January 8, 2003

Dr. J. M. Rowe, Director
Center for Neutron Research
National Institute of Standards and Technology
U. S. Department of Commerce
Gaithersburg, MD 20899

SUBJECT: NRC ANNOUNCED INSPECTION REPORT NO. 50-184/2002-202

Dear Dr. Rowe:

This letter refers to the inspection conducted on December 9-12, 2002 at your Test Reactor Facility, referred to as the National Bureau of Standards Reactor. The enclosed report presents the results of that inspection.

Areas examined during the inspection are identified in the report. 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 to NRC requirements was identified. No response to this letter is required.

In accordance with 10 CFR 2.790 of the NRC's "Rules of Practice," 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 (ADAMS). ADAMS is accessible from the NRC Web site at (the Public Electronic Reading Room) http://www.nrc.gov/NRC/ADAMS/index.html.

Should you have any questions concerning this inspection, please contact Mr. Craig Bassett at (404) 562-4712.

Sincerely,

/RA/

Patrick M. Madden, Section Chief
Research and Test Reactors Section
Operating Reactor Improvements Program
Division of Regulatory Improvement Programs
Office of Nuclear Reactor Regulation

Docket No.: 50-184
License No.: TR-5

Enclosure: NRC Inspection Report No. 50-184/2002-202

cc w/enclosure: See next page

National Institute of Standards and Technology

Docket No. 50-184

cc:

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Division of Regulatory Improvement Programs
Office of Nuclear Reactor Regulation

Docket No.: 50-184
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cc w/enclosure: See next page

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

Docket No.:	50-184
License No.:	TR-5
Report No.:	50-184/2002-202
Licensee:	U. S. Department of Commerce
Facility:	National Bureau of Standards Reactor (NBSR)
Location:	National Institute of Standards and Technology Gaithersburg, MD 20899
Dates:	December 9-12, 2002
Inspectors:	Craig Bassett Lawrence Berg
Approved by:	Patrick M. Madden, Section Chief Research and Test Reactors Section Operating Reactor Improvements Program Division of Regulatory Improvement Programs Office of Nuclear Reactor Regulation

EXECUTIVE SUMMARY

This was a routine, announced inspection of activities at the National Bureau of Standards Reactor (NBSR) facility related to operation of the 20 Megawatt (MW) Class 1 Test Reactor. It included an onsite review of the licensee's programs dealing with organizational structure and functions, operations, design control, review and audit, operator requalification, maintenance and surveillance, fuel handling, experiments, procedural control, and emergency preparedness since the last NRC inspection of this facility. The licensee's programs were acceptably directed toward the protection of public health and safety, and in compliance with NRC requirements.

ORGANIZATIONAL STRUCTURE AND FUNCTIONS

- The organizational structure and staffing were consistent with Technical Specification requirements.

OPERATIONS

- NBSR operations shift turnovers, communication, and operator cognizance of facility conditions were acceptable.

DESIGN CONTROL, REVIEW AND AUDIT

- The evaluation of changes to facilities and procedures satisfied NRC requirements.
- The Safety Evaluation Committee was meeting as required and reviewing the topics outlined in the Technical Specifications.

OPERATOR REQUALIFICATION

- Operator requalification was conducted as required by the Requalification Program.

MAINTENANCE

- The maintenance program satisfied Technical Specification requirements.

SURVEILLANCE

- The surveillance program satisfied Technical Specification requirements.

FUEL HANDLING

- Fuel movement was conducted in accordance with procedural requirements.

EXPERIMENTS

- The program for experiments satisfied Technical Specification and procedural requirements.

PROCEDURES

- The procedural revision, control, and implementation program satisfied Technical Specification requirements.

EMERGENCY PREPAREDNESS

- The emergency preparedness program was conducted in accordance with the Emergency Plan.

REPORT DETAILS

Summary of Plant Status

The licensee's 20 MW Test Reactor continues to be operated in support of laboratory experiments, reactor operator training, and various types of research. During the inspection, the reactor was being operated 24-hours per day to support laboratory experiments and conduct product irradiation.

1. ORGANIZATIONAL STRUCTURE AND FUNCTIONS

a. Inspection Scope (Inspection Procedure (IP) 39745)

The inspectors reviewed selected aspects of the following:

- NBSR organization and staffing
- management and staff responsibilities outlined in the Technical Specifications
- NBSR Console Logbooks (Nos. 107 and 108)
- NBSR Reactor Shift Supervisor Logbooks (Nos. 29 and 30)

b. Observations and Findings

The organizational structure had not changed since the last inspection in the area of reactor operations (refer to NRC Inspection Report No. 50-184/2002-202).

