Rensselaer

Department of Environmental & Energy Engineering

March 12, 2001

U.S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, D.C. 20555-0001

Re: Annual Report of RPI Reactor Critical Facility
Docket No. 50-225
License No. CX-22

To Whom It May Concern:

The attached Annual Report for the RPI Reactor Critical Facility (RCF) for the period January 1 to December 31, 2000, is submitted for information in accordance with Technical Specification 6.5.1.

Sincerely,

Don Steiner

Don Steiner
Institute Professor and Department Chairman

DS:pz
Attachments

1. Annual Report
2. Letter to D. Steiner dated June 1, 2000, NRC Inspection Report No. 50-225/2000202 and notice of violation
3. Letter to Ledyard B. Marsh dated June 22, 2000, NRC Inspection Report No. 50-225/2000202 and notice of violation

cc: Director Region I, Office of Inspection and Enforcement
U.S. Nuclear Regulatory Commission
475 Allendale Road
King of Prussia, PA 19406

T. Dragoun
U.S. Nuclear Regulatory Commission
475 Allendale Road
King of Prussia, PA 19406

Jonsson Engineering Center (518) 276-6402 • Gaerttner Laboratory (518) 276-6406 • Nuclear Engineering Science Building (518) 276-6650
Rensselaer Polytechnic Institute • 110 8th Street • Troy, New York 12180-3590
Fax (518) 276-3055 (JEC), 4007 (GL), 4832 (NES)

A020

Annual Report of RPI Reactor Critical Facility, Calender Year 2000

Docket No. 50-225 License No. CX - 22

The Annual Report for the RPI Reactor Critical Facility (RCF) for the period January 1 to December 31, 2000 is submitted for information in accordance with Technical Specification 6.5.1.

At the beginning of the year 2000, the RCF was emerging from a period in which facility decommissioning had been pursued and then postponed after DOE notified RPI (on October 6, 1999) that DOE could not accept the fuel at any time in the immediate future. The current plan is to operate the reactor as a teaching facility for the indefinite future.

While decommissioning was being considered, facility operations were limited and no new operators were trained. Surveillance testing of reactor safety systems as required by the RCF Technical Specifications was also deferred. In November 1999 training of a new class of students was undertaken by the RCF Supervisor. From November 1999 through January 2000 the RCF was operated sufficiently to support the qualification of 3 new Senior Reactor Operators (SRO). Although attempts were made to complete overdue Surveillance Tests, not all were completed largely due to a succession of equipment problems. The routine biennial NRC Inspection of the RCF, which was performed in April of 2000, noted two violations which were identified in Reference (1). Actions and plans for the resolution of these violations by RPI were reported to the NRC in Reference (2).

The specific report information required by Technical Specification 6.5.1. is presented below.

a. Operations Summary

1. Changes to the facility design. There were no changes to the facility Design during the period March 1, 1999 to February 1, 2001.

2. Performance characteristics (e.g., equipment and fuel performance)
No problems with fuel elements were experienced. Due to the age of the facility, numerous equipment problems were experienced. See Item 6.d. below.

3. Changes in operating procedures which relate to the safety of facility operations. There have been no changes in operating procedures. A minor change was made in the surveillance test of dump valve operation. The data recorded during the test now includes the time lapse between initiating the dump and the first observable power decrease. For the present core the time lapse is 22 seconds which is well under the allowed value of one minute.

4. Results of surveillance tests and inspections required by the Technical Specifications. The results of Surveillance Tests are now recorded on data sheets. Test data for the period January 1, 2000 to December 31, 2000 are attached to the end of this report.

5. A brief summary of those changes, tests, and experiments which require authorization from the Comission pursuant to 10 CFR 50.59(a).

There were no changes, tests, or experiments that required authorization from the Comission pursuant to 10 CFR 50.59(a).

b.. Changes in the plant operating staff serving in the following positions:

(1) Facility Director;
Up to February 29, 2000 - Donald R. Harris
After March 1, 2000 - Frank H. DuBois

(2) Operations Supervisor;
No change - Timothy Trumbull continues

(3) Health Physicist (Radiation Safety Officer)
Up to April 30, 2000 - Xie (George) Xu
After May 1, 2000 - Robert Ryan (acting)

(4) Nuclear Safety Review Board Members - Spring 1999

D. Steiner, Chairman
J. C. Corelli
M. J. Embrechts
B. K. Malaviya
M.Z. Podowski
G. Xu
J. J. Butridge
A. Strollo, Dept. Public Safety
D. R. Harris, RCF Director
T. Trumbull, RCF Supervisor

