

U. S. NUCLEAR REGULATORY COMMISSION

REGION V

Report No. 50-326/88-01

Docket No. 50-326

License No. R-116

Licensee: University of California at Irvine  
Irvine, California 92717

Facility Name: Research Reactor-TRIGA Mark I

Inspection at: Irvine, California

Inspection Conducted: January 27-29, 1988

Inspector: M. Cillis 2/29/88  
M. Cillis, Senior Radiation Specialist Date Signed

Approved by: M. Cillis for 3/5/88  
G. P. Yuhas, Chief Date Signed  
Facilities Radiological Protection Section

Summary:

Inspection on January 27-29, 1988 (Report No. 50-113/88-01)

Areas Inspected: Routine, unannounced inspection by a regionally based inspector of reactor operations program, radiation protection program, emergency preparedness program, radioactive material shipment and receipt program, followup items, and a tour of the facility. Inspection procedures 30703, 39745, 40745, 41745, 42745, 61745, 69745, 82745, 83743, 86740, 92701, and 92702 were addressed.

Results: Of the six areas inspected, two apparent violations were identified for failure to follow Standard Operating Procedures (SOP) (see paragraph 2.E) and failure to follow and maintain the Emergency Plan (EP) (see paragraph 4). Weaknesses within the licensee's organization (see paragraph 2.B), the reactor operator requalification program (see paragraph 2.F), the Review and Audit program (see paragraph 2.G) and the surveillance program (see paragraph 2.H) were also identified. A slight improvement was observed in the radiation protection program (see paragraph 3).

## DETAILS

### 1. Persons Contacted

- \*Professor M. Caverias, Chairman, Department of Chemistry
- \*Professor G. Miller, Reactor Supervisor
- \*Ms. P. Rogers, Senior Reactor Operator
- \*Mr. J. Tripodes, Radiation Safety Officer
- \*Ms. K. Swift, Radiation Safety Technician
- \*Mr. W. Nabar, Health Physicist
- Mr. W. Smirl, Environmental Health and Safety (EH&S) Officer

\*Denotes those individuals attending the exit interview on January 29, 1988.

### 2. Reactor Operations

#### A. General

The inspection disclosed that reactor operations were consistent with the information provided in the licensee's 1986 and 1987 annual reports.

No violations or deviations were identified.

#### B. Organization

The organizational structure for operation and administration of the TRIGA Reactor facility remains unchanged from that previously reported.

Concerns related to the lack of support provided to the Reactor Supervisor which were previously brought to the licensee's attention in paragraphs 2(a) and 9 of Inspection Report 50-326/85-01 appear to have worsened. The Reactor Supervisor's busy schedule in other activities prevents him from providing the attention required for assuring activities at the TRIGA reactor are maintained in accordance with regulatory requirements.

The above observation was brought to the attention of the Department of Chemistry Chairman during the inspection and at the exit interview.

#### C. Experiments

The licensee's experiment program has not changed since the previous inspection. Experiments performed have consisted of activation analysis in support of various research projects and classroom laboratory work. No new experiments had been performed since the previous inspection.

No violations or deviations were identified.

D. Changes

Discussions with the Reactor Supervisor and a review of reactor operating records for the period January 1986 to the present date disclosed that no changes were made to the facility or procedures that would require a safety evaluation pursuant to 10 CFR Part 50.59.

No violations or deviations were identified.

E. Procedures

Technical Specifications (TS), Section 6.3, "Operating Procedures," requires that written procedures shall be in effect and followed for certain items identified in Section 6.3.

It should be noted that paragraph 2(b) of Inspection Report 50-326/85-01 identified concerns in the area of procedure compliance. This concern was brought to the attention of the licensee who informed the inspector that the observations would be evaluated. The concern was categorized as NRC Open Item No. 85-01-03. The inspector examined the implementation of Standard Operating Procedures (SOP) related to reactor operations. Particular attention was given to the weaknesses discussed in Inspection Report 50-326/85-01. The following observations were made with respect to the status of previous inspection findings:

- (1) Health physics activities, such as obtaining liquid samples, performing calibrations of area radiation monitors and performing semiannual gamma and neutron surveys while the reactor is at power had improved.
- (2) Concerns related to the use of monthly, semiannual and annual checklists for tracking the status of TS and surveillance items are as follows:

Appendix B of the licensee's SOPs includes "forms" such as startup checklist, shutdown checklist, monthly maintenance checklist, and a semiannual maintenance summary checklist. As previously stated, the purpose for the checklist is to provide an easy method for tracking the status of surveillance items that are required to be performed by the license conditions. The surveillance items are required to be performed at various frequencies; such as, daily, weekly, monthly, semiannually, and annually. Normally, an operator is required to record the data in the operator log book and also denote it on an appropriate checklist. The checklists are then used as a tool to assure subsequent surveillances are performed at the frequencies prescribed in the TS or a licensee procedure. If a checklist is not used, it becomes a tedious task to verify that the required surveillances are being performed due to the amount of data recorded in an operations log book. In essence, failure to use the checklist enhances the possibility for noncompliance.

It should be noted that Section 4.1 of the licensee's SOPs states, in part: "...Routine operations must comply strictly with these procedures" and Section 4.7.1, dated April 21, 1982, states, in part: "...In addition, a Monthly Summary Checklist of maintenance and test activities shall be completed. On this sheet shall be listed the last date of maintenance for each identified item. This list shall be checked and signed each month by the Assistant Reactor Supervisor and reviewed by the Reactor Supervisor by the seventh working day. If this review has not been completed, reactor operation may not be resumed."

The review of monthly checklists disclosed the following:

- Checklists had not been completed since October 1987.
- Eight checklists between the period of January 1986 and September 1987 were incomplete in that all line items had not been verified.
- Four checklists initiated or completed since January 1986 had not been signed by the Assistant Reactor Supervisor.
- Checklists had not been reviewed by the Reactor Supervisor since January 1986.
- Reactor operations continued even though the checklists were not completed and had not been signed off by the Reactor Supervisor.

Other observations are as follows:

- The last semiannual checklist completed was dated September 18, 1986. The semiannual initiated in January 1986 was annotated in pen and ink to read "annual." The checklist had not been completed and was unsigned. The September 18, 1986, semiannual checklist had not been reviewed by the Reactor Supervisor.

The above observations were brought to the licensee's attention at the exit interview. The inspector emphasized the importance of maintaining the checklists. The inspector stated that the checklists provide an effective method for assuring that TS requirements are met.

The inspector concluded by stating that failure to comply with Section 4.7.1 of the SOPs was an apparent violation. The previous open item, 85-01-05, is closed and a new item number has been assigned for the apparent violation (88-01-01).

Additional observations are as follows:

- The licensee has not established a program for performing a periodic review of implementing SOPs. Several procedures had not been reviewed since 1977.

- ° The licensee still uses a stop watch to measure control rod drop times of less than 1 to 1.8 seconds, respectively. The inspector informed the licensee that all other research reactors in the Region V area are using oscilloscopes and/or some other sophisticated method as a means for improving the accuracy for measuring rod drop times. The Reactor Supervisor said that he felt that the stop watches were as accurate as any other method. He added that he and the Reactor Operations Committee were planning to look into other means for measuring the rod drop times.

F. Reactor Operator Requalification Program

The licensee's NRC approved Reactor Operator (RO) and Senior Reactor Operator (SRO) requalification program dated February 20, 1974, was examined. The program is designed to meet the conditions as set forth in 10 CFR Part 50.54(i) and 10 CFR Part 55, Appendix A.

Selected training records, RO/SRO reactor operating logs and annual RO/SRO examinations that were administered in 1987 were reviewed. Additionally, the concerns raised in Information Notice (IN) 87-22, "Operator Licensing Requalification Examinations at Nonpower Reactors," and the recent changes in 10 CFR Part 55 were discussed with the Reactor Supervisor.

The examination disclosed that the 1987 RO/SRO written examinations was administered before IN 87-22 was issued, and therefore, the exams were not proctored. The Reactor Supervisor informed the inspector that future RO/SRO written examinations will be administered in accordance with the recommendations of the IN.

The inspector concluded that the licensee's RO/SRO requalification program was consistent with the regulatory requirements prescribed in their program dated February 20, 1974.

No violations or deviations were identified.

