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

December 11, 2020

Dr. Robert Bean, Director
Purdue University Radiation Laboratory
School of Nuclear Engineering
400 Central Drive
West Lafayette, IN 47907-2017

SUBJECT: PURDUE UNIVERSITY– ISSUANCE OF AMENDMENT NO. 16 TO RENEWED FACILITY OPERATING LICENSE NO. R-87, FOR THE PURDUE UNIVERSITY RESEARCH REACTOR TO MODIFY THE TECHNICAL SPECIFICATIONS TO ALLOW STARTUP OF THE PURDUE UNIVERSITY REACTOR TO CALIBRATE NUCLEAR INSTRUMENTATION (EPID L-2020-PPM-0000)

Dear Dr. Bean:

The U.S. Nuclear Regulatory Commission (NRC) has issued the enclosed Amendment No. 16 to Renewed Facility Operating License No. R-87 for the Purdue University Research Reactor. This amendment modifies Reactor Safety System surveillance requirements in Technical Specification (TS) 4.2.a.2 and TS 4.2.g in response to your application dated November 24, 2020 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML20337A104 and enclosures (ADAMS Accession Nos. ML20337A105 and ML20337A106). The amendment allows the calibration of nuclear instrument channels by foil activation, as required annually by TS 4.2.a.2, or when necessary, to restore operability of the channels after replacement, repair, or modification, as required by TS 4.2.g, to be performed during reactor operation

A copy of the NRC staff's safety evaluation is enclosed. If you have any questions, please contact me at (301) 415-3724, or by electronic mail at Duane.Hardesty@nrc.gov.

Sincerely,

/RA/

Duane Hardesty, Senior 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. 50-182
License No. R-87

Enclosures:
1. Amendment No. 16 to Renewed Facility Operating License No. R-87
2. Safety Evaluation

cc: w/enclosures: See next page

cc:

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SUBJECT: PURDUE UNIVERSITY– ISSUANCE OF AMENDMENT NO. 16 TO RENEWED FACILITY OPERATING LICENSE NO. R-87, FOR THE PURDUE UNIVERSITY RESEARCH REACTOR TO MODIFY THE TECHNICAL SPECIFICATIONS TO ALLOW STARTUP OF THE PURDUE UNIVERSITY REACTOR TO CALIBRATE NUCLEAR INSTRUMENTATION (EPID L-2020-PPM-0000).
DATED: DECEMBER 11, 2020

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ADAMS Accession No.: ML20336A325 **NRR-058**

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PURDUE UNIVERSITY

DOCKET NO. 50-182

PURDUE UNIVERSITY RESEARCH REACTOR

AMENDMENT TO RENEWED FACILITY OPERATING LICENSE

Amendment No. 16
License No. R-87

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

   A. The application for an amendment to Facility Operating License No. R-87, filed by the Purdue University on November 24, 2020, 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) 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 is not required by 10 CFR 2.105, "Notice of proposed action," and publication of a notice of issuance for this amendment is not required by 10 CFR 2.106, "Notice of issuance."

2. Accordingly, the license is amended as described in Attachment 1 to this license amendment and by changes to the Technical Specifications as indicated in Attachment 2. Paragraph 2.C.2 of Renewed Facility Operating License No. R-87 is hereby amended to read as follows:

   2. Technical Specifications

      The technical specifications contained in Appendix A, as revised by Amendment No. 16, are hereby incorporated in the license. The licensee shall operate the facility in accordance with the technical specifications.

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

FOR THE NUCLEAR REGULATORY COMMISSION

/RA/

Greg A. Casto, 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

Attachments:
1. Changes to Renewed Facility Operating License No. R-87
2. Changes to Appendix A, “Technical Specifications”

Date of Issuance: December 11, 2020

ATTACHMENT TO LICENSE AMENDMENT NO. 16

RENEWED FACILITY OPERATING LICENSE NO. R-87

DOCKET NO. 50-182

Replace the following page of Renewed Facility Operating License No. R-87 with the revised page. The revised page is identified by amendment number and contains lines in the margin indicating the areas of change.

