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

September 5, 2019

Dr. William Charlton, Director
Nuclear Engineering Teaching Laboratory
The University of Texas at Austin
Pickle Research Campus, Building 159
10100 Burnet Road
Austin, TX 78758

SUBJECT: UNIVERSITY OF TEXAS AT AUSTIN – ISSUANCE OF AMENDMENT NO. 7 TO FACILITY OPERATING LICENSE NO. R-129 TO INCREASE THE SPECIAL NUCLEAR MATERIAL POSSESSION LIMITS FOR THE UNIVERSITY OF TEXAS AT AUSTIN RESEARCH REACTOR (EPID NO. L-2019-LLA-0033)

Dear Dr. Charlton:

The U.S. Nuclear Regulatory Commission (NRC) has issued the enclosed Amendment No. 7 to Facility Operating License No. R-129 for the University of Texas at Austin (UTA). The amendment consists of changes to the facility operating license, in response to the UTA application submitted February 18, 2019, as supplemented by letters dated February 27, March 11, March 15, and May 10, 2019, and by electronic mail on August 19, 2019 (Agencywide Documents Access and Management System Accession Nos. ML19053A521, ML19067A245 (redacted version), ML19074A108, ML19079A157, ML19135A069, and ML19238A286, respectively).

This amendment revises UTA License Condition (LC) 2.B.(2)(a)(iii) to increase the possession limit for uranium-235 in the form of foils, and adds a new LC 2.B.(2)(a)(vi) to authorize the possession of sealed plutonium-beryllium neutron source material that UTA currently holds under its Title 10 of the *Code of Federal Regulations* (10 CFR) Part 70, “Domestic Licensing of Special Nuclear Material,” Materials License No. SNM-180. The amendment also revises other items in LC 2.B.(2)(a) to clarify requirements.

A copy of the NRC staff's safety evaluation is enclosed. If you have any questions, please contact me at 301-415-0893, or by electronic mail at Geoffrey.Wertz@nrc.gov.

Sincerely,

***/RA Greg Casto for/***

Geoffrey A. Wertz, Project Manager
Research and Test Reactors Licensing Branch
Division of Licensing Projects
Office of Nuclear Reactor Regulation

Docket No. 50-602
License No. R-129

Enclosures:
1. Amendment No. 7 to Facility Operating License No. R-129
2. Safety Evaluation

cc: See next page

cc:

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SUBJECT: UNIVERSITY OF TEXAS AT AUSTIN – ISSUANCE OF AMENDMENT NO. 7 TO FACILITY OPERATING LICENSE NO. R-129 TO INCREASE THE SPECIAL NUCLEAR MATERIAL POSSESSION LIMITS FOR THE UNIVERSITY OF TEXAS AT AUSTIN RESEARCH REACTOR (EPID NO. L-2019-LLA-0033)
DATE: SEPTEMBER 5, 2019

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UNIVERSITY OF TEXAS AT AUSTIN

DOCKET NO. 50-602

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 7
License No. R-129

1. The U.S. Nuclear Regulatory Commission (the Commission) has found that

   A. The application for an amendment to Facility Operating License No. R-129, filed by the University of Texas at Austin (the licensee) on February 18, 2019, as supplemented by letters dated February 27, March 11, March 15, and May 10, 2019, and electronic mail on August 19, 2019, complies with the standards and requirements of the Atomic Energy Act of 1954, as amended, (the Act) and the Commission's rules and regulations set forth in Title 10 of the *Code of Federal Regulations* (10 CFR) Chapter I;

   B. The facility will operate in conformity with the application, the provisions of the Act, and the rules and regulations of the Commission;

   C. There is reasonable assurance that (i) the activities authorized by this amendment can be conducted without endangering the health and safety of the public, and (ii) such activities will be conducted in compliance with the regulations of the Commission set forth in 10 CFR Chapter I;

   D. The issuance of this amendment will not be inimical to the common defense and security or to the health and safety of the public;

   E. The issuance of this amendment is in accordance with 10 CFR Part 51, "Environmental Protection Regulations for Domestic Licensing and Related Regulatory Functions," of the Commission regulations and all applicable requirements have been satisfied; and

   F. Prior notice of this amendment was not required by 10 CFR 2.105, "Notice of proposed action," and publication of a notice for this amendment is not required by 10 CFR 2.106, "Notice of issuance."

2. Accordingly, the license is amended by changes to paragraph 2.B.(2) of Facility Operating License No. R-129, which is hereby amended to read as follows:

(2) Pursuant to the Act and 10 CFR Part 70, "Domestic Licensing of Special Nuclear Material," in connection with the operation of the facility:

(a) to receive, possess and use:

(i) but not separate, up to 9.5 kilograms of contained uranium-235 enriched to less than 20 percent in the form of TRIGA reactor fuel;

(ii) up to 20 grams of contained uranium-235 of any enrichment in the form of fission chambers;

(iii) up to: 1.0 gram of uranium-233, 30.0 grams of contained uranium-235 of any enrichment, 1.0 gram of plutonium-240, 1.0 gram of plutonium-239, and 1.0 gram of plutonium-241, in the form of foils;

(iv) up to: 1.0 gram of plutonium-239, and 10 grams of contained uranium-235 of any enrichment, in the form of reference materials;

(v) but not separate, up to 150 grams of plutonium in the form of mixed oxide pellets contained in stainless steel pins for experimental purposes; and

(vi) but not separate, up to 147 grams of plutonium in the form of sealed plutonium-beryllium neutron sources.

