

April 29, 2014

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. 50-184/2014-201

Dear Dr. Dimeo:

From April 7–10, 2014, the U.S. Nuclear Regulatory Commission (NRC or the Commission) conducted an inspection at the National Institute of Standards and Technology's Center for Neutron Research facility. The inspection included a review of activities authorized for your facility. The enclosed report documents the inspection results, which were discussed on April 10, 2014, with you, the Deputy Director, the Chief of Reactor Operations, the Senior Health Physicist, and other members of your staff.

The inspection examined 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. The inspector reviewed selected procedures and records, observed activities, and interviewed personnel. Based on the results of this inspection, no findings of significance were identified. No response to this letter is required.

In accordance with Title 10 of the *Code of Federal Regulations* Section 2.390, "Public inspections, exemptions, and requests for withholding," a copy of this letter, its enclosure, and your response (if any) will be available electronically for public inspection in the NRC Public Document Room or from the NRC's document system (Agencywide Documents Access and 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).

R. Dimeo

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Should you have any questions concerning this inspection, please contact Craig Bassett at (301) 466-4495 or by electronic mail at Craig.Bassett@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. 50-184
License No. TR-5

Enclosure:
NRC Inspection Report No. 50-184/2014-201

cc w/encl: See next page

National Institute of Standards and Technology

Docket No. 50-184

cc:

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Dr. David Sean O'Kelly, Chief Reactor Operations
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Test, Research, and Training
Reactor Newsletter
University of Florida
202 Nuclear Sciences Center
Gainesville, FL 32611

R. Dimeo

- 2 -

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*concurring via e-mail

NRC-002

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DATE	4/22/2014	4/29/2014

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

Docket No: 50-184

License No: TR-5

Report No: 50-184/2014-201

Licensee: National Institute of Standards and Technology

Facility: National Bureau of Standards Reactor

Location: Gaithersburg, MD

Dates: April 7–10, 2014

Inspector: Craig Bassett

Accompanied by: Doug Simpkins, Instructor, NRC Technical Training Center

Approved by: Gregory T. Bowman, Chief
Research and Test Reactors Oversight Branch
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. 50-184/2014-201

The primary focus of this routine, announced inspection was the onsite review of selected aspects of the National Institute of Standards and Technology (the licensee's) Class I 20 megawatt test reactor facility safety program including: (1) organization and staffing, (2) review and audit and design change functions, (3) procedures, (4) radiation protection, (5) environmental protection program, and (6) transportation of radioactive material since the last U.S. Nuclear Regulatory Commission (NRC) inspection of these areas. The licensee's safety program was acceptably directed toward the protection of public health and safety and was in compliance with NRC requirements.

Organizational Functions and Staffing

- The organizational structure was consistent with Technical Specifications 6.1 and 6.3.
- Health physics staffing appeared to be adequate for the current level of operations.

Review and Audit and Design Change Functions

- The Safety Evaluation Committee was meeting as required and reviewing the topics outlined in the Technical Specifications.
- The Safety Audit Committee was conducting annual audits as required.
- The design change program being implemented at the facility satisfied NRC requirements.

Procedures

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

Radiation Protection

- Surveys were being completed and documented as required.
- Postings met the regulatory requirements specified in Title 10 of the *Code of Federal Regulations* Parts 19 and 20.
- Personnel dosimetry was being worn as required and recorded doses were within the NRC's regulatory limits.
- Radiation monitoring equipment was being maintained and calibrated as required.

- Radiation work permits were generated as needed to provide guidance and precautionary requirements for on-going and emergent work at the facility.
- The radiation protection training program being implemented by the licensee satisfied regulatory requirements.

Environmental Protection Program

- Effluent monitoring satisfied NRC requirements and releases were within regulatory limits.

Transportation of Radioactive Materials

- The program for transportation of radioactive materials satisfied U.S. Department of Transportation and NRC requirements.

REPORT DETAILS

Summary of Facility Status

The National Institute of Standards and Technology's (NIST's or the licensee's) Center for Neutron Research (NCNR) 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 shut down for maintenance in accordance with the licensee's normal operations cycle.

