December 27, 2010

Mr. Ralph Butler, Director
Research Reactor Center
University of Missouri-Columbia
Research Park
Columbia, MO 65211

SUBJECT: UNIVERSITY OF MISSOURI – COLUMBIA – REQUEST FOR ADDITIONAL INFORMATION, RE: LICENSE AMENDMENT, CENTER TEST HOLE (TAC NO. ME1876)

Dear Mr. Butler:

We are continuing our review of your amendment request for Facility Operating License No. R-103 for the University of Missouri – Columbia Research Reactor which you submitted on August 6, 2009, as supplemented by letter dated August 31, 2010. During our review of your amendment request, questions have arisen for which we require additional information and clarification. Please provide responses to the enclosed request for additional information within 30 days of the date of this letter.

In accordance with Title 10 of the *Code of Federal Regulations* (10 CFR), Section 50.30(b), you must execute your response in a signed original document 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 regarding this review, please contact me at (301) 415-1127.

Sincerely,

/RA by G. Wertz for/

Alexander Adams, Jr., Senior Project Manager
Research and Test Reactors Licensing Branch
Division of Policy and Rulemaking
Office of Nuclear Reactor Regulation

Docket No. 50-186

Enclosure:
As stated

cc w/encl: See next page

cc:

John Ernst, Associate Director
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Homeland Security Coordinator
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Jefferson City, MO 65101

Test, Research, and Training
Reactor Newsletter
University of Florida
202 Nuclear Sciences Center
Gainesville, FL 32611

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University of Missouri-Columbia
Research Park
Columbia, MO 65211

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Dear Mr. Butler:

We are continuing our review of your amendment request for Facility Operating License No. R-103 for the University of Missouri – Columbia Research Reactor which you submitted on August 6, 2009, as supplemented by letter dated August 31, 2010. During our review of your amendment request, questions have arisen for which we require additional information and clarification. Please provide responses to the enclosed request for additional information within 30 days of the date of this letter.

In accordance with Title 10 of the *Code of Federal Regulations* (10 CFR), Section 50.30(b), you must execute your response in a signed original document 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."

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OFFICE OF NUCLEAR REACTOR REGULATION

REQUEST FOR ADDITIONAL INFORMATION

REGARDING LICENSE AMENDMENT REQUEST FOR

THE UNIVERSITY OF MISSOURI - COLUMBIA RESEARCH REACTOR

LICENSE NO. R-103; DOCKET NO. 50-186

We are continuing our review of your amendment request for Facility Operating License No. R-103 for the University of Missouri – Columbia Research Reactor which you submitted on August 6, 2009. On June 1, 2010, as part of a request for additional information for your application for license renewal, we included questions related to your amendment request. You replied to these RAIs by letter dated August 31, 2010. During our review of your amendment request, questions have arisen for which we require additional information and clarification. Please provide responses to the following requests for additional information (RAI) within 30 days of the date of the letter.

1. Page 8 of amendment application. In analyzing the accidents associated with the Flux-trap Irradiations Reactivity Safety Trip (FIRST) device, you state that the FIRST device does not alter the results of analyzed accidents. You also state that the most likely accident initiator in the center test hole is the failure of a single experiment sample in the center test hole canister. Your discussion focuses on the reactivity aspects of experiment failures. The use of the FIRST device could allow an increase in the quantity of material allowed in the center test hole position. Please provide additional detail regarding potential changes in the probability or consequences of failures from other causes involving increased sample loading in the center test hole associated with the FIRST device as it is proposed to be used.

2. RAI 10.5 e. In response to RAI 10.5 e, a methodology is proposed to measure reactivity worth of the empty center test hole canister and a loaded canister with back-to-back reactor startups. Although adjustments to the calculations due to temperature changes are specifically mentioned, no mention is made regarding adjustments for fission product poisons. Please clarify the proposed methodology in determining the reactivity worth of items in the center test hole as related to adjustments for poisons in the core.

   The stated purpose of the FIRST system is to allow the center test hole canister or strainer to be considered a normal part of the reactor for reactivity consideration purposes instead of being considered an experiment. Use of the FIRST system will allow what constitutes the “normal” reactor to change depending if a three tube canister, a six tube canister, or strainer is in the center test hole position. Rod worth curves should be developed for the reactor in each of its normal configurations. Because of this, please propose technical specification (TS) requirements to insure that correct, current rod worth curves exist and are used specific to the configuration being used with the FIRST system.

ENCLOSURE

3. Proposed TS 3.3. Normally it is expected that the use of bypasses in the reactor safety system, where their use is approved, is rare and under significant administrative control. It appears that the use of bypass in the FIRST system will be an operational and experimental need decision. The proposed TS 3.3 adds the channel operability requirement for the Center Test Hole Scram under conditions specified in a footnote. The operation of the reactor with the system bypassed should be through a positive control TS with specific requirements rather than an indirect requirement though a footnote. Please propose new TS wording for the use of the bypass that controls the Center Test Hole Scram function and specifies the requirements for its use or provide justification for its omission.

4. RAIs 10.5 c., d., and g. The statement is made that periodic surveillance and maintenance inspections will reveal potential switch and cable deterioration and failures. You state that TS 4.4 a. (we assume that this TS refers to the proposed license renewal TS, if issued as a stand-alone amendment prior to issuance of the license renewal TS changes will apply to the current TSs) will apply. This TS (and current TS 5.3.a.) refers to channel calibrations. Will the system also be subject to a channel test prior to each start-up? If not, please justify. Because the center test hole canister could be removed before each start-up, the proper operation of the system should be confirmed before start-up. Please provide a copy of draft procedures CP-36 and RX-Q2.

5. Page 7 of your amendment application and RAI 10.5 f. Your amendment application states that the design of the system meets all of the applicable criteria of the Institute of Electrical and Electronics Engineers (IEEE) Standard IEEE-279. However, the answer to RAI 10.5 f. states that the system effectively meets the intent of IEEE-279 (emphasis added). Please provide a copy of your design evaluation of this issue which shows the applicable criteria met, why they were determined to be the applicable criteria and why the system meets the intent of IEEE-279.

   How would the reactor operator become aware of a closed circuit failure? How long could a closed circuit failure exist without the reactor operator not being aware of the failure? If this type of failure could exist for more than a short period of time, please justify the time period an undetected failure could exist.

   It appears that a single bypass switch (1S28) is used to bypass both channels of the FIRST system. Why is a single switch used? Could this switch fail and create a closed circuit failure in both channels of the FIRST system? If not, please explain.