Nuclear Safety Review Board Members - February 2001

D. Steiner, Chairman
J. C. Corelli
M. J. Embrechts
B. K. Malaviya
M.Z. Podowski
G. Xu
Jules Jacquin
Robert Ryan
A. Strollo
F. H. DuBois, RCF Director
T. Trumbull, RCF Supervisor

Robert Ryan is the Interim Radiation Safety Officer
Jules Jacquin is the Senior Director, Risk Management and Internal Auditing

c. Power Generation. *A tabulation of the integrated thermal power during the reporting period.* (The annual energy limit permitted by the Tech Spec. is 200 Kw-hours.)

An conservative estimate of the total thermal energy generated by reactor operations during the period 3/1/99 to 12/31/99 is .0029 Kw-hours. For the period 1/01/00 to 12/31/00 a conservative estimate the thermal energy produced by reactor operations is .00742 Kw-hours. See Table (1).

These data are conservative in the sense that the time interval used in the computation is the time from the initiation of rod withdrawal to the initiation of shutdown. During the majority of this time the actual power is less than the maximum value which is logged. However, the maximum logged power may not be conservative because the process of calibrating the power meter is a best estimate value not an upperlimit. Allowing a large conservative error in the power calibration (say a factor of 10) still yields annual energy production that is less than 0.10% of the 200 Kw-hour limit permitted by the tech. spec.

d. Shutdowns. *A tabulation of unscheduled shutdowns which have occurred during the reporting period, tabulated according to cause, and a brief discussion of the preventive action taken to prevent recurrence.*

10/06/99	Planned operations were aborted because the LP1 trip bisatable would not hold. After a transformer was replaced on 10/07, the instrument functioned normally.
11/09/99	A period scram occurred due to instrument noise on the lowest range.
11/29/99	A scram occurred to to operator error when the power range switch on LP1 was not upscaled as power increased during training operations.
01/16/00	Noise pulses on Log-Period instrument PP2 caused scrams during attempts to perform control rod drop timing. Reconfiguration of the ion chamber ground connection on 01/17/00 reduced the noise spikes.

e. Maintenance. *A tabulation of corrective maintenance (excluding preventive maintenance) performed during the reporting period on safety related sustems and components.*

Maintenance work is described in Table (2)

f. Changes Tests and Experiments. *A brief description and a summary of the safety evaluation for all changes, tests and experiments which were carried out without prior Commision approval pursuant to the requirements of 10 CFR 50.59(b).*

No facility changes, tests, or experiments were performed that were outside the scope of the existing facility liscense and Technical Specification.

g. Radioactive Effluents. *A summary of the nature, amount and maximum concentration of radioactive effluents released or discharged to the environs beyond the effective control of the licensee as measured at or prior to the point of such release or discharge.*

No radioactive effluents were discharged.

h. Radioactive Monitoring. *A summary of the TLD dose rates taken at the exclusion area boundary and the site boundary during the reporting period.*

The TLD dose readings at the exclusion area and site boundaries were reported as zero: i.e., less than the minimal detectable amount.

i. Occupational Personnel Radiation Exposure. *A summary of radiation exposures greater than 25% of the values allowed by 10CFR 20 received during the reporting period (by faculty, students, or experimenters).*

No personnel received greater than 25% of the radiation exposures allowed by 10CFR20. All reported exposures (gamma, beta, and neutron) were less than minimum detectable levels. This is reasonable considering the low level of reactor operations and the low number of hours of operation per quarter.

Table (1) Power History for RCF Operations
Year Ending 12/31/1999

Date	Duration of operations (Upper Limit) (minutes)	Maximum Power (watts)	Upper Limit of Integrated Energ (Watt- Hours)	Power data source (logged or estimated)
27-Mar-99	113	0.06	0.11	logged
03-May-99	65	0.6	0.65	logged
17-Nov-99	28	0.175	0.08	logged
24-Nov-99	170	0.45	1.28	logged
29-Nov-99	107	0.09	0.16	logged
30-Nov-99	53	0.085	0.08	logged
01-Dec-99	109	0.10	0.18	estimated
13-Dec-99	38	0.10	0.06	estimated
15-Dec-99	178	0.10	0.30	estimated
SUM	14.35 hours	SUM	2.90 watt-hours	

