



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

September 6, 2019

Dr. Kenan Unlu, Director
The Pennsylvania State University
Breazeale Nuclear Reactor
Radiation Science and Engineering Center
University Park, PA 16802-2301

SUBJECT: PENNSYLVANIA STATE UNIVERSITY – ISSUANCE OF AMENDMENT NO. 39
TO RENEWED FACILITY OPERATING LICENSE NO. R-2 TO INCREASE THE
SPECIAL NUCLEAR MATERIAL POSSESSION LIMITS FOR THE PENN STATE
BREAZEALE REACTOR (EPID NO. L-2019-LLA-0090)

Dear Dr. Unlu:

The U.S. Nuclear Regulatory Commission (NRC) has issued the enclosed Amendment No. 39 to Renewed Facility Operating License No. R-2 for the Penn State Breazeale Reactor (PSBR). This amendment consists of changes to the facility operating license, in response to the Pennsylvania State University (PSU) application dated March 26, 2019, as supplemented by letter dated June 25, 2019.

This amendment revises PSU License Condition 2.B.2 to increase the possession limits for special nuclear material to include 1 gram of uranium-233 and 1 gram of uranium-235 of any enrichment in solid or liquid form for use in experiments associated with the operation of the PSBR.

A copy of the NRC staff's safety evaluation is enclosed. If you have any questions, please contact me at (301) 415-2856, or by electronic mail at Michael.Balazik@nrc.gov.

Sincerely,

/RA Greg Casto for/

Michael F. Balazik, Project Manager
Research and Test Reactors Licensing Branch
Division of Licensing Projects
Office of Nuclear Reactor Regulation

Docket No. 50-005
License No. R-2

Enclosures:
1. Amendment No. 39
2. Safety Evaluation

cc: See next page

Pennsylvania State University

Docket No. 50-005

cc:

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 DATE: SEPTEMBER 6, 2019

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NRR-058

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

PENNSYLVANIA STATE UNIVERSITY

DOCKET NO. 50-005

PENN STATE BREAZEAL REACTOR

AMENDMENT TO RENEWED FACILITY OPERATING LICENSE

Amendment No. 39
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 March 26, 2019, as supplemented by letter dated June 25, 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-2 which is hereby amended to read as follows:
 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 9.0 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 solid or liquid form for use in experiments; and
 - c. to possess and use, but not separate such special nuclear material as may be produced by the operation of the reactor.
3. This license amendment is effective as of the date of its issuance.

FOR THE NUCLEAR REGULATORY COMMISSION

/RA/

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

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

Date of Issuance: September 6, 2019

ATTACHMENT TO LICENSE AMENDMENT NO. 39

FACILITY OPERATING LICENSE NO. R-2

DOCKET NO. 50-005

Replace the following page of the Renewed Facility Operating License No. R-2 with the revised page. The revised page is identified by amendment number and contains a marginal line indicating the area of change.

Renewed Facility Operating License No. R-2

Remove

2

Insert

2

- 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 9.0 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.

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO AMENDMENT NO. 39 TO

RENEWED FACILITY OPERATING LICENSE NO. R-2

THE PENNSYLVANIA STATE UNIVERSITY

DOCKET NO. 50-005

1.0 INTRODUCTION

By letter dated March 26, 2019 (Agencywide Documents Access and Management System Accession (ADAMS) No. ML19094A260), as supplemented on June 25, 2019 (ADAMS Accession No. ML19179A146), Pennsylvania State University (PSU) applied for an amendment to Renewed Facility Operating License No. R-2 for the Penn State Breazeale Reactor (PSBR). The license amendment request proposes to change the possession limits for special nuclear material (SNM). This SNM will consist of solid or liquid physical form for use in experiments associated with the operation of the PSBR.

Specifically, PSU proposes to:

1. designate License Condition 2.B.2.b as 2.B.2.c;
2. revise License Condition 2.B.2.a to delete "and" at the end of the condition and;
3. add, in a new License Condition 2.B.2.b, the authority to receive, possess, and use up to 1 gram of uranium-233 and 1 gram of uranium-235 of any enrichment in solid or liquid form for use in experiments.

2.0 REGULATORY EVALUATION

The U.S. Nuclear Regulatory Commission (NRC) staff reviewed the PSU's license amendment request 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 50.2, "Definitions," defines 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.
- 10 CFR Part 20, "Standards for Protection Against Radiation," Section 20.1101, "Radiation protection programs," which requires the licensee to develop, document, and implement a radiation protection program. Section 20.1101(b) requires licensees to use, to the extent practical, procedures and engineering controls based upon sound radiation protection principles to achieve occupational doses and doses to members of the public that are as low as is reasonably achievable (ALARA). Section 20.1201, "Occupational dose limits for adults," requires licensees to control radiation dose to facility staff. Section 20.1301, "Dose limits for individual members

of the public,” requires the licensee to conduct its operations in a manner that limits the dose to the public.