(b) to receive, possess and use, but not separate, any amount of special nuclear materials produced by the operation of other facilities, contained in TRIGA fuel transferred from other facilities, and

(c) to possess, use, but not separate, such special nuclear material as may be produced by the operation of the facility.

3. This license amendment is effective as of the date of its issuance.

FOR THE NUCLEAR REGULATORY COMMISSION

***/RA/***

Greg Casto, Chief
Research and Test Reactors Licensing Branch
Division of Licensing Projects
Office of Nuclear Reactor Regulation

Attachment:
Changes to Facility Operating License No. R-129

Date of Issuance: September 5, 2019

UNIVERSITY OF TEXAS AT AUSTIN

ATTACHMENT TO LICENSE AMENDMENT NO. 7

FACILITY OPERATING LICENSE NO. R-129

DOCKET NO. 50-602

Replace the following page of the Facility Operating License No. R-129 with the revised page. The revised page is identified by amendment number and contains a marginal line indicating the area of change.

Facility Operating License

| Remove | Insert |
|---|---|
| 2 | 2 |

Attachment

I. The receipt, possession, and use of the byproduct and special nuclear materials as authorized by this license will be in accordance with the Commission's regulations in 10 CFR Parts 30 and 70, including Sections 30.33, 70.23 and 70.31.

2. Facility License No. R-129 is hereby issued to the University of Texas at Austin as follows:

A. The license applies to the TRIGA Mark II nuclear reactor (the facility) owned by the University of Texas at Austin (the licensee). The facility is located on the licensee's site in Austin, Texas, and is described in the licensee's application for license of November 9, 1984, as supplemented.

B. Subject to the conditions and requirements incorporated herein, the Commission hereby licenses the University of Texas at Austin:

(1) Pursuant to Section 104c of the Act and 10 CFR Part 50, "Domestic Licensing of Production and Utilization Facilities," to possess, use, and operate the facility at the designated location in Austin, Texas, in accordance with the procedures and limitations set forth in this license;

(2) Pursuant to the Act and 10 CFR Part 70, "Domestic Licensing of Special Nuclear Material," in connection with the operation of the facility:

(a) to receive, possess and use:

(i) but not separate, up to 9.5 kilograms of contained uranium-235 enriched to less than 20 percent in the form of TRIGA reactor fuel;

(ii) up to 20 grams of contained uranium-235 of any enrichment in the form of fission chambers;

(iii) up to: 1.0 gram of uranium-233, 30.0 grams of contained uranium-235 of any enrichment, 1.0 gram of plutonium-240, 1.0 gram of plutonium-239, and 1.0 gram of plutonium-241, in the form of foils;

(iv) up to: 1.0 gram of plutonium-239, and 10 grams of contained uranium-235 of any enrichment, in the form of reference materials;

(v) but not separate, up to 150 grams of plutonium in the form of mixed oxide pellets contained in stainless steel pins for experimental purposes; and,

(vi) but not separate, up to 147 grams of plutonium in the form of sealed plutonium-beryllium neutron sources.

(b) to receive, possess and use, but not separate, any amount of special nuclear materials produced by the operation of other facilities, contained in TRIGA fuel transferred from other facilities, and

(c) to possess, use, but not separate, such special nuclear material as may be produced by the operation of the facility.

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO AMENDMENT NO. 7 TO

FACILITY OPERATING LICENSE NO. R-129

THE UNIVERSITY OF TEXAS AT AUSTIN

DOCKET NO. 50-602

## 1.0 INTRODUCTION

By letter submitted February 18, 2019, as supplemented by letters dated February 27, March 11, March 15, and May 10, 2019, and electronic mail on August 19, 2019 (Agencywide Documents Access and Management System Accession Nos. ML19053A521, ML19067A245 (redacted version), ML19074A108, ML19079A157, ML19135A069, and ML19238A286, respectively), the University of Texas at Austin (UTA, or the licensee) submitted a license amendment request (LAR) to amend its Facility Operating License No. R-129 for the UTA TRIGA (Training, Research, Isotope, General Atomics) nuclear research reactor. The March 11, 2019, letter indicated that the date on the letter submitted to the NRC on February 18, 2019, should be 2019 instead of 2018, and the March 15, 2019, letter corrected the special nuclear material (SNM) category stated in the letter dated February 27, 2019.

After a May 6, 2019, telephone discussion with the NRC staff, by letter dated May 10, 2019, and by electronic mail on August 19, 2019, the licensee finalized its LAR to the following license condition (LC) changes:

- revise LC 2.B.(2)(a)(i) to add “but not separate”
- revise LC 2.B.(2)(a)(iii) to add a “colon” after “up to,” and to change “1.0 gram of contained uranium-235,” to “30 grams of contained uranium-235,” and a “comma” after “plutonium-241”
- revise LC 2.B.(2)(a)(iv) to add “up to:” and a “comma” after “enrichment”
- revise LC 2.B.(2)(a)(v) to add “but not separate, up to,” and “in the form of,” in leu of “as” and
- add proposed LC 2.B.(2)(a)(vi) to state, “but not separate, up to 147 grams of plutonium in the form of sealed plutonium-beryllium neutron sources.”

