



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

September 22, 2022

Dr. Lora Weiss
Senior Vice President for Research
The Pennsylvania State University
304 Old Main
University Park, PA 16802

SUBJECT: THE PENNSYLVANIA STATE UNIVERSITY – ISSUANCE OF AMENDMENT
NO. 41 TO RENEWED FACILITY OPERATING LICENSE NO. R-2 FOR THE
PENN STATE BREAZEALE REACTOR (EPID: L-2022-NFA-0005)

Dear Dr. Weiss:

The U.S. Nuclear Regulatory Commission (NRC) has issued the enclosed Amendment No. 41 to Renewed Facility Operating License No. R-2 for the Pennsylvania State University Breazeale reactor. This amendment consists of changes to the renewed facility operating license in response to the application dated April 22, 2022, (Agencywide Documents Access and Management System Accession Nos. ML22111A330, ML22111A331, and ML22111A332, respectively). The license amendment request proposes to increase the allowable inventory of uranium-235 enriched to less than 20 percent in the form of fuel elements by 0.9 kilograms.

A copy of the NRC staff's safety evaluation is also enclosed. If you have any questions, please contact me at (301) 415-1404, or by email at Xiaosong.Yin@nrc.gov.

Sincerely,

A handwritten signature in cursive script that reads "Xiaosong Yin".

Signed by Yin, Xiaosong
on 09/22/22

Xiaosong Yin, 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. 50-005
License No. R-2

Enclosures:

1. Amendment No. 41 to Renewed
Facility Operating License No. R-2
2. Safety Evaluation

cc: See next page

Pennsylvania State University

Docket No. 50-005

cc:

Yuanqing Guo
Manager of Radiation Protection
Pennsylvania State University
0201 Academic Project Bldg
University Park, PA 16802

Director, Bureau of Radiation Protection
Department of Environmental Protection
P.O. Box 8469
Harrisburg, PA 17105

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

Dr. Jeffrey Geuther
Associate Director for Operations
Radiation Science & Engineering Center
104 Breazeale Nuclear Reactor Building
University Park, PA 16802

Dr. Kenan Unlu, Director
Pennsylvania State University
Breazeale Nuclear Reactor
Radiation Science and Engineering Center
University Park, PA 16802

SUBJECT: THE PENNSYLVANIA STATE UNIVERSITY – ISSUANCE OF AMENDMENT NO. 41 TO RENEWED FACILITY OPERATING LICENSE NO. R-2 FOR THE PENN STATE BREAZEALE REACTOR (EPID: L-2022-NFA-0005) DATED: SEPTEMBER 22, 2022

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ADAMS Accession No.: ML22215A150

NRR-058

OFFICE	NRR/DANU/PM	NRR/DANU/LA	OGC	NRR/DANU/BC	NRR/DANU/PM
NAME	XYin	NParker	JEzell	JBorromeo	XYin
DATE	8/3/2022	8/19/2022	9/19/2022	9/20/2022	9/22/2022

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

PENNSYLVANIA STATE UNIVERSITY

DOCKET NO. 50-05

PENN STATE BREAZEALE REACTOR

AMENDMENT TO RENEWED FACILITY OPERATING LICENSE

Amendment No. 41
License No. R-2

1. The U.S. Nuclear Regulatory Commission (the Commission) has found that:
 - A. The application for an amendment to Renewed Facility Operating License No. R-2, filed by the Pennsylvania State University (the licensee) on April 22, 2022, 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 (i) that the activities authorized by this amendment can be conducted without endangering the health and safety of the public and (ii) that such activities will be conducted in compliance with the Commission's regulations 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's 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 the license condition as indicated in the Attachment to this license amendment, and paragraph 2.B.2.a. and 2.C.2 of Renewed Facility Operating License No. R-2 is hereby amended to read as follows:
 - 2.B.2.a up to 9.9 kilograms of contained uranium-235 enriched to less than 20% in the form of fuel elements and up to 50 grams of contained uranium-235 of any enrichment in forms such as fission detectors or fission foils; and
 - 2.C.2. The technical specifications contained in Appendix A, as revised by Amendment No. 41, are hereby incorporated in the license. The licensee shall operate the reactor in accordance with the technical specifications.
3. This license amendment is effective as of its date of issuance and shall be implemented within 14 days.

