July 27, 2016

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

SUBJECT: PENNSYLVANIA STATE UNIVERSITY - REQUEST FOR ADDITIONAL INFORMATION FOR LICENSE AMENDMENT REQUEST REGARDING THE REACTOR BAY VENTILATION SYSTEM UPGRADE FOR THE PENN STATE BREAZEALE REACTOR (TAC NO. ME8001)

Dear Dr. Unlu:

By letter dated February 7, 2012 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML12040A166), Pennsylvania State University (the licensee) requested an amendment to the Facility Operating License R-2 for the Penn State Breazeale Reactor.

The U.S. Nuclear Regulatory Commission is continuing its review of your amendment request regarding the reactor bay ventilation system upgrade which impacts the license technical specifications. During our review, we requested additional information regarding your application by letters dated November 21, 2012, and April 1, 2014 (ADAMS Accession Nos. ML12284A197 and ML14036A319 respectively), and subsequently, you responded by letters dated January 7, 2013, and September 19, 2014 (ADAMS Accession Nos. ML13024A411 and ML14259A336 respectively). After reviewing your responses, further questions have arisen that require additional information and clarification. Please provide responses to the enclosed request for additional information within 30 days of the date of this letter.

In accordance with Title 10 of the *Code of Federal Regulations* (10 CFR), Section 50.30(b), "Oath or affirmation," you must execute your response in a signed original document under oath or affirmation. Your response must be submitted in accordance with 10 CFR 50.4, "Written communications." Information included in your response that is considered sensitive, or proprietary, that you seek to have withheld from the public, must be marked in accordance with 10 CFR 2.390, "Public inspections, exemptions, requests for withholding." Any information related to security should be submitted in accordance with 10 CFR 73.21, "Protection of Safeguards Information: Performance Requirements." Following receipt of the additional information, we will continue our evaluation of your amendment request.

If you have any questions about this review, or if you need additional time to respond to this request, please contact me at (301) 415-1404, or by electronic mail at Xiaosong.Yin@nrc.gov

Sincerely,

/RA/

Xiaosong Yin, Project Manager
Research and Test Reactors Licensing Branch
Division of Policy and Rulemaking
Office of Nuclear Reactor Regulation

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

Enclosure:
As stated

cc: w/enclosure: See next page

If you have any questions about this review, or if you need additional time to respond to this request, please contact me at (301) 415-1404, or by electronic mail at Xiaosong.Yin@nrc.gov.

Sincerely,

/RA/

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Division of Policy and Rulemaking
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Docket No. 50-005
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Enclosure:
As stated

cc: w/enclosure: See next page

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ADAMS Accession No.: ML16188A393; *concurred via e-mail **NRR-088**

OFFICE	DPR/PRLB/PM	DPR/PRLB/LA*	DPR/PRLB/BC	DPR/PRLB/PM
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Test, Research, and Training
Reactor Newsletter
University of Florida
202 Nuclear Sciences Center
Gainesville, FL 32611

Mark A. Trump
Associate Director for Operations
Breazeale Nuclear Reactor
Radiation Science and Engineering Center
Pennsylvania State University
University Park, PA 16802

OFFICE OF NUCLEAR REACTOR REGULATION

REQUEST FOR ADDITIONAL INFORMATION

REGARDING PRELIMINARY SAFETY ANALYSIS REPORT

FOR THE PENNSYLVANIS STATE UNIVERSITY

BREAZEALE REACTOR

LICENSE NO. R-2; DOCKET NO. 50-005

The U.S. Nuclear Regulatory Commission is continuing its review of your amendment request regarding the reactor bay ventilation system upgrade which impacts the license technical specifications (TSs). During our review, we requested additional information regarding your application by letters dated November 21, 2012 and April 1, 2014 (Agencywide Documents Access and Management System (ADAMS) Accession Nos. ML12284A197 and ML14036A319 respectively), and subsequently, you responded by letters dated January 7, 2013 and September 19, 2014 (ADAMS Accession Nos. ML13024A411 and ML14259A336 respectively). After reviewing your responses, further questions have arisen that require additional information and clarification. Please provide responses to the enclosed request for additional information (RAI) within 30 days of the date of this letter.

1. The regulations in Title 10 of the Code of Federal Regulations (10 CFR) Part 20, "Standards for Protection Against Radiation," contains restrictions on occupational and public doses. The NUREG-1537, Part 1, "Guidelines for Preparing and Reviewing Applications for the Licensing of Non-Power Reactors: Format and Content," Section 13.2, "Accident Analysis and Determination of Consequences," states, in part, "the analyses and determination of consequences of the limiting events should be as quantitative as possible."

