



UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

December 3, 2019

Dr. George Miller, Reactor Supervisor
Nuclear Reactor Facility
Department of Chemistry
University of California, Irvine
1102 Natural Sciences 2
Irvine, CA 92697-2025

SUBJECT: UNIVERSITY OF CALIFORNIA – IRVINE, U.S. NUCLEAR REGULATORY
COMMISSION ROUTINE INSPECTION REPORT NO. 50-326/2019-201

Dear Dr. Miller:

From November 5-7, 2019, the U.S. Nuclear Regulatory Commission (NRC) conducted an inspection at the University of California - Irvine Nuclear Reactor Facility. The enclosed report presents the results of that inspection, which were discussed on November 7, 2019, with members of your staff.

The inspection examined activities conducted under your license as they relate to safety and compliance with 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. No response to this letter is required.

In accordance with Title 10 of the *Code of Federal Regulations* Section 2.390, "Public inspections, exemptions, requests for withholding," a copy of this letter, its enclosure, and your response (if any) will be available electronically for public inspection in the NRC Public Document Room or from the Publicly Available Records component of NRC's document system (Agencywide Documents Access and Management System (ADAMS)). ADAMS is accessible from the NRC Web site at <http://www.nrc.gov/reading-rm/adams.html> (the Public Electronic Reading Room).

Should you have any questions concerning this inspection, please contact Mr. Kevin Roche at 301-415-1554 or by electronic mail at Kevin.Roche@nrc.gov.

Sincerely,

/RA/

Anthony J. Mendiola, Chief
Non-Power Production and Utilization Facility
Oversight Branch
Division of Advanced Reactors and Non-Power
Production and Utilization Facilities
Office of Nuclear Reactor Regulation

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

Enclosure:
As stated

cc: w/enclosure: See next page

University of California - Irvine

Docket No. 50-326

cc:

Dr. Douglas Tobias, Chair
Department of Chemistry
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Radiological Health Branch
California Department of Public Health
P.O. Box 997414, MS 7610
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Dr. Rachel Martin, Reactor Director
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Test, Research and Training
Reactor Newsletter
Attention: Ms. Amber Johnson
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University of Maryland
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College Park, MD 20742-2115

Dr. Howard Gillman, Chancellor
University of California, Irvine
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Irvine, CA 92697

Dr. Enrique Lavernia
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University of California, Irvine
509 Aldrich Hall
Irvine, CA 92697-2025

SUBJECT: UNIVERSITY OF CALIFORNIA – IRVINE, U.S. NUCLEAR REGULATORY
COMMISSION ROUTINE INSPECTION REPORT NO. 50-326/2017-201
DATED: DECEMBER 3, 2019

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

Docket No. 50-326

License No. R-116

Report No. 50-0326/2019-201

Licensee: Board of 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: November 5-7, 2019

Inspectors: Kevin Roche
Michael Balazik

Approved by: Anthony J. Mendiola, Chief
Non-Power Production and Utilization Facility
Oversight Branch
Division of Advanced Reactors and Non-Power
Production and Utilization Facilities
Office of Nuclear Reactor Regulation

Enclosure

EXECUTIVE SUMMARY

University of California - Irvine
Nuclear Reactor Facility
Inspection Report No. 50-0326/2019-201

The primary focus of this routine, announced inspection was the onsite review of selected aspects of the University of California - Irvine (UCI or the licensee) Class II research reactor facility safety programs including: (1) organization and staffing; (2) operations logs and records; (3) requalification training; (4) surveillance and limiting conditions for operation (LCOs); (5) emergency planning; (6) maintenance logs and records; and (7) fuel handling logs and records. The licensee's programs were acceptably directed toward the protection of public health and safety, and in compliance with U.S. Nuclear Regulatory Commission (NRC) requirements.

Organization and Staffing

- The operations organizational structure and responsibilities were consistent with technical specification (TS) requirements.
- Shift staffing met the minimum requirements for current operations.