Renewed Facility Operating License No. R-87

Remove	Insert
3	3

C. This license shall be deemed to contain and is subject to the conditions specified in in 10 CFR Parts 20, 30, 50, 51, 55, 70, and 73 of the Commission's regulations; is subject to all applicable provisions of the Act and to the rules, regulations and, orders of the Commission now or hereafter in effect and is subject to the additional conditions specified or incorporated below:

1. Maximum Power Level

The licensee is authorized to operate the facility at steady-state power levels not in excess of 12 kilowatts (thermal).

2. Technical Specifications

The Technical Specifications contained in Appendix A, as revised by Amendment No. 16, are, hereby, incorporated in the license. The licensee shall operate the facility in accordance with the Technical Specifications.

3. Physical Security Plan

The licensee shall fully implement and maintain in effect all provisions of the Commission-approved physical security plan, including all amendments and revisions made pursuant to the authority of 10 CFR 50.90 and 10 CFR 50.54(p). This approved physical security plan, which contains information withheld from public disclosure under 10 CFR 73.21, "Protection of Safeguards Information: Performance Requirements," is entitled "The Purdue University Reactor-1 Physical Security Plan," and is dated March 2016.

4. Reactor Protection and Control Systems

Purdue University shall perform verification and validation testing, factory acceptance testing, and site acceptance testing described in the application for license amendment dated February 27, 2017, as supplemented by letters dated December 18, 2017, and March 2, 2019, on the reactor protection and control systems. The test results and any action taken to correct deficiencies shall be reviewed by the Purdue University Committee on Reactor Operations and reviewed and approved by the Facility Director prior to resuming operation of the reactor.

D. This license is effective as of the date of issuance and shall expire at midnight, twenty years from its date of issuance.

For the Nuclear Regulatory Commission

/RA/

William M. Dean, Director
Office of Nuclear Reactor Regulation

Attachment:
Appendix A, Technical Specifications

Date of Issuance: October 31, 2016

ATTACHMENT TO LICENSE AMENDMENT NO. 16

RENEWED FACILITY OPERATING LICENSE NO. R-87

DOCKET NO. 50-182

Replace the following page of Appendix A, “Technical Specifications,” with the revised page. The revised page is identified by amendment number and contains vertical lines in the margin to indicate the areas of change.

Technical Specifications

Remove	Insert
18	18

Objective - The objective is to assure that the reactor safety system is operable as required by Specification 3.2

Specification –

a. A channel calibration of the reactor safety channels as described in Table I shall be performed as follows:

   1. An electronic calibration shall be performed annually, with no interval to exceed 15 months. The electronic calibration may be deferred with CORO approval during periods of reactor shutdown, but shall be performed prior to startup.

   2. A power calibration by foil activation shall be performed annually, with no interval to exceed 15 months. The power calibration may be deferred with CORO approval during periods of reactor shutdown, but shall be performed as soon as practicable after reactor startup.

b. A channel check on the radiation monitoring equipment shall be completed daily during periods when the reactor is in operation. Calibration of the Safety-Related Channels specified in Table II and hand held radiation survey instruments shall be performed annually, with no interval to exceed 15 months. Calibration may be deferred with CORO approval during periods of reactor shutdown, but shall be performed prior to startup.

c. Shim-safety rod drop times shall be measured annually, with no measurement's interval to exceed 15 months. These drop times shall also be measured prior to operation following maintenance which could affect the drop time or cause movement of the shim-safety rod control assembly. Drop times may be deferred with CORO approval during periods of reactor shutdown, but shall be performed prior to startup.

d. A channel check of each of the Scram capabilities specified in Table I shall be performed prior to each day's startup.

e. A channel check of the pool top radiation monitoring equipment's off-site alarm capability shall be done biannually, not to exceed 7 ½ months.

f. A simulated loss of off-site power shall be performed annually with no interval to exceed 15 months to verify the UPS units are capable of providing Instrumentation and Control power for at least 30 minutes.

g. Appropriate surveillance testing on any technical specification required system shall be conducted after replacement, repair, or modification before the system is considered operable and returned to service unless reactor operation is required for the performance of the surveillance, whereby it shall be done as soon as practicable after reactor startup.

