

February 12, 2014

Dr. Peter Caracappa, 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. 50-225/2014-201

Dear Dr. Caracappa:

From January 14–16, 2014, the U.S. Nuclear Regulatory Commission (NRC or the Commission) conducted an inspection at the Rensselaer Polytechnic Institute. The inspection included a review of activities authorized for your facility. The enclosed report documents the inspection results, which were discussed on January 16, 2014, with member of your staff.

During this inspection, the NRC inspectors examined activities conducted under your license as they relate to public health and safety to confirm 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.

In accordance with Title 10 of the *Code of Federal Regulations* 2.390 of the NRC's "Rules of Practice," a copy of this letter, its enclosure(s), and your response, if you choose to provide one, will be made available electronically for public inspection in the NRC Public Document Room or from the NRC's Agencywide Documents Access and Management System, accessible from the NRC Web site at <http://www.nrc.gov/reading-rm/adams.html>. To the extent possible, your response should not include any personal privacy or proprietary information so that it can be made available to the Public without redaction.

P. Caracappa

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Should you have any questions concerning this inspection, please contact Taylor Lamb at (301) 415-7128 or electronic mail at Taylor.Lamb@nrc.gov.

Sincerely,

/RA/

Gregory T. Bowman, Chief
Research and Test Reactors Oversight Branch
Division of Policy and Rulemaking
Office of Nuclear Reactor Regulation

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

Enclosure:
As stated

cc w/ encl: See next page

Rensselaer Polytechnic Institute

Docket No. 50-225

cc:

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Test, Research, and Training
Reactor Newsletter
University of Florida
202 Nuclear Sciences Center
Gainesville, FL 32611

P. Caracappa

- 2 -

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NAME	PIsaac	GBowman
DATE	12/11/14	12/12/14

OFFICIAL RECORD COPY

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

Docket No: 50-225

License No: CX-22

Report No: 50-225/2014-201

Licensee: Rensselaer Polytechnic Institute

Facility: Reactor Critical Facility

Location: Schenectady, NY

Dates: January 14–16, 2014

Inspectors: Taylor Lamb
Patrick Isaac

Approved by: Gregory T. Bowman, Chief
Research and Test Reactors Oversight Branch
Division of Policy and Rulemaking
Office of Nuclear Reactor Regulation

EXECUTIVE SUMMARY

Rensselaer Polytechnic Institute
Reactor Critical Facility
NRC Inspection Report No. 50-225/2014-201

The primary focus of this routine, announced inspection was the on-site review of selected aspects of the Rensselaer Polytechnic Institute's (the licensee's) Class II research reactor facility safety program including: organization and staffing, operations logs and records, procedures, operator requalification, surveillance and limiting conditions for operation, experiments, design changes, 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 U.S. Nuclear Regulatory Commission (NRC) requirements.

Organization and Staffing

- Organizational structure 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

- Operator requalification was conducted as required by the Requalification Program and Title 10 of the *Code of Federal Regulations* (10 CFR) Part 55.

Surveillance and Limiting Conditions for Operations

- Limiting conditions for operation and surveillances required by TS were being properly implemented.

Experiments

- Experiment review and approval was done in accordance with TS requirements, licensee procedures, and 10 CFR 50.59.

Design Changes

- Records indicated that the licensee's design change program was being implemented as required.

Maintenance Logs and Records

- Maintenance activities were conducted consistent with TS requirements.

Fuel Handling

- Fuel handling activities were conducted in accordance with TS and facility procedures.

REPORT DETAILS

Summary of Facility Status

The Rensselaer Polytechnic Institute's (RPI's or the licensee's) 100 watt critical facility continued to be operated in support of academic instruction, operator training, surveillance, and research. During the performance based portion of the inspection, the reactor was operated for a senior reactor operator licensing examination and for surveillance.

1. Organization and Staffing

a. Inspection Scope (Inspection Procedure (IP) 69001)

The inspectors reviewed the following regarding the licensee's organization and staffing to ensure that the requirements of Section 6.1 of the Technical Specifications (TS) were being met:

- Organizational structure and management responsibilities
- RPI Nuclear Safety Review Board (NSRB) meeting minutes for the past two years
- RCF Contact List, dated January 8, 2014
- Operations Report for the Rensselaer Polytechnic Institute Reactor Critical Facility for 2011, dated March 6, 2012
- Operations Report for the Rensselaer Polytechnic Institute Reactor Critical Facility for 2012, dated March 14, 2013
- RCF logbook entries for the past two years

b. Observations and Findings

Through review of records and logs, and through discussions with licensee personnel, the inspectors determined that the organizational structure and staff responsibilities observed at the Rensselaer Polytechnic Institute Reactor Critical Facility met the requirements stated in Section 6.1 of the TS.

c. Conclusion

The organizational structure and staffing were consistent with TS requirements.

