

May 2, 2000

Dr. S. Golub  
Executive Vice Chancellor,  
University of California, Irvine  
Irvine, CA 92697-2025

SUBJECT: NRC INSPECTION REPORT NO. 50-326/2000-201

Dear Dr. Golub:

This letter refers to the inspection conducted on February 7-10, 2000, at your University of California - Irvine (UCI) TRIGA reactor. The enclosed report presents the results of that inspection.

Various aspects of your reactor radiological safety and emergency preparedness 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, the Nuclear Regulatory Commission (NRC) has identified two violations of NRC requirements. The violations are cited in the enclosed Notice of Violations (Notice). The circumstances surrounding them are described in detail in the subject inspection report. As described in the report, technical staffing support should be considered in your evaluations of the violations and other inspection items. The violations are of concern because they were oversights of Technical Specification requirements.

You are required to respond to this letter and should follow the instructions specified in the enclosed Notice when preparing your response. The NRC will use your response in accordance with its policies to determine whether further enforcement action is necessary to ensure compliance with regulatory requirements.

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/*

Ledyard B. Marsh, Chief  
Events Assessment, Generic Communications  
and Non-Power Reactors Branch  
Division of Regulatory Improvement Programs  
Office of Nuclear Reactor Regulation

Docket No. 50-326  
License No. R-116  
Enclosure: NRC Inspection Report No. 50-326/2000-201

cc w/enclosure: See next page

University of California at Irvine  
(NRC INSPECTION REPORT)

Docket No. 50-326

cc:

Dr. Richard Chamberlin, 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

Dr. William G. Vernetson  
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## NOTICE OF VIOLATION

University of California - Irvine  
University of California TRIGA Reactor

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

During an NRC inspection conducted on February 7-10, 2000, two violations of NRC requirements were identified. In accordance with the "General Statement of Policy and Procedure for NRC Enforcement Actions," NUREG-1600, the violations are listed below:

1. As self identified by the license in a letter dated February 4, 2000, Section 6.2.f Review, of the UCI Technical Specifications states that: "The committee (Reactor Operations Committee) shall meet at least semi-annually, at intervals not to exceed nine months."

Contrary to the above, the committee did not meet between September 1, 1998, and October 19, 1999. This is a Severity Level IV violation (Supplement I).

2. As identified by the inspector during this inspection, Section 3.6 Ventilation System of the UCI Technical Specifications states that: " The reactor shall not be operated unless . . . the emergency exhaust shutdown system has been verified to be operable within the preceding 30 days."

Contrary to the above, from June 1998 to January 2000 the reactor was operated on at least four occasions when the emergency exhaust shutdown system had not been verified operable within the preceding 30 days. This is a Severity Level IV violation (Supplement I).

Pursuant to the provisions of 10 CFR 2.201, the University of California - Irvine is hereby required to submit a written statement or explanation to the U.S. Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington, D.C. 20555 with a copy to the cognizant inspector, within 30 days of the date of the letter transmitting this Notice of Violation (Notice). This reply should be clearly marked as a "Reply to a Notice of Violation" and should include for each violation: (1) the reason for the violation, or, if contested, the basis for disputing the violation or severity level, (2) the corrective steps that have been taken and the results achieved, (3) the corrective steps that will be taken to avoid further violations, and (4) the date when full compliance will be achieved. Your response may reference or include previous docketed correspondence, if the correspondence adequately addresses the required response. If an adequate reply is not received within the time specified in this Notice, an order or a Demand for Information may be issued as to why the license should not be modified, suspended, or revoked, or why such other action as may be proper should not be taken. Where good cause is shown, consideration will be given to extending the response time.

If you contest this enforcement action, you should also provide a copy of your response, with the basis for your denial, to the Director, Office of Enforcement, United States Nuclear Regulatory Commission, Washington, D.C. 20555-0001.