FOR THE NUCLEAR REGULATORY COMMISSION

Joshua M. Borromeo, Chief
Non-Power Production and Utilization Facility
Licensing Branch
Division of Advanced Reactors and Non-Power
Production and Utilization Facilities
Office of Nuclear Reactor Regulation

Attachment:
Changes to Renewed Facility
Operating License No. R-2

Date of Issuance: September 22, 2022

ATTACHMENT TO LICENSE AMENDMENT NO. 41

RENEWED FACILITY OPERATING LICENSE NO. R-2

DOCKET NO. 50-005

Replace the following pages of Renewed Facility Operating License No. R-2 with the attached revised pages. The revised pages are identified by amendment number and contains a marginal line indicating the area of changes.

Renewed Facility Operating License No. R-2

REMOVE

2
3

INSERT

2
3

- F. The licensee is a nonprofit educational institution and will use the facility for the conduct of educational activities, and has satisfied the applicable provisions of 10 CFR Part 140, "Financial Protection Requirements and Indemnity Agreements," of the Commission's regulations;
 - G. The issuance of this renewed license will not be inimical to the common defense and security or to the health and safety of the public;
 - H. The issuance of this renewed license is in accordance with 10 CFR Part 51, "Environmental Protection Regulations for Domestic Licensing and Related Regulatory Functions," of the Commission's regulations and all applicable requirements; and
 - I. The receipt, possession and use of byproduct and special nuclear materials as authorized by this renewed license will be in accordance with the Commission's regulations in 10 CFR Part 30 and 10 CFR Part 70.
2. Facility Operating License No. R-2 is hereby renewed in its entirety to read as follows:
- A. This renewed license applies to the TRIGA Mark III nuclear reactor (the reactor) that is owned by Pennsylvania State University (PSU or the licensee), located at University Park, Pennsylvania, and described in the licensee's application, as supplemented.
 - B. Subject to the conditions and requirements incorporated herein, the Commission hereby licenses the Pennsylvania State University:
 - 1. Pursuant to subsection 104c of the Act, and Title 10, Part 50, "Domestic Licensing of Production and Utilization Facilities," of the *Code of Federal Regulations* (10 CFR Part 50), to possess, use, and operate the reactor as a utilization facility at the designated location in accordance with the procedures and limitations described in the application and this renewed license.
 - 2. Pursuant to the Act and 10 CFR Part 70, "Domestic Licensing of Special Nuclear Material," to receive, possess, and use in connection with operation of the reactor:
 - a. up to 9.9 kilograms of contained uranium-235 enriched to less than 20% in the form of fuel elements and up to 50 grams of contained uranium-235 of any enrichment in forms such as fission detectors or fission foils;
 - b. up to 1 gram of uranium-233 and up to 1 gram of uranium-235 of any enrichment in any physical form for use in experiments; and
 - c. to possess and use, but not to separate such special nuclear material as may be produced by operation of the reactor.

3. Pursuant to the Act and 10 CFR Part 30, "Rules of General Applicability to Domestic Licensing of Byproduct Material," to receive, possess, and use in connection with operation of the reactor: (1) two sealed 50-curie antimony-beryllium neutron sources, either or both of which may be used for reactor start-up, (2) a sealed 0.235 milligram californium-252 neutron source, and (3) a sealed 3-curie americium-beryllium neutron source.
 4. Pursuant to the Act and 10 CFR Part 30 to possess, use, and transfer but not to separate, except for byproduct material produced in non-fueled experiments, such byproduct material as may be produced by operation of the reactor.
- C. This renewed license shall be deemed to contain and is subject to the conditions specified in Parts 20, 30, 50, 51, 55, 70, and 73 of the Commission's regulations; is subject to all applicable provisions of the Act and rules, regulations, and orders of the Commission now or hereafter in effect; and is subject to the additional conditions specified below:

Maximum Power Level

1. The licensee is authorized to operate the reactor at a steady-state power level of 1.0 megawatt (thermal). The maximum power level shall not exceed 1.1 megawatts (thermal) when operated in the manual control mode, the automatic control mode, or the square wave mode. In pulsing mode, reactivity insertions shall not exceed $2.45\% \Delta k/k$.