## 2.0 REGULATORY EVALUATION

The NRC staff reviewed the licensee’s LAR and evaluated the proposed changes based on the regulations and guidance in:

- Title 10 of the *Code of Federal Regulations* (10 CFR) Part 50, “Domestic Licensing of Production and Utilization Facilities,” Section 50.54, “Conditions of Licenses,” paragraph (b) states that no right to the SNM shall be conferred by the license

except as may be defined by the license. Section 50.52, “Combining licenses,” states, “The Commission may combine in a single license the activities of an applicant which would otherwise be licensed severally.”

- 10 CFR Part 51, “Environmental Protection Regulations for Domestic Licensing and Related Regulatory Functions, Section 51.22, “Criterion for categorical exclusion; identification of licensing and regulatory actions eligible for categorical exclusion or otherwise not requiring environmental review,” provides the criterion for categorical exclusion evaluated in Section 4, “Environmental Consideration,” of this Safety Evaluation.

- 10 CFR Part 20, “Standards for Protection Against Radiation,” Section 20.1201, “Occupational dose limits for adults,” and Section 20.1301, “Dose limits for individual members of the public,” provide the dose limits for radiation workers and members of the public.

- 10 CFR Part 70, “Domestic Licensing of Special Nuclear Material,” states that the regulations of this part establish procedures and criteria for the issuance of licenses to receive title to, own, acquire, deliver, receive, possess, use, and transfer SNM; and to establish and provide for the terms and conditions upon which the Commission will issue such licenses.

- 10 CFR Part 73, “Physical Protection of Plants and Materials,” Section 73.2, “Definitions,” defines SNM of low strategic significance as:

  (1) Less than an amount of special nuclear material of moderate strategic significance as defined in paragraph (1) of the definition of strategic nuclear material of moderate strategic significance in this section, but more than 15 grams of uranium-235 (contained in uranium enriched to 20 percent or more in uranium-235 isotope) or 15 grams of uranium-233 or 15 grams of plutonium or the combination of 15 grams when computed by the equation, grams = (grams contained uranium-235) + (grams plutonium) + (grams uranium-233); or

  (2) Less than 10,000 grams but more than 1,000 grams of uranium-235 (contained in uranium enriched to 10 percent or more but less than 20 percent in the uranium-235 isotope); or

  (3) 10,000 grams or more of uranium-235 (contained in uranium enriched above natural but less than 10 percent in the uranium-235 isotope).

  This class of material is sometimes referred to as a Category III quantity of material.

- 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,” paragraph (f), “Fixed site requirements for special nuclear material of low strategic significance,” specifies requirements for each licensee who possesses, stores, or uses SNM of low strategic significance at a fixed site, or contiguous sites.

- 10 CFR 70.24, “Criticality accident requirements,” provides the quantities of SNM that invoke the requirements to implement a criticality monitoring system.

- NUREG-1537, “Guidelines for Preparing and Reviewing Applications for the Licensing of Non-Power Reactors,” Part 1 “Format and Content,” and Part 2, “Standard Review Plan and Acceptance Criteria,” Chapter 9, “Auxiliary Systems,” Section 9.5, “Possession and Use of Byproduct, Source, and Special Nuclear Material,” (ADAMS Accession Nos. ML042430055 and ML042430048, respectively), provide guidance to the NRC staff that the 10 CFR Part 50 license should explicitly state the materials which may be possessed and used at the licensee’s facility.

## 3.0 TECHNICAL EVALUATION

The regulations in 10 CFR 50.2, “Definitions,” state, in part, that SNM means (1) plutonium, uranium-233, uranium enriched in the isotope-233 or in the isotope-235. Further, the regulations in 10 CFR Part 70 require SNM to be controlled as described in the facility operating license. The NRC authorized operation of the UTA research reactor when it issued Facility Operating License No. R-129 by letter dated January 17, 1992. LC 2.B.(2) is the 10 CFR Part 70 license that authorizes the receipt, possession, and use of SNM in connection with operation of the facility.

### 3.1 SNM Possession Limit Changes

The licensee proposed changes to two (2) SNM possession limits in LC 2.B.(2)(a) reflected in **bold** font below:

1. Increase, from 1 gram to 30 grams, the amount of contained uranium-235 of any enrichment in the form of foils in LC 2.B.(2)(a)(iii), which, as revised, would state: [1]

   (iii) up to**:** 1.0 gram of uranium-233, **30.0 grams** of contained uranium-235 of any enrichment, 1.0 gram of plutonium-240, 1.0 gram of plutonium-239, and 1.0 gram of plutonium-241**,** in the form of foils;

2. Add a new LC 2.B.(2)(a)(vi), which would authorize the receipt and possession of up to 147 grams of plutonium in the form of sealed plutonium-beryllium (Pu-Be) neutron sources and state:

   **(vi) but not separate, up to 147 grams of plutonium in the form of sealed plutonium-beryllium neutron sources.**

The change to item no. 1 above includes the licensee’s proposed addition of a “:” (colon) in LC 2.B.(2)(a)(iii) and a comma after the word “plutonium-241.” The reasons for these proposed license condition changes are described in more detail below:

Increase in the contained uranium-235 of any enrichment in the form of foils

During an internal audit conducted by the licensee in calendar year (CY) 2018, the licensee identified additional uranium-235 foils at its facility. The licensee estimated that possession of the additional uranium-235 foils discovered resulted in a total possession amount that exceeds

[1] The colon following the phrase “up to” and the comma following “plutonium-241” are **bold**.

the 1.0-gram possession limit for uranium-235 foils authorized by LC 2.B.(2)(a)(iii). The licensee submitted its LAR after it performed a radiological assay to determine precisely how many uranium-235 foils it possessed and what increase in the LC 2.B.(2)(a)(iii) possession limit would be needed to accommodate the additional amount of uranium-235 foils that its audit identified.