- 10 CFR 51.22, “Criterion for categorical exclusion; identification of licensing and regulatory actions eligible for categorical exclusion or otherwise not requiring environmental review,” which identifies licensing, regulatory, and administrative actions eligible for categorical exclusion from the requirement to prepare an environmental assessment or environmental impact statement.
- 10 CFR 61.55, “Waste classification,” that classifies radioactive waste for disposal.
- 10 CFR Part 70, “Domestic Licensing of Special Nuclear Material,” specifies 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 establishes the terms and conditions upon which the Commission will issue such licenses. Section 70.4, “Definitions,” defines what type of material constitutes SNM and the types of activities that that are for research and development. Section 70.24, “Criticality accident requirements,” requires licenses that possess SNM over certain quantities.
- 10 CFR Part 73, “Physical Protection of Plants and Materials,” specifies requirements for establishing and maintaining a physical protection system that is capable of protecting SNM. Section 73.2, “Definitions,” defines SNM of low strategic significance. Section 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,” 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, “Guidelines for Preparing and Reviewing Applications for the Licensing of Non-Power Reactors: 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 performing reviews of this license amendment request that the materials used at the licensee’s facility should be explicitly stated in the 10 CFR Part 50 license.

3.0 TECHNICAL EVALUATION

As defined in 10 CFR 50.2, “Definitions,” SNM means, in part, uranium-233, uranium enriched in the isotope-233 or in the isotope-235. Further, 10 CFR Part 70 specifies requirements for the receipt, possession and use of SNM. The regulation, 10 CFR 50.54(b), specifies that the right to SNM is only that defined by the license. The NRC reauthorized operation of the PSBR when it issued Renewed Facility Operating License No. R-2 and technical specifications, which was forwarded to the licensee by letter dated November 20, 2009 (ADAMS Accession Nos. ML092810190 and ML092810275). 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. The licensee proposed changes to the SNM possession limit to receive, possess, and use up to

1 gram of uranium-233 and 1 gram of uranium-235 of any enrichment in solid or liquid form for use in experiments. Further, in its license amendment request, PSU considered whether the proposed increase in SNM would affect any requirements or limits in its current technical specifications, physical security plan, emergency plan, and Radiation Safety Program. The licensee concluded that no additional changes were required.

3.1 NRC Staff Review

The NRC staff reviewed the proposed changes described above using the guidance in NUREG-1537, Part 2, Chapter 9, "Auxiliary Systems," Section 9.5, "Possession and Use of Byproduct, Source, and Special Nuclear Material," which states, in part, that 10 CFR Part 50 operating license may authorize the receipt, possession and use of SNM needed for experiments associated with research and development. Furthermore, 10 CFR 50.52, "Combining licenses," states that "[t]he Commission may combine in a single license the activities of an applicant which would otherwise be licensed severally." Examples stated in Part 1 of NUREG-1537 include SNM associated with experimental facilities of the reactor.

The proposed modest increase in the possession limit for uranium-233 and uranium-235 would authorize possession of SNM (enriched up to 100%) to be used to support the licensee's experimental program at the PSBR. The licensee stated in its license amendment request that the SNM would be received as non-dispersible solids or liquids and will be irradiated in its reactor. The licensee also described its general procedures governing the use of the material, including measures to prevent unauthorized access and to control radiation exposures.

Section 1.1.10 Technical Specifications, defines "Experiment" as follows:

Experiment SHALL mean (a) any apparatus, device, or material which is not a normal part of the core or experimental facilities, but which is inserted in these facilities or is in line with a beam of radiation originating from the reactor core; or (b) any operation designed to measure reactor parameters or characteristics.

The licensee intends to use the SNM for research and development purposes, as defined in 10 CFR 70.4, "Definitions," which states:

Research and development means (1) theoretical analysis, exploration, or experimentation; or (2) the extension of investigative findings and theories of a scientific or technical nature into practical application for experimental and demonstration purposes, including the experimental production and testing of models, devices, equipment, materials, and processes.