Power History for RCF Operations
Year Ending 12/31/2000

Date	Duration of operations (Upper Limit) (minutes)	Maximum Power (watts)	Upper Limit of Integrated Energ (Watt- Hours)	Power data source (logged or estimated)
06-Jan-2000	45	0.001	0.00	logged
11-Jan-2000	74	0.90	1.11	recorder chart
14-Jan-2000	81	0.10	0.14	estimated
19-Jan-2000	75	1.00	1.25	logged
20-Jan-2000	108	1.00	1.80	logged
15-Jun-2000	46	1.00	0.77	logged
03-Aug-2000	35	0.82	0.48	logged
17-Aug-2000	68	0.90	1.02	logged
05-Oct-2000	103	0.50	0.86	logged
Sum	10.58 hours	Sum	7.42 watt-hours	

Table (2) RCF Maintenance for the Period March 1, 1999 to December 31, 2000.

9/15/99 The calibration circuit for PP2 Log-Period channel did not operate.

9/29/99 The scram circuit could not be reset. On 10/05/99 the problem was traced to a failed coil on the main scram relay. The relay was replaced.

10/06/99 Due to problems with the area radiation monitoring system, two of the remotely indicating systems (the reactor room deck and the hallway outside the cell) have been replaced by portable systems.

The remote readout for the area criticality detector functions normally providing an indication of conditions in the cell during operations and providing an alarm if radiation levels exceed a preset level.

10/06/99 The plan to operate was aborted because the LP1 trip bisatable would not hold. On 10/07 a transformer was replaced and the instrument functioned normally.

3/23/00 Source range "A" channel (a count-rate indicator) failed. The problem was isolated in the preamplifier. A replacement preamp was procured and installe on 4/11/00.

4/13/00 The Reactor Room Deck portable γ monitor displayed a low reading and a fail light. The device has a NaI crystal detector with a photomultiplier. A background source input is provided by a light source for the photomultiplier. Adjustment of the background source corrected the problem.

5/24/00 The "cal-low" calibration signal on Log-Period channel PP2 did not function although the instrument responded normally to external signals.

7/13/00 The AC motor of the control rod drive motor generator set overheated. A new motor was procured and installed on 7/26/00.

10/19/00 The dial faces of the control rod coarse position dials had aged so that irregularities in the dial face occasionally interferred with rotation of the indicating needle. The dial faces were removed, stripped of the old markings, and new markings placed on the dial faces.

On 11/16/00 a calibration check (physical measurement of the control rod position compared to control room position indication) was completed with satisfactory results.

11/30/00 The ion chamber for linear power channel LP2 had high leakage current. A spare ion chamber was installed and the channel functioned correctly.

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

June 1, 2000

Dr. Donald Steiner, Department Chair
Department of Environmental and Energy Engineering
Rensselaer Polytechnic Institute
Troy, NY 12180-3590

SUBJECT: NRC INSPECTION REPORT NO. 50-225/2000201 AND NOTICE OF VIOLATION

Dear Dr. Steiner:

This refers to the inspection conducted on April 17-21, 2000 at the L. David Walthousen Critical Experimental facility in Schenectady, New York. The enclosed report presents the results of this inspection.

Based on the results of this inspection, the NRC has determined that violations of NRC requirements occurred. These violations are cited in the enclosed Notice of Violation (Notice) and the circumstances surrounding them are described in detail in the subject inspection report.

You are required to respond to this letter and should follow the instructions specified in the enclosed Notice when preparing your response. The NRC will use your response, in part, to determine whether further enforcement action is necessary to ensure compliance with regulatory requirements.

In accordance with 10 CFR 2.790 of the NRC's "Rules of Practice," a copy of this letter, its enclosure(s), and your response will be placed in the NRC Public Document Room.

Should you have any questions concerning this inspection, please contact Mr. Thomas Dragoun at (610) 337-5373.

Sincerely,

LBMarsh

Ledyard B. Marsh, Chief
Events Assessment, Generic Communications
and Non-Power Reactors Branch
Division of Regulatory Improvement Programs
Office of Nuclear Reactor Regulation

Docket No. 50-225
License No. CX-22

Enclosures: Notice of Violation
NRC Inspection Report No. 50-225/2000201

cc w/enc:
Mr. Bernard Drobnicki, Director, Public Safety
Mr. Paul Lawler, Vice President of Finance
Dr. William Vernetson, TRTR
Dr. George Xu, Radiation Safety Officer
State of New York

NOTICE OF VIOLATION

Rensselaer Polytechnic Institute
Reactor Critical Facility

Docket No. 50-225
License No. CX-22

During an NRC inspection conducted on April 17-21, 2000, violations of NRC requirements were identified. In accordance with the NRC Enforcement Policy dated May 1, 2000, (65 FR 25368) the violations are listed below:

> Technical Specification 6.1.3(a)(2) Staffing requires that, in addition to the control operator, a licensed senior operator shall be present or readily available on call when the reactor is not shutdown.
>
> Contrary to the above, for reactor operations on January 6, January 11 and January 14 to 20, 2000, the license of the person filling this position had been terminated on December 31, 1999.