Technical Specifications

2. The technical specifications contained in Appendix A, as revised by Amendment No. 41, are hereby incorporated in the license. The licensee shall operate the reactor in accordance with the technical specifications.

Additional Conditions

3. The licensee shall fully implement and maintain in effect all provisions of the Commission-approved physical security plan, including amendments and changes made pursuant to the authority of 10 CFR 50.90 and 10 CFR 50.54(p). The approved physical security plan consists of a Pennsylvania State University document, withheld from public disclosure pursuant to 10 CFR 73.21, entitled, "The Physical Security Plan for the Pennsylvania State University Breazeale Reactor," dated June 11, 1990, as revised.



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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO AMENDMENT NO. 41 TO

RENEWED FACILITY OPERATING LICENSE NO. R-2

THE PENNSYLVANIA STATE UNIVERSITY

PENN STATE BREAZEALE REACTOR

DOCKET NO. 50-005

1.0 INTRODUCTION

By letter dated April 20, 2022 (Agencywide Documents Access and Management System Accession Nos. ML22111A330, ML22111A331, and ML22111A332, respectively). Pennsylvania State University (PSU) applied for an amendment to increase the possession limit for uranium-235 (U-235) for the PSU Breazeale reactor. The license amendment request (LAR) proposes to increase the allowable inventory of U-235 enriched to less than 20 percent in the form of fuel elements from 9.0 kilograms (kg) to 9.9 kg.

2.0 REGULATORY EVALUATION

The U.S. Nuclear Regulatory Commission (NRC) staff reviewed the licensee's LAR, and evaluated the proposed changes based on the regulations and guidance:

- Title 10 of the *Code of Federal Regulations* (10 CFR) Part 50, "Domestic Licensing of Production and Utilization Facilities," Section 50.2, "Definitions," defines special nuclear material (SNM). Section 50.54, "Conditions of licenses," paragraph (b), states that no right to SNM shall be conferred by the license except as defined by the license.
- Part 20, "Standards for Protection Against Radiation," of 10 CFR which establishes the regulatory requirements for protection against ionizing radiation resulting from activities conducted under licenses issued by the NRC.
- Section 51.22, "Criterion for categorical exclusion; identification of licensing and regulatory actions eligible for categorical exclusion or otherwise not requiring environmental review," of 10 CFR which identifies licensing, regulatory, and administrative actions eligible for categorical exclusion from the requirement to prepare an environmental assessment or environmental impact statement.

- Part 70, "Domestic Licensing of Special Nuclear Material," of 10 CFR specifies the requirements that 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.
- Part 73, "Physical Protection of Plants and Materials," of 10 CFR specifies requirements for establishing and maintaining a physical protection system that is capable of protecting SNM. Section 73.2, "Definitions," of 10 CFR defines SNM of low strategic significance. Section 73.21, "Protection of Safeguards Information: Performance Requirements," which provides requirements for protecting safeguards information. Section 73.67, "Licensee fixed site and in-transit requirements for the physical protection of special nuclear material of moderate and low strategic significance," of 10 CFR paragraph (f), "Fixed site requirements for special nuclear material of low strategic significance," states requirements for each licensee who possesses, stores, or uses SNM of low strategic significance at a fixed site, or contiguous sites.
- 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" (ML042430055 and ML042430048, respectively), chapter 9, "Auxiliary Systems," section 9.5, "Possession and Use of Byproduct, Source, and Special Nuclear Material," which 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

