August 27, 2009

Dr. Robert Dimeo, Director
NIST Center for Neutron Research
National Institute of Standards and Technology
U.S. Department of Commerce
100 Bureau Drive, Mail Stop 8561
Gaithersburg, MD 20899-8561

SUBJECT: NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY - NRC ROUTINE INSPECTION REPORT NO. 50-184/2009-202

Dear Dr. Dimeo:

On July 27-29, 2009, the U.S. Nuclear Regulatory Commission (NRC, the Commission) conducted an inspection at NIST Center for Neutron Research. The inspection included a review of activities authorized for your facility. The enclosed report documents the inspection results, which were discussed on July 29, 2009, with members of your staff.

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 selective examinations of procedures and representative records, interviews with personnel, and observations of activities in progress. Based on the results of this inspection, no safety concern or noncompliance with NRC requirements was identified. No response to this letter is required.

In accordance with Title 10 of the *Code of Federal Regulations* Part 2.390 a copy of this letter and its enclosure will be available electronically for public inspection in the NRC Public Document Room or from the Publicly Available Records (PARS) component of NRC's document system (Agencywide Document Access and Management System (ADAMS)). ADAMS is accessible from the NRC Web site at (the Public Electronic Reading Room) http://www.nrc.gov/reading-rm/adams.html.

Should you have any questions concerning this inspection, please contact Patrick Isaac at 301-415-1019 or by electronic mail at Patrick.Isaac@nrc.gov.

Sincerely,

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

Docket No. 50-184
License No. TR-5
Enclosure:
As stated
cc w/encl: See next page

cc:

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Dr. Wade Richards, Manager of Operations
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Gaithersburg, MD 20899-8561

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

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DATE	8/27/09	8/27/09	8/27/09

OFFICIAL RECORD COPY

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

Docket No:	50-184
License No:	TR-5
Report No:	50-184/2009-202
Licensee:	National Institute of Standards and Technology (NIST)
Facility:	National Bureau of Standards Reactor (NBSR)
Location:	Gaithersburg, MD
Dates:	July 27 - 29, 2009
Inspectors:	Patrick J. Isaac Gregory M. Schoenebeck
Approved by:	Johnny H. Eads, Chief Research and Test Reactors Branch B Division of Policy and Rulemaking Office of Nuclear Reactor Regulation

EXECUTIVE SUMMARY

National Institute of Standards and Technology
National Bureau of Standards Reactor
NRC Inspection Report No. 50-184/2009-202

The primary focus of this routine, announced inspection was the onsite review of selected aspects of the licensee's Class I research reactor facility safety programs including operator licenses, requalification, and medical examinations, experiments, organization and operations and maintenance activities, reactor procedures, fuel movement, surveillance, and emergency preparedness. The licensee's programs were acceptably directed toward the protection of public health and safety, and in compliance with NRC requirements.

Operator Licenses, Requalification, and Medical Examinations

- The licensee was conducting the reactor operator requalification program in accordance with procedural and regulatory requirements.

Experiments

- Experiments were being reviewed and performed in accordance with Technical Specification requirements and the licensee's written procedures.

Organization and Operations and Maintenance Activities

- The reactor appeared to be well maintained and the organizational structure was consistent with TS requirements. Staffing levels were adequate for current level of operations.

Procedures

- Written procedures were being maintained in accordance with Technical Specification requirements. The procedure change process satisfied TS and procedural requirements.

Fuel Movement

- The license maintained and followed procedures which effectively implemented Technical Specification requirements for fuel handling.

Surveillance

- Surveillance practices were being maintained in accordance with Technical Specification requirements.

Emergency Preparedness

- Emergency preparedness practices were being maintained in accordance with regulatory requirements and the licensee's commitments.

REPORT DETAILS

Summary of Facility Status

The licensee's National Institute of Standards and Technology (NIST) Center for Neutron Research (NCNR) Test Reactor, a 20-megawatt test reactor commonly known as the National Bureau of Standards Reactor (NBSR), continued to be operated in support of laboratory experiments and various types of research. During the inspection, the reactor was operated continuously on a 24-hour per day basis.

1. Operator Licenses, Requalification, and Medical Examinations

a. Inspection Scope (IP 69003)

The following documents were review to verify that the licensee was in compliance with the facility requalification program and 10 CFR Part 55:

- Reactor Operator Requalification Program for NBSR, March 2009
- Operator License Requalification Files
- Operator Evaluations, Period 2008
- NBSR Requalification Examinations, January to March 2008
- Requalification Program Document Review and Reactivity Changes, Requalification Period 2008 - 2009
- Medical History and Examination Form, Period 2008
- Certification of Medical Examination by Facility Licensee

b. Observations and Findings

The inspectors reviewed the operator requalification program, particularly the individual operator history files, operator evaluations performed in 2008, and the operator examination given in early 2008. Files for operators were selected at random and examined in depth. Medical examiners used ANS/ANSI 15.4-2004, Selection and Training for Research Reactor Personnel, as a basis for their evaluations. Records indicated that each operator reviewed key procedures and additional information specified by the requalification program. The inspectors considered the written examination to be of similar difficulty to an NRC-administered examination.

c. Conclusions

The licensee was conducting the reactor operator requalification program in accordance with procedural and regulatory requirements.

