July 19, 2011

Mr. Peter F. Caracappa
Radiation Safety Officer
Rensselaer Polytechnic Institute
110 8th Street
Troy, NY 12180-3590

SUBJECT: REQUEST FOR ADDITIONAL INFORMATION REGARDING RENSSELEAR POLYTECHNIC INSTITUTE NEW PART 70 LICENSE APPLICATION (TAC NO. L33128)

Dear Mr. Caracappa:

Rensselear Polytechnic Institute's (RPI) application for a special nuclear materials license is currently undergoing a detailed review by the U.S. Nuclear Regulatory Commission's (NRC's) staff. The application was transmitted by letter, dated March 4, 2011, (Agencywide Documents Access and Management System [ADAMS] Accession Number ML110610468); and accepted by our letter dated May 3, 2011. Our review of RPI's application has identified that additional information is needed before any action can be taken on your submittal. The staff identified a Request for Additional Information (RAI) in the areas of radiation protection, fire safety and nuclear criticality safety. This application is considered a major licensing action and is possible that more than one round of RAIs may be needed to complete the staff's technical review.

The additional information, specified in the enclosure, should be provided within 30 days from the date of this letter.

Pending additional information, which answers the RAI, we anticipate completing our review by October 2012. This date could change depending on the findings of our technical review, urgent assignments, or other factors. We will promptly communicate any significant changes to this schedule.

In accordance with Title 10 of the *Code of Federal Regulations* 2.390 of the NRC's "Rules of Practice," a copy of this letter will be available electronically for public inspection in the NRC Public Document Room or from the Publically Available Records System component of the NRC's document system Agencywide Documents Access and Management System [ADAMS]). ADAMS is accessible from the NRC Web site at http://www.nrc.gov/reading-rm/adams.html.

Please reference the subject Technical Assignment Control No. (TAC NO. L33128) in future correspondence related to this request. If you have any questions regarding this matter, please contact me at 301-492-3172 or via e-mail to Marilyn.Diaz@nrc.gov.

Sincerely,

/RA/

Marilyn Diaz, Project Manager
Fuel Manufacturing Branch
Division of Fuel Cycle Safety
and Safeguards
Office of Nuclear Material Safety
and Safeguards

Docket No. 70-7025

Enclosure:
Request for Additional Information

Please reference the subject Technical Assignment Control No. (TAC NO. L33128) in future correspondence related to this request. If you have any questions regarding this matter, please contact me at 301-492-3172 or via e-mail to Marilyn.Diaz@nrc.gov.

Sincerely,

/RA/

Marilyn Diaz, Project Manager
Fuel Manufacturing Branch
Division of Fuel Cycle Safety
and Safeguards
Office of Nuclear Material Safety
and Safeguards

Docket No. 70-7025

Enclosure:
Request for Additional Information

DISTRIBUTION:
FMB r/f

ML111820354

OFFICE	NMSS/FCSS/FMB	NMSS/FCSS/FMB	NMSS/FCSS/FMB
NAME	MDiaz (RThompson for)	LAllen	RJohnson
DATE	07/13/11	07/18/11	07/19/11

OFFICIAL RECORD COPY

REQUEST FOR ADDITIONAL INFORMATION
RENSSELEAR POLYTECHNIC INSTITUTE
NEW PART 70 LICENSE APPLICATION

Please provide the following information:

Radiation Protection

1. Section 6.III, Measuring and Monitoring Devices, paragraph 3 mentions the calibration of radiation detection systems. Typically, calibration of instruments is performed using standards that are traceable to the National Institute of Standards and Technology. Please clarify if this is the practice at Rensselear Polytechnic Institute (RPI). This is needed to assure adequate procedures consistent with Title 10 of the *Code of Federal Regulations* (10 CFR) 70.22(a)(8).

2. Section 7.I states the procedures applied at the RPI facility. Describe the contamination monitoring procedures with respect to storage of the fuel pins and personnel handling of special nuclear material (SNM). Also state what action guidelines are used for contamination monitoring as well as for release of materials from restricted areas. This is needed to assure adequate procedures consistent with 10 CFR 70.22(a)(8) and 20.1501.