Bases - A test of the safety system channels prior to each startup will assure their operability, and annual calibration will detect any long-term drift that is not detected by normal intercomparison of channels. The channel check of the neutron flux level channel will assure that changes in core-to-detector geometry or operating conditions will not cause undetected changes in the response of the measuring channels.

Area monitors will give a clear indication when they are not operating correctly. In addition, the operator routinely records the readings of these monitors and will be aware of any reading which indicates loss of function.

Reactor operations are required to perform power calibrations. The Technical Specification requirement "as soon as practicable" prohibits any other reactor operations other than those to perform the power calibration. This conditional ensures the only operation following replacement, repair, or modification is to perform the power calibration and before continuing normal work.

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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO AMENDMENT NO. 16

RENEWED FACILITY OPERATING LICENSE R-87

PURDUE UNIVERSITY

PURDUE UNIVERSITY RESEARCH REACTOR

DOCKET NO. 50-182

1.0 INTRODUCTION

By letter dated November 24, 2020 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML20337A104), and enclosures (ADAMS Accession Nos. ML20337A105 and ML20337A106), Purdue University applied for an amendment to Renewed Facility Operating License No. R-87 for the Purdue University Reactor-1 (PUR-1). The license amendment request (LAR) proposed changes to technical specification (TS) 4.2.a.2 and TS 4.2.g to allow reactor operation for the purpose of performing calibration of the nuclear instruments by foil activation. According to the licensee, the PUR-1 cannot be operated unless required safety channels are operable under TS 3.2, "Reactor Safety System," Specification a, and the associated TS 4.2.g surveillance required to restore operability after replacement of the nuclear instrumentation channels cannot be performed without operating the reactor.

2.0 REGULATORY EVALUATION

The NRC staff reviewed the LAR and evaluated the proposed changes to TS 4.2.a.2 and TS 4.2.g, based on the following regulations and guidance:

- Title 10 of the *Code of Federal Regulations* (10 CFR) Part 50, "Domestic Licensing of Production and Utilization Facilities," Section 50.36, "Technical specifications," which provides the requirements for TSs to be included in facility operating licenses, including research reactor licenses. Per 10 CFR 50.36(c)(3), TSs must include requirements to test, calibrate, or inspect to ensure that the necessary quality of systems and components is maintained, that facility operation will be within safety limits (SLs), and that the limiting conditions for operation (LCOs) will be met. Section 50.36(a)(1) also requires a license application to include a statement of the bases or reasons for the TSs, but the bases shall not become part of the TSs.

- 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.

- NUREG-1537, Part 1, “Guidelines for Preparing and Reviewing Applications for the Licensing of Non-Power Reactors: Format and Content,” Appendix 14.1, “Format and Content of Technical Specifications for Non-Power Reactors” (ADAMS Accession No. ML042430055), which provides guidance to applicants and licensees on preparing research reactor license applications and TSs.

- NUREG-1537, Part 2, “Guidelines for Preparing and Reviewing Applications for the Licensing of Non-Power Reactors: Standard Review Plan and Acceptance Criteria,” Chapter 14, “Technical Specifications” (ADAMS Accession No. ML042430048), which provides guidance to the NRC staff for reviewing LARs. NUREG-1537 also references Institute of Electrical and Electronics Engineers (IEEE)-7-4.3.2-1993, “IEEE Standard Criteria for Digital Computer Systems in Safety Systems of Nuclear Power Generating Stations,” which provides guidance for the design, application, and evaluation of digital computer hardware and software.

- American National Standards Institute/American Nuclear Society (ANSI/ANS)-15.1 2007, “The Development of Technical Specifications for Research Reactors” (ANSI/ANS-15.1), Section 4, “Surveillance requirements,” provides guidance used by the NRC staff, applicants, and licensees, including the allowable surveillance requirements (SRs) that should be included in the TSs. The 2007 version is a revision of the ANSI/ANS-15.1-1990 standard cited in NUREG-1537 that was issued in 1996. The ANSI/ANS-15.1-2007 version retains guidance related to the minimum number of channels needed for reactor operation and the surveillance testing following repair or replacement of TS required system specified in ANSI/ANS-15.1-1990 and discussed in this safety evaluation.