2. Operations Logs and Records

a. Inspection Scope (IP 69001)

The inspectors reviewed selected aspects of the following to ensure that the operations program was being implemented as required by TS Sections 3.0, 4.0, and 6.0:

- RCF Operating Procedures, Version 2.2, dated September 2011
- RCF Pre-Start Checklist, Version 8, dated February 2012

- RCF logbook entries for the past two years
- Completed pre-start checklists for the past two years
- Completed reactor secured checklists for the past two years

b. Observations and Findings

On January 15, 2014, the inspectors observed a reactor startup and verified compliance with the appropriate written procedures and TS.

The inspectors verified that the reactor operating characteristics, and other procedurally required entries, were logged appropriately and that the checklists were completed. A review of the licensee's logs and records indicated that the TS operational limits had not been exceeded.

c. Conclusion

Operational activities were consistent with applicable TS and procedural requirements.

3. Procedures

a. Inspection Scope (IP 69001)

The inspectors reviewed the following to ensure that the requirements of TS Section 6.4, "Procedures," were being met concerning written procedures:

- RCF Operating Procedures, Version 2.2, dated September 2011
- RCF Surveillance Procedures, Version 3.0, dated February 2006
- RCF Pre-Startup Procedure, Version 8, dated February 2012
- RCF Emergency Procedures, Version 3, dated May 2006
- RCF Surveillance Procedures, dated August 2011 (not yet approved for use)

b. Observations and Findings

The inspectors determined that written procedures were available for the activities delineated in TS Section 6.4 and were approved by the NSRB before they were implemented. The clarity and detail in the procedures was acceptable. Temporary changes to the procedures that do not change their original intent were authorized by the Operations Supervisor and were subsequently reviewed by the NSRB. RCF staff members conducted TS activities in accordance with applicable procedures.

The inspectors determined that the licensee used their approved procedures and that there have not been any substantive changes to them over the past several years. However, for the past two years the licensee has been developing more up-to-date and comprehensive surveillance procedures for future use, but they have not yet been completed or approved by the NSRB. In order to follow-up on

the licensee's actions to complete the updates to these procedures, the inspectors will document and track this as an inspector follow-up item (IFI 50-225/2014-201-01).

c. Conclusion

Procedural control and implementation satisfied TS requirements.

4. Requalification Training

a. Inspection Scope (IP 69001-02.04)

To verify that the operator requalification activities and training were conducted in accordance with the NRC-approved Requalification Program and other regulatory requirements, the inspectors reviewed selected aspects of:

- RPI RCF Requalification Program, Version 1.0, dated September, 2008
- Individual licensed operator files
- RCF logbook entries for the past two years

b. Observations and Findings

The NRC-licensed staff at the facility consisted of six senior reactor operators. As of the date of the inspection, all the operators' licenses were current. All operators were enrolled in the licensee's NRC-approved requalification and training program and had completed the minimum required hours of reactor operation per quarter. The inspectors noted that operators were receiving the required biennial medical examinations.

The licensee's requalification program included requirements for an annual operating test and a biennial written examination. The inspectors verified that both examinations were administered at the specified frequency and that the level of difficulty was comparable to that of NRC-administered examinations.

The inspectors confirmed that the requalification program was being administered in a manner that sufficiently maintains the qualifications and proficiency of all licensed operators.

c. Conclusion

Operator requalification was conducted as required by the Requalification Program and Title 10 of the *Code of Federal Regulations* (10 CFR) Part 55.

5. Surveillance and Limiting Conditions for Operation

a. Inspection Scope (IP 69001)

To verify that the licensee had conducted its surveillance program in accordance with TS requirements, the inspectors reviewed:

- RCF Surveillance Procedures, Version 3.0, dated February 2006
- RCF surveillance schedule for 2012 and 2013
- RCF monthly surveillance checklist for 2012
- RCF Procedure, "Pre-Startup Procedure," Rev. 8, dated February 2012
- Completed Pre-Start Checklists, August 3, 2011 to present
- RCF Procedure, "Secure Procedure," Version 3, dated July 2013

b. Observations and Findings

Daily, weekly, monthly, and other periodic checks, tests, and verifications for TS required limiting conditions for operation were being completed as required. The inspectors performed a random sampling of the required surveillances and verified that they were completed on schedule and all of the recorded results were within the TS and procedurally prescribed parameters. The records and logs were noted to be complete and were being maintained as required.

c. Conclusion

Limiting conditions for operation and surveillances required by TS were being properly implemented.