Section 50.2 of 10 CFR defines SNM to mean, in part, uranium enriched in the isotope 235. Further, 10 CFR Part 70 specifies requirements for the receipt, possession and use of SNM, and 10 CFR 50.54(b), specifies that the right to SNM is only that defined by the license. The NRC reauthorized operation of the PSU Breazeale reactor when it issued Renewed Facility Operating License No. R-2 and technical specifications (TSs), which was forwarded to the licensee by letter dated November 20, 2009 (ML092810190 and ML092810275). Within the Facility Operating License No. R-2, license condition 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. In its LAR, the licensee proposed to increase the SNM possession limit of 2.B.2.a from current 9.0 kilograms (kg) to 9.9 kg of U-235 enriched to less than 20 percent in the form of fuel elements. In the LAR, PSU considered the impact of the increased allowance of spent nuclear fuel (SNF) on the TS, safety analysis report (SAR), safeguard considerations and emergency planning. The licensee concluded that no additional changes were required.

The PSU Breazeale reactor has been routinely operating since 1965 and thus gradually increased the quantity of fissile material in the form of SNF. In 2018, 64 elements of spent fuel (~2.0 kg of U-235) were selected and inspected for disposal at Idaho National Lab; however, the State of Idaho's current ban on spent fuel shipments has prevented the final transfer of these fuel elements. This shipping restriction limits the licensee's ability to maintain sufficient fresh fuel to maintain criticality at full power based on the current allowance of SNM. According to its LAR, the licensee is installing new beam lab equipment which it expects to increase the operating time of the reactor at full power, thereby increasing fuel consumption to approximately 10 fuel elements per year based on the use of 12 weight percent (wt%) fuel elements. While the

licensee stated it intends to prioritize spent fuel shipment to increase room for additional fuel, it is also seeking the fuel limit increase to allow for additional time at full power operations prior to reaching reactivity limits in the event the shipping ban continues.

The NRC staff reviewed the proposed changes described above using the guidance in NUREG-1537, Part 2, chapter 9, section 9.2 to evaluate the handling, protection, and storage of the fuel when it is not in the reactor core, both before it is inserted and after it is removed. The NRC staff finds that an increase of PSU's fuel limit is justifiable as it allows the licensee to acquire, store, and use additional fuel to allow for continued operations at the projected higher burnup rate with minimal increase of risk to the health and safety of the public or facility personnel.

3.1 Proposed Addition of the Fuel Elements

In its LAR, the licensee proposed to increase its U-235 possession limit from 9.0 kg to 9.9 kg. The increase of the U-235 inventory would allow the licensee to receive, possess, and use up to sixteen additional fuel elements at the facility. As the licensee stated in its request, this increase of the U-235 inventory would allow the licensee to procure additional fuel elements to account for the current consumption rate of approximate 10 fuel elements per year and to avoid becoming reactivity limited during long periods of high-power operations where xenon poisoning is a concern. The additional fuel elements that would be acquired by PSU are standard Training, Research, Isotopes, General Atomics (TRIGA) designed fuels that meet the specification of TS 5.1, "Reactor Fuel," as follows:

The individual unirradiated TRIGA fuel elements shall have the following characteristics:

- a. The total uranium content SHALL be either 8.5 wt% or 12.0 wt% nominal and enriched to less than 20% uranium-235.

The NRC staff reviewed the licensee's proposal in the LAR and the PSU SAR dated November 30, 2005 (ML091250487), and finds that the facility currently possesses 193 assemblies containing uranium enriched to slightly less than 20 percent U-235 (135 -8.5 wt% uranium fuel elements, 51 -12 wt% uranium fuel elements, and 7 control rods with -8.5 wt% fuel followers). The licensee states that it has room for an additional 10 fuel elements under the current 9.0 kg limit, allowing for approximately one year of operations at the projected burnup rate. Based on the SAR which states that the 12 wt% fuel elements contain approximately 53 to 56 grams of U-235, the NRC staff finds that increasing the license limit by 0.9 kg would allow the licensee to receive, possess, and use up to 16 additional fuel elements for a total of 26 additional fuel elements while maintaining the facility possession limit under the proposed quantity of 9.9 kg.