Addition of Plutonium in the form of sealed Plutonium-Beryllium neutron sources

The licensee has a 10 CFR Part 70 Materials License No. SNM-180, Docket No. 70-157, which authorizes the receipt, possession and use of SNM, including 147 grams of Pu in the form of sealed Pu-Be sealed neutron sources. In its letter dated February 27, 2019, the licensee states that it plans to terminate Materials License No. SNM-180 (ADAMS Accession No. ML19067A245) once it is authorized to possess the Pu-Be source material under its Part 50 license, Facility Operating License No. R-129, and the Department of Energy (DOE) removes other SNM that UTA possesses under Materials License No. SNM-180. Because the Pu-Be sources are used in conjunction with reactor operation, the licensee requested that the authority to possess the Pu-Be sources be added to its Part 50 Facility Operating License No. R-129.

The sealed Pu-Be neutron sources are used to calibrate portable survey instrumentation and fixed area radiation monitors located around the TRIGA Mark II reactor facility. The area monitors provide neutron dose rate information during reactor operations to help to control personnel radiation exposure and the portable neutron detectors are used for routine radiological surveys as required by the Radiation Protection Program, testing experiment shielding effectiveness, and for dose assessment in response to a radiological emergency. The Pu-Be sources are necessary to ensure proper operation of the radiation monitoring equipment and which support the safe operation of the research reactor.

Other considerations by the licensee

The LAR indicated that the proposed LCs would increase the authorized amount of SNM that may be possessed under the Part 50 license. The licensee applied the 10 CFR 73.2 definition of SNM of low strategic significance (i.e., Category III quantity of material) and determined that the proposed increase would not change the Category III classification. The licensee explained that the facility would continue to remain well below the 10 CFR 73.2 threshold for SNM of moderate strategic significance (i.e., Category II quantity of material). Category II quantity of material is: (1) Less than a formula quantity of strategic SNM but more than 1,000 grams of uranium-235 (contained in uranium enriched to 20 percent or more in the U-235 isotope) or more than 500 grams of uranium-233 or plutonium, or in a combined quantity of more than 1,000 grams when computed by the equation, grams = (grams contained U-235) + 2 (grams U-233 + grams plutonium); or (2) 10,000 grams or more of uranium-235 (contained in uranium enriched to 10 percent or more but less than 20 percent in the U-235 isotope). The licensee also indicated that it does not need to make any changes to its physical security plan (PSP) as a result of the proposed changes in its possession limits.

In its LAR, the licensee also considered whether the proposed increase in SNM would affect any requirements or limits in its current safety analysis report (SAR), technical specifications (TSs), emergency plan (EP) or Radiological Protection Program, and concluded that no changes were required.

NRC Staff Review

The NRC staff reviewed the proposed license condition changes described above using the Commission's regulations and applicable guidance. The regulation, 10 CFR 50.52, "Combining licenses," states, "The Commission may combine in a single license the activities of an applicant which would otherwise be licensed severally." This regulation allows the NRC to issue a 10 CFR Part 50 license that also authorizes possession of materials under 10 CFR Part 70. The guidance in NUREG-1537, Part 1, Chapter 9, "Auxiliary Systems," Section 9.5, "Possession and Use of Byproduct, Source, and Special Nuclear Material," also states that a 10 CFR Part 50 operating license may also authorize the receipt, possession and use of byproduct, source, or SNM "needed for operation of the reactor and its experimental programs." Examples of SNM needed for the operation of the reactor which are provided in the guidance include "sources for radiation monitor calibration," such as the Pu-Be sealed neutron sources. The uranium-235 foils are not explicitly stated in the guidance, but are used to support the licensee's experimental program, as described below.

The NRC staff reviewed the SAR that the licensee submitted with its license renewal application (ADAMS Accession No. ML12156A097) and finds the proposed increase in the possession limit for uranium-235 foils, as described in SAR Section 4.2.3, "Neutron Moderator and Reflector (Core Structure)," is consistent with the use of these materials in reactor experiments to determine neutron flux in the reactor core. The sealed Pu-Be neutron sources are used to calibrate radiation monitoring equipment needed for safe operation of the facility, as described in SAR Section 11.1.1, "Radiation Sources." The NRC staff finds that both the uranium-235 foils and the Pu-Be neutron sources are related to the operation of the reactor and the licensee's research and development activities. The proposed increase to 30 grams contained uranium-235 is similar to the quantity authorized at other research reactors (e.g., the Texas A&M University, Facility Operating License No. R-83 limit is 40 grams uranium-235; the Ohio State University, Facility Operating License No. R-75 limit is 30 grams uranium-235; the Reed College, Facility Operating License No. R-112 limit is 16 grams uranium-235 [ADAMS Accession Nos. ML13030A410; ML14204A606; and ML120530018, respectively]). The NRC staff finds that the additional uranium-235 foils will be useful for licensee experimental activities conducted to further its research mission and that the amount is acceptable.