1. Organizational Functions and Staffing

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

To verify that the licensee was complying with the requirements specified in Technical Specification (TS) Sections 6.1 and 6.3: the inspector reviewed selected aspects of the following:

- Current NBSR organization and staffing
- Management and staff responsibilities outlined in the TS
- NBSR Administrative Rule 2.0, "Personnel Requirements," issued July 30, 2009

b. Observations and Findings

The inspector noted that the organizational structure had changed since the last inspection in the area of radiation protection (refer to NRC Inspection Report No. 50-184/2013-201). In the past the group leader of the NIST reactor health physics (HP) group reported to the NIST campus Director of Radiation Protection. Because of a recent organizational change at NIST, the reactor HP group leader now reports to the Director, NIST Center for Neutron Research, through the Deputy Director. The inspector confirmed that this change continued to comply with TS requirements. The licensee indicated that they were preparing an license amendment request to obtain NRC approval to modify the TS to more accurately reflect the revised organizational structure.

The inspector also noted that the reactor HP group was composed of the group leader and nine staff members. Six of these individuals, including the group leader, were health physicists; the other four were HP technicians. The staffing level appeared to be adequate to support the current level of activity at the facility.

c. Conclusion

The organizational structure was consistent with TS 6.1 and 6.3 requirements. The reactor HP group staffing appeared to be adequate for the current level of operations.

2. Review and Audit and Design Change Functions

a. Inspection Scope (IP 69007)

The inspector reviewed the following to ensure that the requirements of TS 6.2, "Review and Audit," and Title 10 of *Code of Federal Regulations* (10 CFR) Section 50.59, were being implemented in accordance with NRC requirements:

- Safety Evaluation Committee (SEC) meeting minutes for March 2012 through the present (Meeting Nos. 373–377)
- NBSR Procedure No. NBSR-0007-DOC-04, "Engineering Manual," Rev. 4, dated June 2009
- Health Physics Instruction (HPI) 1-0, "Health Physics Policies," dated March 2001
- Reactor Health Physics Procedure, HP-1.2, "ALARA [As Low As Reasonably Achievable] and Program Review," issued December 21, 2011
- 2013 Reactor Audit in Accordance with TS 6.2.4(1-4), conducted by the Audit Subcommittee of the NCNR Safety Evaluation Committee, dated September 31, 2013, and the NCNR response
- 2013 Annual Report of the Safety Assessment Committee during the period from November 21–22, 2013
- Annual Review of the Reactor Radiation Protection Program, completed by the Group Leader, Reactor Facilities Group, for 2012, dated November 12, 2013
- Quarterly Facility Audit Reports completed by HP staff members for 2013 and to date in 2014
- NBSR Engineering Change Request No. 631, "Area Radiation Monitor System Modifications/Expansion," Level I review, approval dated February 17, 2012
- NBSR Engineering Change Notice (ECN) No. 631, "Area Radiation Monitor System Modifications/Expansion," Minor ECN – Level I review, approval dated December 22, 2010, and work completed on March 27, 2012
- NBSR Engineering Change Request No. 707, "Secondary Cooling N-16 Radiation Monitors RM 3-1 and RM 3-3 Relocation," Level I review, approval dated December 6, 2011
- NBSR ECN No. 707, "Secondary Cooling N-16 Radiation Monitors RM 3-1 and RM 3-3 Relocation," Minor ECN – Level I review, approval dated February 1, 2012, and closed out June 4, 2012
- Operations Report No. 65, "NBSR Annual Report," for the period from January 1, 2012, through December 31, 2012, issued March 28, 2013
- Operations Report No. 66, "NBSR Annual Report," for the period from January 1, 2013, through December 31, 2013, issued March 31, 2014

b. Observations and Findings

(1) Review and Audits Functions

Records of the meetings held by the SEC from March 2013 through the date of the inspection were reviewed. The meeting minutes showed that meetings were held at least semiannually as required by the SEC charter and reviews of proposed changes and experiments were conducted by the SEC or a designated subcommittee. The minutes also indicated that the SEC provided appropriate guidance and direction for reactor operations and ensured suitable use and oversight of the reactor.

