April 24, 2002

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 INSPECTION REPORT NO. 50-184/2002-201

Dear Dr. Rowe:

This letter refers to the inspection conducted on April 8-10, 2002, at 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 concerns or noncompliances of NRC requirements were 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 Craig Bassett at 404-562-4712.

Sincerely,

/RA by Alexander Adams, Jr., Acting for/

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. 50-184/2002-201

cc w/enclosure: Please see next page

National Institute of Standards
and Technology

Docket No. 50-184

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U. S. NUCLEAR REGULATORY COMMISSION

Docket No:	50-184
License No:	TR-5
Report No:	50-184/2002-201
Licensee:	U. S. Department of Commerce
Facility:	National Bureau of Standards Reactor
Location:	National Institute of Standards and Technology Gaithersburg, Maryland 20899
Dates:	April 8-10, 2002
Inspector:	Craig Bassett
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

The primary focus of this routine, announced inspection included onsite review of selected aspects of the licensee's Class I Test Reactor operation including: organization and staffing, review and audit functions, procedure review, radiation protection program, environmental protection program, safeguards and security program, and the shipment of radioactive material since the last NRC inspection of these program areas.

The inspector concluded that the licensee's programs were acceptably directed toward the protection of public and facility workers' health and safety and were in compliance with NRC requirements.

Organization and Staffing

- The licensee's organization and staffing remain in compliance with the requirements specified in the Technical Specifications Section 7.1.

Review and Audit Functions

- Reviews were being conducted by the Safety Evaluation Committee and an annual audit was being completed by the Safety Audit Committee in compliance with the requirements specified in the Technical Specifications.

- Annual reviews of the Radiation Protection Program were being completed by the licensee as required by 10 CFR Part 20.

Procedures

- New procedures and major changes to the licensee's Health Physics procedures were being reviewed and approved by the Safety Evaluation Committee as required.

Radiation Protection Program

- Surveys were being completed and documented as stipulated by procedure.

- Postings met the regulatory requirements specified in 10 CFR Parts 19 and 20.

- Personnel dosimetry was being worn as required and doses were within the NRC's regulatory limits.

- Portable radiation monitoring equipment was being maintained and calibrated as required.

- The ALARA Program being implemented by the licensee satisfied regulatory requirements.

- The training program implemented by the licensee satisfied regulatory requirements specified in 10 CFR Part 19.

Environmental Protection Program

- Effluent monitoring satisfied license and regulatory requirements and releases were within the specified regulatory limits.

Safeguards and Security

- The NRC-approved security program at the facility was acceptably carried out and was in compliance with regulatory requirements.

Material Control and Accountability

- Special Nuclear Material was being acceptably controlled and inventoried.

Transportation of Radioactive Materials

- Licensee unirradiated fuel shipments satisfied internal procedures.

Report Details

Summary of Plant Status

The licensee's 20 megawatt Test Reactor continues to be operated in support of ongoing experiments and laboratory work. During the inspection, the reactor was operated continuously at full power. Installation of a new cold source, construction of a replacement cooling tower, and completion of a Guide Hall addition had all been completed since the last NRC inspection of the facility (refer to NRC Inspection Report No. 50-184/2001-202).

1. Organization and Staffing

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

The inspector reviewed the following regarding the licensee's organization and staffing to ensure that the requirements of Technical Specification (TS) Section 7.1, dated March 31, 1997, were being met:

- organizational structure
- management responsibilities
- staffing requirements for safe operation of the facility

b. Observations and Findings

Through discussions with licensee representatives, the inspector determined that management responsibilities and the organizational structure at the facility had not changed since the previous NRC inspection in the area of radiation protection (refer to NRC Inspection Report No. 50-184/2001-201 issued March 27, 2001). However, since that inspection, the Deputy Chief of Operations had retired. The inspector determined that the person now filling the Deputy Chief position, and those filling the other positions described in the TS, were adequately qualified and their qualifications exceeded those specified in Section 7.1.

With respect to facility staffing, the inspector reviewed various Health Physics (HP) records and logs and discussed facility operations with licensee personnel. As a result, the inspector determined that the staffing at the facility was acceptable to support the ongoing activities and also met the requirements specified in the TS Section 7.1.

c. Conclusions

The licensee's organization and staffing remain in compliance with the requirements specified in the TS Section 7.1.