As authorized in Renewed Facility License No. R-2, PSU already possesses and uses SNM at its facility. The licensee currently possesses a low strategic significance (i.e., a Category III) level of SNM as defined in 10 CFR 73.2, "Definitions." Category III material quantity is: (1) Less than an amount of SNM of moderate strategic significance, 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 of 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).

In comparison, SNM of moderate strategic significance (i.e., a 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 uranium-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, $\text{grams} = (\text{grams contained uranium-235}) + 2 (\text{grams uranium-233} + \text{grams plutonium})$; 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 uranium-235 isotope). If the proposed modest increases of 1 gram of uranium-233 and 1 gram of uranium-235 are authorized, the licensee would still possess a Category III level of SNM. Because the amount of SNM to be possessed is still a Category III amount and SNM security requirements specified in 10 CFR 73.67(f) continue to apply, the NRC staff finds that no changes to PSU's Physical Security Plan are needed.

Further, the NRC staff evaluated the proposed total quantity of SNM authorized in License No. R-2 to ensure the quantity is less than the quantity in 10 CFR 70.24(a) and that no changes to the PSU Emergency Plan are required. Paragraph (a) of 10 CFR 70.24 states, in part, that each licensee authorized to possess more than 450 grams of any combination of contained uranium-235, uranium-233, plutonium shall maintain in each area where such SNM is handled a criticality monitoring system that meets the requirements of 10 CFR 70.24(a)(1) if licensed on or after December 6, 1974. As stated in 10 CFR 70.24(a), that these monitoring requirements do not apply when SNM is handled or stored beneath water shielding. Because the proposed 2 gram increase in the SNM possession limit would result in a total quantity of 52 grams of SNM handled or stored without water shielding and remain less than 450 grams, the NRC staff finds that PSU is not required to meet the requirements of 10 CFR 70.24(a)(1) and that no changes to PSU's Emergency Plan are needed.

The licensee states in the license amendment request that the SNM will consist of either a non-dispersible solid or liquid. In a non-dispersible solid or liquid form ensures that the potential release of SNM to spaces occupied by the facility's workers and offsite to the public is minimized. Because the potential release of SNM to occupational workers and the public is minimized, the NRC staff concludes that receiving, possessing, and using SNM in a non-dispersible solid and/or liquid physical form in proposed in License Condition 2.B.2.b is acceptable.

The NRC staff also reviewed PSU's Technical Specifications to verify that no TS changes are required. Technical Specification 3.7, "Limitations of Experiments," Specification f, limits the fission product inventory for release in the event of an experiment failure. The purpose of Technical Specification 3.7.f is to ensure the radiation exposure occupational dose and the dose to the public in the event of a release would be below the requirements of 10 CFR 20.1201, "Occupational dose limits for adults," and 10 CFR 20.1301, "Dose limits for individual members of the public," which are 5.0 roentgen equivalent man (rem) per year and 0.1 rem per year respectively. The NRC staff finds that Technical Specification 3.7.f, continues to limit fission product inventory that results from experiments that involve irradiating SNM in the PSBR. The NRC staff finds no other reference to SNM used in experiments in PSU's Technical Specifications. Therefore, the NRC staff finds no revisions are needed to PSU's Technical Specifications proposed License Condition 2.B.2.b.

The PSU safety analysis report, Section 11.1, "Radiation Protection," provided with its license renewal application (ADAMS Accession No. ML091250487), states that the PSU University Isotope Committee oversees the use of radioactive material under Federal, State, and PSU regulations. The University Isotope Committee performs those functions required of a radiation

safety committee as defined by Federal and State regulations, and PSU's licenses to possess and use radioactive material. In its license amendment request, PSU states that all work with radioactive material must comply with the University Isotope Committee approved, "Rules and Procedures for the Use of Radioactive Material at the Pennsylvania State University." Technical Specification 6.3.p, requires PSU to use and implement written procedures for experiment evaluation and authorization to ensure the safe operation of the PSBR. Technical Specification 6.4, "Review and Approval of Experiments," requires that all new experiments shall be reviewed for technical specifications compliance, 10 CFR 50.59, "Changes, tests and experiments," analysis, and approved by the Director of the PSBR. Also, Technical Specification 3.6.4, "As Low As Reasonably Achievable (ALARA)" requires PSU to maintain all exposures to radiation and release of radioactive effluents to the environments ALARA. The NRC staff finds that facility procedures and TSs help ensure that PSU will use the additional SNM in a manner that protects the health and safety of PSU staff and the public.