Other records reviewed by the inspector showed that an annual independent audit had been conducted by the Safety Assessment Committee as required by TS 6.2. It was noted that for 2013, the licensee had taken credit for an audit and review conducted by the two members of an International Atomic Energy Agency (IAEA) Operation and Maintenance Assessment of Research Reactors (OMARR) mission, an invited additional expert, and an IAEA secretary, during the period from November 21–22, 2013. The inspector reviewed this OMARR audit and noted that the audit team provided an independent review of the NCNR reactor operations and the performance of the SEC as outlined in the TS. The OMARR audit team also made various observations, which the licensee was taking action to address.

It was noted that the facility radiation protection program was being reviewed annually as required by 10 CFR 20.1101(c).

The inspector also reviewed quarterly audits of the facility completed by HP staff members. The audits included observations of plant conditions, radiation level readings and contamination surveys of various areas, and recommendations for improvements as required by HPI 1.0.

(2) Design Change Functions

The inspector met with the quality assurance engineer who managed the engineering change request program. The inspector reviewed two changes pertaining to radiation protection systems and/or equipment that had been proposed and implemented. The changes were acceptably documented and reviewed in accordance with the TS and the licensee's guidelines. It was noted that both of the ECNs included: (1) a design description; (2) safety considerations; (3) Safety Analysis Report changes, if needed; and (4) a safety evaluation and conclusions. Neither of the changes met the criteria in 10 CFR 50.59 for further review or NRC approval. The design change program was being implemented in accordance with NRC requirements.

c. Conclusion

The SEC was meeting as required and reviewing the topics outlined in the TS and an annual audit was being conducted as required. The Safety Assessment Committee was conducting audits as required. The design change program was being implemented by the licensee in accordance with NRC requirements.

3. Procedures

a. Inspection Scope (IP 69008)

The inspector reviewed the following to ensure that the requirements of TS 6.4 were being met concerning written procedures for radiation protection:

- Procedure revision, review, and approval process
- SEC meeting minutes for March 2012 through the present
- Selected reactor health physics procedures (HPPs) for the NBSR
- NBSR Administrative Rule 5.0, "Procedures and Manuals," issued June 5, 2010
- Selected HPIs pertaining to the NIST campus, including the NBSR

b. Observations and Findings

The inspector noted that the reactor HP group at NCNR used three types of procedures. One type consisted of HPIs or Radiation Safety Instructions (RSIs), which were guidance documents developed by the NIST Office of Safety, Health, and Environment (OSHE), Gaithersburg Radiation Safety Division, to implement the radiation safety program for the entire NIST campus. Certain HPIs/RSIs were written specifically for monitoring reactor operations. Another type consisted of the HPPs for the NBSR issued by the reactor operations group. These procedures applied only to the NCNR and the work conducted there. The third set of procedures consisted of interdivisional procedures. These procedures were used to document the basis and process for issues that affected various different NIST divisions at the Gaithersburg campus.

The inspector determined that the licensee's written procedures and instructions concerning radiation and radioactive contamination control activities were being reviewed and revised as needed.

It was also noted that since the HP group now reported to the Director of the NCNR, the group was in the process of transitioning from the use of OSHE HPI procedures to using mostly HPP procedures for the NBSR. These HPPs were being rewritten and reformatted in accordance with an initiative underway to revise and rewrite the licensee's operations procedures.

c. Conclusion

Licensee HP procedure changes were being reviewed and approved as required.