Through a review of the reactor operations logs for the period from January 2002 to the present and interviews with operations personnel, the inspectors determined that the four operating crews were each staffed with at least three individuals who were licensed senior reactor operators (SROs). (Some crews had four people assigned to the crew.) Record reviews and direct observations verified that shift turnover briefings are held during each shift change and that shift activities are discussed in detail.

From the above observations, the inspectors also determined that the organizational structure was consistent with the requirements of Technical Specifications (TS) Section 7.1 and Figure 7.1, in Revision 8, dated March 31, 1997. Staffing during reactor operation satisfied the requirements of TS Section 7.1.

c. Conclusions

The organizational structure and staffing were consistent with TS requirements.

2. OPERATIONS

a. Inspection Scope (IP 39745)

The inspectors reviewed selected aspects of the following:

- reactor operations logs and records from January 2002 to the present
- shift turnover sheets for September, October, and November 2002

- Operating Instruction (OI) 1.1, "Reactor Startup", issued December 10, 1997
- OI 1.1 Checklist B, "Reactor Startup Checklist (Unplanned Shutdown < 24 hrs)", issued December 10, 1997

b. Observations and Findings

The operating logs and records were clear and provided an indication of operational activities. The logs and records indicated that shift staffing was as required by TS. Logs and records also showed that operational conditions and parameters were consistent with license and TS requirements. Reactor startup procedure OI 1.1 required verification of each of the limiting conditions for operation specified in TS sections 3.1 through 3.11 prior to startup. These verifications were recorded as required. Observation of operational activities confirmed that these conditions and requirements were satisfied.

The inspectors observed the on-shift recovery from a reactor scram due to power fluctuations from the external power supply. The restart was handled appropriately and in accordance with procedures.

c. Conclusions

NBSR operations shift turnovers, communication, and operator cognizance of facility conditions were acceptable.

3. DESIGN CONTROL, REVIEW AND AUDIT

a. Inspection Scope (IP 40745)

The inspectors reviewed selected aspects of:

- Guidelines for Completing Engineering Change Notices, issued November 24, 2000
- Engineering Change Notice (ECN) 460, "Shim Arm Driveshaft Mechanical Bellows Seal," approved March 21, 2002
- ECN 461, "Thermal Column (TC) Tank Cooling and Cavity Modification," approved March 21, 2002
- ECN 462, "Simplified Beam Tube Shutter Control," approved August 19, 2002
- Safety Evaluation Committee meeting minutes for November 2001 through the present
- Safety Audit Committee report for the past year

b. Observations and Findings

(1) Change Control

The inspectors reviewed selected changes to the facility and/or equipment that had been proposed within the last year. The changes were designated as ECNs. The completed ECNs showed that changes were acceptably reviewed in accordance with

the licensee's guidelines. None of the changes reviewed by the inspectors represented a safety question or required a license amendment.

(2) Committee Review

Records of the meetings held from November 2001 to-date by the Safety Evaluation Committee (SEC) and those of the various safety subcommittees were reviewed. The records showed that meetings were held as required and safety reviews were conducted by the SEC or a designated subcommittee. Topics of these reviews were sufficient to provide guidance, direction, and oversight, and to ensure acceptable use of the reactor.

The audit records showed that the annual independent audit by the Safety Audit Committee (SAC) had been completed in those areas outlined in the TS. The SAC found a dedication to safety and excellence in all areas reviewed.

c. Conclusions

The design change program satisfied NRC requirements. The Safety Evaluation Committee and associated subcommittees were meeting as required and reviewing the topics outlined in the TS.

4. OPERATOR REQUALIFICATION

a. Inspection Scope (IP 69003)

The inspectors reviewed selected aspects of:

- Operator Requalification Program dated September 12, 1977
- status of operator licenses
- operator training and examination records for the years 2000-2002
- NBSR Operator Active Status Log for the year 2002
- medical exam records from 1997-2002

b. Observations and Findings

The Requalification Program was maintained up-to-date and SRO licenses were current. Records showed that operator training was consistent with the Requalification Program requirements. Records confirmed that the operators were being given annual operating evaluations and acceptably completing biennial written examinations. NBSR Operator Active Status Logs and records also showed that operators maintained active duty status as outlined and required in the Requalification Program.

