

August 26, 2011

Dr. Mohamad Al-Sheikhly,  
Professor and Director  
Radiation Facilities and Nuclear Reactor  
Chemical and Nuclear Engineering Building 090  
University of Maryland  
College Park, MD 20742

SUBJECT: UNIVERSITY OF MARYLAND, REQUEST FOR ADDITIONAL INFORMATION  
REGARDING THE LICENSE RENEWAL FOR THE MARYLAND UNIVERSITY  
TRAINING REACTOR (TAC NO. ME1592)

Dear Dr. Al-Sheikhly:

The U. S. Nuclear Regulatory Commission (NRC) is continuing the review of your application for renewal of Facility Operating License No. R-70, Docket No. 50-166 for the Maryland University Training Reactor dated May 12, 2000, as supplemented by letters dated June 7, August 4, September 17, and October 7, 2004; April 18, 2005, April 25 (two letters), August 28 (two letters), November 9, and December 18, 2006; May 27, August 27, September 22, and December 14, 2010; January 31, February 2, March 17, May 2, and July 5, 2011. During our review, questions have arisen for which we require additional information and clarification. Please provide responses to the enclosed request for additional information no later than 30 days from the date of this letter.

In accordance with Title 10 of the *Code of Federal Regulations* Section 50.30(b), your response must be executed in a signed original under oath or affirmation. Your response must be submitted in accordance with 10 CFR 50.4, "Written Communications." Information included in your response that is considered security, sensitive, or proprietary, that you seek to have withheld from the public, must be marked in accordance with 10 CFR 2.390, "Public inspections, exemptions, requests for withholding."

If you have any questions please contact Spyros A. Traiforos at 301-415-3965 or by electronic mail at [Spyros.Traiforos@nrc.gov](mailto:Spyros.Traiforos@nrc.gov) or me at 301-415-2784 or by electronic mail at [William.Kennedy@nrc.gov](mailto:William.Kennedy@nrc.gov).

Sincerely,

/RA/

William B. Kennedy, Project Manager  
Research and Test Reactors Licensing Branch  
Division of Policy and Rulemaking  
Office of Nuclear Reactor Regulation

Docket No. 50-166  
License No. R-70

cc: See next page

University of Maryland

Docket No. 50-166

cc:

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**OFFICE OF NUCLEAR REACTOR REGULATION**  
**REQUEST FOR ADDITIONAL INFORMATION**  
**REGARDING LICENSE RENEWAL FOR**  
**THE MARYLAND UNIVERSITY TRAINING REACTOR**  
**LICENSE NO. R-70; DOCKET NO. 50-166**

Title 10 of the Code of Federal Regulations (10 CFR) Section 50.36, "Technical specifications," contains the requirements for proposed technical specifications (TS) submitted as part of a license application. Important general requirements in 10 CFR 50.36 include:

Each applicant for a license authorizing operation of a production or utilization facility shall include in his application proposed technical specifications in accordance with the requirements of this section (10 CFR 50.36).

A summary statement of the bases or reasons for such specifications, other than those covering administrative controls, shall also be included in the application, but shall not become part of the technical specifications.

The technical specifications will be derived from the analyses and evaluation included in the safety analysis report, and amendments thereto, submitted pursuant to 10 CFR 50.34.

Regulation 10 CFR 50.36(c) states that technical specifications will include safety limits (SL), limiting safety system settings (LSSS), limiting conditions for operation (LCO), surveillance requirements, design features, and administrative controls.

In regard to SLs, 10 CFR 50.36(c)(1)(i)(A) states:

Safety limits for nuclear reactors are limits upon important process variables that are found to be necessary to reasonably protect the integrity of certain of the physical barriers that guard against the uncontrolled release of radioactivity.

In regard to LSSS, 10 CFR 50.36(c)(1)(ii)(A) states:

Limiting safety system settings for nuclear reactors are settings for automatic protective devices related to those variables having significant safety functions. Where a limiting safety system setting is specified for a variable on which a safety limit has been placed, the setting must be so chosen that automatic protective action will correct the abnormal situation before a safety limit is exceeded.

