ENCLOSURE 2

U.S. NUCLEAR REGULATORY COMMISSION
REGION IV

Inspection Report: 50-326/95-01

Operating License: R-116

Licensee: University of California at Irvine
Irvine, California 92717-2025

Facility Name: Department of Chemistry
Nuclear Reactor Facility

Inspection At: University of California at Irvine
Department of Chemistry, Building Physical Sciences 1
Irvine, California

Inspection Conducted: November 27 through December 1, 1995

Inspector: J. Blair Nicholas, Ph.D., Senior Radiation Specialist
Plant Support Branch

Approved: Blaine Murray 1/8/96
Blaine Murray, Chief, Plant Support Branch Date
Division of Reactor Safety

Inspection Summary

Areas Inspected: Routine, announced inspection of the licensee's organization and management controls, qualifications and training, special nuclear material and accountability, reviews and audits, logs and records, procedures, reactor operations, surveillances, experiments, transportation of radioactive materials, radiation protection, radiological effluents and environmental monitoring, emergency preparedness, physical security, and reports and notifications.

Results:

- All licensee organizational positions were filled with qualified personnel. Supervisory controls and reactor operational responsibilities were properly implemented (Section 1).

DOCUMENT CONTAINS PROPRIETARY INFORMATION
DECONTROLLED WHEN SEPARATED FROM ATTACHMENT 2

- The Reactor Operations Committee membership met requirements. Generally, the Reactor Operations Committee performed its duties in an effective manner; however, a noncited violation dealing with missed Reactor Operations Committee meetings was licensee-identified (Section 1).

- The reactor facility and the Reactor Operations Committee maintained well qualified personnel. An approved requalification training program for senior reactor operators was being implemented; however, a noncited violation dealing with two missed annual written examinations was licensee-identified. An excellent radiation safety training program was in place (Section 2).

- The inventory and control of special nuclear material was properly maintained (Section 3).

- A violation dealing with the failure to perform and document a review of the reactor control console modification for an unreviewed safety question was identified (Section 4).

- A detailed reactor maintenance and operations log and associated records were maintained (Section 5).

- Approved procedures, checklists, and data forms for reactor safety-related operational and surveillance activities were maintained (Section 6).

- The reactor was properly operated, and the surveillance program was properly implemented (Section 7).

- Reactor experiments were properly reviewed and authorized (Section 8).

- An excellent program was established for the transfer of radioactive byproduct material (Section 9).

- The radiation protection program was effectively implemented (Section 10).

- Radioactive liquid, solid, and gaseous releases from the reactor facility met regulatory requirements (Section 11).

- An environmental monitoring program was maintained around the reactor facility (Section 11).

The licensee's staff were trained and knowledgeable of the emergency plan and emergency response implementing procedures. Support emergency response organizations participated in the licensee's annual emergency drills. A noncited violation was identified involving the failure to submit emergency plan changes to the NRC (Section 12).

- An approved physical security plan was being implemented. The reactor facility security system was installed and operated in accordance with the physical security plan and was well maintained. Testing of the reactor facility security system was properly conducted. A noncited violation was identified involving the failure to maintain copies of the physical security plan at specified locations (Section 13).

- Annual operating reports for the reactor facility were submitted in a timely manner and included the required information (Section 14).

- The licensee's gamma radiation survey results compared well with the NRC's radiation survey results. The NRC's beta-gamma analysis results of the smear survey showed no detectable removable contamination above background (Section 15).

Summary of Inspection Findings:

- A noncited violation was identified (Section 1).
- A noncited violation was identified (Section 2).
- A noncited violation was identified (Section 4).
- A noncited violation was identified (Section 12.1).
- Violation 326/9501-03 was identified (Section 13).
- Inspection Followup Item 326/9501-04 was identified (Section 12.3).
- Inspection Followup Item 326/9101-01 was closed (Section 16.1).
- Inspection Followup Item 326/9302-01 was closed (Section 16.2).

Attachments:

- Attachment 1 - Persons Contacted and Exit Meeting
- Attachment 2 - Physical Security Plan - **PROPRIETARY INFORMATION**

DETAILS

1 ORGANIZATION AND MANAGEMENT CONTROLS (40750)

The inspector reviewed the organization, management controls, and staffing to determine compliance with Technical Specifications 6.1 and 6.2.

The inspector verified that the organizational structure of the reactor facility for reactor operations was as defined in the Technical Specifications. The reactor facility's staff responsibilities were described in the reactor facility's standard operating procedures approved by the Reactor Operations Committee in July 1992. All organizational positions were filled with qualified personnel. There had been no reactor facility staff changes since the previous NRC inspection conducted in February 1993.

