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June 11, 2018

U.S. NUCLEAR REGULATORY COMMISSION

Attn: Document Control Desk
1 White Flint North
Rockville MD 20852

SUBJECT: UNIVERSITY OF CALIFORNIA, DAVIS - RENEWAL OF FACILITY OPERATING LICENSE NO. R-130, REGENTS OF THE UNIVERSITY OF CALIFORNIA, DOCKET NO. 50-607

The Facility Operating License No. R-130 for the McClellan Nuclear Research Center (MNRC) training reactor and isotopes production, General Atomics (TRIGA) nuclear reactor, held by the Regents of the University of California, is scheduled to expire on August 13, 2018. It is the intent of the University of California, Davis (UCD) to renew the operating license so that the facility may continue its mission for the foreseeable future. Attached with this letter are the required elements for the license renewal as outlined in the NRC's correspondence with me on September 25th, 2017.

As this application has been submitted within 30 days of the license expiration, the facility intends to operate under our current license until the U.S. Nuclear Regulatory Commission (NRC) acts upon the application for renewal. This mode of operation is commonly referred to as "timely renewal."

As recommended by the NRC, this license renewal application has been prepared using the guidance of NUREG-1537. As part of the application, all documentation in accordance with 10 CFR 50.33, "Contents of applications; general information," and 10 CFR 50.34, "Contents of applications; technical information," has been included. Changes to and summaries of these documents are provided below.

As a part of your license renewal application review, the staff of UCD and MNRC welcome your requests for additional information (RAI) and/or NRC staff visits to the facility to negotiate terms of the MNRC license renewal rendering reasonable assurance that MNRC may operate safely and securely for the term of the license renewal. Please direct any RAIs and coordinate facility visits with the MNRC director (CC'ed on this letter). The MNRC director will update me regularly on the relicensing progress and bring any details to my attention that are deemed necessary.

U.S. NUCLEAR REGULATORY COMMISSION

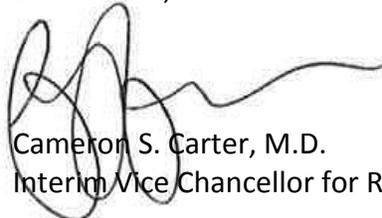
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In accordance with 10 CFR Part 50.30(b), I declare under penalty of perjury that the foregoing is true and correct.

Best wishes,

A handwritten signature in black ink, consisting of several loops and a long horizontal stroke extending to the right.

Cameron S. Carter, M.D.
Interim Vice Chancellor for Research

/pk

c: Wesley Frey, PhD MNRC Director
George Miller, PhD MNRC NSC Chairman

1. Updated Safety Analysis Report

The changes made to the MNRC's safety analysis report (SAR) are best described as an "update." Twenty years ago the MNRC was the first research reactor to undergo licensing (or relicensing) utilizing the NUREG 1537 methodology. NUREG 1537 remains the standard method for the preparation of research and test reactor license or relicensing applications. Furthermore, the accident analysis modeling was left mostly as is, due to the fact modern modeling codes were used for the previous license application and a great deal of care was taken to select conservative input parameters. MNRC is not requesting an increase in maximum steady-state power, pulsing magnitude (maximum reactivity insertion), or any other change that would constitute an unreviewed safety question under 10 CFR 50.59. A summary of changes to SAR are given below:

- i) Current information and analyses on demography, meteorology, geology, seismology, and other natural and man-made (specifically aircraft operations at McClellan Business Park) phenomena were used to update the SAR.
- ii) The MNRC does not intend to pursue I-125 production at this time. All references to the previously approved I-125 system have been removed. If in the future MNRC wishes to pursue I-125 production, a separate license amendment will be submitted to the NRC for approval.
- iii) The MNRC has a number of relatively high burnup 8.5 wt% fuel elements that are not approved for use with 30 wt% fuel for a 2.0 MW core. Much of the MNRC current excess reactivity is due to the small number of newer 30 wt% elements in the core. These elements are needed to remain in the current core to maintain current operations. The MNRC is unlikely to return any of the 8.5 wt% fuel to service and has removed 8.5 wt% elements from permitted use in the previously approved core known as the "Mix J" core. The MNRC will still be allowed to possess 8.5 wt% fuel elements. MNRC has requested the owner of the fuel (DOE) to removal all 8.5 wt% fuel when possible. MNRC has also requested the DOE to supply the MNRC with new 30 wt% elements so that higher burnup 20 wt% elements in the core can be retired from service.
- iv) The radiation protection program description has been updated to include relevant health physics data (Ar-41 effluence, worker dose, etc.) over the previous license term.
- v) During the MNRC review of the SAR one issue was found that has resulted in proposing a new technical specification. The MNRC's current (and for the foreseeable future) core is known as the 30B core which utilizes both 20 wt% and 30 wt% stainless steel TRIGA fuel elements along with 20 wt% fuel follower control rods. No fuel is allowed in the "A ring" or "B ring" and 30 wt% elements are not permitted in the "C ring" to prevent overheating at the reactor's maximum licensed steady-state power. Currently all elements in the core are 20 wt% except for approximately half of the elements in "E ring" that are 30 wt%. It is currently permitted that 30 wt% can be placed in "D ring." During the MNRC's review of the SAR it was determined that an unirradiated 30 wt% fuel element could be placed in "D ring" and exceed the maximum element power output analyzed for in the current accident analysis when the reactor was operated at its maximum licensed steady-state power. This was due to high radial power peaking. Though this situation is unlikely to occur, for a number of reasons, it can be remedied by placing a limiting condition of operation(LCO) maximum per element power output at 2.0 MW to prevent

unacceptable radial power peaking.

