

December 15, 2015

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

SUBJECT: NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY – U.S. NUCLEAR
REGULATORY COMMISSION ROUTINE INSPECTION REPORT NO.
50-184/2015-202

Dear Dr. Dimeo:

From November 2-5, 2015, the U.S. Nuclear Regulatory Commission (NRC) conducted an inspection at the National Institute of Standards and Technology 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 November 5, 2015, with you and 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, 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 Publicly Available Records component of 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/

Anthony J. Mendiola, 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:
As stated

cc: See next page

National Institute of Standards and Technology

Docket No. 50-184

cc:

Environmental Program Manager III
Radiological Health Program
Air & Radiation Management Adm.
Maryland Dept. of the Environment
1800 Washington Blvd, Suite 750
Baltimore, MD 21230-1724

Director, Department of State Planning
301 West Preston Street
Baltimore, MD 21201

Director, Air & Radiation Management Adm.
Maryland Dept. of the Environment
1800 Washington Blvd., Suite 710
Baltimore, MD 21230

Director, Department of Natural Resources
Power Plant Siting Program
Energy and Coastal Zone Administration
Tawes State Office Building
Annapolis, MD 21401

President
Montgomery County Council
100 Maryland Avenue
Rockville, MD 20850

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

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

R. Dimeo

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NAME	CBassett	NParker	AMendiola
DATE	12/ 14 /2015	12/14/2015	12/ 14 /2015

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

Docket No: 50-184

License No: TR-5

Report No: 50-184/2015-202

Licensee: National Institute of Standards and Technology (NIST)

Facility: NIST Center for Neutron Research (NCNR)
NCNR National Bureau of Standards Reactor

Location: Gaithersburg, MD

Dates: November 2–5, 2015

Inspector: Craig Bassett

Approved by: Anthony Mendiola, Chief
Research and Test Reactors Oversight Branch
Division of Policy and Rulemaking
Office of Nuclear Reactor Regulation

Enclosure

EXECUTIVE SUMMARY

National Institute of Standards and Technology
Center for Neutron Research
National Bureau of Standards Reactor
Report No. 50-184/2015-202

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, audit, and design change functions, (3) reactor operations, (4) operator requalification, (5) maintenance and surveillance, (6) fuel movement, (7) experiments, (8) procedures, and (9) emergency preparedness 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. No violations or deviations were identified.

Organization and Staffing

- The organizational structure and supervisory qualifications were consistent with Technical Specifications (TSs) Section 6.1 requirements.
- Staffing levels at the facility were adequate for the current level of operations.

Review, Audit, and Design Change Functions

- The facility Safety Evaluation Committee was meeting as required and reviewing the topics outlined in the TSs.
- Annual independent audits were being conducted by a Safety Assessment Committee as required.
- The design change program being implemented at the facility satisfied NRC requirements.

Reactor Operations

- Acceptable reactor operations were being conducted and the appropriate shift staffing was being maintained.
- Adequate shift turnover briefings were being conducted and each operating crew was appropriately cognizant of facility conditions.

Operator Requalification

- Operator requalification was being conducted and completed as required by the requalification program and the program was being maintained current.
- Physical examinations for the operators were being completed every two years as required.

Maintenance and Surveillance

- The maintenance program was being conducted in accordance with applicable procedural requirements.
- The surveillance program was being completed in a timely manner and as specified in the facility's TSs.

Fuel Movement

- Fuel movement and handling was accomplished in accordance with TSs and procedural requirements.

Experiments

- The program for experiment review and approval satisfied TSs and procedural requirements.

Procedures

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

Emergency Preparedness

- The Emergency Plan and Emergency Instruction Manual (or implementing procedures) were being audited and reviewed biennially as required.
- Drills and exercises were being held and follow-up critiques were conducted to identify corrective actions that could be taken as needed.
- Emergency preparedness training for staff and offsite personnel was being conducted as stipulated in the Emergency Plan.
- Adequate offsite emergency support was being provided by various agencies as required.

REPORT DETAILS

Summary of Facility Status

The National Institute of Standards and Technology (NIST or the licensee) NIST 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 not operated due to a routine maintenance shutdown that was in progress.