G. Review and Audit

A review of the licensee's "review and audit" functions prescribed in Section 6.2 of the TS was conducted. Reactor Operations Committee (ROC) meeting minutes for the period of January 1986 through January 1988 were reviewed.

The review disclosed that an ROC meeting was not conducted during the period of April 23, 1986, through October 13, 1986. TS requires that quarterly ROC meetings be conducted. A licensee letter submitted to Region V on November 4, 1986, reported that the ROC had failed to meet during the third quarter of 1986. The inspector verified that quarterly meetings were conducted since the licensee identified violation of November 4, 1986, was submitted to the NRC. The inspector noted that a full three-year schedule has been submitted to all ROC members as a reminder of ROC meeting dates.

The review of ROC meeting minutes disclosed that audits of reactor operations have decreased since the previous inspection. The ROC minutes did not include any licensee documented audit reports. The ROC review functions appear to consist of a paper work review rather than a physical review of reactor operations.

The above observation was discussed with the Reactor Supervisor and at the exit interview. The Reactor Supervisor informed the inspector that he has also noted that the ROC's review and audit functions have fallen off during the past two years. He added that the TS only requires the ROC to act as a review group rather than a review and audit group.

The inspector informed the licensee that TS, Section 6.2, requires that there shall be an ROC which shall review reactor operations to ensure that the facility is operated in a safe manner consistent with public health and safety and within the terms of the facility license.

The inspector added that the violations and other findings identified in this report could have been eliminated if the ROC had implemented an effective review and audit program.

The above observations were brought to the licensee's attention at the exit interview. The inspector emphasized the importance for the ROC to implement an effective review and audit program.

The inspector was informed that the above observations and the findings of this inspection would be brought to the attention of the ROC Chairman.

#### H. Surveillance Program

Selected records associated with the performance of surveillance activities that are prescribed in TS, Section 4.0, were reviewed. Weaknesses within the licensee's surveillance program were identified during the previous inspection (see paragraph 2(c) of Inspection Report 50-326/85-01) at which time the licensee informed the inspector that methods for improving the program would be evaluated. The previous inspection finding in this area was identified as followup item No. 85-01-05. These weaknesses are directly related to the problem associated with the use of checklists that is discussed in paragraph 2.E of this report.

The inspection disclosed that no effort was taken to improve the program. The conditions identified during the previous inspection had deteriorated.

The inspector was unable to verify that all of the required surveillances specified in the TS were performed since the previous inspection because of the tedious task of sorting out the data documented in several operations log books. The review process was extremely slow and was subject to error. The inspector verified that the most recent surveillances that were due the previous month,

six-month period, and twelve-month period had been accomplished. No abnormal conditions were identified from the cursory review.

The inspector brought the above observation to the attention of the licensee at the exit interview. The inspector encouraged the licensee to utilize the checklists as an assurance that license conditions have been accomplished. The inspector added that followup item 85-01-05 was closed due to the apparent violation discussed in paragraph 2.E which essentially points out the same problem.

3. Radiation Protection Program

A. Liquid and Solid Waste

Liquid and solid wastes generated from the production of by-product materials at the reactor facility are disposed of through the licensee's State of California license.

No liquid wastes were disposed of since the previous inspection. Solid wastes, consisting of nine cubic feet, was disposed in the last year. The nine cubic feet of material contained approximately 245 microcuries of mixed fission products.

No violations or deviations were identified.

B. Posting

The inspector verified that the licensee's posting practices were in compliance with 10 CFR Part 19.11, "Posting of Notices to Workers."

No violations or deviations were identified.

C. Personnel Monitoring

The licensee's program for assuring compliance with 10 CFR Part 20.202 was examined and found to be consistent with the regulatory requirements prescribed in 10 CFR Part 20.101 and 10 CFR Part 20.104. Personnel monitoring exposure records for the period of January 1986 through November 1987 were reviewed.

No violations or deviations were identified.

D. General Employee Training (GET)

The licensee's GET program for assuring compliance with 10 CFR Part 19.12, "Instructions to Workers," was examined.

Training attendance records, written examinations, and the lesson plan used in administering the training were reviewed.

The inspector concluded that the licensee's GET program was consistent with 10 CFR Part 19.12.

No violations or deviations were identified.

E. Surveys

The inspector verified that direct radiation surveys, contamination surveys, and special surveys are performed on a routine schedule.

