

September 30, 2009

Dr. Jeffery Geuther, Director  
Reactor Critical Facility  
NES Building 1-10  
Rensselaer Polytechnic Institute  
110 8th Street  
Troy, NY 12180-3590

SUBJECT: RENSSELAER POLYTECHNIC INSTITUTE - NRC ROUTINE INSPECTION  
REPORT NO. 50-225/2009-201 AND NOTICE OF VIOLATION

Dear Dr. Geuther:

This letter refers to the inspection conducted on August 31 - September 2, 2009, at your Rensselaer Polytechnic Institute (RPI) Reactor Critical Facility. The enclosed report documents the inspection results, which were discussed on September 2, 2009, with you, your staff and members of the Nuclear Safety Review Board (NSRB). The inspection included a review of activities authorized for your facility.

This inspection was an examination of activities conducted under your license as they relate to safety and compliance with the Commission's rules and regulations and with the conditions of your license. Within these areas, the inspection consisted of selected examination of procedures and representative records, observations of activities, and interviews with personnel.

Based on the results of this inspection, the U.S. Nuclear Regulatory Commission (NRC) has determined that a Severity Level IV violation of NRC requirements has occurred. The violation was evaluated in accordance with the NRC Enforcement Policy included on the NRC's Web site at [www.nrc.gov](http://www.nrc.gov); select **What We Do, Enforcement**, then **Enforcement Policy**. The violation is cited in the enclosed Notice of Violation (Notice) and the circumstances surrounding it are described in detail in the subject inspection report.

The NRC has concluded that information regarding the reason for the violation, the corrective actions planned and taken to correct the violation and prevent recurrence is already adequately addressed on the docket in Inspection Report No. 50-225/2009-201. Therefore, you are not required to respond to this letter unless the description herein does not accurately reflect your corrective actions or your position. In that case, or if you choose to provide additional information, you should follow the instructions specified in the enclosed Notice.

J. Geuther

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In accordance with 10 CFR 2.390 "Public inspections, exemptions, and requests for withholding" a copy of this letter and its enclosure will be available electronically for public inspection in the NRC Public Document Room or from the NRC's document system (Agencywide Document Access Management System (ADAMS)). ADAMS is accessible from the NRC Web site at <http://www.nrc.gov/reading-rm/adams.html> (the Public Electronic Reading Room).

Should you have any questions concerning this inspection, please contact Jack Donohue at 301-415-3163 or by electronic mail at [Jack.Donohue@nrc.gov](mailto:Jack.Donohue@nrc.gov).

Sincerely,

**/RA/**

Thomas B. Blount, Deputy Director  
Division of Policy and Rulemaking  
Office of Nuclear Reactor Regulation

Docket No. 50-225

License No. CX-22

Enclosures: 1. NRC Inspection Report No. 50-225/2009-201  
2. Notice of Violation

cc w/ encls: See next page

Rensselaer Polytechnic Institute

Docket No. 50-225

cc:

Mayor of the City of Schenectady  
Schenectady, NY 12305

Barbara Youngberg  
Radiation Section Chief  
New York State Department of Environmental Conservation  
625 Broadway  
Albany, NY 12233-7255

Dr. Tim Wei  
2052 JEC  
Rensselaer Polytechnic Institute  
110 8th Street  
Troy, NY 12181

Director, Bureau of Environmental  
Radiation Protection  
New York State Department of Health  
547 River Street, Room 530  
Troy, NY 12180-2216

Test, Research and Training Reactor Newsletter  
Director of Nuclear Facilities  
University of Florida  
202 Nuclear Science Center  
Gainesville, FL 32611-8300

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OFFICE	PRT:RI	PRT:LA	PRT:BC	DPR:DD
NAME	JDonohue jjd	GLappert gl	JEads jhe	TBlount tb
DATE	9/29/09	9/29/09	9/30/09	9/30/09

**OFFICIAL RECORD COPY**

## NOTICE OF VIOLATION

Rensselaer Polytechnic Institute  
Reactor Critical Facility

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

During an NRC inspection conducted on August 31 – September 2, 2009, a violation (VIO) of NRC requirements was identified. In accordance with the NRC Enforcement Policy, the violation is listed below:

Rensselaer Polytechnic Institute Critical Facility License, CX-22, stipulates in Technical Specification (TS) 4.3 that “The criticality detection system, area gamma monitor and the mobile particulate air monitor shall be checked daily if the reactor is operated, tested monthly and calibrated semi-annually”.