1. Organizational Functions and Staffing

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

To verify that the licensee was complying with the responsibilities, staffing, and training requirements specified in NBSR Technical Specification (TS) Section 6.1, "Organization," the inspector reviewed selected aspects of the following:

- Current NCNR organization and staffing
- Reactor Console Logbooks Nos. 151 through 155
- Qualifications of various management and supervisory personnel
- Execution of management and staff responsibilities outlined in the TS
- NBSR Administrative Rules (AR) 1.0, "Responsibilities of Operations Personnel"
- NBSR AR 2.0, "Personnel Requirements"
- NBSR Emergency Instruction (EI) 0.2, "Emergency Organization and Phone Numbers," listing emergency contact information for Reactor Operations personnel

b. Observations and Findings

Through discussions with licensee personnel and review of pertinent documents, the inspector determined that the licensee's organizational structure had not changed since the last inspection in the area of reactor operations (refer to NRC Inspection Report No. 50-184/2014-203). Also, the organizational structure remained consistent with the requirements of TS Section 6.1 and Figure 6.1. In addition, the inspector found that the various management and supervisory personnel in the Reactor Operations Group exceeded the minimum qualifications specified in the TS with regard to education and experience.

In discussing staffing with management personnel, the inspector noted that there were 19 qualified senior reactor operators (SROs) at the facility who were either in management positions or assigned to various operating crews. It was also noted that there was one additional operator trainee who was assigned to one of the crews. Through interviews with operations personnel, the inspector determined that there were four operating crews at the facility who worked rotating shifts. Additionally, there was a fifth "day shift" crew that typically only worked during the weekdays, but also provided coverage on occasions when individuals from the other crews were unavailable.

Each crew was typically staffed with three or four individuals who were licensed SROs and possibly a trainee.

Through a review of selected entries in the console logbooks for the period from January 2015 to the present and through interviews with operations personnel, the inspector verified that staffing during routine reactor operation was as required and appeared to be adequate. It was also noted that a list of reactor facility personnel by name and telephone number was available to the reactor operators in the control room and was updated at least annually as required by TS Section 6.1.3. The list was last updated on August 26, 2015.

c. Conclusion

The organizational structure and supervisory qualifications were consistent with TS 6.1 requirements and the operations staffing level appeared to be adequate for the current level of operations.

2. Review, Audit, and Design Change Functions

a. Inspection Scope (IP 69007)

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

- Safety Evaluation Committee (SEC) meeting minutes for March 2014 through the present (Meeting Nos. 377 through 380)
- NBSR Procedure No. NBSR-0007-DOC-04, "Engineering Manual," Revision 4, which included procedures and instructions for completing changes at the facility
- 2014 reactor audit conducted in accordance with TS 6.2.4 (1-4) by the NCNR Audit subcommittee of the SEC, dated October 22, 2014
- 2015 reactor audit conducted in accordance with TS 6.2.4 (1-4) by the NCNR Audit Subcommittee of the SEC, dated October 19, 2015
- "2014 Annual [Audit] Report of the Safety Assessment Committee," audit conducted during September 16-18, 2014, dated December 17, 2014
- NCNR Safety Evaluation Committee Charter, approval dated October 9, 2014
- NBSR Engineering Change Request/Engineering Change Notice (ECR/ECN) No. 894, "Replace Pressure Relief Valve (PRV)," ECR Level II review, approval dated January 15, 2015, and ECN Level II review and approval dated February 19, 2015, (with the associated 50.59 Evaluation)
- NBSR ECR/ECN No. 936, "Change DWV-22 to a Diaphragm Valve," ECR Level II review, approval dated September 23, 2015, and ECN Level II

review and approval dated October 14, 2015, (with the associated 50.59 Evaluation)

- Operations Report No. 66, "NBSR Annual Report," for the period from January 1, 2013, through December 31, 2013, issued March 31, 2014, with correction issued June 26, 2014
- Operations Report No. 67, "NBSR Annual Report," for the period from January 1, 2014, through December 31, 2014, issued April 8, 2015

b. Observations and Findings

(1) Review and Audits Functions

The inspector reviewed the charter of the SEC required by the TS. It was noted that the charter delineated the committee's membership, organization, and responsibilities, as well as quorum and meeting requirements. The charter also authorized the formation of subcommittees to assist the SEC. Four subcommittees had been organized for that purpose including: 1) the Audit Subcommittee, 2) the Beam Experiment Subcommittee (BES), 3) the Irradiation Subcommittee, and 4) the Procedure Review Subcommittee. A charter had been developed for each subcommittee and the various charters had been reviewed and approved by the SEC.