Because your response will be placed in the NRC Public Document Room (PDR), to the extent possible, it should not include any personal privacy, proprietary, or safeguards information so that it can be placed in the PDR without redaction. If personal privacy or proprietary information is necessary to provide an acceptable response, then please provide a bracketed copy of your response that identifies the information that should be protected and a redacted copy of your

response that deletes such information. If you request withholding of such material, you must specifically identify the portions of your response that you seek to have withheld and provide in detail the bases for your claim of withholding (e.g., explain why the disclosure of information will create an unwarranted invasion of personal privacy or provide the information required by 10 CFR 2.790(b) to support a request for withholding confidential commercial or financial information). If safeguards information is necessary to provide an acceptable response, please provide the level of protection described in 10 CFR 73.21.

In accordance with 10 CFR 19.11, you may be required to post this Notice within two working days.

Dated this

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

Docket No: 50-326  
License No: R-116  
Report No: 50-326/2000-201  
Licensee: University of California, Irvine  
Facility: Department of Chemistry Nuclear Reactor Facility  
Location: Department of Chemistry  
University of California, Irvine  
Irvine, CA 92697-2025  
Dates: February 7-10, 2000  
Inspector: Stephen W. Holmes, Reactor Inspector  
Approved by: Ledyard B. Marsh, Chief  
Events Assessment, Generic Communications  
and Non-Power Reactors Branch  
Division of Regulatory Improvement Programs  
Office of Nuclear Reactor Regulation

## EXECUTIVE SUMMARY

This routine, announced inspection included onsite review of selected aspects of the following: 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, and Emergency Preparedness Program, since the last NRC inspection in these areas.

The licensee's programs were acceptably directed toward the protection of public health and safety, and in compliance with NRC requirements.

### 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 with the exception of Committee meeting requirements. This was cited as a level IV Violation.

### RADIATION PROTECTION PROGRAM

The radiation protection program (RPP) satisfied the requirements of 10 CFR 19.12, 10 CFR 20.1101, and other applicable requirements.

### RADIATION PROTECTION POSTINGS

Radiological postings satisfied regulatory requirements.

### RADIATION PROTECTION SURVEYS

Surveys were performed and documented as required by 10 CFR Part 20 and TS. Surveys were adequate to evaluate the potential hazard of radiation levels or radioactive materials present. One level IV Violation of TS Limiting Conditions for Operation (LCO) requirements was identified.

### 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. Some mismatches were identified between the licensee's written procedures and survey performance. This is an inspector follow-up item.

EMERGENCY PREPAREDNESS

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

## **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 (69001)

The inspector reviewed selected aspects of:

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

##### b. Observations and Findings

The health physics (HP) and the reactor organizational structure and staffing had not functionally changed since the last inspection. The reactor staff consisted of one permanent half time staff (the reactor supervisor (RS)), one licenced Senior Reactor Operator (providing only reactor operations time), and, since December 1995, direct support staff of a series of quarter time temporary students. With teaching and research duties, and facility relicensing, the time dedicated to reactor operation and maintenance was limited.

The campus HP staffing consisted of the Radiation Safety Officer (RSO), two Health Physicists, and three technical staff members. In addition to having responsibility for the universities broad scope byproduct state license and other material licenses, they provided support to the reactor staff when requested and performed limited quarterly inspections/surveys of the reactor conforming to the campus safety program. The reactor staff performed most HP functions at the reactor. Coordination of HP activities between the staffs was acceptable.

The inspector discussed with the Dean and Associate Dean of Physical Sciences, the RS, and the RSO that, although the licenced reactor staff meet TS requirements, together with current health physics support total staffing appeared significantly challenged for the present operation workload. Also, as shown by the time and type of Inspector Follow-up Items, Unresolved Items, and Non-Cited Violations issued in the previous two inspection reports, and the two Notices of Violations from this inspection, the level of technical support may be a factor to the violations. Therefore, technical staffing support should be considered in the licensee's evaluations of the violations and other inspection items.

c. Conclusions

The organizational structure and functions were consistent with TS requirements.

2. **REVIEW AND AUDIT**

a. Inspection Scope (69001)

The inspector reviewed selected aspects of:

- Reactor Operations Committee (ROC) minutes
- safety review records
- audit records
- responses to safety reviews and audits
- review and audit personnel qualifications

b. Observations and Findings

The ROC membership satisfied TS requirements and the 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.