Operators were receiving a biennial physical examination as required.

c. Conclusions

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

5. MAINTENANCE

a. Inspection Scope (IP 39745)

The inspectors reviewed selected aspects of:

- Mechanical maintenance log book

b. Observations and Findings

Records showed that routine maintenance activities were conducted at the required frequency and in accordance with the Technical Specifications, applicable procedure or equipment manual. Maintenance activities ensured that equipment remained consistent with the Safety Analysis Report and Technical Specification requirements.

c. Conclusions

The maintenance program satisfied TS requirements.

6. SURVEILLANCE

a. Inspection Scope (IP 61745)

The inspectors reviewed aspects of:

- Technical Specification (Tech Spec) Procedure 5.2.3, “Test to be Performed When Any Additions, Modifications, or Maintenance Has Been Performed on the Reactor Coolant System,” approved December 10, 1997
- Tech Spec Procedure 5.3.1, “Reactivity Worth of Each Shim Arm and Regulation Rod,” approved December 10, 1997
- Tech Spec Procedure 5.5.1, “Operability Check and Calibration of N-16 Monitors,” approved December 10, 1997
- surveillance and calibration checklists and records

b. Observations and Findings

The TS did not require procedures for the conduct of surveillances and calibrations. However, appropriate procedures, checklists, and data records were readily available and well kept. The surveillances and calibrations were completed on the schedule specified in the TS and in accordance with the procedures. All results were within the TS or the procedurally prescribed parameters.

c. Conclusions

The surveillance program satisfied Technical Specification requirements.

7. FUEL HANDLING

a. Inspection Scope (IP 60745)

The inspectors reviewed selected aspects of the following:

- OI 6.1, "Fueling and Defueling Procedures," originally issued August 20, 1997, with modifications dated March 17, 1998 and July 23, 1999
- OI 6.2, "Operation of the Fuel Transfer System," originally issued October 8, 1998, with modifications dated February 25, 2002
- OI 6.3, "Operation of Spent Fuel Cutting Tool," issued April 23, 1999

b. Observations and Findings

Operating Instructions 6.1 through 6.3 provided prescribed methods to move, handle, and cut spent fuel consistent with the provision of the Technical Specifications and the licensee safety analyses. Fuel movement and fuel examination records and observations showed that the fuel was moved and tested as required. Records and observations also showed that fuel handling and monitoring equipment was operable. Personnel were knowledgeable of the procedural and equipment requirements for criticality control and assurance of fuel integrity. Radiological precautions were also met following applicable Radiation Work Permits.

c. Conclusions

Fuel movement was conducted in accordance with procedural requirements.

8. EXPERIMENTS

a. Inspection Scope (IP 69005)

The inspectors reviewed selected aspects of:

- scope of experiments
- experiment review and approval
- 10 CFR 50.59 evaluation
- potential hazards identification
- reactivity assessment
- Experimental Proposal, "Search for Time Reversal Violation in N-B Decay," memo to Safety Evaluation Committee dated August 12, 2002
- Experimental Proposal, "Neutron Imaging Facility (NIF) at the BT6 Station," memo to Safety Evaluation Committee dated July 21, 2002

b. Observations and Findings

Experiments at the NBS reactor, as defined by the TS, occur inside the thermal shield, i.e., in core. The reactivity worth and other criteria for these in core experiments are delineated in TS 4.0. The TS do not include criteria for beam port experiments,

however, licensee administrative procedures have extended the review and approval requirements in TS 7.2 to the beam port and guide hall experiments.

In 1970, an Irradiation Subcommittee was appointed by the SEC to review experiments and provide recommendations. This included pneumatic tube (rabbit) irradiations. A database of SEC approved protocols was created and has been maintained. New proposals are compared to this database by the subcommittee. Experiments that fall outside the envelope of the database parameters require SEC approval. A current subcommittee member stated that no new or unknown type of in-core experiments had been initiated, reviewed, or approved for several years.

Records indicated that new beam port and guide hall experiments have been proposed and are reviewed and approved by the SEC as specified by the licensee's administrative requirements. A separate database of approved beam experiments is maintained and used by a subcommittee similar to the in-core experiments. Engineering and radiation protection controls were implemented as required to limit radiation exposure to personnel conducting the experiments.

c. Conclusions

The program for experiments satisfied Technical Specification and procedural requirements.

