



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

May 19, 2020

Dr. Wei Ji, Facility Director  
RPI Critical Experiments Facility  
Rensselaer Polytechnic Institute  
JEC room 5040  
110 8th Street  
Troy, NY 12180-3590

SUBJECT: RENSSELAER POLYTECHNIC INSTITUTE – REQUEST FOR ADDITIONAL  
INFORMATION RE: LICENSE AMENDMENT REQUEST FOR MODIFICATION  
TO THE RESTRICTED AND EXCLUSION AREAS FOR THE RENEWED  
FACILITY OPERATING LICENSE NO. CX-22 (EPID: L-2019-LLA-0254)

Dear Dr. Ji:

By letter dated July 11, 2019 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML19205A066), as supplemented by letter dated February 20, 2020 (ADAMS Accession No. ML20057D420), the Rensselaer Polytechnic Institute (RPI) submitted a license amendment request (LAR) for the RPI Critical Experiments Facility. The proposed LAR would modify the RPI's technical specifications regarding its restricted and exclusion areas.

The U.S. Nuclear Regulatory Commission (NRC) staff identified additional information needed to continue its review of the LAR, as described in the enclosed request for additional information (RAI). As discussed by telephone on May 12, 2020, provide a response to the RAI or a written request for additional time to respond, including the proposed response date and a brief explanation of the reason, by June 19, 2020. Following receipt of the complete response to the RAI, the NRC staff will continue its review of the LAR.

The response to the RAI must be submitted in accordance with Title 10 of the *Code of Federal Regulations* (10 CFR) 50.4, "Written communications," and pursuant to 10 CFR 50.30(b), "Oath or affirmation," be executed in a signed original document under oath or affirmation. Information included in the response that you consider sensitive or proprietary, and seek to have withheld from public disclosure, must be marked in accordance with 10 CFR 2.390, "Public inspections, exemptions, requests for withholding." Any information related to safeguards should be submitted in accordance with 10 CFR 73.21, "Protection of Safeguards Information: Performance Requirements."

Based on the response date provided above, the NRC staff expects to complete its review and make a final determination on the license amendment by April 9, 2021. This date could change due to several factors including a need for further RAIs, unanticipated changes to the scope of the review, unsolicited supplements to the application for amendment, and others. This date can also be reduced by providing prompt response to RAIs.

If the forecasted date changes, the NRC staff will notify you in writing of the new date and an explanation of the reason for the change. In the case that the NRC staff requires additional information beyond that provided in the response to this RAI, the NRC staff will request that information by separate correspondence.

If you have any questions, please contact me at (301) 415-1404, or by electronic mail at [Xiaosong.Yin@nrc.gov](mailto:Xiaosong.Yin@nrc.gov).

Sincerely,

**/RA/**

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. 50-225  
License No. CX-22

Enclosure:  
As stated

cc: See next page

Rensselaer Polytechnic Institute

Docket No. 50-225

cc:

Mayor of the City of Schenectady  
Schenectady City Hall  
105 Jay St.  
Schenectady, NY 12305

Dr. Shekhar Garde  
Dean, School of Engineering  
Rensselaer Polytechnic Institute  
110 8<sup>th</sup> Street  
Troy, NY 12180-3590

Reactor Operations Supervisor  
Rensselaer Polytechnic Institute  
JEC Room 2049  
Department of Mechanical Aerospace  
and Nuclear Engineering  
110 8<sup>th</sup> Street  
Troy, NY 12180-3590

Chief, Radiation Section  
Division of Environmental Remediation  
NY State Dept. of Environmental  
Conservation  
625 Broadway  
Albany, NY 12233-7255

Radiation Safety Officer  
Rensselaer Polytechnic Institute  
21 Union Street  
Gurley Building 2nd Floor  
Troy, NY 12180

RCF Supervisor  
Rensselaer Polytechnic Institute  
NES Building, Room 1-10,  
MANE Department  
110 8<sup>th</sup> St.  
Troy, NY 12180

Annette Chism, Director EH&S  
Rensselaer Polytechnic Institute  
21 Union Street  
Gurley Building 2nd Floor  
Troy, NY 12180

State Liaison Officer Designee  
Senior Project Manager  
Radioactive Waste Policy and Nuclear  
Coordination  
New York State Energy Research &  
Development Authority  
17 Columbia Circle  
Albany, NY 12203-6399

Test, Research, and Training  
Reactor Newsletter  
Attention: Ms. Amber Johnson  
Dept of Materials Science and Engineering  
University of Maryland  
4418 Stadium Drive  
College Road, MD 20742-2115

SUBJECT: RENSSELAER POLYTECHNIC INSTITUTE – REQUEST FOR ADDITIONAL  
INFORMATION RE: LICENSE AMENDMENT REQUEST FOR MODIFICATION  
TO THE RESTRICTED AND EXCLUSION AREAS FOR THE RENEWED  
FACILITY OPERATING LICENSE NO. CX-22 (EPID: L-2019-LLA-0254)  
DATE: MAY 19, 2020

**DISTRIBUTION:**

PUBLIC	DANU R/F	GCasto, NRR
NParker, NRR	XYin, NRR	WKennedy, NRR
MTakacs, NRR	BSmith, NRR	

ADAMS Accession No. ML20135H159

\*concurred via email

NRR-088

OFFICE	NRR/DANU/UNPL/PM*	NRR/DANU/UNPL/LA*	NRR/DANU/UNPL/BC*	NRR/DANU/UNPL/PM*
NAME	XYin	NParker/wcomments	GCasto	XYin
DATE	5/18/2020	5/18/2020	5/19/2020	5/19/2020

OFFICIAL RECORD COPY

OFFICE OF NUCLEAR REACTOR REGULATION

REQUEST FOR ADDITIONAL INFORMATION

REGARDING AMENDMENT TO

FACILITY OPERATING LICENSE NO. CX-22

RENSSELAER POLYTECHNIC INSTITUTE

CRITICAL EXPERIMENTS FACILITY

DOCKET NO. 50-225

The U.S. Nuclear Regulatory Commission (NRC) staff reviewed the license amendment request (LAR), for compliance with the appropriate regulations in Title 10 of the *Code of Federal Regulations* (10 CFR). Based on its review, the NRC staff requires the following additional information to continue its review of the LAR.