Based on the fact that the licensee's reactor pool has the capacity and is well suited for additional fuel elements, the NRC staff concluded that the additional fuel elements due to the increase in fuel limit will not alter the reactor pool's safety integrity and will not cause the pool's shielding and cooling ability to be compromised, therefore the request to increase the additional fuel elements at the facility is acceptable.

3.2 Fuel Storage Considerations

The proposed increase of the U-235 possession limit in the form of fuel elements would allow for 16 additional fuel elements at the facility. In the LAR, the licensee states that there is sufficient room in the pool storage grid plates to safely store additional fuel to the requested limit of 9.9 kg. The licensee also states that currently there is sufficient room for the storage of 31 fuel elements beyond space required for a full core off-load. The proposed 9.9 kg limit would allow PSU to acquire a total of 26 additional fuel assemblies, sufficiently below the available storage space listed above. Further, the licensee stated that there is availability for four other mounting locations for additional storage racks to be added into the reactor pool ensuring there is ample room for storage of any additional fuel acquired under the proposed amendment. The licensee states that the fuel would be stored in standard TRIGA grid plates already installed, which ensures that TS 5.4, "Fuel Storage," are satisfied.

The NRC staff reviewed the LAR proposal and the licensing renewal safety evaluation report (SER) (ML092930497), section 9.2, "Handling and Storage of Reactor Fuel." The fuel storage grid plates used by PSU are designed by General Atomics (GA) with a geometric design that ensures the k-effective of the stored fuel is maintained below the limit established in TS 5.4 Specification a. The reactor pool is so designed that the natural convection cooling provided by the reactor pool water is adequate for any stored fuel. The fuel racks are mounted in the reactor pool to ensure sufficient natural circulation convection cooling to preclude any of the fuel elements from reaching the safety limit defined in TS 2.1, "Safety Limit - Fuel Element Temperature," as required by TS 5.4 Specification b. The coolant system as in the PSU's TS 3.3, "Coolant System," ensures that there are adequate measures to ensure sufficient coolant to keep the reactor fuel elements temperature under desirable levels as specified in TSs 3.3.1, "Coolant Level Limits," and 3.3.6, "Coolant Temperature Limits." The NRC staff concluded that the licensee's plan to safely store the additional fuel acquired under the increased limit is adequate to preclude inadvertent criticality and that there is reasonable assurance that handling and storage of 16 additional fuel elements under the proposed increased fuel limit at the PSU Breazeale reactor will not increase the risk to the health and safety of the public or facility personnel.

3.3 Radiological Consequence Considerations

As stated in the licensee's LAR, the additional fuel elements would not impact the maximum hypothetical accident (MHA) or loss-of-coolant accident analyses conducted during the license renewal. The licensee stated that any accident involving damage to a fuel element is bounded by the air-cooled rupture of a fuel element analyzed in the MHA. Furthermore, as stated in the LAR, since the inventory of radioisotopes of the spent fuel are not considered in either scenario, the chapter 13 of the SAR accident analyses would be unaffected by the increase of the license limit for the possession of TRIGA fuel elements.

The NRC staff reviewed section 11.1.1.3, "Solid Radiation Sources," of the facility's SAR and section 11.1, "Radiation Protection," of the SER. The proposed additional TRIGA fuel elements would be stored in the reactor pool, reducing resultant radiation exposure from the fission products in the reactor fuel after shutdown to insignificant levels. The NRC staff concluded that the risk of increase to the facility dose is minimal from the storage of the additional fuel elements. Further, the MHA does not change because the accident only assumes one fuel assembly is damaged at a time. The risk associated with the moving of single cell does not change since only one element is ever moved at a time. The NRC staff also reviewed the PSU's annual operating reports from 2017 through 2021 (ML16337A331, ML18361A571,