2. Experiments

a. Inspection Scope (IP 69005)

The inspectors reviewed the following to ensure that the requirements of TS

Section 4.8, Experiments, and TS Section 6.5, Experiment Review and Approval, were being met:

- Request #615 “Graphite” from Rabbit Request List
- Approved Irradiations at 20 MW or Less, various
- Memorandum for: Rabbit System Users and Operators, October 4, 2008
- NBSR Irradiation Request/Proposal #2S 440, July 12, 2007
- NBSR Irradiation Request/Proposal #2S 437August 3, 2006
- NCNR Safety Evaluation Committee Meeting Minutes No. 367, July 6, 2009
- Beam Experiment Subcommittee (BEC) Report to the SEC, April 29, 2009

b. Observations and Findings

The inspectors observed a rabbit run for an activation experiment involving a graphite sample. The Reactor Operator referenced the request list and conducted the evolution in accordance with approved procedures, technical specifications and standard practice.

The majority of new experimental activity is related to that which involves use of the neutron beams. Pneumatic samples were the primary form of in-reactor experiments. Although there were no recent irradiation requests, previous proposals had been reviewed in accordance with technical specifications (TS).

c. Conclusions

Experiments were being reviewed and performed in accordance with TS requirements and the licensee’s written procedures.

3. Organization and Operations and Maintenance Activities

a. Inspection Scope (Inspection Procedure (IP) 69006)

The inspectors reviewed the following regarding the licensee’s organization and staffing to verify that the requirements of TS were being met:

- Reactor Shift Supervisor Logbook # 35, June 18, 2008 to present
- Reactor Console Logbook # 133, July 4, 2009 to present
- Reactor Control Room Log, July 28, 2009
- Red Tag Logbook, September 2, 2008 to present
- NBSR Administrative Rule (A.R.) 2.0, Personnel Requirements, August 1, 2008
- NBSR A.R. 1.0, Responsibilities of Operations Personnel, August 1, 2008

b. Observations and Findings

The operations staff consisted of 19 licensed operators and two new operators in training. The inspectors observed a shift turnover on July 29, 2009 and determined from the reactor console logbook that operations crew met the

minimum staffing requirements of TS Section 6.1.3. The licensee recorded maintenance required by TS in the Reactor Operations Daily File. Maintenance considered significant but not required by TS and observations being tracked for potential maintenance needs were logged in the Shift Supervisor Logbook. In all records that the inspectors reviewed, no indication was found that maintenance was not performed in a timely and appropriate manner.

c. Conclusions

The reactor appeared to be well maintained and the organizational structure was consistent with TS requirements. Staffing levels were adequate for current level of operations.

4. Procedures

a. Inspection Scope (IP 69008)

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

- Administrative Rules (A.R.) for the NBSR, August 1, 2008
- A.R. 4.0, Logs, Records, and Instruction Books, July 15, 2004
- A.R. 5.0, Procedures and Manuals, July 15, 2004
- A.R. 15.0, Temporary Minor Changes, July 15, 2004
- Shift Supervisor Instructions, Revised February 25, 2008
- Tech Spec Procedures for the NBSR, August 1, 2008
- Reactor Startup Procedure, July 27, 2009
- Reactor Emergency Power Testing Procedure, July 27, 2009
- Stuck or Faulty Operation of Shim Arms, July 27,

b. Observations and Findings

The inspectors reviewed samples of the licensee's written procedures and revisions to procedures. The Procedures Manual was organized to address the specific categories of procedures identified in TS Section 6.4, Procedures. New procedures and significant changes to existing procedures were observed to have been reviewed in accordance with Procedure AR 5.0, Procedures and Manuals, and TS 6.4. Officially approved copies of procedures were maintained in the Control Room.

c. Conclusions

Written procedures were being maintained in accordance with TS requirements. The procedure change process satisfied TS and procedural requirements.

5. Fuel Movement

a. Inspection Scope (IP 69009)

The following documents were reviewed to verify safe handling, storage,

inspection, and use of reactor fuel elements in compliance with TS Sections 3.9, Facility Specific and 6.4 (2), [Procedures for] fuel loading, unloading, and fuel movement within the reactor vessel:

- Operating and Refueling Procedures for the NBSR
- Technical Specifications for the NBSR, July 2, 2009
- Core Defuel/Fuel Log #593, Reactor Console Log entry on July 14, 2009
- Reactor Console Log #133, July 14, 2009
- Core Defuel/Fuel Log # 593, Reactor Top, July 14, 2009
- Core Defuel/Fuel Log # 593, Pool July 14, 2009

b. Observations and Findings

The inspectors reviewed the core loading designs and fuel handling records for the previous year. They also reviewed the procedures governing fuel handling activities. The procedures reviewed were found to meet the requirements of the TS cited above. The fuel handling records reviewed indicated that the written procedures were followed.