Records showed that the safety reviews were conducted at the TS required frequency. Topics of these reviews were also consistent with TS requirements to provide guidance, direction, and oversight, and to ensure acceptable use of the reactor.

The audit records showed that reviews had been completed in those areas outlined in the TS and at the required frequency.

The inspector noted that the safety reviews and audits and associated findings were acceptably detailed and that the licensee responded and took corrective actions as needed. The safety review and audit personnel qualifications were consistent with licensee administrative controls.

As reported by the RS in a letter dated February 4, 2000, the ROC, failed to "meet at least semi-annually, at intervals not to exceed nine months" as required by TS 6.2.f. in that no meetings were held between those held September 1, 1998 and October 19, 1999. This failure constitutes a Severity Level IV Violation (Supplement I) VIO 50-326/2000-01-01.

c. Conclusions

The review and audit program, excepting the violation noted above, satisfied TS requirements.

3. **RADIATION PROTECTION PROGRAM**

a. Inspection Scope (69001)

The inspector reviewed selected aspects of:

- The RPP
- 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). The reactor and university staffs provided this review and oversight as required by TS and licensee procedures. The review included all areas and no weaknesses were reported.

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

Training records showed that personnel were acceptably trained in radiation protection practices commensurate for the facility and their work.

c. Conclusions

The RPP satisfied the requirements of 10 CFR 19.12, 10 CFR 20.1101, and other applicable requirements.

4. **RADIATION PROTECTION POSTINGS**

a. Inspection Scope (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 reactor were acceptable for the hazards involved and were as required in 10 CFR Part 20, Subpart J. 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.

. Conclusions

Radiological postings satisfied regulatory requirements.

5. **RADIATION PROTECTION SURVEYS**

a. Inspection Scope (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 surveys were performed as required by TS. These were conducted mostly by the reactor staff. Inspections/general surveys were performed quarterly by the campus HP staff. Surveys were annotated with 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. Surveys were adequate to evaluate the potential hazard of radiation levels or radioactive materials present.

During review of these periodic surveys the inspector identified an apparent TS LCO violation. TS Section 3.6 Ventilation System of the UCI Technical Specifications states that: “The reactor shall not be operated unless . . . and the emergency exhaust shutdown system has been verified to be operable within the preceding 30 days.” Contrary to the above, from June 1998 to January 2000 the reactor was operated on at least four occasions when the emergency exhaust shutdown system had not been verified operable within the preceding 30 days. This action constitutes a Severity Level IV Violation (Supplement I) VIO 50-326/2000-01-02.

c. Conclusions

Surveys were performed and documented as required by 10 CFR Part 20, TS, and licensee administrative controls. One level IV Violation of TS LCO requirements was identified.

6. **PERSONNEL DOSIMETRY**

a. Inspection Scope (69001)

The inspector reviewed selected aspects of:

- licensee procedures
- dosimetry records

b. Observations and Findings

The use of dosimeters and exit frisking practices were in accordance with radiation protection requirements. The campus program covered the reactor facility.

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 (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 were consistent with TS requirements and American National Standards Institute or the manufacturers' recommendations. Calibrations followed licensee procedures. With one exception Calibration and check sources were traceable to the National Institute of Standards and Technology (NIST). The sources' geometry matched those used in actual analyses.

No NIST traceable certificate could be located for one old gamma source (Cs-137) although there was some documentation of its activity. Informal comparisons with other sources and instruments calibrated by outside vendors indicated that the values being used were nominally accurate. The RSO stated that they either purchase a NIST traceable replacement source or perform a secondary calibration of the source traceable to NIST. This will be reviewed during a future inspection as an Inspector Follow-up Item (IFI 50-602/99-201-01).

All instruments checked were in calibration. Calibration records were in order.

c. Conclusions

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

8. **EFFLUENT MONITORING AND RELEASE**

a. Inspection Scope (69001)

The inspector reviewed selected aspects of:

- release records
- counting and analysis programs
- annual reports

b. Observations and Findings

The program for the monitoring, storage and release of radioactive liquid and gases was consistent with applicable regulatory requirements. Gaseous releases were monitored and calculated as outlined licence procedures, adequately documented, and well within the annual dose constraint of 20.1101(d), Appendix B concentrations and TS limits.

