

May 26, 2010

Dr. George E. Miller  
Department of Chemistry  
516 Physical Sciences 1  
University of California, Irvine  
Irvine, CA 92697-2025

SUBJECT: UNIVERSITY OF CALIFORNIA AT IRVINE – REQUEST FOR ADDITIONAL  
INFORMATION REGARDING THE LICENSE RENEWAL FOR THE  
UNIVERSITY OF CALIFORNIA IRVINE NUCLEAR REACTOR FACILITY  
(TAC NO. ME1579)

Dear Dr. Miller:

We are continuing our review of the application for Renewal of License No. R-116, Docket No. 50-326 for the University of California Irvine Nuclear Reactor Facility. The application was submitted on October 18, 1999, as supplemented by letters dated October 23, 1999, and January 27, 2010.

During our review of your application and the supplemental letters, questions have arisen for which we require additional information and clarification. Please provide responses to the enclosed request for additional information within 30-days.

In accordance with Title 10 of the *Code of Federal Regulation* Section 50.30(b), your response must be executed in a signed original under oath or affirmation. Following receipt of the requested information, we will continue our evaluation of your application. If you have any questions regarding this review, please contact Ms. Linh Tran at 301-415-4103 or A. Francis DiMeglio at 301-415-0894.

Sincerely,

***/RA By Jessie F. Quichocho/***  
Linh Tran, Senior Project Manager  
Research and Test Reactors Licensing Branch  
Division of Policy and Rulemaking  
Office of Nuclear Reactor Regulation

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

Enclosure:  
As stated

cc w/encl: See next page

May 26, 2010

Dr. George E. Miller  
Department of Chemistry  
516 Physical Sciences 1  
University of California, Irvine  
Irvine, CA 92697-2025

SUBJECT: UNIVERSITY OF CALIFORNIA AT IRVINE – REQUEST FOR ADDITIONAL INFORMATION REGARDING THE LICENSE RENEWAL FOR THE UNIVERSITY OF CALIFORNIA IRVINE NUCLEAR REACTOR FACILITY (TAC NO. ME1579)

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Linh Tran, Senior Project Manager  
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Docket No. 50-326  
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ADAMS Accession No: ML101390251                      \*concurrence by e-mail                      NRR-088

OFFICE	PRLB:PM	PRLB:PM	PRPB:LA	PRLB:ABC	PRLB:PM
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DATE	5/19/2010	5/20/2010	5/19/2010	5/24/2010	5/26/2010

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University of California at Irvine

Docket No. 50-326

cc:

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Test, Research, and Training  
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**OFFICE OF NUCLEAR REACTOR REGULATION**

**REQUEST FOR ADDITIONAL INFORMATION**

**UNIVERSITY OF CALIFORNIA IRVINE NUCLEAR REACTOR FACILITY**

**LICENSE NO. R-116**

**DOCKET NO. 50-326**

The U. S. Nuclear Regulatory Commission (NRC) staff is continuing the review of your application for renewal of Facility Operating License No. R-116, dated October 18, 1999, Safety Analysis Report (1999 SAR), Revision 1, as supplemented by letters dated October 23, 1999 and January 27, 2010. During our review, questions have arisen for which we require additional information and clarification. Our review conformed to the Interim Staff Guidance on the Streamlined Review Process for Research Reactors and NUREG-1537.

Please address and provide the requested information to the following:

1. NUREG-1537, Part 1, Section 4.3, Reactor Tank or Pool states that the applicant should present all information about the pool necessary to ensure its integrity and should assess the possibility of uncontrolled leakage of contaminated primary coolant and should discuss preventive and protective features. Chapter 4, of your 1999 SAR does not provide this information. The following information is required to complete the review.
  - a. Please discuss the reactor pool water level monitoring system, alarm levels and required responses from operator and/or university personnel, if remote alarm signal is present. What is the minimum detectable amount of leakage?
  - b. Please discuss potential draining pathways of reactor pool water leakage, operator responses, and radioactivity monitoring. If water enters the uncontrolled environment, what is the radiological impact?
2. NUREG-1537, Part 1, Section 10.1 Experimental Facilities and Utilization, states that the applicant should provide sufficient information to demonstrate that no proposed operations involving experimental irradiations or beam utilization will expose reactor operations personnel, experimenters, or the general public to unacceptable radiological consequences. Regulatory Guide 2.2, Development of Technical Specifications for Experiments in Research Reactors, is suggested to the applicant as guidance on technical specifications that may be useful. Regulatory Guide 2.2, Section C.1.c.(3) states that the "materials of construction and fabrication and assembly techniques should be so specified and used that assurance is provided that no stress failure can occur at stresses twice those anticipated in the manipulation and conduct of the experiment or twice those which could occur as a result of unintended but credible changes of, or within, the experiment."