In regard to LCOs, 10 CFR 50.36(c)(2) states:

- (i) Limiting conditions for operation are the lowest functional capability or performance levels of equipment required for safe operation of the facility.
- (ii) A technical specification limiting condition for operation of a nuclear reactor must be established for each item meeting one or more of [four criteria specified by 10 CFR 50.36(c)(2)(ii)(A), (B), (C), and (D)]

In regard to surveillance requirements, 10 CFR 50.36(c)(3) states:

Surveillance requirements are requirements relating to test, calibration, or inspection to assure that the necessary quality of systems and components is maintained, that facility operation will be within safety limits, and that the limiting conditions for operation will be met.

In regard to design features, 10 CFR 50.36(c)(4) states:

Design features to be included are those features of the facility such as materials of construction and geometric arrangements, which, if altered or modified, would have a significant effect on safety and are not covered in categories described in 10 CFR 50.36(c)(1), (2), and (3).

In regard to administrative controls, 10 CFR 50.36(c)(5) states:

Administrative controls are the provisions relating to organization and management, procedures, recordkeeping, review and audit, and reporting necessary to assure operation of the facility in a safe manner.

American National Standards Institute/American Nuclear Society (ANSI/ANS) -15.1, 2007, "Development of Technical Specifications for Research Reactors," and NUREG-1537, "Guidance for Preparing and Reviewing Applications for the Licensing of Non-Power Reactors," (Parts 1 and 2) provide guidance for satisfying the requirements of 10 CFR 50.36.

The following requests for additional information (RAIs) relate to the proposed TS submitted as Enclosure 4 to your license renewal application dated May 12, 2000 as revised through your letters dated December 18, 2006, and May 2, 2011. The RAIs address specific sections of the TS and refer to responses to RAIs you submitted by letter dated January 31, 2011. In responding to the following RAIs, provide a response to each individual RAI, and provide a complete set of revised proposed TS that incorporate any changes made as a result of the responses to the RAIs.

1. TS 1.8: In response to RAI 1.d you stated that the term fuel element will be used in all technical specifications. However, the term "fuel rod" is still being used instead of "fuel element" in the TS 1.10 and TS 3.1.4 basis. Also it appears that in TS 1.9 the term "4-element bundle" vs. "4-rod bundle" should be used. Please correct as appropriate or justify why a correction is not required.

2. TS 2.2: This specification states that “The limiting safety system setting shall be 175 C as measured by the instrumented fuel element (IFE). The IFE may be located at any position in the core.” Your response to RAI 2 provided analysis that showed that there are several positions in the core where the IFE should not be located. Please revise TS 2.2 specification and basis to reflect the results of this analysis identifying places where the IFE should not be located.
3. TS 3.3: RAI 6 inquired whether an LCO should be established for maximum pool water temperature. You introduced such an LCO in TS 3.3.4. However, the location of the measurement was not provided. Please provide the location of the measurement and incorporate it into the TS.
4. TS 3.4: Your response to RAI 8 states that the purpose of confinement is to provide sufficient volume for dilution of any radioactive releases. This is also stated in the objective section of TS 3.4. In the specifications section you indicate that you establish confinement by closing certain doors, but do not have any requirements for dilution of radioactive releases. There appears to be an inconsistency between the objective and the specifications to TS 3.4. Moreover, there appears to be an inconsistency between the specifications and the bases which state that “these specifications will dilute and delay the release of radioactive material ...”. Please revise TS 3.4 to eliminate the inconsistency among objective, specifications and bases.
5. TS 3.4.2 requires confinement whenever the reactor is in an unsecured mode. According to TS 1.27 and TS 1.28, the reactor can be in an unsecured mode without conducting a reactor startup. Given that TS 4.4 only requires visual verification of confinement prior to reactor startup, explain how TS 4.4 ensures that TS 3.4.2 will be met whenever the reactor is in an unsecured mode, and revise the TS as appropriate.
6. TS 3.5.1 states that “air within the reactor building shall not be exchanged with other occupied spaces in the building.” We interpret your statement to mean that air within the confinement, which contains the reactor, shall not be exchanged with other occupied spaces in the building. Given that there is no requirement for the ventilation system to be operating (or to have a negative differential pressure within the confinement), it is unclear why there will be no air exchange from the confinement to other occupied spaces in the building. Explain how the requirement of TS 3.5.1 is satisfied and revise the proposed TS as appropriate.
7. TS 3.5.2 states that “all locations where ventilation systems exchange air with the environment shall have failsafe closure mechanisms.” Please describe these locations and their failsafe closure mechanisms. Also, TS 4.5 contains no surveillance requirement for the failsafe closure mechanisms. In accordance with 10 CFR 50.36(c)(3), revise the TS to include a surveillance requirement for the failsafe closure mechanisms, or justify why such a surveillance is not required.
8. TS 3.6.1: RAI 14 inquired about the number of air radiation monitors that should be available. One of two is required as stated in your response and indicated in Table 3.5. In addition, as implied in specification 3.6.1.3, the second alarm set-points of both bridge and exhaust radiation monitors may initiate a reactor scram. Please explain how the