Contrary to the above, the mobile particulate air monitor has not been calibrated semi-annually as required.

This has been determined to be a Severity Level IV violation (Supplement I).

The NRC has concluded that information regarding the reason for the violation; the corrective action planned and taken to correct the violation and prevent recurrence and the date when full compliance will be achieved is already adequately addressed on the docket in Inspection Report No. 50-225/2009-201. However, you are required to submit a written statement or explanation pursuant to 10 CFR 2.201 if the description therein does not accurately reflect your corrective actions or your position. In that case, or if you choose to respond, clearly mark your response as a "Reply to a Notice of Violation," include the VIO number, and send it to the U.S. Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington, DC 20555-0001 with a copy to the Director, Office of Nuclear Reactor Regulation within 30 days of the date of the letter transmitting this Notice of Violation (Notice).

If you choose to respond, your response will be made available electronically for public inspection in the NRC Public Document Room or from the NRC's document system (ADAMS), accessible from the NRC Web site at <http://www.nrc.gov/reading-rm/adams.html>. Therefore, to the extent possible, the response should not include any personal privacy, proprietary, or safeguards information so that it can be made available to the Public without redaction.

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

Dated this 30th day of September 2009

**U. S. NUCLEAR REGULATORY COMMISSION**  
**OFFICE OF NUCLEAR REACTOR REGULATION**

Docket No: 50-225

License No: CX-22

Report No: 50-225/2009-201

Licensee: Rensselaer Polytechnic Institute

Facility: Reactor Critical Facility

Location: Schenectady, NY

Dates: August 31-September 2, 2009

Inspector: Jack Donohue

Approved by: Johnny H. Eads, Chief  
Research and Test Reactors Branch B  
Division of Policy and Rulemaking  
Office of Nuclear Reactor Regulation

## EXECUTIVE SUMMARY

Rensselaer Polytechnic Institute  
Reactor Critical Facility  
NRC Inspection Report No. 50-225/2009-201

The primary focus of this routine, announced, operations inspection was the on-site review of selected aspects of the Rensselaer Polytechnic Institute's (the licensee's) research reactor safety program. This included a review of: organization and staffing, operations logs and records, research procedures, operator requalification, surveillance and limiting conditions for operations, experiments, design changes, committee, audits and reviews, maintenance logs and records, and fuel handling. The licensee's programs were acceptably directed toward the protection of public health and safety, and in compliance with NRC requirements.

### Organization and Staffing

The organization and staffing were consistent with Technical Specification (TS) requirements.

### Operations Logs and Records

Operational activities were consistent with applicable TS and procedural requirements.

### Procedures

Procedural control and implementation satisfied TS requirements.

### Operator Requalification

The Reactor Operator Requalification Program was implemented satisfactorily, the program was up-to-date, and plan requirements were met.

### Surveillance and Limiting Conditions for Operations

The licensee's program for completing surveillance inspections and Limiting Conditions for Operation confirmations satisfied TS and licensee administrative controls except for TS 4.3. See Violation No. 50-225/2009-201-01.

### Experiments

The approval and control of experiments met TS and applicable regulatory requirements.

Design Changes

The licensee's design change program was being implemented as required.

Committees, Audits and Reviews

Nuclear Safety Review Board review and audit functions required by the TS were being acceptably implemented.

Maintenance Logs and Records

Maintenance logs, records, and performance satisfied TS and procedure requirements.

Fuel Handling

Fuel handling activities were completed and documented as required by TS and facility procedures.



## REPORT DETAILS

### Summary of Facility Status

The Rensselaer Polytechnic Institute (RPI, the licensee) Reactor Critical Facility (RCF) Class II research reactor, licensed to operate at a maximum steady-state thermal power of 100 Watts, continued to be operated in support of academic instruction, operator training, surveillance, and research. During the inspection the reactor was not operated.

### 1. Organization and Staffing

#### a. Inspection Scope (Inspection Procedure (IP) 69001-02.01)

The inspector reviewed the following regarding the licensee's organization and staffing to ensure that the requirements of Section 6.1 of the Technical Specifications (TS), Amendment No. 11 to License No. CX-22 dated September 7, 2004, were being met:

- Organizational structure
- Staffing requirements for safe operation of the research reactor facility
- Annual Report for the RPI-RCF for the Year 2007, February 29, 2008
- Standard Operating Procedures
- Reactor Critical Facility (RCF) Logbook entries from April 30, 2008 to present

#### b. Observations and Findings

Through discussions with licensee representatives, the inspector determined that the management structure met TS requirements. The RCF staff consisted of three part-time RPI employees, each holding an NRC Senior Reactor Operator (SRO) license, and three additional SROs; two being current RPI graduate students and the third being a recent RPI graduate working at the Knolls Atomic Power Laboratory but volunteering services and maintaining an SRO license.