The inspector reviewed the Reactor Operations Committee's responsibilities and membership. The Reactor Operations Committee's membership was in accordance with the reactor facility's standard operating procedures. The inspector reviewed Reactor Operations Committee meeting agendas and minutes and determined that the Reactor Operations Committee meetings were being conducted at least quarterly during the period February 1993 through March 1994. The Reactor Operations Committee meeting minutes documented that the Reactor Operations Committee had performed the required reviews and approvals in accordance with the Technical Specification requirements. On May 25, 1994, Amendment 3 to Facility License No. R-116 and the Technical Specifications for the University of California - Irvine was issued which, in part, changed the frequency for the Reactor Operations Committee meetings from at least quarterly to at least semi-annually per Technical Specification 6.2.f. However, the licensee failed to conduct Reactor Operations Committee meetings during the period March 24, 1994 through August 17, 1995. This is a violation of Technical Specification 6.2.f. The licensee self-identified this violation.

After recognizing the fact that the Reactor Operations Committee meeting frequency was not met, the reactor supervisor notified the chairman of the Reactor Operations Committee and an official Reactor Operations Committee meeting was conducted on August 17, 1995. The missed Reactor Operations Committee meetings were reported to the NRC in a letter dated August 16, 1995. This licensee-identified and corrected violation is being treated as a noncited violation, consistent with Section VII of the NRC Enforcement Policy.

2 QUALIFICATIONS AND TRAINING (40750)

The inspector reviewed the requalification training program for senior reactor operators to determine compliance with the approved reactor operator requalification training program and 10 CFR Part 55. The inspector also

reviewed training for experimenters, students, and support staff to determine agreement with recommendations of Regulatory Guides 8.13, 8.27, and 8.29, and compliance with 10 CFR 19.12.

The inspector reviewed the education and experience of the reactor facility staff and Reactor Operations Committee members and determined that all of the reactor facility staff and the Reactor Operations Committee members met the qualification requirements.

The inspector reviewed the reactor operator requalification training program dated February 20, 1974. It was noted that the reactor operator requalification training program was approved by the NRC, and it conformed to the requirements of 10 CFR 50.54 (i-1) and 10 CFR 55.59 (c). Individual training records for the two senior reactor operators (reactor supervisor and assistant reactor supervisor) for the time period January 1992 through December 1995 were reviewed. The two senior reactor operators had taken and satisfactorily passed a written examination administered by the NRC on July 6, 1992. During the time period February 7, 1994 through February 8, 1995, the reactor was not operated and no reactivity controls were performed. Prior to the inspector's review of the two senior reactors operators' training records, the reactor supervisor noted that he had not given an annual written examination to the other senior reactor operator between July 6, 1992 and February 13, 1995, in violation of the requirements of the reactor operator requalification training program for completion of annual written examinations. The reactor supervisor informed the inspector on November 27, 1995, of the violation before giving the inspector the training records for his review. During the restart of the reactor from February 12, 1995 through February 15, 1995, the senior reactor operator (assistant reactor supervisor) satisfactorily passed both written and oral examinations on February 13, 1995, and reviewed all new and previous reactor manipulations and procedures before being allowed to return to full status as a senior reactor operator for the reactor facility.

Sections III and IV of the licensee's approved reactor operator requalification training program requires that all reactor operators and senior reactor operators satisfactorily pass a written examination annually unless they were the senior reactor who prepared, administered, and graded the written examination. The reactor supervisor had always prepared and administered the annual written examination to the other senior reactor operator making the reactor supervisor exempt from taking the examination. However, the assistant reactor supervisor, the second senior reactor operator, had not taken an annual operator written requalification examination during 1993 and 1994. This is a violation of Section III of the reactor operator requalification training program. The licensee self-identified this violation. The missed senior reactor operator written examinations were reported to the NRC in a letter dated November 29, 1995. This licensee-identified and corrected violation is being treated as a noncited violation, consistent with Section VII of the NRC Enforcement Policy.

10 CFR 55.53(i) requires all licensed reactor operators to have a biennial medical examination. The inspector reviewed the medical examination records for the two licensed senior reactor operators and determined that the two licensed senior reactor operators had satisfactorily completed biennial medical examinations.

The inspector reviewed the university's radiation safety training course which was given to all radioisotope users at the university prior to allowing them to work with radioisotopes and to other personnel who might work in or enter the radiological controlled area in the reactor facility. The radiation safety training course covered basic radiation principles, biological effects of ionizing radiation, required monitoring, personnel dosimetry, laboratory procedures and rules, prenatal risks, and included material from NRC Regulatory Guides 8.13 and 8.29, and met the requirements of 10 CFR 19.12. The reactor supervisor conducted an orientation course for those staff and students who routinely entered the radiological controlled area in the reactor facility. Each person was given a guided tour of the reactor facility to familiarize them with emergency equipment and procedures.

3 LICENSEE CONDITIONS AND SPECIAL NUCLEAR MATERIAL CONTROL AND ACCOUNTABILITY (85102)

The licensee's special nuclear material and accountability program was reviewed to determine compliance with 10 CFR Part 70 and the Facility Operating License R-116.