This is a Severity Level IV violation (Supplement I).

> Technical Specification 4.1 requires semiannual measurement of control rod drop time, magnet release time, and moderator-reflector water dump time. All instrument channels are required to be calibrated annually.
>
> Contrary to the above, these surveillances were not completed during calender year 1999.

This is a Severity Level IV violation (Supplement I)

Pursuant to the provisions of 10 CFR 2.201, Rensselaer Polytechnic Institute is hereby required to submit a written statement or explanation to the U.S. Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington, D.C. 20555 within 30 days of the date of the letter transmitting this Notice of Violation (Notice). This reply should be clearly marked as a "Reply to a Notice of Violation" and should include for each violation: (1) the reason for the violation, or, if contested, the basis for disputing the violation or severity level, (2) the corrective steps that have been taken and the results achieved, (3) the corrective steps that will be taken to avoid further violations, and (4) the date when full compliance will be achieved. Your response may reference or include previous docketed correspondence, if the correspondence adequately addresses the required response. If an adequate reply is not received within the time specified in this Notice, an order or a Demand for Information may be issued as to why the license should not be modified, suspended, or revoked, or why such other action as may be proper should not be taken. Where good cause is shown, consideration will be given to extending the response time.

If you contest this enforcement action, you should also provide a copy of your response to the Director, Office of Enforcement, United States Nuclear Regulatory Commission, Washington, DC 20555-0001.

Under the authority of Section 182 of the Act, 42 U.S.C. 2232, this response shall be submitted under oath or affirmation.

Because your response will be placed in the NRC Public Document Room (PDR), to the extent possible, it should not include any personal privacy, proprietary, or safeguards information so that it can be placed in the PDR without redaction. If personal privacy or proprietary information is necessary to provide an acceptable response, then please provide a bracketed copy of your response that identifies the information that should be protected and a redacted copy of your response that deletes such information. If you request withholding of such material, you must specifically identify the portions of your response that you seek to have withheld and provide in detail the bases for your claim of withholding (e.g., explain why the disclosure of information will create an unwarranted invasion of personal privacy or provide the information required by 10 CFR 2.790(b) to support a request for withholding confidential commercial or financial information). If safeguards information is necessary to provide an acceptable response, please provide the level of protection described in 10 CFR 73.21.

In accordance with 10 CFR 19.11, you may be required to post this Notice within two working days.

Dated at Rockville, Maryland
this 1st day of June 2000.

U.S. NUCLEAR REGULATORY COMMISSION

Docket No:	50-225
License No:	CX-22
Report No:	2000201
Licensee:	Rensselaer Polytechnic Institute
Facility:	L. David Walthousen Critical Experimental Facility
Location:	Schenectady, New York
Dates:	April 17-21, 2000
Inspector:	Thomas F. Dragoun, Reactor Inspector
Approved by:	Ledyard B. Marsh, Chief Events Assessment, Generic Communications and Non-Power Reactors Branch Division of Regulatory Improvement Programs Office of Nuclear Reactor Regulation

Attachment 3

Rensselaer

Department of Environmental & Energy Engineering

June 22, 2000

Ledyard B. Marsh, Chief
Events Assessment, Generic Communications
And Non-Power Reactors Branch
Division of Regulatory Improvement Programs
Office of Nuclear Reactor Regulation
United States Nuclear Regulatory Commission
Washington, DC 20555-0001

Subject: NRC INSPECTION REPORT NO. 50-225/2000201 AND NOTICE OF VIOLATION

Dear Mr. Marsh:

The purpose of this letter is to respond to the violations cited in your "Notice of Violation" report of 6/1/00. Should you have any questions concerning this response please contact Frank DuBois (518) 393-9814.

Sincerely,

Don Steiner
Institute Professor of Nuclear Engineering and Chairman
Department of Environmental and Energy Engineering

DS:jdg
Cc: NSRB Committee RPI
T. Dragoon NRC
Jules Jacquin RPI Risk Management & Loss Prevention
W. Vernetson TRTR
R. Ryan Acting Radiation Safety Officer
G. Xu RPI
B. Drobnicki RPI Public Safety

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