The NRC staff also finds that it is reasonable to include the authority to possess the sealed Pu-Be neutron sources in the Part 50 license because the sources are used to calibrate portable and fixed radiation monitors (i.e., neutron detectors) that measure radiation exposure and help limit the radiation doses to workers from the operation of the reactor and its experimental facilities. The calibration of the portable and fixed radiation monitors helps ensure that any radiation doses are effectively maintained below the public and occupational dose limits in 10 CFR 20.1301 and 10 CFR 20.1201, respectively. The inclusion of the phrase "but not separate" in condition LC 2.B.(2)(a)(iv) also requires that the sources remain sealed. Additionally, as noted in its letter dated February 27, 2019, the licensee plans to terminate materials license, SNM-180, once the Pu-Be sources can be possessed under the Part 50 license and DOE removes the other SNM possessed under that license from the facility. Based on the information described above, the NRC staff concludes that the two proposed possession limit increases are consistent with the guidance in NUREG-1537 for material that should be authorized by Part 50 license because the material is associated with the operation of the reactor or its experimental facilities.

The NRC staff reviewed the licensee's TSs (ADAMS Accession No. ML14136A073) and identified a single reference to foils in TS 1.4, "Experiment," which defines "experiment" as:

> Any operation, component, or target (excluding devices such as detectors, foils, etc.), which is designed to investigate non-routine reactor characteristics, or which is intended for irradiation within the pool, on or in a beam tube or irradiation facility and which is not rigidly secured to a core or shield structure so as to be part of their design.

Because this TS does not specify an amount of SNM and because the proposed SNM increase does not conflict with any other TS requirements, the NRC staff finds that no TS revisions are needed to authorize the proposed possession limit increase.

The NRC staff also reviewed the licensee's EP (ADAMS Accession No. ML19130A172) and did not identify any references to uranium-235 foils. EP, Section 1.0, "Introduction," indicates that the Pu-Be sources are provided as major equipment, which is consistent with the use to be authorized under the proposed amended operating license. The EP provides response to any accident scenario at the facility, including the maximum hypothetical accident (MHA) which is the bounding accident. The amount of material that would be added to the license is small in comparison to the source material used in the radiological dose calculations for the MHA. Any accidental release of radioactive material associated with the proposed increase is within the scope of the current EP and 10 CFR Part 20 limits. As such, the NRC staff finds no change to the EP as a result of the proposed increase in the SNM.

10 CFR 73.67, paragraph (f), specifies requirements for each licensee who possesses, stores, or uses special nuclear material of low strategic significance at a fixed site, or contiguous sites. The NRC staff reviewed the proposed increase in SNM and finds that, based on the total quantity of material possessed, the facility would continue to meet the definition in 10 CFR 73.2, for a Category III level of SNM. As such, no changes to the PSP are needed.

The NRC staff also reviewed the licensee's annual reports for CY 2010 to CY 2018, and NRC inspection reports for CY 2010 to CY 2018 in order to understand any past performance issues associated with the receipt, possession or use of SNM in order to assess the licensee's proposed increases in the amount of SNM authorized on the Part 50 license. By letter dated February 25, 2019, the license submitted its annual report for CY 2018 (ADAMS Accession No. ML19059A084), which noted that an audit finding had identified the additional uranium-235 foils. The annual report also noted that the exceedance of the possession limit was reported to the NRC with a commitment to correct the amount in its SNM inventory and to submit a LAR to address the actual SNM inventory. The NRC staff also reviewed recent NRC inspection reports on the licensee's facility and finds that the reports did not identify any violations or non-compliances regarding the control of SNM during the period from CY 2010 to CY 2018. Based on its review of NRC inspection results, the NRC staff finds that, apart from the identification of the additional foils, the licensee otherwise appears to adequately maintain effective controls regarding the use of uranium-235 foils and the sealed Pu-Be neutron sources. Also, by submission of its amendment request, the licensee has initiated a corrective action to have possession of the additional uranium-235 foils authorized by its 10 CFR Part 50 license. The NRC staff, however, plans to evaluate the licensee's SNM material accountability and control in an upcoming inspection and will take appropriate action to correct any problems identified.

In addition, the NRC staff evaluated the combined quantity of SNM authorized in License No. R-112 to ensure that it is less than the limit of 450 grams, as defined in 10 CFR 70.24, "Criticality accident requirements," paragraph (a), that requires a criticality monitoring system. This amount does not include SNM handled or stored under water. The NRC staff finds that because the combination of all SNM allowed by the License No. R-112, not stored under water,

is less than the 450-gram limit, the licensee remains below the amount required for implementation of a criticality system as defined in 10 CFR 70.24.

Based on the information described above, the NRC staff finds that the propose increases in SNM authorized on Facility Operating License No. R-129, are acceptable.

3.2 Other Proposed License Condition Changes

The licensee proposed the following changes described below (additions are noted in **bold**):

Add "but not separate," "up to," and "in the form of"

In its letter dated February 18, 2019, the licensee added the phrase "**but not separate"** to LC 2.B.(2)(a)(i) and LC 2.B.(2)(a)(v)." By letter dated May 10, 2019, the licensee added "up to" to LC 2.B.(2)(a)(v).