3. Also, with regards to Section 7.1, describe the internal exposure assessment procedures that will be utilized should there be a release of SNM. This is needed to assure adequate procedures consistent with 10 CFR 70.22(a)(8) and 20.1204.

4. Verify that the integrity of the fuel pins should not be compromised as a result of the operations described and that there is no expected release of SNM. This is needed to assure adequate procedures are in use consistent with 10 CFR 70.22(a)(8).

5. How does RPI plan to transport the fuel pins from the Walthouse Laboratory to the linear accelerator (LINAC) laboratory? This is needed to assure adequate transportation and security procedures per 10 CFR 70.22(a)(8) and 20.1802.

6. Verify that the New York License No. 1035 allows possession of low-level SNM contaminated waste. This is needed to assure adequate procedures per 10 CFR 70.22(a)(8).

Nuclear Criticality Safety (NCS)

1. Demonstrate subcriticality for the 64 special power excursion reactor test (SPERT) F-1 fuel pins under normal and credible abnormal conditions, including fuel damage and possible

moderation. Demonstrate compliance with the double contingency principle with regard to the handling, storage, and use of these materials. Among other credible scenarios, address the following:

a. Demonstrate compliance with double contingency for the scenario involving the accidental introduction of materials other than, or in quantities exceeding, those covered by your license application.

b. Demonstrate compliance with double contingency for the scenario in which the fissionable material is rearranged (e.g., mechanically deforming the fuel pins, breaching the clad and spilling the pellets) into a more reactive configuration.

Title 10 of the *Code of Federal Regulations* 70.22(a)(7) and (a)(8) require a description of equipment and facilities and proposed procedures to protect health and minimize danger to life or property, which includes avoiding accidental criticality. This information is needed to ensure adequate protection against the consequences of accidental criticality.

2. State whether the basis for subcriticality relies on explicit criticality calculations. If the basis does rely on calculation, submit a criticality code validation. State and justify your maximum allowable calculated k_{eff} value, including the use of an appropriate minimum margin of subcriticality. Title 10 of the *Code of Federal Regulations* 70.22(a)(7) and (a)(8) require a description of equipment and facilities and proposed procedures to protect health and minimize danger to life or property, which includes avoiding accidental criticality. This information is needed to ensure adequate protection against the consequences of accidental criticality.

3. Justify the most reactive credible moderation and reflection conditions used in your criticality calculations. Since lead can be a more effective reflector than water under certain conditions, if your calculations involve lead, show that this material is within the area of applicability of your calculation. Title 10 of the *Code of Federal Regulations* 70.22(a)(7) and (a)(8) require a description of equipment and facilities and proposed procedures to protect health and minimize danger to life or property, which includes avoiding accidental criticality. This information is needed to ensure adequate protection against the consequences of accidental criticality.

4. Demonstrate subcriticality for the interaction of the 64 SPERT F-1 fuel pins with any additional SNM present in your LINAC facility. You stated in your application that your inventory includes several plutonium-beryllium sources and other enriched uranium, in addition to the 64 SPERT F-1 fuel pins covered by your license application. You also stated that your license application will not cover these additional materials. However, the neutron interaction of these materials with the SPERT pins needs to be addressed. Title 10 of the *Code of Federal Regulations* 70.22(a)(7) and (a)(8) require a description of equipment and facilities and proposed procedures to protect health and minimize danger to life or property,

facilities and proposed procedures to protect health and minimize danger to life or property, which includes avoiding accidental criticality. This information is needed to ensure adequate protection against the consequences of accidental criticality.

5. Provide a commitment in your license application that all individuals handling, or having responsibility and oversight for the safe handling, storage, and use of the SPERT F-1 fuel pins, shall receive prior training in nuclear critically training. While the education and experience requirements appear appropriate, there is no mention of NCS in the training program described in your license application. Title 10 of the *Code of Federal Regulations* 70.22(a)(7) and (a)(8) require a description of proposed procedures to protect health and minimize danger to life or property, which includes avoiding accidental criticality. This information is needed to ensure adequate protection against the consequences of accidental criticality.