4. Radiation Protection

a. Inspection Scope (IP 69012)

The inspector reviewed selected aspects of the following to verify compliance with 10 CFR Part 20, TS 3.7 and 4.7, and procedural requirements:

- Selected HPPs and HPIs/RSIs
- ALARA Policy, outlined in various HPPs and HPIs
- Copies of radiation work permits (RWPs) for 2013
- Selected HP survey records documented on “Duty HP Weekly Data Summary” sheets and “Swipe Survey” analysis results data sheets for 2013 and to date in 2014
- Quarterly Facility Audit Reports completed by reactor HP staff members for 2013
- NIST Personnel Dosimetry Summary records for facility personnel for 2012 and the first three quarters of 2013
- Calibration and periodic check records for portable radiation monitoring instruments documented on “NIST HP Survey Instrument Calibration” forms
- Calibration records for area radiation monitors (ARMs) documented on the form “Area Radiation Monitors,” RM 1-1, dated December 8, 2009
- Facility Operations Reports for the past 2 years (Nos. 65–66)

The inspector also observed the use of dosimetry and radiation monitoring equipment during tours of the facility. In addition, the inspector accompanied the duty HP during surveys in the C-200, C-100, basement, and guide hall areas.

b. Observations and Findings

(1) Surveys

The inspector reviewed the results of selected surveys including: (1) daily general area radiation surveys of work areas, (2) weekly contamination surveys of controlled areas at the facility, (3) monthly general area radiation surveys of the interior uncontrolled areas and the area around the exterior of the NCNR, (4) radiation and contamination surveys conducted during the quarterly audits, and (5) contamination surveys of various items being removed from the controlled areas of the facility for 2013 and to date in 2014. The surveys had been completed as stipulated by procedure and the results were documented on the appropriate forms. Areas or items found to be contaminated were decontaminated and then surveyed again to verify there was no contamination present. The survey program appeared to be adequate.

The inspector accompanied one of the HPs during completion of a radiation survey of various work areas inside containment and the guide hall. Because the reactor was shut down, the HP was asked to simulate

the proper conduct of such a survey, mention what actions would be taken depending on the results of the survey, and what the expected radiation levels would be. The inspector noted that the HP was knowledgeable and demonstrated the appropriate actions to take during the process of conducting the survey.

On various occasions during tours of the facility, the inspector also noted that exit frisking was completed by facility personnel using hand and shoe monitors or portal monitors. Frisking practices were acceptable.

(2) Postings and Notices

The inspector reviewed the postings at the entrances to, and inside, various controlled areas including the C-100 area, the basement area, and the guide hall. The postings were acceptable and indicated the radiation 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 in the main hallways of the facility as well as near or above the racks where personnel dosimeters were stored.

(3) Dosimetry and Personnel Exposure

Through direct observation of licensee staff members, the inspector determined that dosimetry was worn acceptably. The thermoluminescent dosimeters (TLDs) worn by NIST staff members were processed by Navy personnel as stipulated in a memorandum of understanding between NIST and the National Naval Medical Center Hospital in Bethesda, MD, dated December 1983. An examination of the TLD results indicating radiation exposures at the facility for 2012 and the first three quarters of 2013 showed that occupational doses, as well as doses to the public, were within 10 CFR Part 20 limits.

The facility also collected and analyzed urine samples for tritium bioassay purposes. The highest attributable doses in 2012 and 2013 from tritium were also within 10 CFR Part 20 limits.

(4) Calibration and Operation of Radiation Monitoring Equipment

The calibration of portable survey meters was typically completed by NIST OSHE personnel as well as by reactor HP staff. Calibration of fixed radiation detectors, 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 ARMs in use at the facility were reviewed. The inspector verified that portable instruments were now being calibrated annually and

records were being maintained as required. The ARMs were checked monthly and calibrated annually.

The inspector verified that the radiation monitoring equipment required in TS 3.7 and 4.7 was operable and was being tested and calibrated as required.

(5) Radiation Work Permit Program

The inspector reviewed RWPs that had been written and used in 2013. There were various "standing" RWPs that remained in effect for the entire year due to the repetitive nature of the work they covered. Other RWPs were generated for specific work, such as fuel storage pool activities, maintenance work, and fuel handling. It was noted that the controls specified in the RWPs were acceptable and applicable for the work being done. Also, the RWPs had been reviewed and approved as required.