Records of the meetings held by the SEC from March 2014 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 completed by the SEC or by 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.

A review of audit records indicated that the SEC Audit Subcommittee conducted an annual audit of the safety program at the facility in accordance with TS 6.2.4. The audits were reviewed by the full SEC and licensee management responded to the subcommittee's findings and recommendations and took corrective actions as needed.

Other records reviewed by the inspector showed that, as required by TS 6.2.5, an independent Safety Assessment Committee (SAC) had conducted an annual audit. The 2014 audit was conducted by individuals who worked at other Research and Test Reactors in the United States including representatives from the University of Maryland, University of Missouri – Columbia, and Massachusetts Institute of Technology. The SAC audit provided good insight into the licensee's program and the committee made various worthwhile recommendations for program improvement. The 2015 SAC audit was being conducted during the same time frame as the current NRC inspection.

(2) Design Change Functions

The inspector reviewed selected requests for changes to the facility (i.e., changes to structures, systems, or components) that had been proposed within the last 2 years. At NIST these change proposals were designated as ECRs. Each ECR documented what was proposed to be changed, the facility drawings that would need to be changed, the procedures that would require revision, and any tests or measurements that would need to be completed following the change. In order to track the change requests, they were numbered sequentially during the year. These were screened to determine whether or not a 10 CFR 50.59 review would be required. Based on the safety significance and the 10 CFR 50.59 screen results, the changes were classified as either Level I (Minor) or Level II (Major). All Level II ECRs required a 10 CFR 50.59 review which often resulted in the completion of a 10 CFR 50.59 evaluation.

Once an ECR was approved, indicating that the change project could move forward, an ECN was developed which contained various sections. The sections detailed the design description, safety considerations and analysis, a safety evaluation, and the 10 CFR 50.59 screening criteria results.

A review of selected ECRs and ECNs demonstrated that changes were acceptably documented and reviewed in accordance with NRC requirements and the licensee's guidelines. It also indicated that the work and the required document revisions were being completed as necessary. It was noted that the changes were being tracked to completion by the licensee. None of the changes reviewed by the inspector met any of the criteria of 10 CFR 50.59(c)(2), which would have required a license amendment from the NRC.

c. Conclusion

The facility SEC was meeting as required and reviewing the topics outlined in the TSs. Independent annual audits were being conducted by a SAC as required. The licensee's design change program satisfied NRC requirements.

3. Reactor Operations

a. Inspection Scope (IP 69006)

To verify that the licensee was operating the reactor and conducting operations in accordance with TS Sections 2 and 3 and procedural requirements, the inspector reviewed selected portions of the following:

- Reactor Console Logbooks Nos. 151 through 155
- Various NIST reactor control room log sheets
- Selected NIST reactor area inspection log sheets
- Shift supervisor's instructions and special log sheets
- NBSR Reactor Shift Supervisor Logbook Nos. 39 and 40
- Selected reactor operations shift turnover log notebook entries
- Associated reactor operations records from October 2014 to the present
- NBSR AR 2.0, "Personnel Requirements"
- NBSR AR 9.0, "Reactor Startup and Operation"
- Selected NBSR Operating Instructions (OIs) (i.e., operating procedures)
- Facility "NBSR Annual Reports" for the past two years

b. Observations and Findings

The inspector was not able to observe reactor operations due to the maintenance shutdown that was in progress. However, a review of logs and related records indicated that, when the reactor was operated, operations were being conducted in accordance with facility procedures as required. The logs and records were clear and provided an indication of ongoing activities. The records demonstrated that shift staffing during reactor operation, as well as during maintenance periods, was being maintained as required by TS 6.1.3.

The records reviewed also showed that operational conditions and parameters were consistent with TS and procedural requirements and that these conditions and requirements were satisfied. Reactor startup procedure, NBSR OI 1.1, required verification of each of the limiting conditions for operation specified in TS 3.1 through 3.11 prior to startup. These verifications were being completed and recorded as required. The inspector noted that various other procedural requirements were also being met.

Through logbook review and through direct observation, the inspector also verified that shift turnover briefings were held prior to each shift change. It was noted that activities of the previous shift, and events or job evolutions scheduled for the upcoming shift, were discussed in detail. A status board was also maintained in the Control Room. The records kept and the briefings that were given ensured that the operators were aware of the current conditions in the facility and what was planned for the upcoming shift.

c. Conclusion

Acceptable shift staffing was being maintained. Adequate shift turnover was being conducted and each operating crew was cognizant of facility conditions.