6. Clarify whether your area radiation monitors will meet the requirements of 10 CFR 70.24, and whether you commit to follow American National Standard Institute/American Nuclear Society-8.3-1997. Provide commitments in your license application describing how you will meet 10 CFR 70.24, or provide a request for exemption from the requirements of 10 CFR 70.24 in accordance with 10 CFR 70.17. Title 10 of the *Code of Federal Regulations* 70.24(a) requires the installation and maintenance of a criticality monitoring system in all areas when in possession of specified quantities of fissionable materials. Your requested possession limits exceed the quantities specified in 10 CFR 70.24(a).

7. Clarify whether the LINAC facility contains water-based fire suppression systems. If so, address the possible moderation of the 64 SPERT F-1 fuel rods following activation of the fire suppression system. Title 10 of the *Code of Federal Regulations* 70.22(a)(7) and (a)(8) require a description of equipment and facilities and proposed procedures to protect health and minimize danger to life or property, which includes avoiding accidental criticality. This information is needed to ensure adequate protection against the consequences of accidental criticality.

8. Describe the elements of your facility program(s) for ensuring NCS, including training, periodic audits and inspections, your evaluation and change review process, and the staff that will perform these duties. Title 10 of the *Code of Federal Regulations* 70.22(a)(7) and (a)(8) require a description of proposed procedures to protect health and minimize danger to life or property, which includes avoiding accidental criticality. This information is needed to ensure adequate protection against the consequences of accidental criticality.

9. Provide a description of the NCS controls and limits that ensure subcriticality under normal and credible abnormal conditions, and the measures that will be used to ensure that these controls will be available and reliable to perform their safety function(s) when needed. Title 10 of the *Code of Federal Regulations* 70.22(a)(7) and (a)(8) require a description of equipment and facilities and proposed procedures to protect health and minimize danger to

life or property, which includes avoiding accidental criticality. This information is needed to ensure adequate protection against the consequences of accidental criticality.

Fire Safety

1. Describe the facility's floor, ceiling, and roof construction; electrical installation; emergency lighting; life safety/egress routes; ventilation and lightning protection. This information is pursuant to the requirements in 10 CFR 70.22(a)(7) and the acceptance criteria found in NUREG-1520, Rev. 1, Section 7.4.3.

2. What nationally recognized codes does the Life Safety Shop follow for the inspection, testing, and maintenance of fire protection systems present in the LINAC Laboratory Facility? If none, please describe frequencies. This information is pursuant to the requirements in 10 CFR 70.22(a)(7) and the acceptance criteria found in NUREG-1520, Rev. 1, Section 7.4.3.

3. Describe, by fire area (room), any potential combustible loading, possible fire scenarios, the potential consequences, and any mitigative controls. This information is pursuant to the requirements in 10 CFR 70.22(a)(7) and the acceptance criteria found in NUREG-1520, Rev. 1, Section 7.4.3.

4. Are there any hazardous chemicals or processes which may contribute to the fire hazards in radiological areas? This information is pursuant to the requirements in 10 CFR 70.22(a)(7) and the acceptance criteria found in NUREG-1520, Rev. 1, Section 7.4.3.

5. Is the facility compliant with the National Fire Protection Agency (NFPA) 45, Standard for Fire Protection in Laboratory Facilities, and/or NFPA 801, Standard for Fire Protection for Facilities Handling Radioactive Materials? This information is pursuant to the requirements in 10 CFR 70.22(a)(7) and the acceptance criteria found in NUREG-1520, Rev. 1, Section 7.4.3.

6. Describe the frequency and scope of any training for facility workers in response to a fire (fire extinguisher, safe shutdown, evacuation, etc.). This information is pursuant to the requirements in 10 CFR 70.22(a)(8) and the acceptance criteria found in NUREG-1520, Rev. 1, Section 7.4.3.