2. Review, Audit, and Design Functions

a. Inspection Scope (IP 40745)

The inspector reviewed the following to ensure that the reviews and audits stipulated in TS Sections 7.2 and 7.3 were being completed:

- Safety Evaluation Committee (SEC) meeting minutes for 2001 to date
- Safety Audit Committee (SAC) audit conducted during October 2001
- Health Physics Instruction 1-2, "Health Physics Skills, Duties, and Audits," dated March 2001
- TS duties specified for the SEC and the SAC

b. Observations and Findings

The inspector reviewed the SEC meeting minutes from January 2001 to the present. These meeting minutes showed that the SEC met as required by the TS with a quorum being present. The inspector also noted that, during the meetings, the SEC had considered the types of topics outlined by the TS.

It was noted that the SAC completed annual audits of the facility operations and the performance of the SEC. The inspector reviewed the SAC audit conducted in October 2001. The inspector noted that the audit report was informative and the resulting findings were acceptable.

The inspector also verified that the licensee had completed annual reviews of the Radiation Protection Program as required by 10 CFR 20.1101(c) and quarterly audits required by procedure. This annual review, coupled with quarterly audits conducted by Reactor HP personnel, was sufficient to ensure that all aspects of the program had been reviewed and areas were noted where improvements could be made. Commitments and/or improvements noted in the quarterly audits were reviewed and progress was noted. The reviews and audits were acceptable.

c. Conclusions

Reviews were being conducted by the SEC and an annual audit was being completed by the SAC according to the requirements specified in the TS. Annual reviews of the Radiation Protection Program were being completed by the licensee as required by 10 CFR Part 20.

3. Procedures

a. Inspection Scope (IP 42745)

The inspector reviewed the following to ensure that the requirements of TS Section 7.4 were being met concerning written procedures:

- Health Physics Instruction (HPI) 1-0, "Health Physics Policies," dated March 2001
- HPI 1-2, "Health Physics Skills, Duties, and Audits," dated March 2001
- HPI 1-5, "Special Nuclear Material Accountability," dated March 2001
- HPI 3-2, "Radiation Work Permit," dated March 2001
- HPI 3-3, "Reactor Survey Operations," dated March 2001
- HPI 3-8, "Contaminated Materials at NBSR," dated March 2001

- the process used to revise, review, and approve facility procedures

b. Observations and Findings

The inspector determined that the licensee's written procedures and instructions concerning radiation protection activities were being reviewed and revised as required by procedure. New procedures and major changes were reviewed and approved by the SEC. Minor changes did not require approval but were reviewed and approved by the Chief of the Occupational Health and Safety Division and/or the Deputy Chief, Reactor Operations and Engineering.

c. Conclusions

New procedures and major changes to the licensee's Health Physics procedures were being reviewed and approved by the SEC as required.

4. Radiation Protection Program

a. Inspection Scope (IP 83743)

The inspector reviewed selected aspects of the following to verify compliance with 10 CFR Part 20 and procedural requirements:

- Health physics survey records outlined in HPI 3-1, "Reactor Inplant Monitoring Summary," dated December 1993
- HPI 1-4, "Radiological Safety Training," dated December 1993
- HPI 3-2, "Radiation Work Permit," dated March 2001
- HPI 7-4, "Survey Instrument Calibration (beta/gamma)" dated October 1995
- Records of Radiation Work Permits required by HPI 3-2
- National Institute of Standards and Technology (NIST) Personal Dosimetry Summary records for 2001
- calibration and periodic check records for portable radiation monitoring instruments
- ALARA Policy stated in various Health Physics Procedures and Health Physics Instructions

b. Observations and Findings

(1) Personnel

As noted in NRC Inspection Report No 50-184/2001-202, the former Supervisory Health Physicist at the reactor retired and was replaced by promotion of a reactor Health Physicist (HP). No problems were noted as a result of this change. A Certified HP was recently hired so that, currently, all the professional positions in the Reactor Health Physics Group are filled. The licensee is in the process of hiring one additional HP Technician so that all the technical positions will be filled as well. Although the one position remains to

be filled, no negative impact on the program was noted due to the number of highly qualified staff.

(2) Surveys

The inspector reviewed the daily general area radiation surveys of work areas during reactor operation conducted by the Designated Health Physicist (DHP), selected monthly general area radiation surveys around the exterior of the NIST Center for Neutron Research (NCNR), and quarterly radiation surveys of the perimeter and unrestricted areas for 2001 to-date. The surveys had generally been completed by the DHP as stipulated by procedure and the results were documented on the appropriate forms.

During the inspection, the inspector conducted a radiation survey of the Experiment Floor area (C100 area) around the reactor and compared the readings detected with those found by the licensee. The results were comparable and no anomalies were noted.