4. Operator Requalification

a. Inspection Scope (IP 69003)

To verify compliance with the operator requalification program for the NBSR, which was last updated March 2009, the inspector reviewed:

- Reactor Console Logbooks Nos. 151 through 155
- Medical examination records from 2013 through 2015
- Current status of selected qualified operators' licenses
- NBSR requalification examinations (biennial) for 2012 and 2014
- NBSR 2014-2015 requalification program consisting of training provided in the areas of: reactor theory, radiation protection, emergency plan and actions, safety systems, physical security, reactor systems, and TS requirements
- Operator training records for the years 2013, 2014, and 2015 to date, documented on forms entitled, "Requalification Program Documentation Review and Reactivity Changes," no revision date
- Supervisor's annual operator evaluations documented on forms entitled, "Operator Evaluation," form revised November 2009

b. Observations and Findings

As mentioned previously, there were 19 qualified SROs employed at the facility, as well as one operator trainee. Through a review of various requalification and training documents, the inspector verified that the SRO operators' licenses were current and records of the licensed operator's requalification status were being maintained as required.

A review of program records also showed that operator training was consistent with the NBSR requalification program requirements. The inspector verified that all operators had completed the requalification training and had taken the written biennial requalification examination. Additional training on various plant systems and industrial hygiene/safety was also provided. NBSR console logbooks and requalification records showed that operators maintained active duty status by participating in the reactivity manipulations and document reviews as outlined and required in the requalification program. The inspector also confirmed that the operators had been given annual operating evaluations as required.

The inspector verified that the qualified operators were receiving a biennial physical examination as well.

c. Conclusion

Operator requalification was being conducted and completed as required by the licensee's requalification program. Physical examinations for the operators were being completed every two years as required.

5. Maintenance and Surveillance

a. Inspection Scope (IP 69006 and IP 69010)

To ensure that maintenance activities were being completed and to determine that surveillance activities and calibrations were being completed as required by TS Section 4, the inspector reviewed selected aspects of:

- Reactor Console Logbooks Nos. 151 through 155
- Reactor TS Log Book, Volume 2
- Selected TS surveillance schedules for each month for the period from January to October 2014, which indicated which surveillance activities were due for completion during that month
- Selected NIST reactor area inspection log sheets (completed every shift during routine operation) for the past 12 months
- Selected NIST reactor control room log sheets (data taken every hour during routine operation) for the past 12 months
- Selected NBSR Instrument Test Procedures and TS Procedures
- Facility "NBSR Annual Reports," for the past two years

b. Observations and Findings

(1) Maintenance Activities

During this inspection the reactor was in a maintenance shutdown and various activities were scheduled to be completed. The inspector was able to observe a limited number of maintenance activities including the replacement of a primary valve DWV-22. A work package had been prepared to aid in the work flow. During the work evolution, an attempt was made to depressurize the line which included DWV-22. However, not all the pressure was released which resulted in an operator being sprayed in the face with heavy water D₂O when he attempted to loosen the bolts around the valve flange. The job was halted and Health Physics personnel were called. The proper actions were subsequently taken to recover from the problem.

The inspector also reviewed various maintenance records, console logbooks, and data sheets which indicated that routine maintenance activities were conducted at the required frequency and in accordance with the applicable procedure or equipment manual. Maintenance activities ensured that equipment remained consistent with the Safety Analysis Report and TS requirements.

(2) Surveillance Activities

Various surveillance activities were conducted during the outage. The inspector reviewed various TS-required procedures used to conduct surveillances and calibrations. These procedures included checklists and

tables for recording data which were being used to document completion of the required surveillance activities. The frequency that these activities were to be performed was specified in the TS.

The completion and results of the surveillances and calibrations were tracked by the Chief of Reactor Operations, as well as by operations personnel. Tracking was done by means of the "TS Surveillance Schedule," which was updated as the tasks were completed and then revised. A new surveillance schedule was issued monthly. A review of the monthly surveillance schedules, console logbooks, and related data recorded on the appropriate forms indicated that the surveillances and calibrations were completed at the frequency specified in the TS and in accordance with procedure. If a surveillance activity could not be completed within the established time frame, the reason for the delay was typically documented in the logs or records. All results reviewed by the inspector were within TS or procedurally prescribed parameters.

c. Conclusion

The maintenance program was being conducted and documented as required by procedure. The surveillance program was being conducted as specified by TS requirements.