The inspector reviewed the storage and inventory of the licensee's special nuclear material for compliance with the Facility Operating License R-116 as amended and dated May 24, 1994. Facility Operating License Conditions 2.B and 2.C authorize the possession and use of up to 4.5 kilograms of uranium-235 for use in connection with the operation of the reactor and a 3-curie sealed americium-beryllium neutron source for reactor startup. The inspector performed an inventory of the special nuclear material on site. It was determined that the licensee possessed a 2-curie sealed americium-beryllium neutron start-up source and verified that it was stored in the reactor core for use in starting up the reactor.

The inspector performed a visual inventory of the reactor fuel which the licensee had in the reactor pool. It was determined that the licensee had 25 standard fuel elements in the storage racks mounted on the perimeter of the reactor pool and 82 fuel elements and 4 control rods in the reactor core. In addition to the fuel stored in the reactor pool, the inspector determined, by direct observation and review of fuel inventory records, that 6 new unirradiated elements consisting of 1 standard fuel element, 4 instrumented elements, and 1 fuel follower control rod were stored in a storage locker in the reactor room. These values agreed with the licensee's records and fuel inventory performed September 30, 1995.

The licensee's fuel contained approximately 4090 grams of uranium-235 which was less than the 4500 grams of uranium-235 allowed by the Facility Operating License. The inspector reviewed the licensee's special nuclear material status form No. 742 for the reporting period April 1 through September 30, 1995, as the latest example of the forms which had been submitted semiannually to the Nuclear Materials Management Safeguards System Program Control. The licensee's forms were found in order and correct as verified by the inspector's inventory of the reactor fuel elements in the reactor pool and stored in the reactor room's storage cabinet. The licensee's inventory and control of special nuclear material on site met the conditions of the Facility Operating License.

4 REVIEWS AND AUDITS (40750)

The inspector reviewed the review and audit programs conducted by the Reactor Operations Committee to determine compliance with Technical Specification 6.2.

The inspector reviewed the audits performed by the university's senior health physicist as a member of the Reactor Operations Committee. The audits were performed at the frequency corresponding to the Reactor Operations Committee meetings during the time period of February 1993 through August 1995. The audits were of excellent quality.

The inspector reviewed the Reactor Operations Committee meeting minutes from the period February 1993 through August 1995. The Reactor Operations Committee's meeting minutes documented that the reviews of experiments; proposed changes to the facility, procedures, and Technical Specifications; reactor operation and operational records; abnormal performance of facility equipment and operating anomalies; and unusual or abnormal occurrences and incidents reportable under 10 CFR Part 20 and 10 CFR Part 50 were performed as required by the Technical Specifications. However, the Reactor Operations Committee failed to review the reactor control console instrumentation modifications as described below.

During the time period February 7, 1994 through February 8, 1995, the reactor was not operated in order to perform maintenance on the reactor control console and replace and upgrade the neutron channel instrumentation for the log, linear, start-up, and period channels. The wide range logarithmic monitoring channel and the wide range linear monitoring channel were replaced. These monitoring channels provided scram trips to the scram channels, but the scram relay busses were not changed or affected during the modification. No changes to the reactor's safety systems (scram networks or control rod drive systems) were made during the reactor control console upgrade modification.

10 CFR 50.59 (b)(1) and (2) states, in part, that the licensee shall maintain records of changes in the facility to the extent that these changes constitute changes in the facility as described in the safety analysis report. These records must include a written safety evaluation which provides the bases for

the determination that the change does not involve an unreviewed safety question and submit a report as specified in 10 CFR 50.4 containing a brief description of any changes including a summary of the safety evaluation. Furthermore, Technical Specification 6.2.b.3 states, in part, that the responsibilities of the Reactor Operations Committee shall include the determination of whether a proposed change, test, or experiment would constitute an unreviewed safety question. However, on November 29, 1995, the inspector determined that the licensee had not performed a written safety evaluation which provided the bases for the reactor control console modification nor determined whether it did or did not constitute an unreviewed safety question. The failure to perform and provide a written safety evaluation of the modifications made to the reactor control console is a violation of 10 CFR 50.59. (326/9501-01)

5 LOGS AND RECORDS (40750)

The inspector reviewed documentation of reactor operations and maintenance activities to determine compliance with Technical Specification 6.6.

The inspector reviewed the documentation of reactor maintenance and operations for the period March 1993 through November 1995. The logs and records documenting routine reactor maintenance and operation, fuel inventory and storage, fuel inspection, experiment performance, instrumentation checks and calibrations, radiation surveys, and personnel radiation exposure were reviewed. The inspector determined that the annual reactor operating reports, the reactor operations log, and reactor surveillance and test records adequately documented reactor maintenance and operations activities. The licensee's logs and records were clear, concise, and legible. Reactor operations, maintenance, and testing were satisfactorily documented in accordance with Technical Specification requirements.