**RAI 1**

**Requirement**

10 CFR 20.1301, "Dose limits for individual members of the public," paragraph (a)(1) requires that the total effective dose equivalent (TEDE) to individual members of the public from the licensed operation does not exceed 0.1 rem (1 millisievert (mSv)) in a year.

10 CFR 20.1301(a)(2) requires that the dose in any unrestricted area from external sources, excluding of the dose contributions from patients administered radioactive material and released in accordance with 10 CFR 35.75, "Release of individuals containing unsealed byproduct material or implants containing byproduct material," does not exceed 0.002 rem (0.02 mSv) in any one hour.

**Background**

In the LAR, the licensee specifies changes to the locations of the restricted and exclusion area boundary fences. The licensee specifies that the technical specifications (TSs) are being changed to specify that the inner fence (restricted area boundary) is more than 28 feet from the center of the reactor and that the outer fence (exclusion area boundary) is more than 35 feet from the center of the reactor. At various places in the LAR the licensee specifies that the closest location the inner fence is located to the reactor is the south fence which is located at 28.3 feet from the reactor center. However, in the supplemental letter, Appendix 1B, "Safety Analysis of Fence Line Reconfiguration," states that the west side of the facility has the highest dose rate because of an area of lower density concrete on the west side of the building. However, it states that the fence on the west side has been moved farther from its original location and that the highest dose rate in an area where the fence has moved closer to the reactor is along south side fence, which the licensee specifies it is considered to be limiting. The NRC staff notes however, that the revised TS would allow the outer fence to be as near as 35 feet from the reactor center on all sides and the inner fence to be as near as 28 feet from the reactor center at all sides.

Enclosure

Appendix 1B also indicates that the south side fence is being changed from 45 feet to 35 feet (which is inconsistent with information provided elsewhere in the LAR which indicates that the distance is 28.3 feet) and that the dose rate at maximum power was calculated at 45 feet to be 1.15 millirem per hour (mrem/hour) and was then extrapolated to 35 feet using the inverse square law to be 1.9 mrem/hour. The licensee indicates that this dose rate is acceptable because the inner fence location is used to ensure the dose rate to members of the public does not exceed 2 mrem/hour.

Using the inverse square law, if the maximum dose rate 35 feet south of the building is 1.9 mrem/hour the dose rate at just over 28 feet (which is the distance specified in the TS and elsewhere in the LAR), would be expected to be greater than 2.9 mrem/hour.

Based on the above, it is unclear that the dose to members of the public will be appropriately controlled, in accordance with 10 CFR 20.1301.

**Provide the following information:**

1. Clarify the distance of the south side inner fence from the reactor center.
2. Clarify the dose rate at the south side inner fence at the nearest distance allowed by the TSs (more than 28 feet from the reactor center), at maximum power. Explain how this dose rate was determined (specify survey information used, assumptions made for extrapolation, etc) and explain why assumptions made are acceptable.
3. Explain why the inverse square law for calculation of dose at a distance from radiation sources is appropriate for determining a reasonable maximum dose rate and annual dose for members of the public during full power operations at the highest rated power for the reactor.
4. While the licensee indicates that the south side fence is the closest to the reactor center, the licensee indicates that the dose rate on the west side are highest and the proposed TS allows for the inner fence on all sides to be any distance more than 28 feet from the center of the reactor and the outer fence to be more than 35 feet from the center of the reactor. Provide information demonstrating that the dose limits in 10 CFR 20.1301 will be met if all fences are at the nearest distance allowed by the TSs or revise the TSs, as appropriate. As part of this response, provide information assuring that the dose rate in all unrestricted areas does not exceed 0.002 rem (0.02 millisievert) in any one hour, to ensure that the requirement in 10 CFR 20.1301(a)(2) are met.

**RAI 2**

**Requirement**

10 CFR 20.1301(a)(1) requires that the TEDE to individual members of the public from the licensed operation does not exceed 0.1 rem (1 mSv) in a year.

**Background**

The licensee provided radiological soil sample data in Appendix 3 in the supplemental letter to show that there is no significant risk to the public and the environment from moving the fences, however, it is unclear that the data provides useful information. The soil samples appear to be taken mostly near the location of the old outer fence line and the radionuclides analyzed do not appear to include any of the radionuclides commonly associated with nuclear fission (such as Cesium-137, Strontium-90, or Iodine-131).

Therefore, it is unclear to NRC staff that the data provided demonstrates that radioactive materials released from the reactor have been and will be acceptable to justify that area should be no longer restricted from public unlimited access.

**Provide the following information:**

Explain how the data provided demonstrates that releases have been and will be acceptable to support the approval of this amendment.

**RAI 3**

**Regulation**

10 CFR 20.1301(a)(1) requires that the TEDE to individual members of the public from the licensed operation does not exceed 0.1 rem (1 mSv) in a year.

**Background**

The licensee indicates that fence relocation does not affect the dose estimates for the maximum hypothetical accident (a release of radioactive material from an encapsulated experiment), because the release would be airborne and would escape the site.

**Provide the following information:**

Provide justification for the conclusions in your supplemental letter that a release would escape the site and that the changes to fence locations does not result in increased accident doses due to effluents (e.g. an analysis was previously performed that demonstrates this).