Operations Logs and Records

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

Requalification Training

- Operator requalification was conducted as required by the Requalification Program and Title 10 of the *Code of Federal Regulations* (10 CFR) Part 55, "Operators' Licenses."

Surveillance and Limiting Conditions for Operation

- LCO and surveillances required by TSs were being properly implemented.

Emergency Planning

- The emergency preparedness program was conducted in accordance with the emergency plan (E-Plan) and implementing procedures.

Maintenance Logs and Records

- Maintenance was performed and logs and records maintained consistent with TS and licensee procedure requirements.

Fuel Handling Logs and Records

- Fuel handling and inspection activities were being completed and documented in accordance with the requirements specified in the TSs and facility procedures.

REPORT DETAILS

Summary of Facility Status

The 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.

1. Organization and Staffing

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

The inspector reviewed the following regarding the licensee's organization and staffing to ensure that the requirements of TS Section 6.1, "Organization and Structure," were being met:

- Staff qualifications
- Management responsibilities
- Staffing requirements for the safe operation of the facility
- Selected portions of the operations log from June 2017 through the present
- The UCI NRF organizational structure and staffing

b. Observations and Findings

The licensee's organizational structure included the Reactor Director, Dr. Rachel Martin, the Reactor Supervisor, Mr. Jonathan Wallick and senior reactor operator (SRO) Mr. Edward Jenner. Mr. Wallick is leaving the facility and Dr. George Miller will take over as Reactor Supervisor. The reactor staff consisted of five licensed SROs; and one licensed reactor operator (RO). This overall staff size was sufficient to meet all TS and procedural qualification requirements for current operations.

The campus health physics (HP) staff consisted of the radiation safety officer (RSO), one Health Physicist, and a technician. In addition to having responsibility for the university's broad scope state byproduct license, they provided support to the reactor staff when requested and performed specific quarterly audits/inspections/surveys of the reactor. The reactor staff performed most HP functions at the reactor. Coordination of radiation protection activities between the HP staff and the reactor staff was acceptable. The operations log and associated records confirmed that shift staffing met the minimum requirements for duty and on-call personnel.

The inspector noted that the organizational chart in Figure 1 of the TS no longer reflects the current UCI organizational structure and needs to be updated. UCI recently reorganized the Environmental Health and Safety (EH&S) department eliminating the Deputy Director position. Functionally, the RSO now reports to the Director of EH&S, but there was no change to the reactor organizational structure. The licensee was informed that this update will be tracked by the NRC using an Inspector Follow-up Item (IFI 50-326/2019-201-1) and reviewed during a future inspection.

c. Conclusion

The organizational structure and functions were consistent with TS requirements.

2. Operations Logs and Records

a. Inspection Scope (IP 69001)

The inspector reviewed selected parts of the following reactor operations records to verify that the requirements of TS Section 6.8, "Records," were being met:

- UCI NRF Standard Operating Procedures, Revision 3, Approved March 2000
- Reactor Logbooks #52, 53, 54, and 55, June 5, 2017, to present
- Daily Startup Checklists
- Shutdown Checklists

b. Observations and Findings

The UCI NRF procedures specified a records system that was commensurate with the size of the facility staff, and utilization factor. The reactor logs were detailed and operations were well documented. Procedures called for most operational data to be recorded in the reactor logbooks, startup checklists, and shutdown checklists. Inspectors reviewed chart recorder sheet that has linear and logarithmic reactor power for the startup and 15 minute run at 1745 on November 5, 2019. Data recorded indicated that the reactor was operated within the envelope of safety parameters established in the reactor license and TS.

c. Conclusion

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

3. Requalification Training

a. Inspection Scope (IP 69001)

The inspector reviewed the following to verify that the requirements of 10 CFR Part 55 were being met:

- UCI NRF Operator Requalification Program, October 2010
- Requalification training records for the previous two years
- A sample of Personnel Files
- Exams for a sample of operators
- Reactor Logbooks #52, 53, 54, and 55, June 5, 2017, to present

b. Observations and Findings

The UCI NRF had five qualified SROs and one qualified RO. The licensee's requalification program included the regulatory requirement for an annual operating test and a biennial written examination. The inspector verified that both examinations were

administered at the specified frequency and that the level of difficulty was comparable to that of NRC-administered examinations.