ML20168B046, ML21091A095, and ML21362A413, respectively), and found that the detectable radioactivity above background was primarily from the gaseous effluent release of Argon-41 during reactor operations and from pool water evaporation of Tritium-3 and is well below the regulatory limits of 10 CFR Part 20 and not specifically affected by the fuel stored in the pool. Further, the facility radiation protection program requirements, including the TS requirement to keep doses as low as reasonably achievable (ALARA), remain unchanged and therefore, the NRC staff finds that there is no significant increase in individual or cumulative radiation exposure and that the facility would continue to meet 10 CFR Part 20 limits. The NRC staff concludes that the potential risk of radiological consequences to occupational workers and the public does not increase because of the additional fuels stored in the reactor pool since the radiological risks are mainly resulted from the reactor operation and fuel handling and therefore, the increase of the possession limits for the facility to receive, possess, and use in connection with operation of the reactor in proposed license condition 2.B.2.a is acceptable.

3.4 Security Requirements

In the LAR, the Licensee assessed that an increase in the license limit to allow possession and use of up to 9.9 kg in the form of 20 percent enriched TRIGA fuel would not exceed the limit of 10,000 grams (10.000 kg) for "Special Nuclear Material of Low Strategic Significance," as defined in 10 CFR 73.2. The licensee stated that all additional fuel would be stored in the fuel storage grid within the reactor pool inside the reactor security boundary, which has an NRC-approved physical security plan that meets the requirements of 10 CFR 73. The physical protection of the fuel inventory will be unchanged since the additional fuel will be in the same storage location.

The NRC staff reviewed the licensee's current license conditions and the regulations of 10 CFR 70. Per the renewed license, PSU currently possesses a low strategic significance (i.e., a Category III) level of SNM defined in 10 CFR 73.2 to include less than 10,000 grams but more than 1,000 grams of U-235 (contained in uranium enriched to 10 percent or more but less than 20 percent in the U-235 isotope). If the proposed increase of 9.0 kg to 9.9 kg of U-235 is authorized, the licensee would continue to possess a Category III level of SNM as defined in 10 CFR 73.2, and thus does not require a change to the security requirements specified in 10 CFR 73.67(f). The NRC staff concludes that the amount of SNM to be possessed would remain a Category III amount and that the SNM security requirements specified in 10 CFR 73.67(f) would continue to apply and thus no changes to PSU's physical security plan would be needed.

3.5 Proposed New License Condition 2.B.2.a

Current license condition 2.B.2.a allows the facility to receive, possess, and use up to 9.0 kg of contained U-235 enriched to less than 20 percent in the form of TRIGA-type reactor fuel. The licensee stated it is expecting to become reactivity limited under the current license limit due to increase research operations. The licensee proposed updated license condition 2.B.2.a to allow the receipt, possession, and use of up to 9.9 kg (an increase of 0.9 kg from the current limit) of contained U-235 enriched to less than 20 percent in the form of TRIGA-type reactor fuel.

The proposed new LC 2.B.2.a states:

2.B. Subject to the conditions and requirements incorporated herein, the Commission hereby licenses the Pennsylvania State University:

2. *Pursuant to the Act and 10 CFR Part 70, "Domestic Licensing of Special Nuclear Material," to receive, possess, and use in connection with operation of the reactor:*
 - a. *up to 9.9 kilograms of contained uranium-235 enriched to less than 20% in the form of fuel elements and up to 50 grams of contained uranium-235 of any enrichment in forms such as fission detectors or fission foils.*

4.0 ENVIRONMENTAL CONSIDERATION

The proposed amendment would increase PSU possession limit from 9.0 kg to 9.9 kg of U-235 enriched to less than 20% in the form of fuel elements. 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 Change to License Condition 2.B.2.a to increase possession limit

Section 51.22(c)(9), of 10 CFR 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 in 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, "Issuance of amendment," paragraph(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* (10 CFR 50.92(c)(1))