(i) **but not separate,** up to 9.5 kilograms of contained uranium-235 enriched to less than 20 percent in the form of TRIGA reactor fuel;

(v) **but not separate, up to** 150 grams of plutonium **in the form of** mixed oxide pellets contained in stainless steel pins for experimental purposes; and,

The NRC staff finds that the proposed change to add the phrases "but not separate," to LC 2.B.(2)(a)(i) and (a)(v) and to add "up to" and "in the form of" to LC 2.B.(2)(a)(v) helps to ensure that the SNM, uranium-235 and Pu, up to the amount specified, remains in its licensed form of TRIGA fuel or Pu in mixed oxide pellets contained in stainless steel pins for experimental purposes, respectively. The proposed change also helps ensure that the facility remains a utilization facility and does not become a production facility as defined by 10 CFR 50.2, "Definitions." This prohibition on separation of SNM also reduces potential nuclear proliferation risks associated with the possession and use of SNM at the facility. The addition of the phrase is also consistent with current LC 2.B.(2)(b) and LC 2.B.(2)(c), and with proposed LC 2.B.(2)(a)(vi). Additionally, changing "as" to "in the form of" clarifies the license condition, and is consistent with proposed LC 2.B.(2)(a)(vi) and the phraseology of current RTR licenses. For these reasons, and the NRC staff finds that these proposed changes support nuclear safety and are acceptable.

Add "up to:"

In its letter dated February 18, 2019, the license added the phrase "**up to:**" to proposed LC 2.B.(2)(a)(iv)

(iv) **up to:** 1.0 gram of plutonium-239, and 10 grams of contained uranium-235 of any enrichment, in the form of reference materials;

The NRC staff also finds the proposed change to add the phrase "up to:" to LC 2.B.(2)(a)(iv) clarifies that the license condition represents an upper limit on the amount of material authorized by the condition and that the stated amounts of SNM are not to be exceeded. The change is also consistent with the phraseology used in existing LC 2.B.(2)(a)(ii) and LC 2.B.(2)(a)(iii), and proposed LC 2.B.(2)(a)(v) and LC 2.B.(2)(a)(vi), and is consistent with the format of a renewed licenses recently issued by the NRC. As a result, the NRC staff finds that the proposed change is acceptable.

Addition of a colon and a comma

In its letter dated February 18, 2019, the license added a colon after the phrase “up to” to proposed LC 2.B.(2)(a)(iii) to denote a list of independent items. By letter dated May 10, 2019, the licensee added a comma after the word “enrichment” to LC 2.B.(2)(a)(iv) and after the word “plutonium-241” in LC 2.B.(2)(a)(iii) (see section 3.1 above).

> (iii) up to**:** 1.0 gram of uranium-233, 30.0 grams of contained uranium-235 of any enrichment, 1.0 gram of plutonium-240, 1.0 gram of plutonium-239, and 1.0 gram of plutonium-241**,** in the form of foils;

The NRC staff finds that the addition of a “,” after the word “enrichment” in LC 2.B.(2)(a)(iv) and after the word “plutonium-241” in LC 2.B.(2)(a)(iii) clarifies that the license condition lists multiple items in the form of foils, clarifies that each amount listed is an upper limit and, as revised, is grammatically correct. The NRC staff finds that the materials in LC 2.B.(2)(a)(iii) to constitute a list and the addition of a colon and comma is acceptable.

Conclusion

Based on the information provided above, the NRC staff concludes that the licensee’s proposed license condition changes are consistent with NUREG-1537 guidance that material used in conjunction with the operation of the reactor may be authorized in a Part 50 license and 10 CFR 50.52, which allows the NRC to also include authorization of 10 CFR Part 70 activities in a Part 50 license. The proposed modest increase in the amount of SNM does not change the Category III designation and no changes to the licensee’s SAR, TSs, EP or PSP are required. The NRC staff also concludes that the proposed changes clarify the receipt, possession, and use requirements of the SNM. Therefore, the NRC staff finds the proposed changes to LC 2.B.(2)(a) acceptable.

## 4.0 ENVIRONMENTAL CONSIDERATION

Pursuant to 10 CFR 51.22(b), no environmental assessment or environmental impact statement is required for any action within the category of actions listed in 10 CFR 51.22(c), for which the Commission has declared to be a categorical exclusion by finding that the action does not individually or cumulatively have a significant effect on the human environment.

### 4.1 Proposed Changes to SNM Receipt, Possession and Use Limits

The regulation in 10 CFR 51.22(c)(9), states, in part, that issuance of an amendment that changes a requirement with respect to installation or use of a facility component located within the restricted area, as defined by 10 CFR Part 20, meets the definition of a categorical exclusion, provided that, the proposed change satisfies each of 10 CFR 51.22(c)(9) criteria listed below:

*(i) The amendment or exemption involves no significant hazards consideration;*
[10 CFR 51.22(c)(9)(i)]

Pursuant to 10 CFR 50.92(c), the Commission may make a final determination that a license amendment involves no significant hazards consideration if operation of the facility, in accordance with the amendment, would not:

*(1) Involve a significant increase in the probability or consequences of an accident previously evaluated; or* [10 CFR 50.92(c)(1)]

