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

September 18, 2019

Dr. Alan Cebula
Nuclear Reactor Facility Manager
Kansas State University
112 Ward Hall
Manhattan, KS 66506-5204

SUBJECT: KANSAS STATE UNIVERSITY – SUMMARY OF TELECONFERENCES RELATED TO LICENSE AMENDMENT REQUEST FOR THE USE OF 12 WEIGHT PERCENT URANIUM FUEL ELEMENTS (EPID NO. L-2019-LLA-0092)

Dear Dr. Cebula:

By letter dated April 9, 2012 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML12109A063), as supplemented by letter(s) dated April 28, 2014; October 5, 2016; May 2, 2017; September 23, 2017; and November 30, 2018 (ADAMS Accession Nos. ML16200A317, ML16291A498, ML17139C979, ML17319A305, and ML18347A209, respectively), Kansas State University (KSU) applied for an amendment to Facility Operating License No. R-88 for the KSU Training, Research, Isotopes, General Atomics (TRIGA) Mark-II Nuclear Reactor Facility. The U.S. Nuclear Regulatory Commission's (NRC's) approval of the license amendment request (LAR) would allow KSU to add up to four fuel elements that are 12 percent by weight uranium (wt% U) to its reactor core. In a letter transmitting a request for additional information (RAI) dated June 5, 2019 (ADAMS Accession No. ML19128A342), the NRC staff provided KSU with an estimated LAR review completion date of December 31, 2020, based on an RAI response date of October 7, 2019.

KSU and NRC staff discussed the status of the LAR review by teleconferences on September 3 and September 16, 2019. During the calls, KSU and NRC staff discussed the timeframe for KSU's response to the NRC staff's RAI letter dated June 5, 2019, and KSU indicated that it currently expects to need additional time beyond the October 7, 2019, response date. Additionally, KSU and NRC staff discussed that, based on analyses performed by KSU to date in support of the LAR, KSU is also evaluating and addressing some potential reactor operating conditions that may not be bounded by the existing analyses supporting the reactor's current licensing basis (CLB), but would not be specifically prohibited by KSU's current reactor operating license and technical specifications (TSs). Potential reactor operating conditions discussed included steady-state full-power reactor operation at any reactor bulk pool water temperature, reactor operation with flow channels between fuel elements partially blocked by experiments, and reactor operation with one or more control rods inoperable.

KSU's current and planned reactor operations were also discussed during the calls. Although the KSU reactor is currently licensed to operate at up to 1,250 kilowatts-thermal (kW(t)), KSU stated that it cannot currently operate the reactor at steady-state power levels above approximately 550 kW(t) because of the limited reactivity available in its core. KSU stated that its core excess reactivity is currently approximately $2.35. KSU further stated that it does not expect to make any core configuration changes that would significantly increase core reactivity

prior to the completion of the LAR review, due in part to the limited availability of additional 8.5 wt% U fuel elements (the current TSs limit KSU fuel to 9.0 wt% U or less). KSU stated that it expected that any core configuration changes it may make prior to the completion of the LAR review would not cause its excess reactivity to exceed $2.50 (KSU estimated that a $2.50 excess reactivity would allow it to operate the reactor at a maximum steady-state power level of approximately 600 kW(t)). KSU stated that although its current TSs allow higher reactor bulk pool water temperatures during some or all conditions of operation, it only plans to operate the reactor with a bulk pool temperature well below 50 degrees Celsius (°C) (122 degrees Fahrenheit (°F)) prior to the completion of the LAR review. KSU further stated that although its current TSs do not prohibit or limit reactor operation with objects (e.g., experiments) inserted into the interstitial flux wire ports (such that parts of flow channels between fuel elements could be blocked) for any specific reactor conditions, it does not plan to operate the reactor with such objects inserted in the ports prior to the completion of the LAR review unless the bulk pool temperature is 37 °C (98.6 °F) or less. Additionally, KSU stated that although its current TSs do not require any minimum number of operable control rods, it does not currently plan to operate with any of the reactor's four control rods inoperable.