Also during this inspection the inspector noted that exit frisking was by sensitive, automated equipment. Some older equipment had been replaced by newer, more sensitive models.

(3) Postings and Notices

The inspector reviewed the postings at the entrances to various controlled areas including the C100 area, the basement area, and radioactive material storage areas. The postings were acceptable and indicated the radiation and contamination hazards present. Other postings also showed the industrial hygiene hazards present in the areas. The facility's radioactive material storage areas were noted to be properly posted. No unmarked radioactive material was found in the facility. Copies of current notices to workers, required by 10 CFR Part 19, were posted near or above the racks where personnel dosimeters are stored in the main hallways of the facility.

(4) Dosimetry

The licensee's personnel dosimeters are processed by the Navy. An examination of the records for the past year (2001) showed that all exposures were within NRC limits. The majority of the records showed that NCNR personnel received exposures of less than fifty millirem for the year.

Through direct observation, the inspector determined that dosimetry was acceptably used by facility personnel.

(5) Portable Radiation Monitoring Equipment

The calibration of portable survey meters was typically completed by personnel from another group within the NIST Occupational Health and Safety Division. Calibration of fixed radiation detectors, fixed air monitoring instruments, and other instrumentation associated with the reactor was completed by the Reactor Engineering Group. The calibration records of selected portable

survey meters, friskers, and air monitoring equipment in use at the facility were reviewed. The instruments were being calibrated semi-annually and records were being maintained as required.

(6) Radiation Work Permit Program

The inspector reviewed the Radiation Work Permits (RWPs) that had been written and used during the year to-date as stipulated in HPI 3-2. It was noted that the controls specified in the RWPs were acceptable and applicable for the work being done. The RWPs had been reviewed, approved, and eventually terminated as required.

(7) ALARA Policy

The ALARA Policy was outlined and established in various Health Physics Procedures and Health Physics Instructions. The ALARA program provided guidance for keeping doses as low as reasonably achievable and was consistent with the guidance in 10 CFR Part 20.

(8) Training

The inspector reviewed the content of the computer- based training program for researchers and determined that it satisfied requirements in 10 CFR 19.12. The exam given following the training provided a good review of the material and gave a good indication of the trainee's knowledge of radiation protection.

(9) Facility Tours

The inspector toured the Control Room, the C100 area or Experimental Floor, the new fuel and spent fuel storage areas, the Guide Hall, and other selected support laboratories and offices. Control of radioactive material and control of access to radiation and high radiation areas was acceptable. As noted earlier, the postings and signs for these areas were appropriate.

c. Conclusions

The inspector determined that, because: 1) staffing was adequate; 2) surveys were being completed as stipulated; 3) postings met regulatory requirements; 4) personnel dosimetry was being worn as required and doses were within the NRC's regulatory limits; 5) radiation monitoring equipment was being maintained and calibrated as required; 6) Radiation Work Permits stipulated requirements for non-routine work; and, 7) training was appropriate, the Radiation Protection Program being implemented by the licensee satisfied regulatory requirements.

5. Environmental Protection Program

a. Inspection Scope (IP 80745)

The inspector reviewed selected aspects of the following to ensure that the monitoring required in TS Section 5.9 was being conducted:

- HPI 8-1, "Liquid Radioeffluent Release," dated November 2000
- HPI 8-2, "Environmental Sampling," dated December 1993
- HPI 8-4, "Reactor Stack Monitoring," dated December 1993
- TLD results for Environmental Stations for 2001 to-date
- Gaseous release logs and records

b. Observations and Findings

Environmental soil and vegetation samples were collected and prepared for analysis using generally accepted techniques in accordance with HPI 8-2. The data indicated that there were no significant changes from past results. The results were acceptably documented and were reported in the licensee's Annual Report.

Releases of argon-41 and tritium gases to the environment were acceptably monitored and recorded as specified in HPI 8-4.

c. Conclusions

The environmental monitoring program satisfied TS Section 5.9 requirements.

6. Safeguards and Security

a. Inspection Scope (IP 81401, 81402, and 81421)

The inspector reviewed selected aspects of the licensee's physical security arrangements including the following to ensure that the requirements of the Safeguards Plan, last updated April 26, 1988, were being met:

- Reactor Operations Section Administrative Rule, AR 13.0, "Building Access," dated April 30, 1998
- security systems and equipment
- selected names on the list of individuals authorized unescorted access to the facility
- admittance process used to allow individuals, whose names are not on the access list, to enter the facility

b. Observations and Findings

Physical protection systems, equipment and instrumentation exceeded the requirements of the Safeguards Plan for the facility. A new computerized alarm panel had been installed at the NIST Police dispatch location. Access control was as stipulated by procedure and as required by the Safeguards Plan. Annual audits of Plan implementation were being completed as required. No deficiencies were reported.