The RCF Director, J. Geuther reports to the Head of the Mechanical, Aerospace and Nuclear Engineering (MANE) Department. Reporting to the RCF Director were Adjunct Professor T. Trumbull and Operations Supervisor J. Berry. The MANE Department Head T. Wei reports to D. Rosowsky, Dean of Engineering.

Through review of the reactor logbook the inspector verified that the individuals staffing for the reactor were clearly designated and met the TS requirements.

#### c. Conclusions

The licensee's organization and staffing were in compliance with the requirements specified in the TS.

## 2. Operations Logs and Records

### a. Inspection Scope (IP 69001-02.02)

The inspector reviewed selected parts of the following reactor operations records to verify that the requirements of TS Section 6.6 were being met:

- RCF Procedure, Pre-Startup Procedure, Revision (Rev.) 6.3, dated January 2009
- RCF Procedure, Pre-Startup Checklist, Version 2.3, dated July 2008
- RCF Procedure, Pre-Startup Checklist, Version 2.1, dated September 2006
- RCF Logbook entries from April 30, 2008 to present
- Completed Pre-start Checklists, October 2008 to present
- Completed Reactor Secured Checklists, October 2008 to present

### b. Observations and Findings

The inspector found that records were comprehensive and complete indicating that the operations were conducted in accordance with written procedures that were properly reviewed and approved.

The procedures were electronically available for use at the control panel for use during reactor operations and maintenance of the reactor. The inspector determined the logs reflect accurate accounts of reactor operations and maintenance.

### c. Conclusions

Operational activities were consistent with applicable TS and procedural requirements.

## 3. Procedures

### a. Inspection Scope (IP 69001)

The inspector audited the following to ensure that the requirements of TS Section 6.2 were being met concerning written procedures:

- List of current versions of approved procedures and written procedures
- RCF Procedure: Operating Procedures, Version 2.1, dated September 2006
- RCF Procedure: Pre-Startup Procedure, Version 6.3, dated January 2009
- RCF Procedure: RCF Power Calibration Surveillance Test, Version 2.1, dated September 2006

b. Observations and Findings

The inspector determined that written procedures were available for the activities delineated in TS Section 6.2 and were approved by the Nuclear Safety Review Board (NSRB) before they were implemented. The clarity and detail in the procedures were acceptable. Temporary changes to the procedures that do not change their original intent could be authorized by the Operations Supervisor and were required to be subsequently reviewed by the NSRB. RCF staff members conducted TS activities in accordance with applicable procedures.

c. Conclusions

Procedural control and implementation satisfied TS requirements.

**4. Requalification Training**

a. Inspection Scope (IP 69001-02.04)

The inspector reviewed the following to verify that the requirements of Title 10 of the Code of Federal Regulations (10 CFR) 50.55, Operators' Licenses, were being met:

- RPI RCF Requalification Program, Version 1.0, dated September, 2008
- Medical File for SROs
- RCF Logbook entries from April 30, 2008 to present

b. Observations and Findings

The licensee's requalification program is in accordance with TS 6.1.4 and ANSI/ANS-15.4-1977, Section 4-6, American National Standard for Selection and Training of Personnel for Research Reactors. The inspector verified through review of records that RPI personnel holding SRO licenses undergo continuous training for oral checkouts, an annual operating test and a biennial written examination. The inspector reviewed records indicating that SRO's performed requalification activities in accordance with the program. Additionally, the inspector reviewed medical records of all SRO's and found them complete and satisfactory.

c. Conclusions

Operator requalification was conducted as required by the licensee's Requalification Program.

**5. Surveillance and Limiting Conditions for Operation**

a. Inspection Scope (IP 69001-02.05)

The inspector reviewed the following to verify compliance with TS Section 3.0, Limiting Conditions for Operation, and to determine if the periodic surveillance

tests on safety systems were performed as stipulated in TS Section 4.0, Surveillance Requirements:

- RCF Surveillance Procedures Version 3.0, dated February 2006
- RCF Procedure, Pre-Startup Procedure, Rev. 6.3, dated July 2008
- RCF Procedure, Pre-Startup Checklist, Version 2.3, dated July 2008
- RCF Procedure, Secured Checklist, Version 2.1, dated September 2006
- RCF Logbook entries from April 30, 2008 to present
- Completed Pre-start Checklists, October 2008 to present
- Completed Reactor Secured Checklists, October 2008 to present
- Gold foil activation for power calibration performed on August 6, 2008, per SOP Section C, Version 3, dated February, 2006

b. Observations and Findings

The inspector selected a sample of the TS limiting conditions for operation to verify implementation. In general, the licensee demonstrated a method of compliance built into SOPs and documenting completion in reactor logbooks or on supplementary forms.