6. Fuel Movement

a. Inspection Scope (IP 69009)

The inspector reviewed selected aspects of the following to verify that fuel movement and handling was being conducted as required by TSs 3.9 and 5.3:

- Reactor Console Logbooks Nos. 151 through 155
- NBSR Reactor Shift Supervisor Logbook Nos. 39 and 40
- Current core configuration, designated as Core No. 626
- Pool Log No. 3 and fuel transfer records from July 2014 to the present
- Core reload/refuel and core defuel/refuel verification and sign-off sheets for Core Nos. 619 through 626
- NBSR AR 6.0, "Refueling Operations"
- NBSR Reference Procedure, Ref 62, "Reloading Fuel From Pool, with Known Shims and Known Core"

b. Observations and Findings

Licensee procedures and operator instructions provided approved methods to move and handle fuel consistent with the provisions of the TS and the licensee safety analysis. The inspector reviewed the core loading and fuel handling records for recent refueling cycles and found them to be complete and properly documented. Fuel movement, fuel loading/reloading, and fuel examination records documented that fuel was moved and controlled as required.

The records also showed that the fuel movements were verified by various individuals as required and that fuel elements were in the designated locations. Records further showed that fuel handling and monitoring equipment was operable. Personnel were knowledgeable of the procedural requirements that ensured criticality control and fuel integrity.

It was noted that during the inspection the core was to be reloaded. The inspector took the opportunity to observe the fuel movement and reloading operation. Spent fuel elements were transferred from the reactor core to the spent fuel pool. Then the elements in the core were shuffled into new locations. Finally, four new fuel elements were placed into the core. Procedures were followed, verifications were made, proper radiological controls were in place, and the transfer of fuel was accomplished without a problem.

c. Conclusion

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

7. Experiments

a. Inspection Scope (IP 69005)

To ensure that the requirements of TS 3.8, 4.8, and 6.5, and licensee's administrative procedures were being met governing the experimental program, the inspector reviewed selected aspects and/or portions of:

- BES Report to the SEC dated September 19, 2014
- Experimental control procedures for various instruments located in the C 100 area and the guide hall
- Rabbit Request List maintained in the Control Room which contained the irradiation requests that have been authorized for the pneumatic system
- Experimental Proposal Approval Sheet, No. 508, "NG7 PHADES (Polarized He3 and Detector Experiment Station," approval by the NCNR Director dated July 20, 2015
- Experimental Proposal Approval Sheet, No. 511, "Cold Neutron Imaging Instrument (CNII) at the NG-6 End-Section," approval by the NCNR Director dated September 21, 2015

b. Observations and Findings

Experiments at the NBSR included: 1) irradiation experiments and 2) beam experiments. Irradiation experiments were those conducted in a pneumatic tube or in any other NBSR irradiation facility inside the thermal shield. Beam experiments were ones which were conducted in or with experimental instruments outside the reactor thermal shield. Beam experiments were typically conducted in the C-100 area or the guide hall. For irradiation experiments, the reactivity worth and other criteria were delineated in the TS; no criteria were

listed in the TS for beam experiments. Depending upon the type of experiment being proposed, either the Irradiation Subcommittee or the BES reviewed the experimental proposal as required and provided recommendations. Since the TS did not include criteria for beam port experiments, the licensee developed administrative guidelines to extend the review and approval requirements in TS 6.5 to include the beam port and guide hall experiments.

The inspector interviewed the Chair of the BES. He explained the procedure followed for experiment approval and discussed two recent experiments that were reviewed by his committee. The inspector reviewed the approval procedure and package for two recent beam experiments and noted that the BES had reviewed these experiments. The NCNR Hazards Review Committee had reviewed these experiments as well. The inspector verified that the beam experiment proposals were forwarded to the SEC for review and subsequently to the Director for approval. The inspector also noted that the approved beam experiment documentation required specific engineering and radiation protection controls that were required to be implemented to limit radiation exposure to personnel conducting the experiments.

The inspector also interviewed the Chair of the Irradiation Subcommittee. It was noted that no new proposals dealing with experiments in the thermal shield or the pneumatic system had been forwarded to the subcommittee. The review and approval process for the Irradiation Subcommittee remained in effect.

c. Conclusion

The program for experiment review and approval satisfied TS and procedural requirements.