The licensee was maintaining appropriate control over access to the Controlled Access Area (CAA) and over keys used at the facility. Security devices and physical barriers for the CAA, and the facility in general, were also being maintained as required.

c. Conclusions

The inspector determined that the licensee was complying with the requirements specified in the NRC regulations and in the licensee's Safeguards Plan.

7. Material Control and Accounting

a. Inspection Scope (IP 85102)

The inspector reviewed selected aspects of the licensee's material control and accountability program including:

- SNM shipping and receiving records
- storage and movement of fuel
- physical inventory of spent and unirradiated fuel
- accountability records and reports

b. Observations and Findings

The licensee acquires new fuel as needed to minimize the amount stored on the site. The material control and accountability program tracked the identity, locations and quantity of fuel. The licensee conducted SNM inventories upon fuel receipt and transfer, thus exceeding the requirements of 10 CFR 70.51(d) which require an annual inventory. The possession and use of SNM were limited to the locations and purposes authorized under the license. The material control and accountability forms (DOE/NRC Forms 741, 742, and 742c) were prepared and transmitted as required.

c. Conclusions

Special Nuclear Material was being acceptably controlled and inventoried.

8. Shipment of Radioactive Material

a. Inspection Scope (IP 86740)

The inspector reviewed the following to verify compliance with procedural requirements for transferring licensed material:

- HPI 4-13, "Shipping Radioactive Material," dated March 1996
- records of transfers of unirradiated fuel (Special Nuclear Material)
- Letter from NIST to Department of Transportation (DOT) dated August 16, 2000 requesting an exemption from the requirements of 49 CFR 177.842

- Response letter from DOT to NIST dated March 23, 2001

The inspector also interviewed licensee personnel.

b. Observations and Findings

The DOT recently informed NIST that, as a federal agency transporting unirradiated fuel using federal employees and federal vehicles to conduct federal business, NIST was exempt from DOT regulations. However, as an internal policy, NIST will continue to comply with DOT regulations except for 49 CFR 177.842(b) regarding unirradiated fuel. A NIST request for an exemption from this particular rule lead to the DOT response.

Based on the review of records of unirradiated fuel shipments, the inspector determined that the licensee shipped such material in accordance with their internal procedures.

c. Conclusions

Licensee unirradiated fuel shipments satisfied internal procedures.

9. Exit Interview

The inspection scope and results were summarized on April 10, 2002, with members of licensee management. The inspector described the areas inspected and discussed in detail the inspection findings. No dissenting comments were received from the licensee. The Safeguards Plan, and related subject matter, were identified as proprietary information.

PARTIAL LIST OF PERSONS CONTACTED

Licensee

P. Brand, Chairman, Safety Evaluation Committee
D. Brown, Supervisory Health Physicist
P. Gallagher, Group Leader, Research Facility Operations
T. Myers, Acting Deputy Chief, Reactor Operations and Engineering
S. Weiss, Chief, Reactor Operations and Engineering

Other Personnel

D. Strawsburg, Captain, NIST Police

INSPECTION PROCEDURES USED

IP 39745:	Class 1 Research and Test Reactor Organization, Operations, and Maintenance Activities
IP 40745:	Class 1 Research and Test Reactor Review and Audit and Design Change Functions
IP 42745:	Class 1 Research and Test Reactor Procedures
IP 80745:	Class 1 Research and Test Reactor Environmental Protection
IP 83743:	Class 1 Research and Test Reactor Health Physics
IP 81401:	Plans, Procedures, and Reviews
IP 81402:	Reports of Safeguards Events
IP 81421:	Fixed Site Physical Protection of Special Nuclear Material of Moderate Strategic Significance
IP 85102:	Material Control and Accounting - Reactors
IP 86740:	Inspection of Transportation Activities

ITEMS OPENED, CLOSED, AND DISCUSSED

Opened

None

Closed

None

LIST OF ACRONYMS USED

CFR	Code of Federal Regulations
DHP	Designated Health Physicist
DOT	Department of Transportation
HPI	Health Physics Instruction
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
RWP	Radiation Work Permit
SAC	Safety Audit Committee
SEC	Safety Evaluation Committee
SNM	Special Nuclear Material
TS	Technical Specifications