Survey records for the period of January 1986 through December 1987 were reviewed. The results were consistent with the levels reported in the licensee's annual reports. Survey data was well documented. The licensee's monitoring program had showed a significant improvement over what was identified during the previous inspection. No abnormal results were noted.

No violations or deviations were identified.

F. Particulate and Gaseous Effluent Releases

Annual Argon-41 releases are determined by calculations which is based on the production of Argon-41 during reactor operations. The basis and calculational method are discussed in Section 8.4 of the Safety Evaluation Report of 1968. The calculations are considered to provide conservative values.

The licensee's annual report for the period of July 1, 1986, through June 30, 1987, disclosed that the amount of Argon-41 was  $1.8E4$  microcuries. This represents a concentration of less than or equal to  $3E-10$  microcuries per milliliters ( $\mu\text{Ci/ml}$ ) when averaged over a 12-month period. This value is considerably less than the Maximum Permissible Concentration of  $4E-8 \mu\text{Ci/ml}$  allowed by 10 CFR Part 20, Appendix B.

A continuous air monitor (CAM) is located alongside the reactor pool. The CAM is operated continuously during reactor operations pursuant to TS, Section 3.3. The CAM draws a continuous sample from a location over the reactor pool. An audio-visual alarm is provided at the unit and at the reactor console.

A review of the CAM's operating records revealed that particulate airborne concentrations were essentially non-detectable.

No violations or deviations were identified.

G. Environmental Monitoring Program

An array of thermoluminescent dosimeters (TLDs) supplied and processed by a certified vendor are placed at various locations within and adjacent to the reactor facility.

The results of environmental monitoring data collected over the past two years were reviewed. The data gave no indication of changes in the environs due to operation of the licensee's TRIGA reactor facility.

No violations or deviations were identified.

4. Emergency Plan Implementation

10 CFR Part 50.54(q) states, in part: "...A licensee authorized to possess and/or operate a research reactor or fuel facility shall follow and maintain in effect emergency plans which meet the requirements in Appendix E of this part."

Paragraph IV.G of Appendix E to 10 CFR Part 50 requires the program to describe the provisions to be employed to ensure the emergency plan, emergency equipment and the emergency plan implementing procedures are maintained up-to-date.

The capabilities for responding to emergencies as specified in the licensee's NRC approved Emergency Plan (EP) of January 1985, and for demonstrating compliance with 10 CFR 50.54(q) and 10 CFR Part 50, Appendix E, were examined. The examination included a review of the EP implementing procedures, inspection of emergency response equipment, inspection of the campus medical facility, a review of drill/exercise scenario and drill critiques, and discussions with the licensee's staff.

Inspector's concerns related to this subject area were identified during the previous inspection (see paragraph 3 of Inspection Report 50-326/85-01).

The following observations were identified:

- A. Several of the findings identified in the previous inspection still existed; for instance,
  - (1) Records of training are not being maintained.
  - (2) The campus police department did not have a copy of the latest emergency call out list.
  - (3) Although a memorandum of understanding (MOU) with Western Medical Center had been established on October 21, 1986, it had not been renewed since it was established on October 21, 1986. Section 10.3 of the EP requires an annual renewal of all agreements with off campus agencies.
- B. Section 8.3.2 of the EP states, in part: "Several staff members are qualified in first aid." The Radiation Safety Officer informed the inspector that all of the staff members had allowed their first-aid qualifications to lapse.
- C. Two emergency call out lists posted on the outside walls of the reactor facility were not in agreement with each other. The Reactor Supervisor removed the outdated call out list when it was brought to his attention by the inspector.
- D. Section 8.2 of the EP identifies that a high volume air sampler is maintained in the emergency supply closet. Discussions with the

reactor assigned health physics technician revealed that the individual had never used such a sampler and was not knowledgeable on how to use it under normal or emergency conditions.

- E. Section 10.1 of the EP states, in part: "Procedures shall be established to ensure that annual review of the plan by all personnel is accomplished and that new personnel are familiarized within 30 days of commencing their duties which would involve them in emergency operations."

The examination disclosed procedures were not established to ensure personnel other than reactor operators would review the plan; therefore, annual reviews of the plan by personnel from the Environmental Health and Safety (EH&S) and Security groups were not performed since the plan was issued.