8. 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:

- Procedure change, review, and approval process
- NBSR AR 5.0, "Procedures and Manuals"
- NBSR-0005-CH-00, "Charter for the NCNR Safety Evaluation Committee Procedure Review Subcommittee," approval dated October 9, 2014
- SEC meeting minutes for March 2014 through the present (Meeting Nos. 377 through 380)
- Facility "NBSR Annual Reports," for the past two years

b. Observations and Findings

Written procedures for the activities listed in TS 6.4 were available as required. Those activities included normal reactor operations, abnormal operations, emergency conditions involving the potential or actual release of radioactivity, radiation protection, site emergency actions, and fuel handling. The inspector noted that the licensee had started and was continuing the process of reformatting all procedures so that they would all be in a standard format. Because this was a project that would take a great deal of time and effort to complete, the issue was identified in a previous report as an Inspector Follow-up Item (see Paragraph 10 below).

In 2014, the licensee had established a Procedure Review Subcommittee (PRS) which reported to the SEC to review the newly reformatted and revised procedures. The inspector verified that the official, approved copies of reactor operations procedures were kept in the control room as stipulated by procedure. The inspector also verified that the procedures were being reviewed by the SEC PRS. The procedures were then approved by the Chief of Reactor Operations or the Chief of Reactor Operations and Engineering as required in the TS.

c. Conclusion

The procedure revision, control, and implementation program satisfied TS requirements.

9. Emergency Preparedness

a. Inspection Scope (IP 69011)

In order to verify compliance with the NBSR Emergency Plan (E-Plan) dated December 2008, the latest revision submitted May 17, 2012, the inspector reviewed selected aspects of:

- Emergency preparedness training records for 2014 and 2015
- Selected NIST reactor area inspection log sheets for the past 12 months
- Support provided by support groups (i.e., NIST Fire Department (FD), NIST Police Department (PD), and Montgomery County, Maryland)
- Records documenting annual evacuation drills and the latest biennial emergency exercise
- Documentation of inventories of emergency response supplies, equipment, and instrumentation
- EI Manual (containing the E-Plan implementing procedures)
- EI Procedure 0.2, "Emergency Organization Phone Numbers"
- EI Procedure 0.3, "Emergency Classification and Criteria"

b. Observations and Findings

The E-Plan in use at the reactor and support facilities was the same as the latest version submitted to the NRC. The E-Plan was being audited and reviewed biennially as required. It was noted that the emergency implementing procedures, contained in the EI Manual, were in the process of being updated and reformatted. The inspector verified that operators understood their duties in response to emergency conditions.

Records showed that radio communications with the NIST PD were checked weekly. Other communications capabilities were checked periodically and phone numbers for the various support organizations were verified annually, as stipulated in the TS. The inspector conducted an onsite tour of the licensee's Emergency Support Center and determined that communication equipment, radiological response supplies, and radiation detection equipment was functional.

The most recent annual emergency drill was conducted on December 7, 2014. It was noted that the drill was composed of a series of Table Top exercises involving operations and health physics personnel. A critique was held following the exercise to discuss the strengths and weaknesses identified and to develop possible solutions to any problems identified. The results of the exercise critiques were documented and filed.

The most recent biennial emergency exercise was conducted on September 9, 2015. It involved a scenario which included armed intruders trying to gain access to the reactor facility with the intent to steal radioactive material/fuel. It was a challenging scenario that provided good discussion and training for all the various NCNR responders and NIST support groups who were involved. A critique was held following the drill to discuss those things that were done well and how to correct the problems identified.

In 2014, the inspector participated in the annual emergency evacuation drill which occurred during the inspection. In 2015, the emergency evacuation drill was held on October 26. In each drill, everyone evacuated the facility in a timely manner but some areas for improvement were noted such as ensuring that doors were closed as people left their areas.

Emergency preparedness and response training for NBSR personnel was being completed as required. This was accomplished through the initial training for incoming personnel and the refresher training provided for all NCNR employees. The licensee's health physics group conducted biennial emergency response training for the NIST FD and PD, as well. The inspector verified that the last training for these groups had been conducted during June and July 2014.

The inspector reviewed the results of selected emergency equipment inventories required by Section 8.5 of the E-Plan. It was noted that the emergency equipment in the lockers located in the A-wing front lobby/break area, in

Basement Level 2, and in the C-200 area had been inventoried as required. The TSs required an annual inventory; the lockers were being inventoried monthly.