Surveillances were completed on schedule and in accordance with licensee procedures for those items on the audit list. The protocols and techniques were effective in verifying acceptable performance of the safety equipment checked. The recorded results reviewed were within the TS and procedurally prescribed parameters. The records and logs were complete and were being maintained as required. Checks and calibrations were completed as required by TS with one noted exception, (VIO 50-225/2009-001-01) the mobile particulate air monitor is required to be calibrated semi-annually. The detector has not been calibrated for five years. It appears that the operations staff at the time agreed that this was not a useful evolution, but did not request a revision to the TS or justify why they did not agree with the basis for the semi-annual calibration provided in the TS.

The pre-start procedures at the facility requires the operator to test the area monitors and the mobile particulate air monitor instrument by holding a test source next to the detector and verifying the instrument responds as expected. This satisfies the TS definition of the "test" and therefore as long as the reactor is operated at least monthly both the daily check and the monthly test are completed by this start-up procedure. The operator would sign the logbook to document the entire startup procedure. The signature in the logbook is the only documentation that the steps of the startup procedure, including the radiation detection system were performed.

Following identification of the violation, a plan was implemented by the licensee to satisfy the TS requirement and improve documentation of the checks. The corrective actions are as follows:

- The periodic surveillance summary sheet will be updated to include monthly tests of the radiation monitoring system. This item will be

checked off each month after the pre-start procedure is completed for the first time each month.

- The existing calibration procedure for the mobile air particulate detector (APD) will be implemented immediately to satisfy the TS requirement to inspect the APD. This procedure will be executed semi-annually until such time as a revision to the TS removing the equipment is authorized.

It should be noted that following the inspection, the inspector was notified by the licensee that the plan was executed and the facility was now in compliance with the TS requirements.

c. Conclusions

Operations were found to be in compliance with the limiting conditions for operation and surveillance requirements as stated in the TS except Section 4.3, Radiation Monitoring. The semi-annual calibrations of the mobile particulate air monitoring instrument were not recently performed and have been determined to be a Severity Level IV violation, failure to comply with the Action Statement for a TS (Supplement I).

**6. Experiments**

a. Inspection Scope (IP 69001)

The inspector reviewed selected aspects of the following to verify compliance with TS Section 3.4:

- Experimental program requirements
- Experimental administrative controls and precautions
- RCF Logbook entries from April 30, 2008 to present
- Critical Benchmark Experiment Procedure Using Borobond™, dated August 25, 2009

b. Observations and Findings

There was one new experiment approved during the interval since the last inspection. Most of the utilization consisted of classroom training and performing previously approved experiments.

At the time of the inspection, preparatory work was in progress for a new experiment that had been recently approved by the NSRB. The purpose of the experiment is to perform reactivity measurements of ceramic material.

c. Conclusions

The approval and control of experiments met TS and applicable regulatory requirements.

## 7. Design Changes

### a. Inspection Scope (IP 69001)

In order to verify that any modifications to the facility were consistent with 10 CFR 50.59, the inspector reviewed selected aspects of:

- Facility design changes and records for the past two years
- RCF Logbook entries from April 30, 2008 to present
- [Annual] Operations Reports for the RPI RCF, dated March 1, 2007 and February, 29, 2008
- RCF Procedures

### b. Observations and Findings

Through review of applicable records and interviews with licensee personnel, the inspector determined that no significant changes had been completed at the facility since the last inspection. The inspector verified that administrative controls were in place that required the appropriate review and approval of all changes prior to implementation and previous changes had been performed in accordance with regulatory requirements.

### c. Conclusions

Based on the records reviewed, the inspector determined that the licensee's design change program was being implemented as required.