The inspectors verified the locations of the spent fuel elements that had been transferred on July 14, 2009, to storage racks within the fuel pool.

c. Conclusions

The license maintained and followed procedures which effectively implemented TS requirements for fuel handling.

6. Surveillance

a. Inspection Scope (IP 69010)

The inspectors reviewed the following to ensure that the requirements of TS Section 5.0, Surveillance Standards, were being met concerning surveillances:

- Surveillance Test Master List, July 2009
- TSP (Technical Specification Procedure) 4.1.2(2), July 2, 2009
- TSP 4.3.3, July 2, 2009
- TSP 4.3.2(2), July 2, 2009
- Reactor Console Logbook # 133, July 4, 2009 to present
- Reactor Console Logbook # 132, April 2, 2009 – July 4, 2009
- Reactor Shift Supervisor Logbook # 35, June 18, 2008 to present

b. Observations and Findings

A new set of TS were issued for the NBSR on July 2, 2009. The inspectors verified that new surveillance procedures were developed and implemented to reflect the new TS. The inspectors conducted a random sample of three TS procedures surveillances to verify that they met the intent of the new TS. All surveillances and Limiting Conditions for Operation (LCO) reviewed were

completed on schedule as required by TS 4.0, Surveillance Requirements and in accordance with licensee procedures.

c. Conclusions

Surveillance practices were being maintained in accordance with TS requirements.

7. Emergency Preparedness

a. Inspection Scope (IP 69011)

The inspectors reviewed the following to determine if the licensee's emergency preparedness program was maintained in a state of operational readiness since the last inspection and to determine if the licensee's emergency preparedness program and changes to the program met 10 CFR Part 50.54(q) regulatory requirements and the licensee's commitments:

- NBSR Emergency Plan, December 2008
- NBSR Emergency Instructions, November 2008
- Letter to NRC, "Docket Number 50-184 and the NBSR E-Plan", dated September 24, 2008
- Memorandum of Understanding Between Naval Medical Command, National Capital Region, and National Bureau of Standards and Between Naval Hospital Bethesda, MD and National Bureau of Standards, Aug 1983
- Emergency Exercise scenario and Critique, November 24, 2008

b. Observations and Findings

The inspectors determined if revisions to the Emergency Plan (EP) and implementing procedures were made in accordance with 10 CFR Part 50.54(q) and the licensee's administrative controls.

The inspectors performed an onsite tour of the licensee's Emergency Support Center and determined that communication equipment, radiological response supplies, and detection equipment was functional. Additionally, the inspectors visited the Fire Station which provides support for the entire NIST Campus as well as a supplement to the Montgomery County emergency response efforts. Through interviews with on-duty personnel, it was determined that the emergency response organization was cognizant of the agreements for assistance from offsite organizations and that training between response and reactor personnel was being performed in accordance with procedure and standard practice.

Through records and interviews, it was determined that exercises, drills, and training, were being performed as required by the EP.

c. Conclusions

Emergency preparedness practices were being maintained in accordance with regulatory requirements and the licensee's commitments.

8. Exit Interview

The inspection scope and results were summarized on July 29, 2009, with members of licensee management. The inspectors described the areas inspected and discussed the inspection findings. No dissenting comments were received from the licensee.

PARTIAL LIST OF PERSONS CONTACTED

Licensee

P. Brand, Chief of Reactor Engineering
T. Myers, Chief, Reactor Operations
W. Richards, Chief of Operations and Engineering

INSPECTION PROCEDURES USED

IP 69003	Class 1 Research and Test Reactor Operator Licenses, Requalification, and Medical Examinations
IP 69005	Class 1 Research and Test Reactor Experiments
IP 69006	Class 1 Research and Test Reactor Organization and Operations and Maintenance Activities
IP 69008	Class 1 Research and Test Reactor Procedures
IP 69009	Class 1 Research and Test Reactor Fuel Movement
IP 69010	Class 1 Research and Test Reactor Surveillance
IP 69011	Class 1 Research and Test Reactor Emergency Preparedness

ITEMS OPENED, CLOSED, AND DISCUSSED

Opened

None

Discussed

None

Closed

None

LIST OF ACRONYMS USED

10 CFR	Title 10 of the *Code of Federal Regulations*
ADAMS	Agencywide Document Access Management System
CFR	*Code of Federal Regulations*
HP	Health Physicist
IP	Inspection Procedure
NBSR	National Bureau of Standards Reactor
NCNR	NIST Center for Neutron Research
NIST	National Institute of Standards and Technology
NRC	Nuclear Regulatory Commission
PARS	Publicly Available Records
Rev.	Revision
TS	Technical Specification