The NRC inspection program verifies that the licensee properly uses and maintains procedures control and account for SNM and that the licensee complies with the requirements of its TSs. The NRC staff read the NRC inspection reports for 2013 to 2019 and PSU's annual reports for 2013 to 2018 to review the licensee's recent performance regarding the receipt, possession, and use of its SNM. The NRC inspection reports did not identify any violations of NRC requirements or non-compliances regarding the receipt, possession, or use of SNM for the period from calendar years 2013 to 2019. Based on its review of administrative controls and NRC inspection results, the NRC staff finds that PSU continues to maintain written approved procedures and adequate controls and has approval reviews to conduct activities related to the receipt, possession and use of SNM for experiments.

The NRC staff reviewed the PSU waste management program to ensure that it can properly dispose of the additional SNM that PSU proposes to possess in proposed License Condition 2.B.2.b. Section 11.2, "Radioactive Waste Management," of the PSBR safety analysis report describes its radioactive waste management program. The licensee states in the license amendment request that the resulting waste from the SNM will be classified as Class A waste as defined in 10 CFR 61.55, "Waste classification." As stated in the PSU safety analysis report, Section 11.2, one method of waste disposal is by shipment to commercial burial sites. PSU states in the license amendment request that at the completion of the research, waste products from the use of the uranium-233 and uranium-235 material will be packaged into waste shipment containers in consultation with radioactive waste material vendors. Therefore, the NRC staff concludes that the licensee's radioactive waste management program is acceptable to ensure radioactive waste resulting from the irradiation of SNM for experiments proposed to be authorized by License Condition 2.B.2.b will be properly deposited.

3.0 Conclusion

Based on the information provided above, the NRC staff concludes the following:

- the licensee's proposed changes to License No. R-2 that would authorize a small increase in the possession limit of uranium-233 and uranium-235 for experiments are consistent with NUREG-1537, Part 1 and 2, guidance that SNM used in conjunction with the operation of the reactor and that such receipt, possession, and use may be authorized in a 10 CFR Part 50 license under the provisions of 10 CFR Part 70;

- the receipt, possession and use of the SNM proposed in License Condition 2.B.2.b is acceptable because the SNM is used in experiments that are conducted during reactor operations;
- SNM can be included on the 10 CFR Part 50 license pursuant to Section 50.52 that authorizes combining activities in a single license;
- the proposed increase in the receipt, possession and use requirements do not require any changes to the licensee's technical specifications, emergency planning or physical security plan because of the small quantity being added;
- PSU continues to maintain written approved procedures and adequate controls and has approval reviews to conduct activities related to the receipt, possession and use of SNM for experiments; and
- PSU's radioactive waste management program is acceptable to ensure radioactive waste resulting from the irradiation of SNM for experiments will be properly disposed.

The NRC staff also reviewed the licensee's proposed change to delete "and" at the end of License Condition 2.B.(2)(a) and to renumber License Condition 2.B.2.b as 2.B.2.c to reflect the addition of the new license condition. The NRC staff finds these editorial changes reflect the addition of proposed License Condition 2.B.2.b.

Therefore, as described above, the NRC staff finds the proposed addition of a new License Condition 2.B.2.b, which would authorize a small increase in the SNM receipt, use and possession limits, is 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 Changes to Special Nuclear Material Possession Limits for Experiments

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 addition of a new License Condition 2.B.2.b would authorize a small increase the SNM possession limit, allowing the use of both uranium-233 and uranium-235 in a solid or liquid form for use in experiments at the PSBR.

PSU states in the license amendment request that the likely accident involving the possession and use of the additional material is the complete spillage of the SNM. Although the requested amount of SNM is small (i.e., up to 2 grams) and would not provide a significant occupation or public dose if mishandled, the application describes the procedures and practices used to minimize the probability of a spill and the impact if a spill were to occur. The licensee's Technical Specification 3.7. f requires that experiments generating an inventory of 5 millicuries of iodine-131 through iodine-135 be reviewed to ensure that in the case of an accident, the total release of iodine will not exceed the iodine released for the postulated maximum hypothetical accident (MHA). The MHA, which was previously evaluated in the safety analysis report, assumes a rupture of the cladding of an air-cooled fuel element resulting in a dose to the staff of 1.038 rem and to the public of 0.026 rem that bounds all accidental releases at the facility. The resulting MHA dose to the staff and public is below the requirements of 10 CFR 20.1201 and 10 CFR 20.1301, which are 5.0 rem per year and 0.1 rem per year respectively. Further, the SNM is handled in accordance with the licensee's Radiation Safety Program to help reduce the probability or consequence of an accident. SAR Section 10.3, "Experiment Review," states that procedures have adequate controls to ensure that the technical specifications limitations for experiments are not exceeded. Technical specifications require that any new experiments that could have a significant effect upon reactivity or the release of radioactivity shall be reviewed by the Penn State Reactor Safeguards Committee helps to ensure experiment safety and minimize the probability and consequence of any potential accident from a reactor experiment.