3.0 TECHNICAL EVALUATION

PUR-1 is a Lockheed Nuclear Products Materials Testing Reactor licensed for operation at a power level of 12 kilowatts (thermal). Purdue University School of Nuclear Engineering manages and operates PUR-1. The primary mission of PUR-1 is training and educating Purdue University nuclear engineering students and students from neighboring universities without reactors, such as the University of Illinois.

The initial license, granted in 1962, was renewed in 1968, 1988, and 2016. The NRC issued Renewed Facility Operating License R-87 in 2016 (ADAMS Accession No. ML16267A000), and issued License Amendment No. 14, dated April 1, 2019 (ADAMS Package No. ML18275A090), which authorized the licensee to install an all-digital control and safety system.

The PUR-1 is currently shut down because TS 3.2 requires that the NFMS, which includes the Log count rate and change rate channel, Log N and change rate, Linear channel, and Safety channel, be operable for reactor operation. TS 3.2 requires, in part, that “[t]he two shim-safeties shall not be moved more than 6 cm from the fully inserted position unless:"

a. The reactor safety channels and safety-related instrumentation shall be operable in accordance with Tables I and II including the minimum number of channels and the indicated maximum or minimum set points.

The NFMS channels were replaced during the all-digital upgrade authorized by Amendment No. 14. The replacement NFMS is not considered operable under TS 3.2 until the appropriate surveillance required by TS 4.2.g is performed. For the NFMS, the appropriate SR is TS 4.2.a, which requires that operability of the NFMS be established by both an electronic calibration and a power calibration by foil activation. Currently, TS 4.2.a allows these surveillances to be deferred with approval of the Committee on Reactor Operations (CORO) during periods of reactor shutdown, but the surveillances must be performed prior to reactor startup.

In the LAR, the licensee stated that operation of the PUR-1 before the foil calibration is complete would violate the TSs because the TSs prohibit reactor operation with uncalibrated instruments and the calibration cannot be performed without operating the reactor. To eliminate the conflict between the TS requirements, the licensee proposed the following changes to TS 4.2:

The current TS 4.2.a.2, states:

> A power calibration by foil activation shall be performed annually, with no interval to exceed 15 months. The power calibration may be deferred with CORO approval during periods of reactor shutdown, but shall be performed prior to startup.

The proposed TS 4.2.a.2, states:

> A power calibration by foil activation shall be performed annually, with no interval to exceed 15 months. The power calibration may be deferred with CORO approval during periods of reactor shutdown, but shall be performed as soon as practicable after reactor startup.

The current TS 4.2.g, states:

> Appropriate surveillance testing on any technical specification required system shall be conducted after replacement, repair, or modification before the system is considered operable and returned to service

The proposed TS 4.2.g, states:

> Appropriate surveillance testing on any technical specification required system shall be conducted after replacement, repair, or modification before the system is considered operable and returned to service unless reactor operation is required for the performance of the surveillance, whereby it shall be done as soon as practicable after reactor startup.

Additionally, the licensee proposed changes to the Bases for TS 4.2 as required by 10 CFR 50.36.

The proposed change to TS 4.2.a.2 would replace the words “prior to startup” with “ as soon as practicable after startup” and the TS 4.2.g change would add the phrase “unless reactor operation is required for the performance of the surveillance, whereby it shall be done as soon as practicable after reactor startup.” According to the LAR, a power calibration by foil activation must be performed to calibrate the nuclear instruments, foil activation must be done during reactor operation, and the TSs, as written, prohibit reactor operation since the calibration is currently required prior to startup. The proposal to modify TS 4.2.a.2 and TS 4.2.g would allow reactor operation to perform the required foil calibration as soon as practicable after reactor startup. The LAR also states that operation of the reactor to perform the channel calibration would not be detrimental to the public health and safety because there are other means of reactor protection that do not rely on absolute reactor power measurement. As stated in the LAR, the NFMS electronic calibration required by TS 4.2.a.1, ensures, in part, that the protection system can initiate a scram (i.e., shutdown the reactor) on high change rate (15 percent per second). Also, based on its analysis, even at the maximum change rate initiated from a low power (100 watts) the operator would have over 30 seconds to recognize the transient and initiate a manual scram before the reactor exceeded the licensed power level of 12 kilowatts (thermal). Additionally, the pool top radiation area monitor, which is independently calibrated with an external source, is capable of scramming the reactor if an unsafe condition develops. TS 3.2, Table I, requires that the pool top monitor initiate a reactor scram at a setpoint of 50 millirem per hour, twice full power background, or less than either [of these two possible setpoints].