The proposed changes involve a small increase in the possession limits of SNM that is currently in use at the facility. Accidents that are previously evaluated are described in the licensee's SAR (ADAMS Accession No. ML12156A097), Chapter 13, "Accident Analysis." The SAR does not specifically identify any accidents involving the receipt, possession or use of either uranium-235 foils or sealed Pu-Be neutron sources. However, the probability of an accident from any radioactive exposure from the activation of the uranium-235 foils in an experiment, or from the loss (i.e., exposure to a member of the public) of a sealed Pu-Be neutron source would continue to remain small because of several factors. First, the facility has TS requirements and continues to implement administrative controls that help to ensure that the additional foils are safely handled and irradiated. Some of these administrative controls are described in SAR Section 13.8, "Experiment Malfunction," and include evaluation of the potential radiological effluents which could be activated by experimental irradiation, and limits on the amount of material and the irradiation time to ensure that activation products remain below safe levels prior to the performance of the experiment. Second, the probability of an accident involving the sealed Pu-Be neutron sources, which are currently used to calibrate area detectors and portable radiation monitoring equipment, remains low because the sources are controlled by procedures to help ensure any exposure the workers is minimized. Additionally, the Pu-Be sources are sealed which provides a physical barrier to prevent the accidental release of any radioactive material. Third, because the amendment does not authorize any changes in reactor hardware design or in authorized reactor power level, the probability of an accident previously evaluated remains low because of TS requirements and facility procedures.

The proposed change does not involve a significant increase in the consequences (i.e., radiological dose to workers or members of the public) of a previously evaluated accident for several reasons. SAR, Section 13.3, "Maximum Hypothetical Accidents, Single Element Failure in Air," describes the MHA as the bounding postulated accident that involves the greatest release of fission products from a fuel element and has the highest radiological doses (i.e., consequences) to the public. The source term for the MHA is the failure of the cladding of a fuel element, exposed to air, that has been completely irradiated and results in the maximum fission product release to the atmosphere. The calculation of doses resulting from the postulated MHA demonstrate that the doses to the workers and to members of the public remain within the limits 10 CFR 20.1301 and 10 CFR 20.1201, respectively. In addition, the facility workers are protected from the radiological consequences of an accident by the radiation monitoring, alarms, and evacuation requirements as described in the emergency plan. The licensee has TS controls, as described below, which help to ensure that any experimental irradiations would not result in a potential radiological release that is greater than the MHA.

All experiments, including those involving uranium-235 foils, are controlled by the requirements in TS 3.4, "Experiments," 3.4.2, "Materials," item d, which limits the total inventory of iodine (I) isotopes I-131 through I-135 in each fueled experiment to no greater than 750 millicuries and the maximum strontium inventory to no greater than 2.5 millicuries. According to TS 3.4.2.d Bases, these two isotopes represent the radioactive exposure risk to individuals for fission product nuclides with short (iodine)

and long (strontium) half-lives. The fission product inventory is limited to ensure that any potential releases would not exceed the concentrations stated in 10 CFR Part 20, Appendix B, "Annual Limits on Intake (ALIs) and Derived Air Concentrations (DACs) of Radionuclides for Occupational Exposure; Effluent Concentrations; Concentrations for Release to Sewerage," which helps ensure that the resulting radiological doses would also remain below the limits in 10 CFR 20.1301 and 10 CFR 20.1201. Further, TS 6.4, "Experiment Review and Approval," requires all new experiments or classes of experiments shall be approved by the Director or a Senior Reactor Operator and the Nuclear Reactor Operations Committee. TS 6.4, item a., requires approved experiments shall be carried out in accordance with established and approved procedures, which reduces the potential for an accident associated with an experimental irradiation of uranium-235. The requirements in TS 3.4, and TS 6.4 also helps ensure that any experimental irradiations involving uranium-235 remain in accordance with the safety basis as described in the SAR MHA.

The addition of the phrase "but not separate" to LC 2.B.(2)(a)(i), LC 2.B.(2)(a)(v), and LC 2.B.(2)(vi) helps to ensure that the SNM, uranium-235 and Pu, remains in the form of TRIGA fuel or mixed oxide pellets contained in stainless steel pins for experimental purposes, respectively, and that the sealed Pu-Be neutron sources are not unsealed. This reduces the potential for accidental releases since the material form may not be altered and that the SNM is not released from its container. Because the releases associated with uranium-235 foils are bounded by the potential release of radioactive material from a fuel element, as evaluated in the MHA, and controlled by TS limits on experiments, and because the Pu-Be neutron sources are sealed, and handled and controlled in accordance with the licensee's procedures, the NRC staff concludes that there is no significant increase in the probability or consequences of an accident previously evaluated.

(2) *Create the possibility of a new or different kind of accident from any accident previously evaluated; or* [10 CFR 50.92(c)(2)]

The proposed change would authorize a small increase in the amount of SNM that is are already authorized for use at the under either the Part 50 license (uranium-235 foils) or the Part 70 license (sealed Pu-Be neutron sources).) and no changes in facility's reactor hardware design or operation is being authorized. The licensee has experience storing, handling, and using the SNM proposed by this change, has Radiation Protection Program procedures in place to control the use of the material, and no changes to these procedures are needed to accommodate possession of the additional SNM to be authorized by LC 2.B.(2)(a). Due to the small amount of material being added, the licensee's current SAR, TSs, EP, or PSP are sufficient to ensure that the operation of the facility remains within regulatory limits. Further, the proposed amendment does not involve any changes to the operation of the reactor or create any new radiological accident release pathways or new accident sequences.

The addition of the phrase "but not separate" to LC 2.B.(2)(a)(i), LC 2.B.(2)(a)(v), and LC 2.B.(2)(vi) helps to ensure that the SNM, uranium-235 and Pu, remains in the form of TRIGA fuel or mixed oxide pellets contained in stainless steel pins for experimental purposes, respectively, and that the Pu-Be sources are not unsealed.