Enclosure

Proposed Technical Specification (TS) 3.8.2(b), Limitations on Experiments, allows that explosive materials in quantities less than 25 mg may be irradiated in the reactor in a container "provided that the pressure produced in the experiment container upon accidental detonation of the explosive has been experimentally determined to be less than the design pressure of the container." The word "half" should be inserted after "less than" in proposed TS 3.8.2(b) or a discussion provide justifying why it is not needed.

3. NUREG-1537 states, a thermal hydraulic analysis should be performed for the reactor. In your response dated January 27, 2010 to NRCs request for additional information (RAI) dated December 3, 2009, the analysis is provided through a reference for analyses made at two research reactors. However, the information is incomplete in that no information is provided on the similarity of the research reactors involved.

Please provide a comparison between the thermal hydraulic parameters (i.e., channel dimensions and geometry, linear power, etc.) and characteristics of the UCINRF core vs. the referenced research reactors core so as to provide validity to using this information for the UCINRF.

4. NUREG-1537, Chapter 7 states a description should be provided of the reactor protection system. While this has been provided, there are inconsistencies in the discussion in the response to our RAI. Response to RAI 4.6 mentions "power level scrams", 1999 SAR Fig. 7-9 shows two level scrams and proposed TS 3.2.3, Table 2 shows one level scram. Please provide additional clarification.
5. NUREG 1537, Part 1, Section 4.5, Nuclear Design, states the applicant should discuss normal operating conditions, reactor core physics parameters and operating limits. The discussion should include a discussion of the complete, operable core; control rod worths; kinetic parameters; excess reactivities; shut down margins; and flux distribution or all planned configurations for the life of the core.

Section 4.5 of the 1999 SAR presents a representation of the flux distribution in the core. However, based on 1999 SAR Figure 4-13, this flux plot in 1999 SAR Figure 4-16 appears to not be representative in that it shows no flux peaking in the center flux trap and does not portray the flux near the position of the adjustable transient rod (which is important to the Limiting Safety System Setting (LSSS)). Please provide appropriate flux distribution information including how the distribution will affect the peak to average power ratio.

6. NUREG-1537, Part 1, Chapter 14, Technical Specifications, states the applicant needs to establish Technical Specifications that will provide reasonable assurance that the facility will function as analyzed in the SAR without endangering the environment or the health and safety of the public and the facility staff.

Proposed TS 3.2.3, Reactor Safety System. This Limiting Conditions for Operation (LCO) contains the fuel element temperature scram. The listed value of 500 degrees C (°C) is the same as the LSSS when the instrumented fuel element is located in the B-ring position. However, this setpoint is above the LSSS when the instrumented fuel

element is located in the C-ring position. Propose appropriate changes in the TS wording for the instrumented fuel element in the C-ring to correct this inconsistency.

7. NUREG 1537, Part 1, Chapter 14, Technical Specifications, states the applicant needs to establish Technical Specifications that will provide reasonable assurance that the facility will function as analyzed in the SAR without endangering the environment or the health and safety of the public and the facility staff.
  - a) Proposed TS 1.11, Experiment. The definition does not include in the definition the distinction of “in or near the core” that is contained in ANSI/ANS-15.1. Propose appropriate TS wording or justify why it is not needed.
  - b) Proposed TS 1.23, Reactor Secured. The definition uses the term “optimum conditions of configuration or reflection” rather than “optimum conditions of moderation or reflection” that is used in ANSI/ANS-15.1. Propose appropriate TS wording or justify why it is not needed.
  - c) Proposed TS 1.28, Shall. The definitions do not include the definitions for “should” and “may” that are included in ANSI/ANS-15.1. The term “should” was not found to be used in a manner that needs to be included in the TS. However, the term “may” is used in Section 5, Design Features. Propose appropriate TS wording or justify why it is not needed.
  - d) Proposed TS 3.1.4. Pulse Operation. Please provide a discussion regarding a reactivity insertion limitation to ensure a fuel temperature of less than 830°C during a pulse. Propose appropriate TS wording or justify why it is not needed.
  - e) Proposed TS 3.1.5 Fuel Burnup. This statement described why there is no limitation on fuel burnup and is not a TS. Propose appropriate TS wording or justify why a TS is not needed.
  - f) Proposed TS 3.7.2 Effluents. There appear to be a typographical error in the units of the specification. It should be  $\mu\text{curies/ml}$  rather than  $\mu\text{c/ml}$ . Propose an appropriate correction to the TS wording for this specification.
  - g) Proposed TS 4.1, Reactor Core Parameters. The requirement to inspect fuel elements is not labeled with a sub-header and should be labeled (“e.”). Propose appropriate TS wording changes.
  - h) Proposed TS 4.4 is not a TS. The wording should be changed to indicate that specification is blank or reserved.
  - i) Propose appropriate TS wording for levels of pool radioactivity or justify why they are not needed. The proposed TS do not include LCO or surveillance requirements for levels of radioactivity in the reactor pool as recommended by ANSI/ANS-15.1

- j) The requirements for the conditions when fuel elements are removed from service are present in the current UCINRF TS, but have not been carried over to the proposed TS. Reinsert these requirements or justify why they are not needed.