The NRC staff evaluated proposed changes to TS 4.2.a.2., and TS 4.2.g, using the PUR-1 TSs; the guidance in NUREG-1537, Part 1, Appendix 14.1, Section 4.2, “Reactor Control and Safety Systems,” NUREG-1537, Part 2, Section 3.5, “Systems and Components,” and Section 7.3, “Reactor Control Systems”; and ANSI/ANS-15.1, Section 4, “Surveillance requirements.”

NUREG-1537, Part 1, Appendix 14.1, Section 4.2, Item (6), “Operability Tests,” states that the NRC accepts the guidance provided in this section of ANSI/ ANS 15.1 and Appendix 14.1, Section 4.2, Item (8), “Thermal Power Calibration for Reactors Not Cooled by Forced Convection,” which applies to the PUR-1 design, indicates the calibration method should be specified.

NUREG-1537, Part 2, Section 3.5 states, in part, “The surveillance activities proposed in the technical specifications acceptably ensure that the safety-related functions of the electromechanical systems and components will be operable and the health and safety of the public will be protected.”

NUREG-1537, Part 2, Section 7.3 states that the subsystems and equipment of the RCS should be readily tested and capable of being accurately calibrated. Section 7.3 also states that hardware and software for computerized systems should meet the guidelines of IEEE [Institute of Electrical and Electronics Engineers] 7-4.3-2-1993, “IEEE Standard Criteria for Digital Computer Systems in Safety Systems of Nuclear Power Generating Stations.” IEEE 7-4.3.2-1993, Section 5.7, “Capability for test and calibration,” states that no requirements beyond IEEE 603 “IEEE Standard Criteria for Safety Systems for Nuclear Power Generating Stations,” are necessary. IEEE Standard 603, Section 5.7, “Capability for Test and Calibration,” states, in part: “Capability for testing and calibration of safety system equipment shall be provided while retaining the capability of the safety systems to accomplish their safety functions.”

Finally, ANSI/ANS-15.1, Section 4, states, in part, “The technical specification SRs must specify which activities can only be performed with scheduled surveillances that will become due during planned periods of operation.”

Based on review of the LAR and the NRC staff’s knowledge of the calibration methods applicable to the design of the PUR-1, the staff finds that the use of a foil irradiation technique for power calibration necessitates that the reactor be operated up to 100 percent thermal power to calibrate the NFMS over its operating range. NFMS channels 2, 3, and 4 read in percent reactor power and must be calibrated so that the measured neutron flux level (actual reactor power) is equivalent to the reactor power indicated by the instruments. Accordingly, the proposed TS 4.2.a.2 allowing reactor operation to perform the foil calibration is consistent with NUREG-1537 guidance for thermal power calibration for reactors not cooled by forced convection to ensure the safety systems (e.g., NFMS) are operable to protect the health and safety of the public. Additionally, the NRC staff finds that the surveillance is necessary to calibrate the NFMS before the system is considered operable and returned to service. The NRC staff also finds that specifying as soon as practicable after reactor startup in TS 4.2.a and TS 4.2.g is consistent with the ANS/ANSI-15.1, Section 4 guidance to specify the scheduled surveillances that will become due during planned periods of operation. Further, since there are other means of reactor protection, such as the period scram, the pool top radiation monitor, and manual operator action, the NRC staff finds that there is reasonable assurance that the performance of NFMS calibration activities during reactor operations as soon as practicable after reactor startup would not adversely impact either safe operation or the capability to achieve or maintain the safe shutdown of the reactor.

