



UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
WASHINGTON, D.C. 20555-0001

November 30, 2021

Dr. Prasant Mohapatra  
Vice Chancellor for Research  
Department of Computer Science  
University of California  
Davis, CA 95616

SUBJECT: REGENTS OF THE UNIVERSITY OF CALIFORNIA – REQUEST FOR  
ADDITIONAL INFORMATION REGARDING LICENSE RENEWAL  
APPLICATION FOR THE UNIVERSITY OF CALIFORNIA – DAVIS/MCCLELLAN  
NUCLEAR RESEARCH CENTER (EPID NO. L-2020-NFR-0002)

Dear Dr. Mohapatra:

By letter dated June 11, 2018 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML18179A501), the Regents of the University of California submitted a license renewal application (LRA) for a 20 year renewal of the Class 104c Facility Operating License No. R 130, Docket No. 50 607, for the University of California – Davis McClellan Nuclear Research Center Training, Research, Isotope, General Atomics nuclear reactor. By letter dated July 6, 2020 (ADAMS Accession No. ML20188A368), the licensee updated its LRA to reflect its decision to reduce the licensed thermal operating power level from 2.3 megawatt thermal (MWt) to 1.0 MWt, and to eliminate pulsing capability and irradiation of explosive materials in the reactor tank.

The U.S. Nuclear Regulatory Commission (NRC) staff identified additional information needed to continue its review of the LRA, as described in the enclosed request for additional information (RAI). As discussed by telephone on November 23, 2021, provide a response to the RAI or a written request for additional time to respond, including the proposed response date and a brief explanation of the reason, by 45 days from the date of this letter. Following receipt of the complete response to the RAI, the NRC staff will continue its review of the LRA.

The response to the RAI must be submitted in accordance with Title 10 of the *Code of Federal Regulations* (10 CFR) 50.4, "Written communications," and pursuant to 10 CFR 50.30(b), "Oath or affirmation," be executed in a signed original document under oath or affirmation. Information included in the response that you consider sensitive or proprietary, and seek to have withheld from public disclosure, must be marked in accordance with 10 CFR 2.390, "Public inspections, exemptions, requests for withholding." Any information related to safeguards should be submitted in accordance with 10 CFR 73.21, "Protection of Safeguards Information: Performance Requirements."

Based on the response date provided above, the NRC staff expects to complete its review and make a final determination on the LRA by September 22, 2022. This date could change due to several factors including a need for further requests for additional information, unanticipated changes to the scope of the review, unsolicited supplements to the application for renewal, and others. If the forecasted date changes, the NRC staff will notify you in writing of the new date and an explanation of the reason for the change. In the case that the NRC staff requires

additional information beyond that provided in the response to this RAI, the NRC staff will request that information by separate correspondence.

If you have any questions regarding the NRC staff's review or if you intend to request additional time to respond, please contact me at (301) 415-0893, or by electronic mail at [Geoffrey.Wertz@nrc.gov](mailto:Geoffrey.Wertz@nrc.gov).

Sincerely,



Signed by Wertz, Geoffrey  
on 11/30/21

Geoffrey Wertz, Project Manager  
Non-Power Production and Utilization Facility  
Licensing Branch  
Division of Advanced Reactors and Non-Power  
Production and Utilization Facilities  
Office of Nuclear Reactor Regulation

Docket No. 50-607  
License No. R-130

Enclosure:  
As stated

cc: See next page

University of California-Davis/McClellan

Docket No. 50-607

cc:

David Reap, Radiation Safety Officer  
5335 Price Avenue, Bldg. 258  
McClellan, CA 95652-2504

California Energy Commission  
1516 Ninth Street, MS-34  
Sacramento, CA 95814

Radiologic Health Branch  
California Department of Public Health  
P.O. Box 997414, MS 7610  
Sacramento, CA 95899-7414

Test, Research and Training  
Reactor Newsletter  
Attention: Ms. Amber Johnson  
Dept of Materials Science and Engineering  
University of Maryland  
4418 Stadium Drive  
College Park, MD 20742-2115

Dr. Wesley D. Frey, Reactor Director  
McClellan Nuclear Research Center  
University of California, Davis  
5335 Price Avenue, Building 258  
McClellan, CA 95652-2504

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 DATED: NOVEMBER 30, 2021

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**ADAMS Accession No. ML21316A116**

**NRR-088**

<b>OFFICE</b>	NRR/DANU/UNPL/PM	NRR/DANU/UNPL/LA	NRR/DANU/UNPL/BC	NRR/DANU/UNPL/PM
<b>NAME</b>	GWertz	NParker	JBorromeo	GWertz
<b>DATE</b>	11/15/2021	11/15/2021	11/30/2021	11/30/2021

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OFFICE OF NUCLEAR REACTOR REGULATION

REQUEST FOR ADDITIONAL INFORMATION

REGARDING RENEWAL OF FACILITY OPERATING LICENSE NO. R-130

UNIVERSITY OF CALIFORNIA-DAVIS/MCCLELLAN NUCLEAR RESEARCH CENTER

DOCKET NO. 50-607

The U.S. Nuclear Regulatory Commission (NRC) staff reviewed the license renewal application (LRA) for compliance with Title 10 of the *Code of Federal Regulations* (10 CFR) using the following guidance and standard(s):