## 8. Committees, Audits, and Reviews

### a. Inspection Scope (IP 69001)

The inspector reviewed the following to ensure that the audits and reviews stipulated in TS Section 6.1.5 and 10 CFR 50.59 were being completed by the NSRB:

- RPI NSRB Draft Minutes, dated May 19, 2009
- [Quarterly] RCF Checks, dated November 5, 2008 to July 22, 2009
- RPI NSRB Minutes of Meeting November 26, 2008
- RPI NSRB Minutes of Meeting May 1, 2008
- RPI NSRB Minutes of Meeting November 27, 2007

b. Observations and Findings

The TS for the RPI RCF required semiannual meetings of the NSRB. The inspector reviewed the minutes for the last two years and found them compliant with the TS requirements. The TS requires an annual assessment of reactor operations. This assessment of reactor operations was conducted by the RSO on reactor equipment; criticality detectors, area monitors particulate activity detectors, portable detectors and event contact lists. Additionally, the audit covered surveillance items, rod timing, moderator dump time, instrument channel calibration, reactor parameters, radiation detectors, contamination inspection and material reports and provide advice to the Facility Director. The RSO proceeded to briefly stipulate the NSRB composition, a brief set of rules, and descriptions of the review and audit functions. The review function included new tests and experiments of a significant difference, reportable occurrences and TS changes. The inspector noted that the SRO performed quarterly reviews at the RCF. The inspector in discussion with the NSRB chair indicated the NSRB had awareness as to the state of reactor operations and their commitment to provide oversight as required in its operations.

c. Conclusions

NSRB review and audit functions required by the TS were being acceptably implemented and documented.

**9. Maintenance Logs and Records**

a. Inspection Scope (IP 69001-02.11)

The inspector reviewed the following selected maintenance logs and records to verify compliance with the requirements of regulations and TS Sections 6.2.7, 6.5.1.d, and 6.6.1.a:

- RCF Logbook entries from April 30, 2008 to present
- Annual Report for the RPI-RCF for the Year 2007, dated February 29, 2008

b. Observations and Findings

The inspector reviewed selected portions of the reactor logbooks governing the interval of time since the previous inspection. Major maintenance activities were found documented there with detail commensurate with the safety significance of the activity.

During log review, the inspector reviewed bank worth measurements, integral rod worth, ceramic material testing, power calibrations, temperature measurement, gold foil activation and rod drop testing. The logs were complete, well written and comprehensive.

c. Conclusions

Maintenance performed along with logs and records of maintenance activities met TS requirements.

**10. Fuel Handling Logs and Records**

a. Inspection Scope (IP 69001-02.12)

The inspector reviewed the following to verify compliance with requirements of TS Sections 5.6 and 6.2.2:

- RCF Logbook entries from April 30, 2008 to present
- RCF Procedure, Operating Procedure Section C, Fuel Handling, Version 2.1, dated September 2006

b. Observations and Findings

The inspector reviewed a core configuration change on August 13, 2008. Fuel was moved in accordance with an approved written procedure and recorded in the reactor logbook. The inspector noted that no fuel movement operation was performed during the last calendar year.

c. Conclusions

Fuel handling activities were completed and documented as required by TS and facility procedures.

**11. Exit Interview**

The inspection scope and results were summarized on September 2, 2009, with the Facility Director and NSRB. The inspector discussed the findings for each area reviewed. The licensee acknowledged the findings and did not identify as proprietary any of the material provided to or reviewed by the inspector during the inspection and the results of the inspection are subject to management review.



## **PARTIAL LIST OF PERSONS CONTACTED**

### Licensee

J. Berry	Operations Supervisor
P. Caracappa	Radiation Safety Officer
J. Geuther	Reactor Critical Facility Director
M. Podowski	Chair Nuclear Safety Review Board
T. Trumbull	Adjunct Professor of Nuclear Engineering

## **INSPECTION PROCEDURES USED**

IP 69001	Class II Non-Power Reactors
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## **ITEMS OPENED, CLOSED, AND DISCUSSED**

### Opened

VIO 50-225/2009-201-01	A Severity Level IV VIO for the failure to perform semi-annual calibrations of the mobile particulate air monitor per TS Section 4.3
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### Closed

None

## **LIST OF ACRONYMS USED**

ADAMS	Agencywide Document Access and Management System
ANSI/ANS	American National Standards Institute/American Nuclear Society
CFR	<i>Code of Federal Regulations</i>
IFI	Inspector Follow-up Item
IP	Inspection Procedure
NIMS	National Incident Management System
NSRB	Nuclear Safety Review Board
NRC	Nuclear Regulatory Commission
RCF	Reactor Critical Facility
Rev.	Revision
RPI	Rensselaer Polytechnic Institute
RSO	Radiation Safety Officer
SOP	Standard Operating Procedure
SRO	Senior Reactor Operator
TS	Technical Specification
VIO	Violation