6. Experiments

a. Inspection Scope (IP 69001)

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

- Experimental administrative controls and precautions
- RCF logbook entries from August 3, 2011, to present
- "A Manual of Experiments," MANE-4440, dated 2010
- RPI RCF, "Installation of Zircaloy Reflector Slabs," approval dated July 11, 2011
- Operations Report for the Rensselaer Polytechnic Institute Reactor Critical Facility for 2011, dated March 6, 2012
- Operations Report for the Rensselaer Polytechnic Institute Reactor Critical Facility for 2012, dated March 14, 2013

b. Observations and Findings

Most of the use of the RCF consisted of classroom training and performance of previously-approved experiments. One new experiment had been approved and installed since the last inspection. The purpose of the experiment is to determine core reactivity on Zircaloy slabs.

Through review of the experiment procedure, the reactor logbook, and interviews with staff, the inspectors determined that the experimental review process and

approval were conducted as required by the TS and in accordance with the regulations.

c. Conclusion

Experiment review and approval was done in accordance with TS requirements, licensee procedures, and 10 CFR 50.59 regulations.

7. Design Changes

a. Inspection Scope (IP 69001)

To ensure that facility changes were reviewed and approved as required by TS Section 6.2 and 10 CFR 50.59, the inspector reviewed selected aspects of:

- Operations Report for the Rensselaer Polytechnic Institute Reactor Critical Facility for 2011, dated March 6, 2012
- Operations Report for the Rensselaer Polytechnic Institute Reactor Critical Facility for 2012, dated March 14, 2013
- NSRB meeting minutes, dated November 2013, May 2013, November 2012, and May 2012
- RPI RCF, "Installation of Zircaloy Reflector Slabs," approval dated July 11, 2011
- Evaluation of Replacement of Model 1718 Linear Picoammeter, dated 2013
- RCF logbook entries from August 3, 2011 to present

b. Observations and Findings

Through review of applicable records and interviews with licensee personnel, the inspectors determined that no significant changes had been completed at the facility since the last inspection. The inspectors 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. Conclusion

Records indicated that the licensee's design change program was being implemented as required.

8. Maintenance Logs and Records

a. Inspection Scope (IP 69001)

To verify that the licensee's operational and maintenance activities have been completed consistent with regulatory requirements since the last inspection, the inspector reviewed selected aspects of:

- RCF logbook entries from August 3, 2011, to present
- Operations Report for the Rensselaer Polytechnic Institute Reactor Critical Facility for 2011, dated March 6, 2012
- Operations Report for the Rensselaer Polytechnic Institute Reactor Critical Facility for 2012, dated March 14, 2013
- Evaluation of Replacement of Model 1718 Linear Picoammeter, dated 2013
- RCF Maintenance Procedure, Version 1.0, dated December 11, 2013

b. Observations and Findings

The inspectors reviewed selected portions of reactor logbooks regarding scheduled and unscheduled maintenance activities since the last inspection. This review indicated that equipment malfunctions were logged. Maintenance activities that have an effect on reactor safety were carried out and reported as required. After maintenance items were completed, system operational checks were performed to ensure the affected systems were operable before returning them to service.

c. Conclusion

Maintenance activities were conducted consistent with TS requirements.

9. Fuel Handling Logs and Records

a. Inspection Scope (IP 69001)

The inspectors reviewed the following to verify compliance with requirements of TS:

- RCF logbook entries for the past two years
- RCF Operating Procedures, Section G, "Fuel Handling," Version 2.2, dated September 2011
- RPI RCF, "Installation of Zircaloy Reflector Slabs," approval dated July 11, 2011

b. Observations and Findings

The licensee primarily conducted fuel movements for fuel inspections and experiments. The fuel movements were well documented. The inspector found

that the procedures used for the safe handling of fuel elements were adequate.

c. Conclusion

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

10. Exit Interview

The inspector reviewed the inspection results with members of licensee management, NSRB members, and the Dean of Engineering at the conclusion of the inspection on January 16, 2014. The licensee acknowledged the items presented.

PARTIAL LIST OF PERSONS CONTACTED

Licensee

P. Caracappa RCF Director
G. Winters RCF Operations Supervisor

INSPECTION PROCEDURES USED

IP 69001 Class II Non-Power Reactors

ITEMS OPENED, CLOSED, AND DISCUSSED

Opened

50-225/2014-201-01 IFI Follow-up on the licensee's actions to complete, approve, and implement a new version of the procedures

Closed

None

LIST OF ACRONYMS USED

10 CFR Title 10 of the *Code of Federal Regulations*
ANSI/ANS American National Standards Institute/American Nuclear Society
IP Inspection Procedure
NSRB Nuclear Safety Review Board
NRC U.S. Nuclear Regulatory Commission
RCF Reactor Critical Facility
RPI Rensselaer Polytechnic Institute
TS Technical Specification