The NRC staff also considered if other research and test reactor licenses allow for surveillance of the nuclear instrumentation with the reactor operating. According to the LAR, Dow Chemical Company (Docket No. 50.264), Reed College (Docket No. 50-288), Missouri University of Science and Technology (Docket No. 50-123), and the University of Utah (Docket No. 50-407) all include TS language that allows reactor operations to perform the required calibration surveillance (ADAMS Accession Nos. ML12137A171, ML120530021, ML090140520, and ML112500333, respectively).

Based on its review of these licenses, the NRC staff finds that the TSs for the above facilities contain language requiring that surveillances be completed prior to reactor operation unless reactor operation is required for performance of the surveillance. Further, the TSs specify that such surveillance shall be performed as soon as practicable after reactor operation. In the respective safety evaluations for these facilities, the NRC staff found the TSs allowing certain surveillances to be performed at power to be consistent with the guidance in NUREG-1537, Part 1, Appendix 14.1, Section 4. For example, in the safety evaluation for the Dow TRIGA Research Reactor (ADAMS Accession No. ML12137A181), the NRC staff accepted that TS 4.0, Specification 1, which requires surveillances at power to be accomplished as soon as practicable after startup. The NRC staff finds that the proposed Purdue changes are consistent with TS language in other NRC-approved research reactor licenses that allow the calibration of nuclear instrumentation as soon as practicable after reactor startup.

Additionally, the NRC staff finds that TS 3.2 requires that the NFMS channels be operable before the two shim-safeties can be moved more than 6 centimeters from the fully inserted position. At this low height, the reactor cannot achieve criticality. In light of this TS 3.2 restriction on movement of the shim-safeties and the proposed language in TS 4.2.a.2 and TS 4.2.g, allowing reactor operation only when required for the performance of surveillance, would restrict operation of the reactor for any other reason than to complete required

surveillances. Therefore the NRC staff concludes that proposed TS changes would preclude the resumption of normal operations, including irradiations or experiments, until after completion of the required surveillance establishes NFMS operability and other TS requirements for operation are satisfied.

Based on the above information, the NRC staff finds that the proposed revisions to TS 4.2.a and TS 4.2.g are acceptable to allow testing and calibration of safety system equipment, while retaining the capability of the safety systems to accomplish their safety functions. The phrase "as soon as practicable" acknowledges that the calibration could involve multiple adjustments over several startups to complete the calibration over the range of the licensed thermal power level. The NRC staff also finds that the proposed revisions to TS 4.2.a, and TS 4.2.g, meet the 10 CFR 50.36(c)(3) requirement that SRs assure that the necessary quality of systems and components is maintained, that facility operation will be within SLs, and that the LCOs will be met. Therefore, the NRC staff finds that the proposed changes to TS 4.2.a and TS 4.2.g are 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). The Commission has declared certain actions to be a "categorical exclusion" by finding that the action does not individually or cumulatively have a significant effect on the human environment.

An amendment authorizing revisions of TS 4.2.a and TS 4.2.g involves a change to surveillance requirements in a 10 CFR Part 50 license. The issuance of the proposed amendment is subject to the categorical exclusion in 10 CFR 51.22(c)(9) if it meets each of the criteria below:

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

Pursuant to 10 CFR 50.92, "Issuance of amendment," paragraph (c), a license amendment involves no significant hazards consideration if operation of the facility, in accordance with the proposed amendment, would not—

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

The amendment would revise TS 4.2.a and TS 4.2.g to allow reactor operations in order to perform the required calibration of the NFMS soon after reactor startup to ensure the instrumentation accurately displays the reactor power level to the operator and provides automatic protective action. In Chapter, 13, "Accident Analysis," of the Safety Evaluation Report on the issuance of Renewed Facility Operating License No. R-87, the NRC staff evaluated a postulated maximum hypothetical accident that bounds all accidents at the facility and assumes that the release of fission products from a fuel element to the unrestricted environment results in radiological consequences. The proposed change does not involve a significant increase in the probability or consequences of an accident previously evaluated because, as stated in the technical evaluation, the operation of the PUR-1 to perform the required surveillance to calibrate the NFMS instrumentation would not adversely impact reactor operation, the capability of the protection system to shut down the reactor in the case of an accident, or to maintain it in a safe shutdown condition. Also, no changes are proposed to the reactor design or hardware, or to

structures, systems, and components (SSCs) that are relied upon for accident detection, mitigation, or response. In addition, the proposed LAR does not change the licensed power level of the reactor, the amount of special nuclear material or byproduct material authorized to be possessed and used at the facility, or any potential release paths from the facility. Therefore, 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 [10 CFR 50.92(c)(2)];* and