scram function is coordinated between the two radiation monitors and the two types of reactor scram channels listed in Tables 3.1 and 3.3.

9. TS 3.6.1: Based on FSAR Section 7.7 pg 7-29, the facility also has a third radiation monitor at the hot room glove box. If the radiation monitor provides a radiation safety function, consider whether there should be a TS requirement for operability of this radiation monitor during use of the hot room glove box. Revise the proposed TS to incorporate any necessary requirement and the basis for the requirement or justify why it is not required.
10. TS 3.6.1: The bases are not numbered to correspond to the specifications. Please consider numbering your bases to be consistent with the formatting used in the remainder of the TS.
11. TS 3.7.4: RAI 18 stated that "since the container design pressure should have a safety factor of two (Regulatory Guide 2.2), the failure pressure should be half the design pressure. Therefore, TS 3.7.4 should be modified accordingly." In your response to RAI 18 you stated that the statement "the failure pressure of the container is one-half of the design pressure" will be added. However, in the previous sentence, it appears that the term "design pressure" should be replaced by the term "failure pressure". Please make the appropriate changes or justify why they are not required
12. TS 3.7.5: In your response to RAI 19, you stated in your specification TS 3.7.5 in part that "the quantity and type of material in the experiment shall be limited such that"... However, this statement is redundant to a statement that already exists. Please revise the TS to eliminate redundancy.
13. TS 4.2.4: In your response to RAI 23, you stated that a surveillance requirement for the IFE will be added to TS 4.2.4. However, you did not add such a surveillance requirement. Please add a surveillance requirement or justify why it is not required.
14. TS 4.3: In your response to RAI 24 you stated that the numbering of specifications and bases in TS 4.3 will be made consistent. However, it does not appear that you made them consistent. There appears to be an inconsistency between specification 4.3.1 and basis 4.3.1. Also there appears to be an inconsistency between specification 4.3.3 and basis 4.3.3. Please revise the bases to be consistent with the specifications.
15. In TS 4.3 you use the terms "coolant systems" (in TS title and applicability) and "coolant system" (in TS objective). In TS 4.3.1 specification you also use the term "primary coolant". Please use one consistent terminology throughout the TS or explain the difference between the terms.
16. TS 4.7.2 appears to incorrectly refer to 6.2.3. Please revise the reference to refer to the appropriate section of the TS.
17. TS 5.3.1 refers to 21 fuel bundles with four fuel elements and 3 fuel bundles with three fuel elements and one control rod guide tube. TS 1.9 defines only the fuel bundles with four fuel elements. Please revise TS 1.9 to be consistent with TS 5.3.1.

18. TS 5.3.4. does not have a basis. In accordance with 10 CFR 50.36(a)(1), please provide a basis.
19. TS 5.4.1. In response to RAI 32, you refer to a single fuel assembly. Please define the term in the TS. Also in TS 5.4.1 you refer to fueled devices. Please define the term in the TS.
20. TS 6.4.2. In your response to RAI 41 you stated that there is no need for a procedure for in-reactor fuel movement because MUTR is licensed to operate with only one core configuration, which precludes fuel movement within the reactor. TS 6.4.2 requires procedures for installation and removal of fuel elements. Please explain whether the procedures for installation and removal of fuel elements include procedures that cover all types of intentional fuel movements within the reactor pool (e.g., refueling, movement of fuel to storage locations, fuel inspection, etc.). If not, justify not requiring procedures for intentional fuel movements other than installation and removal.

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Sincerely,

/RA/

William B. Kennedy, Project Manager  
Research and Test Reactors Licensing Branch  
Division of Policy and Rulemaking  
Office of Nuclear Reactor Regulation

Docket No. 50-166

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