(6) Radiation Protection Program

The radiation protection program was established and described in various licensee documents including: (1) NIST Administrative Manual, Chapter 12, "Safety," Subchapter 12.03, "Ionizing Radiation Safety;" (2) HPPs for the NBSR; (3) HPIs; and (4) Good Work Practice Guides. These documents were revised as needed and were approved by the appropriate organizations. The inspector noted that the documents contained acceptable instructions concerning audits, safety, training, and personnel responsibilities. As noted above, the radiation protection program was reviewed each year as required by 10 CFR 20.1101(c).

The ALARA policy was also outlined in the aforementioned documents. The ALARA program provided guidance for keeping doses as low as reasonably achievable and was consistent with the requirements in 10 CFR Part 20.

(8) Radiation Protection Training

The training program was set up so that authorized beam users, pneumatic tube (rabbit) users, laboratory users, radioisotope users, and all other types of radiation workers, including NIST staff, received radiation protection training. The inspector noted that individuals who required unescorted access to the reactor facility and/or who worked with radioactive material completed a course on radiation safety principles or provided evidence that they had received such training at another facility. Refresher training was given every 2 years and completion was tied to a person's facility access authorization, which was also renewed biennially.

The inspector verified through records review, direct observation, and licensee interviews that facility employees, guest researchers, and

emergency responders had received the required training at the required frequency.

(9) Facility Tours

The inspector observed ongoing activities in various laboratories, the C-100 or the experimental floor area, and the guide hall. The inspector also toured other areas, including the C-200 area (which included the control room), portions of the basement area, including the pneumatic tube (rabbit) labs, and other selected support areas and offices. Control of radioactive material and access to radiation and high radiation areas was acceptable. As noted earlier, the postings and signs for these areas were appropriate.

c. Conclusion

The inspector determined that the radiation protection and ALARA programs being implemented by the licensee satisfied regulatory requirements because: (1) surveys were being completed as required, (2) postings met regulatory requirements, (3) personnel dosimetry was being worn as required and doses were within the NRC's regulatory limits, (4) radiation monitoring equipment was being maintained and calibrated as required, and (5) radiation protection training was provided to facility employees and guest users.

5. Environmental Protection Program

a. Inspection Scope (IP 69004)

The inspector reviewed selected aspects of the following to ensure that the requirements in 10 CFR Part 20 were being met and the calibrations and monitoring required in TS 3.7 and 4.7 were being conducted:

- Selected HPPs and HPIs
- Tritium and Argon-41 release data sheets
- Building 235 environmental survey sheets
- Licensee COMPLY code calculations for 2012 and 2013
- Gammatracer data results for 2013 and to date in 2014
- NIST environmental sample analysis results for 2012 and 2013
- TLD results for environmental stations for 2013 through the date of the inspection
- Facility Operations Report for the past 2 years (Nos. 65 and 66)

b. Observations and Findings

Environmental vegetation samples were collected and prepared quarterly for analysis during April through September using standard techniques in accordance with HPI 8-2. Environmental soil samples were collected and prepared quarterly for analysis during October through March. Environmental

water samples were collected and prepared quarterly for analysis throughout the year. The 2012 and 2013 results of these various analyses were acceptably documented and the results, which showed no significant changes when compared with previous years, were outlined in the licensee's Annual Operations Report.

The inspector reviewed the records documenting liquid and airborne releases to the environment for the past 2 years. The inspector determined that liquid and gaseous releases continued to be calculated as required by procedure and were acceptably documented. Calculations performed by the licensee using the Environmental Protection Agency's COMPLY computer code indicated an annual dose to members of the public of 0.5 millirem for 2012 and 0.8 millirem for 2013. The releases were determined to be within the annual dose constraints of 10 CFR 20.1101(d), 10 CFR 20.1301, and TS limits.

On-site gamma radiation monitoring was completed using the reactor facility stack effluent monitor and various environmental TLDs in accordance with the applicable procedures. The data indicated that there were no measurable doses above any regulatory limits. These results were reported in the facility Annual Operations Reports for 2012 and 2013. Through observation of the facility, the inspector found no new potential release paths.