   The response to RAI No. 2, you provided in your letter dated September 19, 2014, question 3, you cited various sources, i.e., NUREG, ICRP, NCRP, and other RTR facility, etc., to conclude that "Any additional calculation using reduced flow rates is bounded by the existing MHA, so further calculations are unnecessary to evaluate the impact of the release on the health and safety of the public." Although the dose consequences to the health and safety of the public might be low as from the cited sources in the request however, none of the citations is quantitative and it is not specifically applicable to Penn State facility. The scenario proposed in the request, i.e., operating reactor without any exhaust fans for an extended period of time, will result in a ground release dispersion scenario as in your response. While it is true that the filtration provided by emergency exhaust system is not credited for Penn State's existing maximum hypothetical accident analysis, the elevated or duct release is a part of the calculation to access for the radiological consequences.

   In addition, your current TS 3.7 e. (3), states "possible accident conditions in the experiment, SHALL be limited in activity such that the airborne concentration of radioactivity averaged over a year SHALL NOT exceed the limit of Appendix B Table 2 of 10 CFR Part 20."

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Provide a quantitative calculation to support the conservative assumption you made and demonstrate that both the ground release and elevated dilution release are fully assessed and the radiological consequences from both of these releases meet the regulatory requirements. In addition, the calculation would confirm that TS 3.7 e. (3) requirement would not be compromised.

2. The regulations in 10 CFR Part 20 contains restrictions on occupational and public doses. The guidance in NUREG-1537, Part 1, Section 6, "Engineered Safety Features," states, in part, "The concept of ESFs evolved from the defense-in-depth philosophy of multiple layers of design features to prevent or mitigate the release of radioactive materials to the environment during accident conditions."

   Under your amendment proposal, the title of your TS Section 3.5, "Ventilation Systems," has been changed from the current TS 3.5, "Engineered Safety Features – Facility Exhaust System and Emergency Exhaust System," to the proposed "Ventilation Systems." By the proposal, it appears that the importance of engineered safety features, i.e., exhaust systems are designated as a part of the engineered safety features at your facility, has been removed.

   Provide technical justifications that by renaming TS 3.5, the effectiveness of reactor bay exhaust systems serving as engineered safety features is not reduced and/or changed.

3. The regulations in 10 CFR 50.36(c)(2) requires TSs to have limiting conditions for operation. The guidance in NUREG-1537, Part 1, Section 3.5, "Systems and Components," states, in part, "For non-power reactors, this section should include, at a minimum . . . reactor room ventilation . . .."

   a) Under your amendment proposal, a statement has been added to TS 3.5, Specification a., that states "With no operating exhaust fans, restore an exhaust fan to operation within 1 hour or shut down the reactor." This statement gives an impression that it is overwriting the requirement of the current TS 3.5, Specification a. that requires, "If the reactor is operating, at least one facility exhaust fan SHALL be operating . . ."

      Provide a well worded replacement, if the addition is necessary, of the added statement and designate it as TS, to remove any confusion or misunderstanding and ensure the requirement in current TS 3.5, Specification a., will not be compromised due to this added statement.

   b) Under your amendment proposal, a statement has been added to TS 3.5, Specification b., that states, "With no operating exhaust fans or discovery of an inoperable emergency exhaust system, complete the movement in progress then cease all further movement until compliance with 3.5.b is restored." This statement gives an impression that it is overwriting the requirement of the current TS 3.5, Specification b., that requires "If irradiated fuel or a fueled experiment with significant fission product inventory is being moved outside containers, . . ., at least one facility exhaust fan SHALL be operating and all emergency exhaust system SHALL be operable."

Provide a well worded replacement, if the addition is necessary, of the added statement and designate it as TS, to remove any confusion or misunderstanding to ensure the requirement in current TS 3.5, Specification b., will not be compromised due to this added statement.

4. The regulations in 10 CFR 50.36(c)(2) requires TSs to have limiting conditions for operation. The guidance in NUREG-1537, Part 1, Section 9.4, "Communication Systems," states, "The discussions of communication systems should include the bases of any related technical specifications, including testing and surveillance."

   Under your amendment proposal, a statement has been added to TS 3.6.2, "Evacuation Alarm," Specification, that states, "With no operable evacuation alarm system, within 1 hour of discovery return the evacuation alarm to operation or verify that an evacuation can be initiated using the facility announcement system or other audible alarm. The use of an alternate alarm shall not exceed a period of 30 days." This statement gives an impression that it is overwriting the requirement of the current TS 3.6.2, that requires "The reactor SHALL NOT be operated unless the evacuation alarm is operable and audible . . ."

   Provide a well worded replacement, if the addition is necessary, of the added statement and designate it as TS, to remove any confusion or misunderstanding and ensure the requirement in current TS 3.6.2 will not be compromised due to this added statement.