This reduces the potential for accidental releases since the material form may not be altered and that the SNM is not released from its container.

Because the licensee is currently authorized to possess the sealed Pu-Be neutron sources under a separate license and to use contained uranium-235 in the form of foils, and because the proposed amendment would authorize a small increase in the amount of SNM, prohibit the separation of SNM, and does not authorize in changes in operation or reactor hardware design or authorized power level, the amendment does not create the possibility of a new or different kind of accident from any accident previously evaluated.

*(3) Involve a significant reduction in a margin of safety.* [10 CFR 50.92(c)(3)]

The proposed change involves a small increase in the amount of SNM that may be possessed under the Part 50 license (29 grams of contained uranium-235 foils and 147 grams of sealed Pu-Be neutron sources) includes material that is currently in possession and use at the facility and results in an amount that continues to meet the Category III designation for SNM at the facility. TS 3.4 helps ensure that any potential releases from an experiment remain within the occupational and public dose limits of 10 CFR Part 20. The licensee's Radiation Protection Program has procedures in place to control the use of the material to minimize the potential for an accident. The proposed amendment does not authorize any changes in reactor hardware design or in authorized reactor power level which helps ensure that the probability of an accident remains low. The proposed changes also restrict the separation of the SNM and require the material to remain in its licensed form (TRIGA fuel, Pu in the form of mixed oxide pellets in stainless steel pins, or Pu-Be sources) which minimizes the potential for an accidental release. Given the restrictions on the SNM described above, the proposed amendment does not involve a reduction in the margin of safety.

Based on the above, the NRC staff concludes that the amendment involves no significant hazards consideration.

*(ii) There is no significant change in the types or significant increase in the amounts of any effluents that may be released offsite; and* [10 CFR 51.22(c)(9)(ii)].

The proposed changes to LC 2.B.(2)(a) do not result in any change in the types of effluents that may be released offsite or cause any significant increase in the amount of radioactive material that could become airborne at the facility and released offsite. The sealed Pu-Be neutron sources are currently authorized for use at the facility and are sealed in a protective capsule that is designed to prevent the release of any of the contained radioactive material. Although the proposed increase in the uranium-235 foils would increase from 1 gram to 30 grams, which would modestly increase the amount of radioactive material which could be released, the foils are already authorized by the license, and there is no change in the type of effluents that may be released. The TSs continue to require controls over reactor operations, including experiments, to ensure that 10 CFR Part 20 dose limits are not exceeded. In addition, the licensee's continued adherence to the Radiation Protection Program will help ensure that the material is properly controlled and no significant increase in the amounts of effluents that may be released offsite will result. The prohibition on the separation of SNM (fuel, mixed oxide pellets, and the Pu-Be neutron source) helps ensure that an accidental radioactive

release will not occur since the SNM will remain is its current form. Therefore, there is no significant change in the types of significant increase in the amounts of any effluents that may be released offsite.

*(iii) There is no significant increase in individual or cumulative occupational radiation exposure.* [10 CFR 51.22(c)(9)(iii)]

The proposed changes to LC 2.B.(2)(a) do not cause any significant increase in individual or cumulative occupational radiation exposure. The increase proposed in this license amendment represents a small increase in SNM, and the licensee maintains administrative controls for handling the uranium-235 foils and sealed Pu-Be neutron sources in the Radiation Protection Program, which are designed to minimize the radiation exposure to individuals. In addition, the TSs continue to require that the limits in 10 CFR 20.1201 and 10 CFR 20.1301 are met. Therefore, there is no significant increase in individual or cumulative radiation exposure.

4.2 Other Proposed License Condition Changes

The licensee also proposed other minor editorial changes (the addition of a colon inserted after "up to" in LC 2.B.(2)(a)(iii) and the addition of the phrase "up to:" to LC 2.B.(2)(a)(iv) clarify that the license condition represents an upper limit on the amount of material authorized by the condition. The addition of a comma after "plutonium-241 in LC 2.B.(2)(a)(iii) and after "enrichment" in LC 2.B.(2)(a)(iv) also clarifies that the license condition lists independent items. These changes are consistent with LC 2.B.(2)(a)(iv). Further, replacing "as" with the words "in the form of" in LC 2.B.(2)(a)(v) clarifies the material form. Accordingly, the proposed changes meet the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(10)(v).

4.3 Conclusion

The issuance of this amendment changes a requirement with respect to the installation and use of a facility component (i.e., the uranium-235 foils and the sealed Pu-Be neutron sources used in connection with the reactor) located within the restricted area under 10 CFR Part 50. The NRC staff has determined that amendment involves no significant hazards consideration as well as no significant increase in the amounts, and no significant increase in the types, of any effluents that may be released offsite, and there is no significant increase in individual or cumulative occupational radiation exposure. Additionally, the amendment involves minor editorial changes for clarity and consistency. Accordingly, the proposed changes meet the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9) and 10 CFR 51.22(c)(10)(v). Pursuant to 10 CFR 51.22(b), no environmental impact statement or environmental assessment need be prepared in connection with the issuance of this amendment.

## 5.0 CONCLUSION

The Commission has concluded, based on the considerations discussed above, that: (1) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, (2) there is reasonable assurance that such activities will be conducted in compliance with the Commission's regulations, and (3) the issuance of the amendment will not be inimical to the common defense and security or to the health and safety of the public.

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