The inspector reviewed the requalification program records and requalification plan and compared those to 10 CFR 55.59, "Requalification." As indicated by the records and discussions with key staff members, the program continued to meet all TS and procedural requirements. The need to rotate the position of requalification training coordinator every two years per the requalification program was discussed.

The inspector reviewed the medical files for the NRC-licensed operators at the facility and determined that they were satisfactorily completed within the required biennial periodicity.

c. Conclusion

Operator requalification was conducted as required by the Requalification Program and 10 CFR Part 55.

4. Surveillance and Limiting Conditions for Operation

a. Inspection Scope (IP 69001)

The inspector reviewed the following to verify compliance with TS Section 3., "Limiting Conditions for Operation," and to determine if the periodic surveillance tests on safety systems were performed as stipulated in TS Section 4., "Surveillance Requirements":

- Reactor Logbooks #52, 53, 54, and 55, June 5, 2017, to present
- Daily Startup Checklists
- Shutdown Checklists.
- UCI NRF standard operating procedure (SOP), 4.3, "Reactor Power Calibration," Approved 2000
- SOP 4.4, "Reactor Control Rods and Drives Surveillance (TS 4.2)," Revision 3.2 approved 2009
- SOP 4.4.2, "Reactor Control Rod Reactivity Worth Calculation (TS 4.2(a))" Revision 3.2 approved 2009
- Annual Calibration for the following:
 - Water Level Calibration form dated January 10, 2019, Revision 2 (1/10/2019)
 - Water Level Calibration form dated January 18, 2018, Revision 1 (1/5/2017).
 - Fuel Temperature Calibration Form dated January 08, 2019, Revision 1 (1/15/2017).
 - Fuel Temperature Calibration Form dated January 17, 2018, Revision 1 (1/15/2017).
 - Water Temperature Calibration Form dated January 08, 2019, Revision 1 (1/15/2017).
 - Water Temperature Calibration Form dated January 17, 2018, Revision 1 (1/15/2017).

b. Observations and Findings

Surveillances were completed on schedule and in accordance with licensee procedures. The protocols and techniques were effective in verifying the performance of the safety equipment. All the recorded results were within the TS and procedurally prescribed parameters. The records and logs were complete and were being maintained as required. Checks and calibrations were completed as required by TS. The inspector noted several procedures reference TS requirements that were changed during license renewal. The licensee is currently considering updates to these procedures in order to correct the TS references. Even though the references were not updated, the inspectors noted that the licensee was meeting the TS requirements. The licensee was informed that these procedure updates would be tracked by the NRC as an IFI and reviewed during a future inspection (IFI 50-326/2019-201-02).

c. Conclusion

Operations were found to be in compliance with the LCO and surveillances requirements as stated in the TS.

5. Emergency Planning

a. Inspection Scope (IP 69001)

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

- E-Plan for the UCI NRF, Revision 4.2, submitted to the NRC on January 29, 2019
- Memorandum of Understanding between UCI and Orange County Fire Authority dated 3/14/2012
- After Action Report for Radiation Safety Exercise on September 7, 2017, tabletop exercise for a medical emergency involving a potentially contaminated individual
- After Action Report for Radiation Safety Exercise on November 21, 2018, functional Exercise of a medical emergency with an exposed irradiation source
- 2018 E-Plan review. And review of updated plan for January 29, 2019

b. Observations and Findings

At the UCI campus emergency management was the responsibility of the Office of EH&S. The NRF staff worked closely with EH&S staff in matters such as emergency preparedness and exercises. The current revision of NRF's E-Plan was submitted to the NRC on January 29, 2019. The recent revision to the E-Plan was made in accordance with 10 CFR 50.54(q) "Emergency Plans." The inspector verified that the changes did not decrease the effectiveness of the program and reflected the current emergency response program at the facility.