9. PROCEDURES

a. Inspection Scope (IP 42745)

The inspectors reviewed selected aspects of:

- administrative controls
- procedure change process
- procedural implementation

b. Observations and Findings

Written procedures for the activities listed in TS 7.4 were available as required. The procedures were reviewed by the SEC and approved by the Deputy Chief, Reactor Operations as specified in the TS. The only official copy of each procedure was kept in the control room.

The inspectors noted that procedure changes can be initiated by any operator or result from an Engineering Change Notification. The process to permanently or temporarily change a procedure was described by the licensee as follows: 1) draft procedures were developed by the Deputy Chief, Reactor Operations to assure consistency, 2) drafts were circulated to the operations staff for review and comment, and 3) final versions were screened as per 10 CFR 50.59, reviewed, approved, and issued as described in TS 7.4.

c. Conclusions

The procedures satisfied Technical Specification requirements.

10. EMERGENCY PREPAREDNESS

a. Inspection Scope (IP 82745)

The inspectors reviewed selected aspects of:

- Emergency Plan, dated September 30, 1982
- Emergency Instruction 4.4, "Emergency Equipment," dated December 20, 2000
- Emergency response facilities, supplies, equipment, and instrumentation
- Training records for 2001 and 2002
- Offsite support
- Emergency drills and exercises

b. Observations and Findings

The Emergency Plan (E-Plan) in use at the reactor and emergency facilities was the same as the version most recently approved by the NRC. The E-Plan was audited and reviewed as required. Implementing procedures were reviewed and revised as needed to employ the E-Plan effectively. The inspectors verified that operators understood their duties in response to emergency conditions. Facilities, supplies, instrumentation, and equipment were being maintained, controlled, and inventoried as required by the E-Plan.

According to the licensee, the agreement with the Bethesda Naval Medical Hospital for medical support in case of an emergency was current and acceptable.

Records showed that communications capabilities were checked on October 16, 2001 and on November 8, 2002, as stipulated in the E-Plan. The latest emergency exercise was conducted on March 26, 2002. A critique was held following the exercise to discuss the strengths and weaknesses identified during the exercise and to develop possible solutions to any problems identified. The results of the critique was documented and filed. Emergency preparedness and response training was being completed as required. Training for NIST fire fighting and police personnel was conducted although not required by the E-Plan.

c. Conclusions

The emergency preparedness program was conducted in accordance with the Emergency Plan.

11. EXIT INTERVIEW

The inspection scope and results were summarized on December 12, 2002, with members of licensee management and staff. The inspectors described the areas inspected and discussed in detail the inspection findings.

No dissenting comments were received from the licensee. The licensee did not identify as proprietary any of the material provided to or reviewed by the inspectors.

PARTIAL LIST OF PERSONS CONTACTED

Licensee Personnel

R. Beasly, Senior Reactor Operator
N. Bickford, Senior Reactor Operator
P. Brand, Chairman, Safety Evaluation Committee
D. Brown, Health Physicist
M. Cassells, Senior Reactor Operator
P. Gallagher, Deputy Director, Center for Neutron Research
W. Mueller, Reactor Shift Supervisor
T. Myers, Deputy Chief, Reactor Operations
M. Rowe, Director, Center for Neutron Research
S. Weiss, Chief, Reactor Operations and Engineering

Other Personnel

K. Rogers, Consultant and former NRC Commissioner

INSPECTION PROCEDURES USED

IP 39745 Class I Non-Power Reactors Organization, Operations, and Maintenance Activities
IP 40745 Class I Non-Power Reactor Review and Audit and Design Change Functions
IP 42745 Class I Non-Power Reactor Procedures
IP 60745 Class I Non-Power Reactor Fuel Movement
IP 61745 Class I Non-Power Reactor Surveillance
IP 69003 Class I Non-Power Reactor Operator Licenses, Requalification, and Medical Activities
IP 69005 Class I Non-Power Reactor Experiments
IP 82745 Class I Non-Power Reactor Emergency Preparedness

ITEMS OPENED, CLOSED, AND DISCUSSED

Opened

None

Closed

None

LIST OF ACRONYMS USED

CFR	Code of Federal Regulations
ECN	Engineering Change Notice
E-Plan	Emergency Plan
IFI	Inspector Follow-up Item
IP	Inspection Procedure
IR	Inspection Report
MW	Megawatt
NIST	National Institute of Standards and Technology
NBSR	National Bureau of Standards Reactor
NRC	Nuclear Regulatory Commission
OI	Operating Instruction
SAC	Safety Audit Committee
SEC	Safety Evaluation Committee
SRO	Senior Reactor Operator
TS	Technical Specification