During the review of the reactor operations log and records and the annual reactor operating reports, the inspector noted that during 1993, 1994, and 1995 only one significant modification was made to the reactor facility. This modification involved the replacement and upgrade of the neutron channel instrumentation for the log, linear, start-up, and period channels in the reactor control console. Routine repair and maintenance of building equipment and systems was performed with no changes which effected the safe operation of the reactor. The reactor operations log and records documented routine reactor equipment maintenance and instrument checks conducted by the reactor staff.

During the review of the reactor operations log and records and annual operating reports for 1993, 1994, and 1995, the inspector noted that eight inadvertent scrams and unplanned shutdowns were logged during 1993, no inadvertent scrams and unplanned shutdowns were logged during 1994 because the reactor was shutdown from February 1994 to February 1995, and five inadvertent scrams and unplanned shutdowns logged during 1995. The inspector reviewed the reactor scram histories and determined that none of the scrams involved any significant safety issues.

6 PROCEDURES (40750)

The inspector reviewed the reactor facility's standard operating procedures to determine compliance with Technical Specification 6.3.

The licensee had written and approved reactor operating procedures, checklists, and data forms for safety-related operational and surveillance activities that included reactor startup, routine operation, and shutdown; routine maintenance; and checks and calibration of equipment and instrumentation. A review of selected procedures and data forms indicated that satisfactory programmatic procedures were being maintained and updated. The procedures were reviewed and approved by the reactor supervisor and the Reactor Operations Committee. The last revision to the standard operating procedures was performed in July 1992.

Health physics procedures maintained in the university's Radiation Safety Manual and Radiation Safety Handbook were reviewed and approved by the university's Radiation Safety Committee and the radiation safety officer. The inspector reviewed selected health physics procedures and verified that they were updated and included proper terminology, references, and requirements in accordance with "new" 10 CFR Part 20.

The licensee maintained approved procedures, checklists, and data forms for reactor safety-related operational and surveillance activities. A program for review and approval of procedures was implemented.

7 REACTOR OPERATIONS AND TECHNICAL SPECIFICATION SURVEILLANCE REQUIREMENTS (40750)

The inspector observed reactor operations and reviewed reactor logs, records, and surveillance results to determine compliance with Technical Specifications 2.0, 3.0, 4.0, and 5.0.

The inspector inspected the licensee's reactor facilities; reviewed operations logs and records, annual reports, and records of experiment performance; and observed the startup and operation of the reactor to verify reactor protection systems operation. The licensee stated that the reactor was routinely operated several hours per week for the purpose of reactor system tests, reactor surveillances, sample irradiations, and performance of experiments. During the time period February 7, 1994 through February 8, 1995, the reactor was shutdown to perform maintenance on the reactor control console and replace and upgrade the neutron channel instrumentation for the log, linear, start-up, and period channels. During the time period July 1, 1993 through June 30, 1994, the reactor was critical 137 hours, generated 4.2 megawatt hours of energy, and was pulsed 9 times. A total of 256 experiments were performed and 413 samples were irradiated. During the time period July 1, 1994 through June 30, 1995, the reactor was critical 85 hours, generated 10.8 megawatt hours of energy, and was not pulsed. A total of 128 experiments were performed and 935 samples were irradiated.

The inspector observed the licensee initiate a routine reactor startup on November 28, 1995, to irradiate a sample and demonstrate to the inspector the operation of the reactor protective systems. Prior to and in conjunction with the reactor startup, the inspector accompanied and observed the licensee perform the visual inspections of the reactor core, reactor pool, and reactor room; verify the operation of the reactor room ventilation system; verify the proper valve lineup and operation of the reactor water system; and verify the operational status and alarm setpoints and take initial background readings on the radiation area monitors and the continuous air monitor located in the reactor room. The inspector observed the licensee perform the required reactor safety and interlock checks at the reactor console and record the required reactor operational parameters in the reactor operations log. The inspector also observed the licensee scram the reactor and perform a routine shutdown of the reactor.

The inspector observed a graduate student remove the sample tube from the reactor and perform the initial radiation survey on the sample as it was removed from the reactor. The retrieval and handling of the irradiated sample was properly performed. The inspector noted that the graduate student handling the sample wore appropriate whole-body and finger ring dosimetry when in the reactor room and while handling the irradiated sample. Excellent ALARA procedures were used during the irradiation and handling of the sample.

The inspector reviewed the reactor facility's operations logs and records to determine compliance with the Facility Operating License and Technical Specification requirements. The licensee had operated the reactor at thermal power levels less than 250 kilowatts in compliance with Facility Operating License Condition 3.A. The reactor safety limit for the reactor fuel element temperature was verified to be maintained less than 1000 degrees centigrade in compliance with Technical Specifications 2.1.