The E-Plan requires periodic drills and exercises to support training of emergency response personnel. The inspectors reviewed documentation related to annual exercise conducted on November 21, 2018, including the After Action Report which included a critique of the drill and lessons learned. Based on a review of these records, the requirements of the E-Plan continued to be met for training of personnel and conduct of drills and exercises.

c. Conclusion

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

6. Maintenance Logs and Records

a. Inspection Scope (IP 69001)

The inspectors reviewed the following selected maintenance logs and records to verify compliance with the requirements of TS Section 6.8.1 b.:

- Reactor Logbooks #52, 53, 54, and 55, June 5, 2017, to present
- Maintenance Logs from November 19, 2018, for repair of the Adjustable Transient Rod and log entry for post-maintenance test

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 in accordance with the requirements in licensee administrative controls. The inspector verified that all maintenance was conducted in accordance with the requirements of the TS, and system operational checks were performed before returning them to service.

c. Conclusion

Maintenance was performed and logs and records maintained consistent with TSs and licensee procedure requirements

7. Fuel Handling Logs and Records

a. Inspection Scope (IP 69001)

The inspectors reviewed selected aspects of the following to verify adherence to fuel handling and inspection requirements specified in TS Sections 3.1.6, "Fuel Element Inspection Parameters," and 4.1, "Reactor Core Parameters," and the applicable procedures and documents:

- UCI Core Status Board
- Console Logbooks Nos. 53 and 54
- Annual Examination and Fuel Elements History Records dated January 2018
- UCI SOP Section 4.8.3, "Fuel Element Inspection," Revision 3.1.1
- UCI Annual Operating Reports for periods 2017-2018 and 2018-2019

b. Observations and Findings

The inspectors determined that the licensee was maintaining the required records of the various fuel movements that had been completed as required. The latest core

reconfiguration and fuel element inspection was completed in January 2018. Through reviewing entries in the console logbook, the inspectors verified the core status board was current.

Fuel movement and fuel examination records showed that the fuel in the current core and in storage was examined as required by TSs 3.1.6 and 4.1. All the fuel elements were last inspected in January 2018. The inspectors noted that the licensee replaced five fuel elements because of discoloration and minor surface scratching of the cladding. The inspectors noted that the fuel handling tool was adequately controlled and secured when not in use.

c. Conclusion

Reactor fuel movements and inspections were completed and documented in accordance with applicable procedures. The fuel was being inspected as required by TSs 3.1.6 and 4.1.

8. Exit Interview

The inspection scope and results were summarized on November 7, 2019, with members of licensee management. The inspector described the areas inspected and discussed in detail the inspection findings. 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

J. Wallick	Reactor Supervisor
E. Jenner	Senior Reactor Operator
G. Miller	Reactor Supervisor (Acting)

INSPECTION PROCEDURES USED

IP 69001	Class II Research and Test Reactors
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ITEMS OPENED, CLOSED, AND DISCUSSED

Opened

50-326/2019-201-01	IFI	Update TS Organization Chart
50-326/2019-201-02	IFI	Follow-up on updates to procedural references to TS

Closed

None

PARTIAL LIST OF ACRONYMS USED

10 CFR	Title 10 of the <i>Code of Federal Regulations</i>
EH&S	Environmental Health and Safety
E-Plan	Emergency Plan
HP	Health Physics
IFI	Inspector Follow-up Item
IP	Inspection Procedure
NRC	U.S. Nuclear Regulatory Commission
NRF	Nuclear Reactor Facility
SOP	Standard Operating Procedure
SRO	Senior Reactor Operator
RO	Reactor Operator
RSO	Radiation Safety Officer
TS	Technical Specification
UCI	University of California - Irvine