Rensselaer | DEPARTMENT OF MECHANICAL, AEROSPACE, AND NUCLEAR ENGINEERING

RCF 13-01
March 14, 2013

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 2012 (CY2012) Operation Report of the Rensselaer Polytechnic Institute (RPI) Reactor Critical Facility (RCF) to the U.S. Nuclear Regulatory Commission (NRC) and the RPI management.

The RCF operated successfully during CY2012. The RCF was used for one laboratory course and supported an introductory course in the Nuclear Engineering. Also facility tours were provided to officer candidates from the West Point Military academy and members of the local American Nuclear Society. The work during the year essentially supported the laboratory course and training of students.

Work proceeded on critical experiments with the 0.640" pitch lattice plates. Critical measurements were performed with the 326-pin configurations. Some subcritical experiments were also conducted with fewer pins. The core configuration remained same as in 2011. This is the configuration with Zircaloy slab reflectors. (In 2007 the Reactor Critical Facility obtained several slabs of zircaloy from the U.S. Department of Energy. A critical benchmark project using the slabs as radial reflectors was designed. The mounting hardware to position the reflectors within the reactor tank was manufactured. The benchmark test program was terminated in January 2008, to support Laboratory course for students. To continue the benchmark studies the core with zircaloy was loaded as a new core in 2011. Several experiments required to characterize the core as a "Known" core in accordance with the RCF Technical specifications were performed.)The SPERT (F1) fuel, used is 4.81 w/o enriched high density UO_2 pellet fuel clad in stainless steel, so it is similar to power plant reactor fuel. These experiments have been designed to be similar to power reactor startup measurements.

An NRC inspection was performed in September 2012. NRC findings have been reported in other correspondence. Based on the results of that inspection, no safety concerns or non-compliances with NRC requirements are identified. A deficiency (Level IV violation) was found in the Emergency Preparedness maintenance, involving notification of emergency support groups. This was addressed in separate correspondence to NRC. Corrective steps were taken and reported. Other items of inspection were documented in separate correspondence.

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Training and proficiency requirements for all licensed operators have been reviewed and are current. Total staffing on December 31, 2012 is seven licensed Senior Reactor Operators with three individuals passing their licensing examinations in November 2012.

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

1. Changes to the facility design: None.
2. Significant Maintenance, repairs, or other work performed on RCF systems:
   New wiring for the reactor neutron detectors was installed and will be connected to the detectors as time permits. A new BF3 detector was installed to replace one that was erratic.
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.
5. Changes, tests, or experiments requiring authorization from the USNRC under 10CFR50.59 (a) or (b): None.
6. Staff Changes during CY 2012: None
7. Changes to Nuclear Safety Review Board during 2012:
   An additional representative from RPI Public Safety, Ms. Leslie Norton was added to the NSRB. Attachment 1 shows the current members of NSRB
8. Calculated Thermal Power:
   Approximately 0.039 kwhr for all CY2012, far less than the 2 kwhr/yr limitation in the Technical Specifications. The April - June quarter recorded the highest usage at 0.024 kwhr.
9. We encountered a prolonged secured period from May 19th to September 1st. Initially, the shutdown was to load an experiment into the reactor core, which required disassembling a large portion of the core, and routine but typically unscheduled maintenance. Prior to operations, a TS required linear power channel picoammeter failed causing a continuous over scale scram. The unit was sent back to the original company it was purchased from for repairs. The problem was determined to be an intermittent -12V power supply, corrected and the device returned.
10. Maintenance operations were carried out and logged with satisfactory results.
11. The core moderator was discharged to the environment once during CY2012. Two samples of the moderator were analyzed for gross alpha/beta activity prior to the routine discharge. No activity above background was detected.
12. 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 2012 were 127 mrem. The sum of the gross and net dose results for 2012 are:

	Gross	Net
EM1:	106 mrem	0 mrem
EM2:	121 mrem	0 mrem
EM3:	115 mrem	0 mrem
EM4:	114 mrem	0 mrem
EM5:	112 mrem	0 mrem
EM6:	117 mrem	0 mrem

13. Three quarterly personnel monitoring badges, for three different individuals, reported an accumulated dose above the minimum detectable dose of 10 mrem per quarter. All other personnel badges recorded a dose below the minimum detectable dose. The reported collective dose to the facility staff was 35 mrem for 2012.

Sincerely,

Sastry R Sreepada

Dr. Sastry Sreepada, Director
RPI Reactor Critical Facility

Cc:

Dr. David V. Rosowsky Dean of Engineering	Dr. Suvranu De, Chairman MANE	Dr.George Xu, Head Nuclear Engineering Program
Dr. Yaron Danon Chairman RPI NSRB	Mr. Glenn Winters, Operations Supervisor, RPI RCF	Annette Chism, Director EH&S
Dr. Peter Caracappa RPI Radiation Safety Officer	Dr. Timothy Trumbull Adjunct Professor	Dr. Jason Thompson Senior Reactor Operator

Attachment: 1

Members of NSRB as of December 31, 2012:

1. Dr. Yaron Danon, Head NSRB
2. Dr. Peter Caracappa , RPI Radiation Safety Officer
3. Dr. Mark Embrechts
4. Dr. Tarek Abdoun (Associate Dean for Research)
5. Ms. Annette Chism, Director Environmental Health and Safety
6. Sergeant. Marcie DelVechhio (Public Safety)
7. Dr. Wei Ji
8. Dr. Bimal Malaviya
9. Dr. George Xu
10. Dr. Mike Podowski
11. Dr. Jason Thompson, RCF Operations Supervisor
12. Dr. Sastry Sreepada, Director RCF
13. Ms. Leslie Norton (Public Safety)
14. Dr. Timothy Trumbull (RCF)

Attachment #2 Updated list of RPI personnel and the mailing addresses.

1. Prof. Sastry Sreepada
   Director Reactor Critical Facility,
   Rensselaer Polytechnic Institute,
   Jonsson Engineering Center, Room 2032
   110 8th Street,
   Troy, NY 12180

2. Peter F. Caracappa, Ph.D, CHP
   Radiation Safety Officer,
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   110 8th street, Troy NY 12180-3590

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

4. Jason Thompson
   Reactor Operations Supervisor,
   NES Building, Room 1-10, Department of MANE
   Rensselaer Polytechnic Institute,
   110 8th street, Troy NY 12180

5. Dr. Yaron Danon
   Head NSRB
   NES Building, Room 1-10, Department of MANE
   Rensselaer Polytechnic Institute,
   110 8th street, Troy NY 12180