Liquid wastes from use of by-product material were disposed by being transferred to the custody of the Campus Environmental Health and Safety Office.

Records were current and acceptably maintained.

c. Conclusions

The effluent monitoring and release program satisfied NRC requirements.

9. **ENVIRONMENTAL PROTECTION**

a. Inspection Scope (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 direct quarterly radiation measurements at selected locations immediate to the confines of the facility, and distant locations on campus. Dosimetry results in unrestricted areas were not statistically different from background readings.

c. Conclusions

Environmental monitoring satisfied the radiation protection program requirements.

10. **PROCEDURES**

a. Inspection Scope (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 the TS, license, and facility directives. Written changes were reviewed and approved as required. Oversight and review were provided by the reactor and university staffs as required by TS and licensee procedures.

Training of personnel on procedures and changes was acceptable. Personnel conducted TS activities in accordance with applicable procedures. Records showed that procedures for potential malfunctions (e.g., radioactive releases and contaminations, and reactor equipment problems) were implemented as required.

The inspector noted however, a number of mismatches between some written procedures and the present manner and frequencies in which radiation protection surveys were performed. It appears that some older (pre 1990 dated) licensee procedures (not TS required) had not been formally updated when newer practices were implemented. The RS and the Dean of Physical Science stated that the written procedures would be updated to match present survey practices or the surveys would be performed as outline in the written procedures. This will be reviewed during a future inspection as an Inspection Follow-up Item (IFI 50-326/2000-201-02).

c. Conclusions

With the exception noted above the procedural control and implementation programs satisfied TS requirements.

11. **EMERGENCY PREPAREDNESS**

a. Inspection Scope (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. Implementing procedures were reviewed and revised as needed to employ the E-Plan effectively. The licensee was reminded that all posted call lists need to be kept current.

Facilities, supplies, instrumentation and equipment were being maintained, controlled and inventoried as required by the E-Plan. Through records reviews and interviews with licensee personnel, emergency responders were determined to be knowledgeable of the proper actions to take in case of an emergency. Agreements with outside response organizations had been updated and maintained as necessary.

Emergency drills had been conducted as required by the E-Plan. Emergency preparedness and response training was being completed as required. Training for 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. **EXIT MEETING SUMMARY (30703)**

The inspector presented the inspection results to members of licensee management at the conclusion of the inspection on February 10, 2000, and in follow-up telephone conversations the week of March 13, 2000. 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**

*F. Gallagher III	Radiation Safety Officer, Environmental Health and Safety
*G. Miller	Reactor Supervisor
*P. J. Rogers	Senior Reactor Operator
#J. Stern	Dean, Physical Sciences
#K. Wolonsky	Associate Dean, Physical Sciences

\* Attended Out briefing  
# Out briefed separately and by telephone.

**INSPECTION PROCEDURE (IP) USED**

IP 69001: CLASS II NON-POWER REACTORS

**ITEMS OPENED, CLOSED, AND DISCUSSED**

**Opened**

VIO 50-326/2000-01-01	As reported by the RS in a letter dated February 4, 2000, the ROC, failed to “meet at least semi-annually, at intervals not to exceed nine months” as required by TS 6.2.f. in that no meetings were held between those held September 1, 1998, and October 19, 1999.
VIO 50-326/2000-01-02	The reactor was operated on at least four occasions from June 1998 to January 2000, when the emergency exhaust shutdown system had not been verified operable within the preceding 30 days.
IFI 50-602/99-201-01	NIST traceable replacement source or perform a secondary calibration of older Cs source.
IFI 50-326/2000-201-02	Written procedures to be updated to match present survey practices or the surveys would be performed as outline in the written procedures.

**Closed**

NONE

## **PARTIAL LIST OF ACRONYMS USED**

LCO	Limiting Conditions for Operations
NRC	Nuclear Regulatory Commission
ROC	Reactor Operations Committee
RS	Reactor Supervisor
RPP	Radiation Protection Program
TS	Technical Specifications
UCI	University of California - Irvine