The operation of the reactor to perform alignment of NFMS channels as soon as practicable after reactor startup does not create any new or different accident from any accident previously evaluated. The amendment does not involve any design or hardware changes to SSCs that are relied upon for accident detection, mitigation, or response and the operation of the reactor to perform foil calibration is consistent with operations at similar research reactors and with the guidance in NUREG-1537. 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 reactor safety-related systems as a result of the proposed amendment. Therefore, 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 SRs allow operation of the reactor to perform the alignment of the NFMS channels as soon as practicable after reactor startup. Calibration of the NFMS channels provides assurance that the measured neutron flux level (actual reactor power) is equivalent to the reactor power indicated by the instruments and that automatic protective action occurs at the power level assumed in the safety analysis. The revised SRs do not authorize any changes in the design, function, or operation of SSCs, or change the authorized steady-state reactor power level. The proposed amendment does not alter how SLs or limiting safety system settings are determined, change LCOs, or adversely affect the reliability of equipment assumed to mitigate accidents in the facility. In addition, the proposed changes do not adversely affect equipment required to safely shut down the reactor or required to maintain it in a safe shutdown condition. Therefore, the NRC staff finds that this amendment does not involve a significant reduction in a margin of safety.

(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)].

The operation of the reactor to perform the alignment of the NFMS channels as soon as practicable after reactor startup would not result in a significant change in the types or a significant increase in the amounts of fission products and effluents generated by operation of the reactor. License Condition 2.C.1 of Renewed Facility Operating License No. R-87 would continue to limit PUR-1 operation to a steady-state maximum power level of 12 kilowatts (thermal) and the proposed amendment would not change potential release paths from the facility or the amount of nuclear materials authorized to be possessed and used at the reactor. The important design features of the PUR-1 confinement, are specified

in TS 5.1, “Site Description.” TS 5.1, Specifications e and h, continue to support the accident analysis by providing parameters necessary to support the assumptions used to demonstrate compliance with 10 CFR Part 20 requirements. TS 3.4, “Confinement,” will continue to control the amounts of effluents that may be released off site and provide reasonable assurance that releases do not exceed limits in 10 CFR Part 20 and Table 2 of 10 CFR Part 20, Appendix B. Therefore, the NRC staff finds that there is no significant change in the types or increase in the amounts of any effluents that may be released offsite.

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

The proposed operation of the reactor to perform the alignment of the NFMS channels as soon as practicable after reactor startup does not significantly affect individual or cumulative occupational radiation exposure. The amendment would not change the amount of nuclear material possessed and used at the reactor, the maximum power level, or postulated accident doses. Occupational and individual doses would remain below the limits in 10 CFR 20.1201, “Occupational dose limits for adults,” and 10 CFR 20.1301, “Dose limits for individual members of the public,” respectively. TS 6.3, “Radiation Safety,” provides the administrative requirements for radiation safety, which requires the licensee to implement a radiation protection program at the facility, as required by 10 CFR Part 20. Additionally, TS 6.4, “Procedures,” requires administrative controls of operating procedures for the reactor and the surveillance checks, calibrations, and inspections of reactor instrumentation to ensure they are adequate for the safe operation of the reactor. TS 6.4 also requires radiation protection procedures that would continue to help ensure the adequacy of the radiation protection program, helping to limit individual or cumulative occupational radiation exposure. Therefore, the NRC staff finds that there is no significant increase in individual or cumulative occupational radiation exposure.

4.1 Conclusion

Accordingly, the NRC staff determined that issuance of this amendment changes surveillance requirements in a 10 CFR Part 50 license. The NRC staff further determined that the amendment involves no significant hazards consideration, there is no significant change in the types or significant increase in the amounts of any effluents that may be released off site, and there is no significant increase in individual or cumulative occupational radiation exposure. Therefore, this amendment meets the eligibility criteria for a categorical exclusion stated 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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