Proposed license condition 2.B.2.a would increase the possession limit of U-235 enriched to less than 20% in the form of fuel elements for the PSU Breazeale reactor by 0.9 kg. As described in the above safety evaluation and in the license renewal SER, section 4.1, the NRC staff evaluated the postulated MHA. The MHA bounds all accidents at the facility and assumes the failure of an experiment that contains radioactive material that is then released into the environment. The proposed increase of the U-235 possession limit would not alter the MHA analysis. Further, there are no proposed changes to reactor design or hardware, or to structures, systems, and components (SSCs) that are relied upon for accident detection, mitigation, or response. If an accident occurs, all portions of the TSs would continue to function as necessary to mitigate the consequence of an accident. In addition, the proposed amendment does not change the licensed power level of the reactor or change any potential release paths from the facility. Therefore, 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 (10 CFR 50.92(c)(2))

Proposed license condition 2.B.2.a would increase the possession limit of U-235 enriched to less than 20% in the form of fuel elements at the PSU Breazeale reactor by 0.9 kg, which would not change the U-235 limit beyond the low strategic significance (i.e., Category III) level. This proposed change would not authorize any changes in the hardware, design, function, or operation of any equipment important to safety, or in the authorized reactor power level. The proposed change does not create any new or different accidents from any accident previously evaluated because no changes are being proposed to SSCs that are relied upon for accident detection, mitigation, or response to an accident. In addition, the proposed change would not introduce any new accident scenarios, transient precursors, failure mechanisms, or limiting single failures, and there would be no adverse effect or challenges to any systems important to safety because of the proposed amendment. The proposed amendment also does not involve any changes to the operation of the reactor or create any new radiological accident release pathways. Additionally, the proposed change does not alter or decrease the functional capability of any equipment used for defense in depth. Therefore, the proposed 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)).

Proposed license condition 2.B.2.a would increase the possession limit of U-235 enriched to less than 20% in the form of fuel elements at the PSU Breazeale reactor by 0.9 kg. The proposed change would not authorize any changes in design, function, or operation of any equipment important to safety, or in the authorized reactor power level. The proposed amendment does not alter how safety limits, limiting safety system settings, or limiting conditions for operation are determined and does not adversely affect existing facility safety margins or the reliability of equipment assumed to mitigate accidents in the facility. Additionally, the proposed change does not alter or decrease the functional capability of any equipment used for defense in depth. Therefore, the proposed amendment does not involve a significant 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; (10 CFR 51.22(c)(9)(ii)) and

Proposed license condition 2.B.2.a would increase the possession limit of U-235 enriched to less than 20% in the form of fuel elements at the PSU Breazeale reactor by 0.9 kg. The proposed change does not change the types of effluents that may be released offsite or cause any significant increase in the amount of radioactive material that could be released offsite because the existing requirements for monitoring and release of radioactive effluents are unchanged. Further, the reactor power level and the design of equipment important to safety are not changed. The additional fuel elements would be well seated in the reactor fuel grids and fully submerged in the reactor pool and would not increase radioactivity above background released from the facility. Therefore, there is no significant change in the types or 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)).

Proposed license condition 2.B.2.a would increase the possession limit of U-235 enriched to less than 20% in the form of fuel elements at the PSU Breazeale reactor by 0.9 kg. The reactor power level and the design of equipment important to the safety of the reactor are not changed. The proposed change does not alter any technical or safety requirements for radiation monitoring at the facility or affect occupational radiation exposure. Additionally, the licensee's radiation safety program has effectively controlled radioactive material exposure to prevent exposures that exceed the dose limits of 10 CFR Part 20 and the release limits in table 2 of appendix B to Part 20. The NRC staff also reviewed the annual operation reports for calendar years 2016 through 2021 and found no reported detectable radioactivity above background was released from the facility. Further, facility radiation protection program requirements, including the TS requirement to keep doses ALARA, remain unchanged. Therefore, there is no significant increase in individual or cumulative radiation exposure.

Accordingly, the NRC staff finds that the proposed amendment meets the eligibility criteria for categorical exclusion in 10 CFR 51.22(c)(9).

5.0 CONCLUSION

The NRC staff 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.

Principal Contributors: X. Yin, NRR
A. Eyler, NRR

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