Based on the information in the LAR, as supplemented, and contingent on acceptable responses to the NRC staff's June 5, 2019, RAIs (including appropriate analyses and proposed revised license and TS limits), the NRC staff currently expects that if a license amendment were issued in response to KSU's LAR, the amendment would modify the CLB such that it is appropriately bounding for allowed reactor operations.

Furthermore, based on the NRC staff's understanding of its discussions with KSU on September 3 and September 16, 2019, until the LAR review is complete, KSU currently expects to be unable and/or does not plan to operate its reactor in the conditions or configurations (summarized above) that may not be adequately bounded by KSU's CLB. Based on the information discussed during the September 3 and September 16, 2019, teleconferences, the NRC staff could consider an extension to the October 7, 2019, RAI response date reasonable if KSU submits an RAI response date extension request letter which (1) includes the following operational practices described below, (2) confirms KSU's plans to adhere to these operational practices until completion of the LAR review, and (3) indicates that KSU will provide advance notification to the NRC if it later plans to change these operational practices prior to completion of the LAR review:

- No reactor operation with core excess reactivity significantly greater than its current value (i.e., more than $0.15 above the current core excess reactivity, which allows KSU to operate at a maximum steady-state power of approximately 550 kW(t)), except low-power reactor operation that may be necessary to make measurements needed to determine excess reactivity;

- No reactor operation when the bulk pool temperature is above 50 °C (122 °F);

- No reactor operation when experiments or other objects are inserted in interstitial flux wire ports in the grid plate and the bulk pool temperature is above 37 °C (98.6 °F); and,

- No reactor operation when one or more control rods is inoperable.

In its RAI letter dated June 5, 2019, the NRC staff had requested that KSU provide a response to the RAIs, or a written request for additional time to respond, including the proposed response

date and a brief explanation of the reason, by October 7, 2019. As discussed during the September 3 and September 16, 2019, teleconferences, the NRC staff plans to continue its LAR review in an expedited manner, as allowed by its resources and priorities.

KSU's responses to this letter and/or the June 5, 2019, RAI letter should be submitted in accordance with Title 10 of the *Code of Federal Regulations* (10 CFR) 50.4, "Written communications," and, per 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."

If you have any questions, please contact me at 301-415-4067 or by electronic mail at Edward.Helvenston@nrc.gov.

Sincerely,

/RA/

Edward Helvenston, Project Manager
Research and Test Reactors Licensing Branch
Division of Licensing Projects
Office of Nuclear Reactor Regulation

Docket No. 50-188
License No. R-88

cc: See next page

cc:

Office of the Governor
State of Kansas
300 SW 10th Avenue, Suite 212 S
Topeka, KS 66612-1590

Kim Steves
Radiation Control Section
Kansas Department of Health and Environment
1000 SW Jackson, Suite 330
Topeka, KS 66612-1365

Mayor of Manhattan
City Hall
1101 Poyntz Avenue
Manhattan, KS 66502

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

Robert Seymour, Reactor Supervisor
Kansas State University
117 Ward Hall
Manhattan, KS 66506

SUBJECT: KANSAS STATE UNIVERSITY – KANSAS STATE UNIVERSITY – SUMMARY OF TELECONFERENCES RELATED TO LICENSE AMENDMENT REQUEST FOR THE USE OF 12 WEIGHT PERCENT URANIUM FUEL ELEMENTS
DATE: SEPTEMBER 18, 2019

DISTRIBUTION:

PUBLIC	NParker, NRR	PRLB R/F
RidsNrrDlpPrlb	AMendiola, NRR	PBoyle, NRR
RidsNrrDlp	LTran, NRR	JStaudenmeier, RES
RidsNrrDlpProb	EHelvenston, NRR	GCasto, NRR
CBassett, NRR	PSahd, NRR	TMarenchin, OE

ADAMS Accession No. ML19248C834 *concurrence via e-mail NRR-106

OFFICE	NRR/DLP/PRLB/PM*	NRR/DLP/PRLB/LA*	NRR/DLP/PRLB/BC*	NRR/DLP/PRLB/PM
NAME	EHelvenston	NParker	GCasto	EHelvenston
DATE	9/17/19	9/16/19	9/18/19	9/18/19

OFFICIAL RECORD COPY