Technical Specification limiting conditions for operation were reviewed. The inspector verified, by review of the reactor operations log, that the reactor shutdown margin was calculated during each reactor shutdown and was greater than $0.50 per Technical Specification 3.1.a. The total reactivity worth of each control rod was determined annually and was last determined on February 13, 1995. The inspector verified, by review of the reactor surveillance test record, that the total reactivity worth of the two transient control rods was less than $3.00 in compliance with Technical Specification 3.1.b, and the annual surveillance frequency was in compliance with Technical Specification 4.2.a. The core excess reactivity was calculated during each reactor operation and was verified to be less than $3.00 in compliance with Technical Specification 3.1.d. The control rod drop times were determined annually and were last determined on February 1, 1995. The inspector verified, by review of the reactor surveillance test record, that the drop times for the adjustable transient rod, regulating rod, and shim rod were 0.79 seconds, 0.59 seconds, and 0.64 seconds, respectively. The drop times for the standard control rods were less than 1 second per Technical Specification 3.2.h, and the annual surveillance frequency was in compliance with Technical Specification 4.2.b.

The reactor instrumentation requirements were reviewed. The inspector verified, by direct observation during a reactor startup, that all of the reactor measuring channels required in Technical Specification 3.3 were tested and determined to be operable prior to each startup of the reactor.

The reactor safety system requirements were reviewed. The inspector verified, by direct observation during a reactor startup, that all of the reactor safety system channels required in Technical Specification 3.4 were tested and determined to be operable prior to each startup of the reactor in compliance with Technical Specifications 4.3.a, 4.3.b, and 4.3.c. The inspector verified, by review of the reactor surveillance test record, that the reactor power level monitoring channels were calibrated annually and last calibrated on February 14, 1995.

The fuel elements were visually inspected for physical damage and measured for length and bend at least once every 36 months. An inspection of the entire reactor core was last performed in January 1993 in compliance with Technical Specifications 4.1 and 4.2.a.

By review of reactor surveillance test records, the inspector verified that the reactor water level measuring channel was verified operable at intervals not exceed 2 months per Technical Specifications 3.7 and 4.4.

The radiation monitors were installed and operational in key locations throughout the reactor facility including above the reactor pool and around the reactor tank in the reactor room. The reactor room area radiation monitors were checked and verified, by direct observation and by review of the reactor startup checklist, to be gamma-sensitive detectors which were checked

to be operational in the reactor room prior to and during reactor operation in compliance with Technical Specification 4.5. The reactor room area radiation monitors produced readout and audible alarms locally and in the reactor control room. The continuous air monitor was operable in the reactor room when the reactor was operating and produced a readout and audible alarm locally and in the reactor control room in compliance with Technical Specification 4.5, which was verified during the performance of the reactor startup checklist prior to each reactor startup. The alert and alarm setpoints were verified to be calculated and set to initiate an alarm at pre-established activity concentrations.

The design features for reactor fuel, reactor core, control rods, radiation monitoring system, fuel storage, reactor building and ventilation system, and reactor pool water systems were inspected and verified by direct observation and discussion with licensee personnel. The reactor fuel was verified to be the standard TRIGA stainless-steel clad elements required in Technical Specification 5.1.a. The inspector reviewed the current reactor core configuration map and verified that the reactor fuel elements were positioned in the reactor grid plate in accordance with the current core map and in compliance with Technical Specification 5.1.b. Twenty-five fuel elements were stored in racks located at the bottom and on the outside perimeter of the reactor pool in a safe geometry in compliance with Technical Specification 5.3. The reactor room minimum free volume met the Technical Specification 5.2.b requirement. The reactor room ventilation system and exhaust stack from the reactor facility met the requirements of Technical Specification 5.2.c.

The reactor was being operated in accordance with the Facility Operating License and Technical Specification requirements, and all Technical Specification surveillance requirements had been performed.

8 EXPERIMENTS (40750)

The inspector reviewed the program for control and conduct of reactor experiments including evaluations, authorizations, conduct, and documentation of experiments performed to determine compliance with Technical Specification 6.8.

The inspector reviewed the three active reactor experiment procedures currently used in the reactor which documented the licensee's compliance with the Technical Specification requirements regarding the evaluation, review and approval of reactor experiments. The inspector verified that the three active experiment procedures (Experiment 5, Experiment 102, and Experiment 110) were reviewed and authorized in accordance with Technical Specification requirements. It was noted that the reactor supervisor and the Reactor Operations Committee had approved the three active experiments during the

1970s. The inspector verified that no new experiments were approved and authorized since the previous NRC inspection. The inspector also reviewed selected sample irradiation request forms and experiment performance forms which were completed during the performance of reactor irradiation experiments.

9 TRANSPORTATION OF RADIOACTIVE MATERIALS (86740)

The inspector reviewed the licensee's program for the transportation of radioactive materials and special nuclear materials to determine compliance with the requirements in the Facility Operating License, Technical Specifications, 10 CFR Part 71, and 49 CFR Parts 172-189.

