated NRF.

Closed

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

PARTIAL LIST OF ACRONYMS USED

ALARA	As Low As Reasonably Achievable
CFR	Code of Federal Regulations
EHS	(Office of) Environmental Health and Safety
IFI	Inspector Follow-up Item
IP	Inspection Procedure
NRC	U.S. Nuclear Regulatory Commission
NRF	Nuclear Reactor Facility
ROC	Reactor Operations Committee
RS	Reactor Supervisor
RSC	Radiation Safety Committee
RSO	Radiation Safety Officer
SOP	Standard Operating Procedure
SRO	Senior Reactor Operator
TLD	thermoluminescent dosimeter
TS	Technical Specifications
UCI	University of California - Irvine
UCI NRF	University of California - Irvine Nuclear Reactor Facility