The inspector verified that the agreement with the Walter Reed National Military Medical Center for medical support in case of an emergency, originally signed December 22, 1983, remained in effect and was acceptable. It was noted that other hospitals in the vicinity of NIST were also equipped to handle emergencies involving a contaminated injured person if needed.

On Wednesday during the inspection, the inspector conducted an onsite tour of the licensee's Emergency Support Center and determined that communication equipment, detection equipment, and radiological response supplies were available and functional. Additionally, the inspector visited the fire station, which provides support for the entire NIST campus, as well as supplemental support to 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 for response and reactor personnel was being completed in accordance with procedure and standard practice.

c. Conclusion

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

10. Follow-up on Previously Identified Items

a. Inspection Scope (IP 92701)

The inspector reviewed the actions taken by the licensee to address a previously identified Inspector Follow-up Item (IFI) concerning facility procedures.

b. Observation and Findings

50-184/2013-202-01 – IFI – Follow-up on the licensee's actions to reformat existing procedures, review and revise the procedures, and develop written guidance on procedure writing and revision.

During a review of procedures in December 2013, the inspector noted that the licensee was in the process of reformatting all procedures so that they would all be in a standard format. Once this was completed the licensee planned to conduct a review of each procedure and ensure that it was correct, reflected current practice, and was in accordance with the TS. This was identified by the NRC as an IFI.

During this inspection the inspector reviewed the progress made by the licensee regarding reformatting their procedures and incorporating the appropriate changes as needed. The inspector found that the majority of the various types of

facility procedures and instructions had been revised but over half were still in the process of being reviewed and approved. This issue will remain open and will be reviewed during a subsequent inspection.

c. Conclusions

One IFI was reviewed. This issue remains open.

11. Exit Interview

The inspection scope and results were summarized on November 5, 2015, with members of licensee management. The inspector described the areas inspected and discussed the inspection findings. The licensee acknowledged the findings presented and did not identify as proprietary any of the material provided to or reviewed by the inspector during the inspection.

PARTIAL LIST OF PERSONS CONTACTED

Licensee

P. Brand	Chief, Reactor Engineering and Chair, Hazards Review Committee
F. Cassels	Reactor Supervisor/Senior Reactor Operator
R. Dimeo	Director, NIST Center for Neutron Research
D. Hughes	Chief, Reactor Operations
B. Kirby	Chair of the Beam Experiment Subcommittee
S. MacDavid	Engineering Technician
T. Newton	Chief, Reactor Operations and Engineering and NCNR Deputy Director
R. Strader	Quality Assurance Program Manager
R. Sprow	Reactor Supervisor/Senior Reactor Operator
D. Wilkison	Reactor Supervisor/Senior Reactor Operator

Other Personnel

W. Neal	Lieutenant, Fire Protection Group, Emergency Services Division, Office of Facilities and Property Management, NIST
S. Shahan	Chief, Fire Protection Group, Emergency Services Division, Office of Facilities and Property Management, NIST
A. Washington	Lieutenant, Police Department, Emergency Services Division, Office of Facilities and Property Management, NIST

INSPECTION PROCEDURES USED

IP 69003:	Class 1 Research and Test Reactor Operator Licenses, Requalification, and Medical Activities
IP 69005:	Class 1 Research and Test Reactors Experiments
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 69009:	Class 1 Research and Test Reactors Fuel Movement
IP 69010:	Class 1 Research and Test Reactors Surveillance
IP 69011:	Class 1 Research and Test Reactors Emergency Preparedness
IP 92701	Follow-up on Open Items

ITEMS OPENED, CLOSED, AND DISCUSSED

Opened

None

Discussed

50-184/2013-202-01 IFI Follow-up on the licensee's actions to reformat existing procedures, review and revise the procedures, and develop written guidance on procedure writing and revision.

Closed

None

LIST OF ACRONYMS USED

10 CFR	Title 10 of the <i>Code of Federal Regulations</i>
AR	Administrative Rule
BES	Beam Experiment Subcommittee
ECN	Engineering Change Notice
ECR	Engineering Change Request
EI	Emergency Instruction
E-Plan	Emergency Plan
FD	Fire Department
IFI	Inspector Follow-up Item
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
OI	Operating Instruction
PD	Police Department
SAC	Safety Assessment Committee
SEC	Safety Evaluation Committee
SRO	Senior Reactor Operator
TS	Technical Specification