The inspector determined that the licensee had made no shipments of special nuclear material since the previous NRC inspection conducted in February 1993. The licensee had transferred radioactive byproduct material produced during the irradiation of samples in conducting sample irradiation experiments to other licensed personnel authorized to receive such radioactive byproduct material. Most of the radioactive byproduct material produced during sample irradiation experiments was transferred to students authorized under the university's broad scope license or to other appropriate licensee's. The inspector reviewed selected reactor irradiation request forms and experiment performance forms which were completed for each sample irradiation experiment performed. The forms documented the sample and reactor data and radioactive material survey data associated with each irradiated sample and the approximate specific isotopic activity of radioactive byproduct material which was produced and transferred. The inspector also reviewed selected isotope release forms and off-campus radioactive materials transfer forms for the transfer of radioactive byproduct material to licensed users not associated with the university or licensed under the university's broad scope license. These off-campus transfer forms documented the sample and reactor data, radioactive material survey data associated with the irradiated sample and the transfer container, the approximate specific isotopic activity of radioactive byproduct material which was produced and was being transferred, and the transferee's license number authorizing the transferee to receive that quantity of radioactive byproduct material. The transfer of radioactive byproduct material met applicable regulatory requirements.

10 RADIATION PROTECTION (40750)

The inspector reviewed the radiation protection program to determine compliance with Technical Specification 4.3.3, and 10 CFR Part 20.

Radiation exposure records for reactor facility personnel were reviewed. It was noted that personnel with duties in the reactor facility were issued monthly whole-body and extremity dosimetry (ring badge) beta-gamma thermoluminescent dosimeters. During the period May 1, 1993 through April 30, 1994, twelve persons were monitored on a continual basis. The total measured

11 RADIOLOGICAL EFFLUENTS AND ENVIRONMENTAL MONITORING (40750)

The inspector reviewed the radiological effluent and environmental programs to determine compliance with 10 CFR 20.1301 and 20.1302.

The inspector reviewed the reactor operating reports which included the periods July 1, 1992 through June 30, 1993, July 1, 1993 through June 30, 1994, and July 1, 1994 through June 30, 1995, concerning radioactive effluent activities. Effluent releases from the reactor facility were controlled and maintained as low as is reasonably achievable (ALARA) and met regulatory requirements.

Environmental monitoring was conducted at the reactor facility by positioning 8 thermoluminescent dosimeters around the reactor facility and by suspending a dosimeter in each of the two reactor facility exhaust stacks. The thermoluminescent dosimeters were exchanged and analyzed quarterly. The inspector reviewed the environmental data for 1993, 1994, and 1995. No unusual dose rates were detected. The air released from the reactor facility showed no detectable activity above background measured by the thermoluminescent dosimeters suspended in the two reactor facility exhaust stacks.

12 EMERGENCY PLANNING AND PREPAREDNESS (40750)

The inspector reviewed the emergency preparedness program to determine compliance with 10 CFR 50.54(q) and the Emergency Plan, Revision 2, dated April 1991. The inspector reviewed emergency equipment and supplies, changes to the emergency plan and emergency implementing procedures, and documentation related to emergency preparedness to determine if the licensee's emergency preparedness program was maintained in a state of operational readiness. The inspector interviewed licensee personnel responsible for implementing the emergency plan and the emergency implementing procedures to determine whether the licensee's staff was trained and prepared to respond to emergency conditions.

12.1 Changes to the Emergency Plan and Implementing Procedure

The inspector reviewed the current emergency plan and determined that it was reviewed and approved by the Reactor Operations Committee. However, the inspector noted that the current Emergency Plan, Revision 2, dated April 1991, had not been submitted to the NRC for review and approval.

10 CFR 50.54(q) states, in part, that a research reactor licensee may make changes to the emergency plan without Commission approval only if these changes do not decrease the effectiveness of the plan. If a change is made without approval, the licensee shall submit a report of each change within 30 days after the change is made. However, on November 30, 1995, the inspector determined that the licensee had not submitted to the NRC the

changes made to the emergency plan, as Revision 2, dated April 1991. In the inspector's opinion, these changes were minor and did not reduce the plan's effectiveness. The failure to submit changes made to the emergency plan, which do not decrease the effectiveness of the plan and do not require prior approval, within 30 days of making the changes is a violation of 10 CFR 50.54(q). This failure to submit constitutes a violation of minor significance and is being treated as a minor noncited violation consistent with Section IV of the NRC Enforcement Policy.

Implementation of the emergency plan was proceduralized in 11 emergency response implementing procedures (Section 6 of the reactor facility's standard operating procedures). The inspector reviewed the procedures and found them satisfactory. The emergency response implementing procedures were approved by the Reactor Operations Committee in August 1987.

12.2 Emergency Preparedness Program Implementation

The licensee had conducted annual emergency drills in accordance with the emergency plan.