Because PSU continues to have procedures, practices, and programs for handling Category III quantity of SNM as defined in 10 CFR 73.2, and that the PSU's Technical Specifications have limits for experiments to minimize the consequences of a potential radioactive release and ensure that any potential accidental release of radioactive material will be bounded as evaluated by the MHA and the resulting dose is below the limits in 10 CFR 20.1201 and 10 CFR 20.1301, this proposed amendment does not involve a 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 small increase in the amount of SNM that would be authorized (2 grams total) includes uranium-235, which is currently in the possession and use at the facility and uranium-233, a fissile material that has similar hazards. The proposed increase in the total possession limit of SNM at the facility does not exceed the SNM in 10 CFR 70.24 quantities and remains at Category III quantity of SNM as defined in 10 CFR 73.2. 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 licensee has procedures and programs in place to

control the use and handling of the SNM, and technical specification requirements that restrict the use of the materials in experiments. The current procedures, programs and technical specification will ensure that the additional SNM possessed and used in a manner that does not create a new or different accident.

Because the licensee is currently authorized to receive, possess, and use SNM similar to that proposed by the changes to License Condition 2.B.2.b, the proposed increase in the amount authorized is small, and the amendment does not authorize changes in reactor operation, reactor hardware design, or reactor power level, 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)]

The small increase in the amount of SNM that would be authorized includes uranium-235 that is currently in the possession and use at the facility. Uranium-233 is a fissile material that has similar hazards than uranium-235. The licensee has procedures and programs in place to control the use and handling the material, and Technical Specification requirements that govern the use of the material in experiments. The licensee's continued control and use of these materials, using approved procedures, helps to ensure that an accident scenario involving their use does not occur. PSU's Technical Specifications continue to require experiments to be reviewed and approved to ensure that experiments using the SNM will be conducted within the effluent and radiation exposure limits in 10 CFR Part 20. Likewise, due to the type and small amount of additional SNM to be possessed, the licensee's current Emergency Plan and Physical Security Plan are adequate to protect public health and safety and the common defense and security. Thus, the 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; and [10 CFR 51.22(c)(9)(ii)]

The proposed small increase in authorized SNM (i.e., 2 grams) will not result in a significant increase in the type or amount of radioactive material which could be released. The use of the SNM, which becomes more radioactive when irradiated in the reactor during an experiment, is controlled by processes and limits for experiments provided by the licensee's Radiation Safety Program and Technical Specification 3.7, "Limitations of Experiments," and Technical Specification 6.4, "Review and Approval of Experiments," which will continue to prevent potential damage to the reactor and to minimize any release radioactive effluents to within the limits specified in 10 CFR Part 20 in the event of an experiment failure. Similar SNM is currently authorized for use at the facility, and continued adherence to the Radiation Safety Program and the Technical Specifications will help ensure that the additional SNM is properly controlled and that there will be no significant increase in the amounts of effluents that may be released offsite. Thus, 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)]

The license has administrative controls for handling the SNM in its Radiation Safety Program, which is designed to minimize the radiation exposure to individuals. Technical Specification 6.4 requires experiments to be reviewed and approved by the Director of the PSBR. The licensee also requires specific training for individuals that handle SNM at the facility. Continued effective implementation of the licensee's administrative controls in the Radiation Safety Program helps ensure that any individual or cumulative occupational radiation exposure will remain within regulatory limits. Additionally, Technical Specifications 3.6.4 and 3.7, which require the implementation of an ALARA program and continues to ensure no significant increase in individual and cumulative occupational radiation exposure and that any exposure remain within the occupational and public exposure limits of 10 CFR Part 20.1201 and 10 CFR 20.1301. Further, the licensee has experience handling SNM and currently uses similar SNM in conjunction with the operation of the PSBR. Thus, there is no significant increase in individual or cumulative occupational radiation exposure.

4.2 Conclusion

The NRC staff has determined that issuance of this amendment changes a requirement with respect to the installation and use of a facility component (i.e., the uranium-233 and uranium-235 in a non-dispersible solid or liquid form for use in the PSBR experimental facilities) 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. Therefore, the amendment meets the eligibility criteria for a categorical exclusion set forth in 10 CFR 51.22(c)(9). 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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Date: September 6, 2019