- The regulation, 10 CFR 50.34, "Contents of Applications, Technical Information," requires that information provided to the Commission by a licensee be complete and accurate in all material respects.
- NUREG-1537 Part 1, "Guidelines for Preparing and Reviewing Applications for the Licensing of Non-Power Reactors, Format and Content," issued February 1996 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML042430055)
- NUREG-1537 Part 2, "Guidelines for Preparing and Reviewing Applications for the Licensing of Non-Power Reactors, Standard Review Plan and Acceptance Criteria," issued February 1996 (ADAMS Accession No. ML042430048)
- University of California-Davis, McClellan Nuclear Research Center (MNRC), LRA, updated safety analysis report (SAR) (redacted version) submitted by letter dated July 6, 2020 (ADAMS Accession No. ML20238B984)

Based on its review, the NRC staff requires the following additional information to continue its review of the LAR.

1. The regulation, 10 CFR 50.34, item (b), "Final safety analysis report," states, in part, that the final safety analysis report shall include information that describes the facility. The guidance in NUREG-1537, Part 1, Section 1.4, "Shared Facilities and Equipment," states, in part, that the application should describe systems and equipment that are shared with facilities not covered by the SAR. Further, NUREG-1537 states that any safety implications that result from sharing facilities or systems should be evaluated in and referenced to the appropriate chapter of the SAR.

The NRC staff review of the licensee's SAR, Section 1.4.3, "Shared utilities," could not ascertain if any of the utilities (electric, natural gas, water, phone, internet, etc.) used to support the operation of the reactor facility were shared with other facilities not described in the SAR, and/or if any safety implications could result from any shared utilities.

Enclosure

Describe whether any utilities are shared with other facilities not covered by the SAR, and if any safety implications could result from the loss of any shared utilities, or justify why no additional information is needed.

2. The regulation, 10 CFR 50.34, item (b), states, in part, that the final safety analysis report shall include information that describes the facility. The guidance in NUREG-1537, Part 1, Section 1.8, "Facility Modifications and History," states, in part, that the SAR should indicate if the facility has not undergone significant or safety-related physical or operational modifications since it was initially licensed, or since the last renewal was issued and should reflect any significant modifications made to the non-power reactor.

The NRC staff review of the licensee's SAR, Section 3.1.3, "Protection by Multiple Fission-Product Barriers (Criteria 10-19)," "Criterion 13: Instrumentation and Control," finds that the licensee states that "Note that square wave and pulse mode are no longer utilized at MNRC." However, the NRC staff was not able to identify the facility modifications or changes needed to prevent an inadvertent square wave or pulse operation in the SAR.

Provide the following information to support the NRC staff review:

- a. Provide a description of the facility modifications planned or implemented to prevent an inadvertent square or pulse operation of the MNCR.
  - b. Provide an assessment of the potential for an inadvertent square wave or pulse event, including any changes or updates needed to the descriptions of any accident scenarios provided in the LRA SAR, Chapter 13, "Accident Analysis."
  - c. Provide any changes to the proposed technical specifications, if applicable to the proposed facility modifications.
3. The regulation, 10 CFR 50.34, item (b), states, in part, that the final safety analysis report shall include information that describes the facility. The guidance in NUREG-1537, Part 1, Section 4.2.2, "Control Rods," states, in part, that the applicant should discuss the design, composition, and reactivity effects of control rod fuel-followers. Section 4.1, "Introduction," and Section 4.2.3.1, "Control Function," of the SAR indicate that the fuel-follower sections consist of 20 or 30 weight percent uranium. However, Section 7.3.1, "Control Rods," of the SAR states that the weight percent of uranium in the fuel is 20. The NRC staff needs additional clarification as to the weight percent of uranium used on the control rod fuel-followers.

Additionally, Section 4.6.4.3, "Operating Core Configuration (OCC)," of the SAR indicates that the operating core configuration (OCC) only contains control rod fuel-followers with 20 weight percent uranium. The NRC staff notes that changes made to the OCC to develop the limiting core configuration (LCC) are described in Section 4.6.4.4, "Future Cores and the Limiting Core Configuration (LCC)," of the SAR, but changes to the composition of the control rod fuel-followers are not specified. The NRC staff also finds that the analysis of the OCC and LCC provides the basis for hot-channel power used in steady-state thermal hydraulic analysis of the MNRC core, as well as control rod worth values and power peaking factors used in the accident analyses. The 30/20 control rod fuel-followers contain more uranium by weight than 20/20 control rod fuel-followers and are expected to have a higher reactivity worth. The NRC staff needs to understand if control rod fuel-followers are loaded in the core that differ from those modeled in the SAR, then control rod worth in the core may

exceed that used in the accident analysis, and power density and peaking factors achieved in the LCC may not be limiting.

Provide the following information to support the NRC staff review:

- a. Clarify what control rod fuel-followers are modeled in analysis of the OCC and LCC described in the SAR.
- b. Describe the allowable loading of control rod fuel-followers in the core.
- c. If the allowable loading differs from that modeled in analysis of the OCC and LCC, please provide additional basis to confirm that design and accident analysis remains applicable.