The inspector conducted a tabletop discussion with licensee representatives to determine if personnel who would be expected to respond during an emergency were trained on the emergency plan and use of the emergency implementing procedures and could demonstrate this knowledge and the capability to implement the Emergency Plan properly. The tabletop discussion included the reactor supervisor; the university's radiation safety officer and senior health physicist, and representatives from the university police department, Orange County Fire and Hazard Materials Department, and medical support facilities including Western Medical Center/Santa Ana, University of California - Irvine Medical Center, and University of California - Irvine Student Health Center. Individuals participating in the tabletop discussion are noted in Attachment 1 to this report.

The tabletop discussion included an evaluation of the licensee's understanding of organizational responsibilities for emergency response activities, the classification and notification of emergencies, and the implementation of emergency procedures. Several hypothetical accident scenarios were discussed to evaluate the licensee's and the emergency response support organization's responses. Representatives of the off-site emergency response support organizations described their responsibilities specific to the reactor facility emergencies and their procedures and resources available.

All personnel participating in the tabletop discussion demonstrated a clear understanding of their respective organization's responsibilities for responding to emergencies at the reactor facility. Representatives from the university police, Orange County Fire Department, and the medical support facilities indicated that specific training had been conducted for response to accidents involving radioactive materials. The hospital representatives

stated that decontamination equipment, radiation survey instruments, and procedures were maintained for treatment of contaminated injury victims. The inspector noted that all representatives participating in the tabletop discussion had an excellent understanding of emergency response procedures and measures. Representatives of the off-site emergency response support organizations indicated that a good relationship was established with the licensee and good cooperation occurred during training exercises.

During the tabletop discussions, licensee representatives were able to describe accurately how they would classify certain scenario events, how they would make specific notifications, and how they would respond to certain emergency conditions. Assessment criteria for determining initiating conditions for emergency classification were accurately described for the scenario events presented.

12.3 Off-site Support and Emergency Alarms

The inspector determined that a current copy of the licensee's emergency call list (issued August 1, 1995) was readily accessible in the reactor control room.

The inspector visited the university police department's dispatch facility. The university police department's dispatch facility was continuously staffed and was responsible for dispatching university police and Orange County fire personnel in response to emergencies at the reactor facility. The inspector found that the licensee's emergency call list in the university police department dispatch facility's computer was not current and included the name of a person no longer on the university's radiation safety staff. The inspector also noted that the emergency call list located in the university's police dispatch facility did not include the NRC Region IV telephone number and that the NRC Headquarters 24-hour emergency operations center telephone number was incorrect. These items were discussed with the reactor supervisor during the inspection and at the exit meeting. The reactor supervisor agreed to supply the university police department's dispatch facility with an updated emergency call list and verify that the emergency call list in the university police dispatch facility's computer was also updated. The inspector stated that it is important to maintain correct phone numbers to ensure that emergency support organizations and NRC are notified in a timely manner. The lack of an up-to-date call list is considered an inspection followup item. The inspector will review the posting of phone numbers for emergency response personnel during future inspections (IFI 326/9501-04).

The inspector observed a successful test of the reactor facility's security alarm system from the university's police dispatch facility with the activation of an intrusion or reactor emergency alarm and a trouble emergency alarm at the reactor facility.

The inspector determined that the Western Medical Center/Santa Ana and the University of California - Irvine Medical Center maintained approved procedures, equipment, and radiation survey instruments which were available to respond to the arrival of potentially contaminated injury victims. A decontamination receiving facility would be made available outside the hospital's emergency department. The inspector was informed that emergency staff at both medical centers were trained in response procedures to handle potentially contaminated injury victims.

The inspector noted that letters of agreement were on file to identify support agreements with the Western Medical Center/Santa Ana and the University of California - Irvine Medical Center.

12.4 Emergency Preparedness Exercises and Drills

The inspector reviewed documentation of emergency exercises conducted since the previous NRC inspection. Emergency exercises had been conducted approximately every 12 months. The exercise scenarios involved credible emergencies. The inspector noted that the emergency exercise scenarios involved challenges for emergency response personnel and involved participation by the emergency response organizations. Critiques were performed following each exercise.

12.5 Training

The two senior reactor operators were trained in the emergency plan and emergency implementing procedures. The inspector determined, from discussions with the university's radiation safety officer and senior health physicist, that university police, Orange County Fire and Hazardous Materials personnel, and emergency medical personnel, who respond to reactor facility alarms, had been trained.

13 PHYSICAL SECURITY (81401, 81402, 81403, 81431, and 81810)

The inspector reviewed the physical security program to determine compliance with 10 CFR 50.54(p) and the physical security plan, as revised in August 1990.

In accordance with 10 CFR 2.790(d), the material concerning the physical security plan is exempt from disclosure. Therefore, this material is discussed in Attachment 2 to this Enclosure and will not be placed in the Public Document Room.