- F. Section 10.2 of the EP states, in part: "An annual, on-site emergency exercise shall be conducted in which an event at the reactor facility is simulated to test the preparedness of the staff and the response of on campus assistance..."

The examination disclosed that an annual exercise had not been conducted since December 19, 1986.

- G. Section 10.3 of the EP states, in part: "Emergency Call Lists and Equipment Inventory Lists shall be updated as needed, but verified at least at intervals not to exceed 3 months."

The examination disclosed that call lists are verified every 6 months and that equipment inventory lists are not used to verify the contents of emergency supplies.

- H. Section 8.6 of the EP requires that all instruments included in the Emergency store room inventory shall be included in the regular testing and calibration program of the facility and campus radiological safety instruments.

The examination disclosed that the high volume air sampler identified in subparagraph (C) above had not been included in the licensee's regular testing and calibration program for greater than two years.

The above observations were discussed with the licensee's staff and at the exit interview. The inspector stated that failure to follow and maintain in effect the Emergency Plan was an apparent violation (88-01-02). The inspector added that the previous followup item number 85-01-06 was closed.

The inspector stated that the findings indicate there is a need for immediate management attention and support to resolve the findings.

5. Radioactive Material Shipment and Receipt

An examination of the licensee's radioactive material transfer and shipping program was conducted.

A review of radioactive material shipping and receipt records disclosed that transfers and/or shipments of radioactive materials were made through the licensee's State of California license. Transportation activities appeared to be consistent with the licensee's SOP, Section 5.0 and the appropriate regulatory requirements prescribed in Department of Transportation regulations, 49 CFR Parts 172-178.

No violations or deviations were identified.

6. Facility Tour

A tour of the licensee's facility was conducted during the inspection. Independent measurements were performed with an Eberline Corporation Model E-520 radiation measurement instrument, Serial Number 1586, that was due for calibration on February 11, 1988.

The independent measurements confirmed that the licensee's posting and labeling practices were consistent with 10 CFR Part 20.203.

All fixed and portable radiation monitoring instruments were in current calibration.

The reactor office, control room, and reactor room were cluttered with what appeared to be unnecessary extraneous material. This observation was brought to the Reactor Supervisor's attention. The Reactor Supervisor stated that he had come to the same conclusion; however, he did not have the time and necessary resources to clean the facility.

No violations or deviations were identified.

7. Followup Items

A. Enforcement Items and Open Items

Corrective actions taken by the licensee to resolve enforcement items, open items, and licensee identified items (85-01-01, 85-01-02, 85-01-04, 85-01-05, 85-01-06, 06-16-83, and 86-11-41) were examined. Licensee's actions were satisfactory except for open items 85-01-05 and 85-01-06. These items have been replaced with enforcement items 88-01-01 (see paragraph 2.E) and 88-01-02 (see paragraph 4). Items 85-01-01, 85-01-02, 85-01-04, and 06-16-83 are closed.

B. Information Notices (INs)

The inspector verified that INs pertinent to research reactors are routinely evaluated for applicability at the TRIGA reactor facility after they are received.

No violations or deviations were identified.

8. Generic Letters (GL)

Discussions with the Reactor Supervisor and Department of Chemistry Chairman revealed that an evaluation of GL 85-11, "Distribution of Products Irradiated in Research Reactors," was reviewed. The inspector was informed that the licensee does not have any current plans to irradiate any gem stones for commercial use. The Reactor Supervisor stated that the NRC would be informed of any future decisions to irradiate gem stones for commercial or private use.

No violations or deviations were identified.

9. Exit Interview

The inspector met with the individuals (denoted in paragraph 1) at the conclusion of the inspection on January 29, 1988. The scope and findings of the inspection were summarized. The inspector informed the licensee of the two apparent violations discussed in paragraphs 2.E and 4.

The inspector added that it appears that the weaknesses discussed during the exit interview of the previous inspection held on September 6, 1985 (see paragraph 9 of Inspection Report 50-326/85-01) had not been corrected as was committed to by the licensee's staff attending the exit interview. The inspector added that the two apparent violations might have been avoided had management's attention and support been provided.

The Department of Chemistry Chairman informed the inspector that the inspector's observations would be carefully evaluated.