Rensselaer | DEPARTMENT OF MECHANICAL, AEROSPACE, AND NUCLEAR ENGINEERING

May 12, 2003

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

U.S. Department of Energy
NE-30
John Gutteridge
1000 Independence Avenue, SW
Washington, DC 20585

Re: Annual Report for the Rensselaer Polytechnic Institute Reactor Critical Facility (RCF)
NRC License CX-22
Docket Number 50-225

To Whom It May Concern:

The RPI Reactor Critical Facility (RCF) operated successfully over the period Fall 2002 – Spring 2003. Over the past year, the RCF was used for one course, and six credits of PhD thesis work. In addition, extensive upgrades to equipment were carried out. The facility re-licensing documentation was submitted to the NRC in November. This document constitutes the current Report of the Rensselaer Polytechnic Institute's Reactor Critical Facility (RCF) to the USNRC, USDOE, and to RPI administration.

Work proceeded on critical experiments with the 0.640 pitch lattice plates, the last of the three sets of lattice plates provided by USDOE contract. The SPERT(F1) fuel 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. The RCF is one of the few facilities 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 PhD thesis experiment is underway to measure the penetration of fission gammas through fuel pin lattices without water; the application is to above-ground cask storage of spent fuel and to fuel handling devices.

Work continues on upgrading the reactor instruments, circuits, readouts, and facilities. Most notably, the paper and ink strip chart recorders were replaced with new plasma screen units, where data can be viewed and saved electronically. The analog linear and log power instrumentation was replaced with new digital units.

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The RCF continued to share the facility with visiting groups, with a total to date of over one thousand individuals from participating organizations examining the RCF, operating it, and carryout out a reactor physics experiment. The visitors also learn about the radiological and nuclear safety of the reactor, its regulation by the USNRC and its relation to civilian, naval and research power reactors. A cumulative list of RCF Sharing events is attached (Attachment A).

Physical and procedural security upgrades to the facility are underway. RCF staff is working closely with RPI Public Safety to implement these plans.

License maintenance training for the RCF continues.

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

1. Changes to facility design: Instrumentation upgrades as described above.

2. Significant maintenance, repairs or other work performed on RCF systems as follows:
   a. 5/22/02 Continuous air monitoring system calibrated.
   b. 9/5/02, 9/19/02 Installation and testing of new nuclear instrumentation.
   c. 1/9/03 Installation and testing of new water heaters.
   d. 4/15/03 Sent out one area gamma monitor for maintenance.

3. Changes in operating procedures which relate to the safety of RCF operations: None, though changes to startup procedures will be made shortly to accommodate operation of new reactor instrumentation.

4. Surveillance checks, tests, and calibrations were conducted and logged as required. The results were satisfactory. On May 24, 2002, 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. Timothy Trumbull was Operations Supervisor through the end of the 2002 calendar year. Presently, Jonathan Stephens is the Operations Supervisor. Dr. Don Harris has been Director for the past year, though Glenn Winters is the new Director as of June 2003. The health physicist (formerly Dr. George Xu) is Dr. Chan Kim.

7. Calculated integrated thermal power: Approximately 0.02 kWh/yr, far less than the Tech Spec 3.1.10 limit of 200 kWh/yr.

8. There were 3 unplanned scrams in the report interval, occurring on 7/25/02, 8/20/02 and 10/3/02. In all cases, an unplanned scram was induced in LP2, apparently by an electrical transient. The LP2 scram was reset and no further problem occurred. The

LP2 instrument has since been replaced with a new digital instrument and chart recorder.

9. Maintenance operations were carried out and logged with satisfactory results.

10. The environmental monitoring program yielded the following summary of TLD doses taken at the exclusion area boundary and the site boundary for this report period: All were within limits.

Station	Dose (mRem)
1. Exclusion Area Boundary	Radiation Safety Office
2. Exclusion Area Boundary	"
3. Exclusion Area Boundary	"
4. Exclusion Area Boundary	"
5. Site Boundary	"
6. Site Boundary	"
7. Control (Public Safety Office)	"

11. Facility personnel exposures were all less than 100 mRem for the report period.

Sincerely,

Jonathan E. Stephens

Jonathan E. Stephens, Supervisor
RPI Reactor Critical Facility

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Attachment A

Reactor Sharing Events

September 1990 – May 2003

Date	Visitor	# of Students
09/29/90	Troy High School	30
03/06/91	U.S. Navy	6
04/16/92	U.S. Military Academy	11
05/01/91	U.S. Military Academy	13
05/08/91	Amsterdam High School	21
05/21/91	Troy High School	17
05/28/91	Burnt Hills High School	16
08/02/91	Oneonta	25
02/28/92	Adirondack Community College	9
03/04/92	Fulton Montgomery Comm. College	11
03/27/92	Amsterdam High School	15
05/12/92	Stillwater High School	14
05/12/92	Williams College	13
05/18/92	Guilderland High School	45
05/19/92	Guilderland High School	45
05/20/92	Guilderland High School	60
08/04/92	Oneonta	26
03/27/93	ANS North Eastern Student Conference	28
05/06/93	Vermont Tech	6
12/03/93	Adirondack Community College	28
05/06/93	Boy Scouts of America	25
05/03/94	Vermont Tech	9
05/05/94	State University of NY at Delhi	9
10/29/94	ANS Secondary School Teachers	35
03/02/95	Duanesburg Central School	45
03/03/95	Duanesburg Central School	38
05/05/95	Bethlehem Central High School	23
05/09/95	Vermont Tech	7
11/06/95	U.S. Military Academy	32
03/15/96	Schenectady Fire Department	25
05/07/96	Vermont Tech	9
03/03/97	Bethlehem Central High School	24
05/01/97	Vermont Tech	10
04/06/98	Albany Academy	6
05/05/98	Vermont Tech	8
05/12/98	Guilderland High School	92

05/13/98	Guilderland High School	85
09/06/00	Vermont Tech	9
10/28/01	RPI Group	5
05/29/01	Vermont Tech	9
11/06/01	Scout Troop	18
03/13/02	Emma Willard School	63
05/16/02	RPI Group	16
10/24/02	RPI Group	10
10/30/02	RPI Group	8
1/30/03	KAPL, Inc. / Naval Reactors	5
	Total to Date	1059