2. Financial Qualifications (10 CFR 50.33, "Contents of applications; general information," and 10 CFR 50.75, "Reporting and recordkeeping for decommissioning planning")

In the attached financial qualification documentation, the University has provided the following to facilitate the NRC review of the financial capability of the University to operate and ultimately decommission the MNRC:

- i) The most recent published annual financial statement for the University of California Davis. An estimated annual operating cost for the first 5 year period after the projected license renewal, the underlying assumptions and bases of the estimate, and the source(s) of funding to cover these costs.
- ii) Evidence that the MNRC reactor continues to satisfy the definition of a class 104 facility in 10 CFR 50.21(c). Meaning the facility's primary purpose is non-profit in nature and that no more than 50 percent of the annual cost of owning and operating the facility is devoted to the production of materials, products, or energy for sale or commercial distribution, or to the sale of services, other than research and development or education or training.
- iii) Evidence that UC Davis and MNRC are entities of the State of California so that the included statement of intent (SOI), as the method to provide decommissioning funding assurance, is valid. This SOI is signed by a high level UC Davis official that is authorized to commit University funds in this manner.
- iv) A decommissioning cost estimate is provided in 2018 dollars with the required 25% contingency factor and an excepted cost escalation methodology (NUREG 1307) is also included.

3. Environmental Report (10 CFR Part 51.45, "Environmental Report")

NUREG-1537, "Guidelines for Preparing and Reviewing Applications for the Licensing of Non-Power Nuclear Reactors", identifies that license renewal of research reactors is an action that requires an environmental assessment. The staff of MNRC has prepared this Environmental Report (ER) to support the NRC's review of the environmental regulations pertinent to MNRC's license renewal request. The MNRC staff finds there is no significant environmental impact related to the continued operation of MNRC for the license renewal term.

Regulatory guidance for the preparation of ERs for research reactors is minimal. However, the guidance originating from the renewal of operating licenses for commercial nuclear power plants is both significant and comprehensive. To provide a thorough and comprehensive ER, MNRC has used this guidance to identify and evaluate issues related to license renewal of a research reactor. This same methodology was used successfully by the Missouri University Research Reactor (MURR).

4. Technical Specifications

As discussed in section 1 part ii, the MNRC does not intend to pursue I-125 production. Any potential future I-125 production would produce numerous unreview safety questions and would therefore require the submission of a license amendment to the NRC. It is proposed the current I-125 possession limits in the technical specifications be removed.

As discussed in section 1 part iii, the MNRC is unlikely to ever utilize 8.5 wt% fuel in the Mix J core again. It is proposed the Mix J core be removed from the technical specification and stated that the MNRC may possess, but not use 8.5 wt% fuel in core. If the MNRC wishes to pursue a lower power (e.g. 1 MW maximum steady-state) core that utilizes 8.5, 20, and 30 wt% fuel, an in-depth analysis must be conducted and submitted to the NRC as a separate license amendment.

As discussed in section 1 part v, the MNRC proposes the addition of a per element maximum power output to limit radial power peaking so that current core thermal hydraulic analysis remains valid. A more detailed discussion of the justification of this new technical specification can be found in chapter 4 and 13 of the SAR. A limit of 32.0 kW per element during steady-state operation at 2.0 MW is proposed.

On July 15th of 2011 it was requested by the UCD/MNRC that the operating license be amended to adopt the proposed revision 14 to the UCD/MNRC technical specifications. The primary proposed change was the removal of the management position of "Operations Manager" that was incorporated into revision 13 of the technical specifications. This position was eliminated prompting the need for a change in the technical specifications which requires a license amendment. The license amendment was later withdrawn in September of 2016 with the understanding that the elimination of the "operations manager" would be requested as part of this license renewal. It is proposed that the position of "operations manager" is removed from the technical specifications. The new Organization Chart included reflects this change.

5. Operator Regualification Program (10 CFR 50.54, "Condition of licenses," paragraph (i-1) and 10 CFR Part 55, "Operator 's Licenses")

Included in the license renewal application is a copy of MNRC's current "Selection and Training Plan for Reactor Personnel." There are no proposed changes to the operator regualification program associated with this license renewal application.

6. Emergency Plan (10 CFR 50.54(q) and (r), and 10 CFR Part 50, Appendix E, "Emergency Planning and Preparedness for Production and Utilization Facilities")

Included in the license renewal application is a copy of the MNRC's current emergency plan. Two small changes have been made to the emergency plan during the MNRC's internal review of the emergency plan as part of preparing this license renewal application. These changes are minor and do not reduce the MNRC's capability to perform an emergency planning function in the event of a radiological emergency. Therefore, NRC approval of the changes is not required. These changes are as follows:

- i) MNRC now typically runs 1.0 MW single shift operations not 2.0 MW single shift operations.
- ii) MNRC is no longer insured by Lloyds of London.

7. Physical Security Plan (10 CFR 73.67, "Licensee fixed site and in-transit requirements for the physical protection of special nuclear material of moderate and low strategic significance")

A hard copy of the MNRC Physical Security Plan is being shipped to the NRC document control desk as part of this license renewal application. There are no proposed changes to the physical security plan associated with this license renewal application.