The inspector reviewed the physical security plan and determined that it was reviewed and approved by the Reactor Operations Committee and the NRC. However, during the review of the physical security plan requirements, the inspector determined that a copy of the security response procedures (Section 7 of the reactor facility's standard operating procedures) was not

lice department and that a
s not located at the Office
ne physical security plan.

all prepare and maintain
e with Appendix C of
nsee's NRC-approved
. required that the reactor
ith security incidents that
thorized interference with
nce and copies of these
ne University of
ffice of Environmental
nt copy of the reactor
sity of California - Irvine
al Health and Safety is a
-approved physical security
r significance and is being
tion IV of the NRC

mplemented. The reactor
l in accordance with the
esting of the reactor
quired.

reports and notifications
71(c) and Technical

or operating reports for the
. 1993 through June 30.
was determined that the
nformation.

urvey of the reactor room on
ee's gamma radiation survey
r also took several
ent laboratory for
is results of the smear
n above background.

RY INFORMATION
ROM ATTACHMENT 2

Followup Item 326/9101-01: Safeguards Procedure on clear Material

326/9101-01 was discussed in NRC Inspection Report
a review of the assumptions made in developing the
"Theft of Special Nuclear Material," dated July 19,
sment of the potential for theft of special nuclear
to determine if the rationale used in 1987 still
es of unirradiated special nuclear material held in
time. On February 24, 1993, the Reactor Operations
sical security plan and discussed and evaluated the
ping Safeguards Procedure 7.4 with regard to the
ecial nuclear material received August 1, 1989.
mented fuel elements, one fuel follower control rod,
ent, totalling 222 grams of Uranium-235; and two
tained less than 2 grams of Uranium-235. Except for
al itemized above, all other special nuclear
cility was contained in the reactor pool under a
r and was either in the reactor core or in vertical
Operations Committee concluded that the changes in
al inventory did not change the original implied
security plan that the unirradiated fuel represents
ncern at the reactor facility. They also concluded
n was raised by the change in unirradiated fuel
determined that the additional unirradiated special
ugust 1, 1989, as described above, would be locked
inspector verified that the unirradiated special
in a security cabinet.

ollowup Item 326/9302-01: Key Accountability Security Keys

6/9302-01 was discussed in NRC Inspection Report
he updating of the key accountability system for
which provided access to equipment storage areas
ing to the reactor control room. A major re-keying
iences building 1 was not completed for these
to have these doors re-keyed with 30 days of the
February 18, 1993. The inspector verified at the
doors to the equipment storage areas and the room
ol room were re-keyed on February 24, 1993, and
reactor supervisor.

TAINS PROPRIETARY INFORMATION
EN SEPARATED FROM ATTACHMENT 2

ATTACHMENT 1

1 PERSONS CONTACTED

1.1 Licensee Personnel

†*F. E. Gallagher, III, Radiation Safety Officer
†*G. E. Miller, Reactor Supervisor
*J. L. Redpath, Professor, Radiation Oncology, Reactor Operations Committee
*P. J. Rogers, Assistant Reactor Supervisor
†*W. G. Nabor, Senior Health Physicist
*H. W. Sobel, Chairman, Reactor Operations Committee

1.2 Other Personnel

†M. Bourgeois-Bennett, Emergency Room Registered Nurse, Western Medical Center/Santa Ana
†B. Bundy, Battalion Chief, Orange County Fire Department
†J. Cooper, Fire Captain, Orange County Fire Department
†G. Feldman, Radiation Safety Officer, University of California - Irvine Medical Center
†R. Fruchey, Facilities Manager, University of California - Irvine Physical Sciences
†E. Gilbert, Firefighter/Hazard Material Team, Orange County Fire Department
†M. Hart, MD, Operations Director, Emergency Department, University of California - Irvine Medical Center
†S. Hernandez, Firefighter, Orange County Fire Department
†S. Jones, Manager, Emergency Department, Western Medical Center/Santa Ana
†C. Leonard, Fire Apparatus Engineer, Orange County Fire Department
†R. Lucas, Sergeant, University of California - Irvine Police
†M. Mack, Captain, Orange County Fire Department
†P. Manrique, Firefighter/Hazard Material Team, Orange County Fire Department
†P. Shimomcora, Registered Nurse, University of California - Irvine Student Health Center
†R. Tabor, MD, Clinic Physician, University of California - Irvine Student Health Center
†A. Takeda, Firefighter, Orange County Fire Department

1.3 NRC Personnel

†B. Murray, Chief, Plant Support Branch

†Indicates those present at the emergency preparedness tabletop discussion on November 30, 1995.

*Indicates those present at the exit meeting on December 1, 1995.

DOCUMENT CONTAINS PROPRIETARY INFORMATION
DECONTROLLED WHEN SEPARATED FROM ATTACHMENT 2

2 EXIT MEETING

An exit meeting was conducted on December 1, 1995. During this meeting, the inspector reviewed the scope and findings of the report. The licensee identified the physical security plan, which was provided to and reviewed by the inspector, as proprietary information.