



Rensselaer

L. DAVID WALTHOUSEN LABORATORY
REACTOR CRITICAL FACILITY

RCF 18-01
March 29, 2018

U.S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, DC 20555

Re: Operations Report for the Rensselaer Polytechnic Institute Reactor Critical Facility, NRC License CX-22, Docket Number 50-225.

To Whom It May Concern:

This document constitutes the Calendar Year 2017 Operations Report of the RPI Reactor Critical Facility to the USNRC and to Rensselaer management.

The Reactor Critical Facility (RCF) operated successfully during calendar year 2017. The RCF was used for one laboratory course and two introductory courses in the Nuclear Engineering curricula. The facility staff trained two new Senior Reactor Operators, one of whom passed an NRC licensing exam conducted in February 2017. The other individual passed the licensing exam conducted in November 2017.

Students from Vermont Technical College carried out experiments similar to those performed in the laboratory course.

Researchers from Los Alamos National Laboratory and Institut de Radioprotection et de Sûreté Nucléaire collected data with multiple He3 detectors in several critical and subcritical configurations.

Tours and presentations were provided to attendees at the 2017 Emergency Responder Symposium held at the local NY Air National Guard Base, to participants in the Naval Nuclear Laboratory Engineering Leadership Development Program and to local members of the American Society for Non-destructive Testing.

A new experiment was installed in June 2017. A heated water loop has been installed in the center of the reactor core, so that water of up to about 80 C can be pumped through at various speeds to record reactivity worth and reaction times. The data from these experiments is intended to supply benchmark data for coupled multi-physics reactor codes.

Work proceeded on critical experiments with the 0.640 pitch lattice plates. Critical measurements were performed with 333-pin and 408-pin configurations. Some subcritical measurements were conducted with fewer pins. The SPERT(F1) fuel is 4.81 w/o enriched high density UO₂ pellet fuel clad in stainless steel, so it is similar to power plant reactor fuel. The RCF is now the only facility in the U.S. carrying out reactor physics critical experiments in support of the power reactor function. These experiments are similar to power reactor startup measurements.

A NRC inspection was performed in August 2017. NRC findings have been reported in other correspondence.

Training and proficiency requirements for all licensed operators have been reviewed and are current.

The Nuclear Safety Review Board members remain the same.

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The Technical Specifications, App. A to USNRC License CX-22 require reporting the following operational items:

1. Changes to facility design: The NEUP experiment installed in June 2017 requires 408 fuel pins.
2. Significant maintenance, repairs or other work performed on RCF systems: New gears were installed in the rod drive system for control rod 7. The facility ventilation stack was replaced with a "mushroom cap" design.
3. Changes in operating procedures which relate to the safety of RCF operations: None
4. Surveillance checks, tests, and calibrations were conducted and logged as required. The results were satisfactory. On May 31, 2017 an emergency preparedness drill was conducted at the RCF.
5. Changes, tests or experiments requiring authorization from the USNRC under 10CFR50.59 a or b: None
6. Calculated integrated thermal power: Approximately 114.6×10^{-3} kw-hr for all of 2017.
7. There were no unplanned scrams in the report interval.
8. Maintenance operations were carried out and logged with satisfactory results.
9. There were no discharges of radioactive effluents.
10. Environmental monitor dosimetry is performed at the exclusion area fence (EM1 through EM4), and at the site boundary fence (EM5 and EM6). The environmental monitoring results are reported without background subtraction, and the accumulated dose to an off-site control monitor is reported separately. The sum of the quarterly control readings from 2017 was 126 mrem. The sums of the gross readings and net dose results for 2017 are:

	Gross	Net
EM1	124 mrem	0 mrem
EM2	132 mrem	6 mrem
EM3	118 mrem	0 mrem
EM4	114 mrem	0 mrem
EM5	111 mrem	0 mrem
EM6	131 mrem	5 mrem

11. A total of 5 personnel monitoring badges recorded an accumulated dose greater than the minimum reportable dose of 10 mrem in at least one quarter of 2017, for a total collective dose of 87 mrem.

Sincerely,



Dr. Peter Caracappa, Director
RPI Reactor Critical Facility

Cc:

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