The inspector reviewed the calibration records of the gas and stack monitoring systems. The systems were being calibrated annually according to procedure.

c. Conclusion

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

6. Shipment of Radioactive Material

a. Inspection Scope (IP 86740)

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

- Selected HPI procedures
- Material Transfer Request forms for 2013
- Radioactive material shipment records for 2013

b. Observations and Findings

The inspector reviewed records of shipments of radioactive material made during 2013. Through this review and discussions with licensee personnel, the inspector determined that the licensee had shipped various types of radioactive material since the previous inspection in this area. The records indicated that the radioisotope types and quantities of these materials were calculated and dose rates measured as required. The records also indicated that the shipping

containers were appropriate and had been labeled if required. The radioactive material shipping records reviewed by the inspector had been completed as required.

The inspector verified that the licensee was maintaining copies of consignees' radioactive material possession licenses as required. If the current copy of the license was not available at NCNR, the licensee was aware that they were required to contact the consignee and obtain a current copy before a shipment could be made. The licensee also maintained on file the certificates of compliance pertaining to those shipping containers that were used to ship radioactive material as required. In addition, the inspector verified that the licensee staff members assigned to complete and/or review the shipping paperwork were trained and that refresher training was being completed at least triennially as required.

c. Conclusion

The program for transportation of radioactive materials satisfied Department of Transportation and NRC requirements.

7. Exit Interview

The inspection scope and results were summarized on April 10, 2014, with members of licensee management. The inspector described the areas inspected and discussed the preliminary inspection findings. The licensee acknowledged the results of the inspection and did not identify any information to be withheld from public disclosure.

PARTIAL LIST OF PERSONS CONTACTED

Licensee

T. Barvitskie	Reactor Health Physicist
P. Brand	Chief, Reactor Engineering and Chair, Hazards Review Committee
D. Brown	Senior Reactor Health Physicist and Leader, Reactor HP Group
K. Consani	Reactor Health Physicist
R. Dimeo	Director, NIST Center for Neutron Research
G. Downing	Leader, Nuclear Methods Division and Chair, Safety Evaluation Committee
D. Hughes	Chief, Reactor Operations
S. O'Kelly	Deputy Director, NIST NCNR and Chief, Reactor Operations and Engineering
F. Scarano	Reactor Health Physics Technician
M. Schwaderer	Reactor Health Physicist
R. Strader	Quality Assurance Program Manager
J. Tracy	Reactor Health Physicist

Other Personnel

J. Shupe	Certified Health Physicist, Radiation Facilities Group, Gaithersburg Radiation Safety Division, OSHE
A. Walton	Health Physics Technician, Radiation Facilities Group, Gaithersburg Radiation Safety Division, OSHE

INSPECTION PROCEDURES USED

IP 69004:	Class 1 Research and Test Reactor Effluent and Environmental Monitoring
IP 69006:	Class 1 Research and Test Reactors Organization, Operations, and Maintenance Activities
IP 69007:	Class 1 Research and Test Reactors Review and Audit and Design Change Functions
IP 69008:	Class 1 Research and Test Reactor Procedures
IP 69012:	Class 1 Research and Test Reactor Radiation Protection
IP 86740:	Inspection of Transportation Activities

ITEMS OPENED, CLOSED, AND DISCUSSED

Opened

None

Closed

None

LIST OF ACRONYMS USED

10 CFR	Title 10 of the <i>Code of Federal Regulations</i>
ADAMS	Agencywide Document Access Management System
ALARA	As Low As Reasonably Achievable
ARM	Area Radiation Monitor
ECN	Engineering Change Notice
HP	Health Physics/Health Physicist
HPI	Health Physics Instruction
HPP	(Reactor) Health Physics Procedure
IAEA	International Atomic Energy Agency
IP	Inspection procedure
NBSR	National Bureau of Standards Reactor
NCNR	NIST Center for Neutron Research
NIST	National Institute of Standards and Technology
NRC	U.S. Nuclear Regulatory Commission
OMARR	Operation and Maintenance Assessment of Research Reactors
RSI	Radiation Safety Instruction
RWP	Radiation Work Permit
SEC	Safety Evaluation Committee
OSHE	Office of Safety, Health, and Environment
TLD	Thermoluminescent Dosimeter
TS	Technical Specifications