



UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

October 3, 2019

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
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SUBJECT: NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY – U.S. NUCLEAR
REGULATORY COMMISSION ROUTINE INSPECTION REPORT
NO. 50-184/2019-202

Dear Dr. Dimeo:

From September 9-12, 2019, the U.S. Nuclear Regulatory Commission (NRC) conducted an inspection at the National Institute of Standards and Technology Center for Neutron Research. The enclosed report documents the inspection results, which were discussed on September 12, 2019, with Dr. Thomas Newton, Deputy Director, Daniel Flynn, Chief, Reactor Operations Acting, Meagan Nydegger, Chief, Reactor Operations, and James Tracy, Reactor Health Physics Group Leader Acting.

This 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 observed various activities in progress, interviewed personnel, and reviewed selected procedures and representative records. 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 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).

If you have any questions concerning this inspection, please contact Craig Bassett at (240) 535-1842 or by electronic mail at Craig.Bassett@nrc.gov.

Sincerely,

/RA/

Anthony J. Mendiola, Chief
Research and Test Reactors Oversight Branch
Division of Licensing Projects
Office of Nuclear Reactor Regulation

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

Enclosure:
As stated

cc: See next page

cc:

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SUBJECT: NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY – U.S. NUCLEAR
REGULATORY COMMISSION ROUTINE INSPECTION REPORT
NO. 50-184/2019-202 DATE: OCTOBER 3, 2019

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

Docket No: 50-184

License No: TR-5

Report No: 50-184/2019-202

Licensee: National Institute of Standards and Technology

Facility: Center for Neutron Research
National Bureau of Standards Reactor

Location: Gaithersburg, Maryland

Dates: September 9–12, 2019

Inspector: Craig Bassett

Accompanied by: Zarva Taru, Administrative Assistant

Approved by: Anthony J. Mendiola, Chief
Research and Test Reactors Oversight Branch
Division of Licensing Projects
Office of Nuclear Reactor Regulation

Enclosure

EXECUTIVE SUMMARY

National Institute of Standards and Technology
Center for Neutron Research
National Bureau of Standards Test Reactor
Inspection Report No. 50-184/2019-202

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 megawatts test reactor facility safety program including: (1) operator licenses, requalification, and medical examinations; (2) experiments; (3) organization and operations and maintenance activities; (4) review and audit and design change functions; (5) procedures; (6) fuel movement; (7) surveillance; and, (8) 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.

Operator Licenses, Requalification, and Medical Examinations

- Operator requalification was being conducted and completed as required by the requalification program and the program was being maintained current.
- Medical examinations for operators were being completed every 2 years as required.

Experiments

- The program for experiment review and approval satisfied technical specification (TS) and procedural requirements.
- The experiments were conducted in compliance with the applicable procedural controls.

Organization and Operations and Maintenance

- The established organization was consistent with TS Section 6.1 requirements.
- Staffing levels at the facility were adequate for the current level of operations.
- Acceptable reactor operations were being conducted and the appropriate shift staffing was being maintained.
- The maintenance program was being conducted in accordance with applicable procedural requirements.

Review and Audit and Design Change Functions

- The facility Safety Evaluation Committee (SEC) was meeting as required and reviewing the topics outlined in the TSs.

- Annual independent audits were being conducted by a Safety Assessment Committee (SAC) as required.
- The design change program being implemented at the facility satisfied NRC requirements.

Procedures

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

Fuel Movement

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

Surveillance

- The surveillance program was being completed in a timely manner and as specified in the facility's TSs.

Emergency Preparedness

- The Emergency Plan (E-Plan) and Emergency Instruction (EI) 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 E-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) NIST Center for Neutron Research (NCNR) reactor, a 20 megawatts 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.

1. Operator Licenses, Requalification, and Medical Examinations

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:

- Medical examination records from 2016 through 2019
- Current status of selected qualified operators' licenses
- NBSR requalification (biennial) examinations for 2016 through 2019
- Training provided the operators during the NBSR 2016-2017 and 2018-2019 requalification training cycles
- Operator training records for the years 2016, 2017, 2018, and 2019 to date, documented on forms entitled, "Requalification Program Documentation Review and Reactivity Changes"
- Supervisor's annual operator evaluations documented on forms entitled, "Operator Evaluation"

b. Observations and Findings

The inspector noted that there were 19 qualified and 16 active senior reactor operators (SROs) employed at the facility. In addition, it was noted that there was currently one SRO candidate in training, that person being the Manager of Reactor Operations. Through a review of various requalification and training documents, the inspector verified that the facility 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 facility operators had completed the requalification training and had taken the written biennial requalification examinations. 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.

Furthermore, the inspector verified that the qualified operators were receiving a physical examination every 2 years 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 conducted every 2 years as required.

2. Experiments

a. Inspection Scope (IP 69005)

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

- Beam Experiment Subcommittee (BES) Reports to the NCNR SEC during meetings held in 2018 and to date in 2019
- Experimental Control Procedures Summary Notebook containing experiments involving 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 authorized for the pneumatic system as well as a list of authorized users
- Experimental Proposal Approval Sheet for No. 610.02.0063, "Chromatic Analysis Neutron Diffractometer or Reflectometer (CANDOR) on NG-1," approval by the SEC dated August 23, 2019
- Re-review of Experimental Proposal Approval Sheet for Activity No. 490, "Neutron Spin Echo Spectrometer at NG-A," approval by the SEC dated December 2013, and re-review completion dated April 12, 2018

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 of the other NBSR irradiation facilities 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 TSs did not include criteria for beam port experiments, the licensee developed administrative guidelines to extend the review and approval requirements in TS Section 6.5 to include the beam port and guide hall experiments.

The inspector interviewed the Chair of the BES. He explained the process followed for experiment approval and discussed current experiments that were reviewed by his committee. The inspector reviewed the package for a recently approved beam experiment. It was noted that the BES had reviewed the beam experiment package as required and that the experiment did not require a review by the NCNR Hazards Review Committee. The inspector verified that the beam experiment package was forwarded to the SEC for review and subsequently to the Director for approval. The inspector also noted that the approved beam experiment documentation outlined specific engineering and radiation protection controls that were required to be implemented to limit radiation exposure to, and ensure the safety of, personnel conducting the experiments.

The BES Chair also explained that the subcommittee had initiated a program to re-review some of the long-standing experiments at the facility to ensure that there were no new safety or industrial hazards that had developed since they were first reviewed. The inspector reviewed one of these re-reviews that had been conducted by the BES. It was noted that, during the reevaluation, the experimenter in charge and the subcommittee members visited the beamline to discuss the experiment, the manner in which it was conducted, and the safety precautions established. The re-review program appeared to be a good practice and demonstrated an example of the safety conscious work environment at the facility.

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 but an improved process was being developed. The inspector verified that any new experiments involving the thermal shield or the pneumatic system would receive a Title 10 of the *Code of Federal Regulations* (10 CFR) 50.59, "Changes, tests and experiments," review.

The inspector determined that all the current experiments, as they were being conducted, were completed with the cognizance of the reactor operators on duty and in compliance with the applicable procedural precautions and controls.

c. Conclusion

The program for experiment review and approval satisfied TSs and procedural requirements. The experiments were conducted in compliance with the applicable procedural controls.

3. Organization and Operations and Maintenance Activities

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

To verify that the licensee was complying with the organizational and staffing requirements specified in NBSR TS Section 6.1; and complying with operating requirements in TS Sections 2.0, 3.0, and procedural requirements; and, to ensure that maintenance activities were being completed; the inspector reviewed selected aspects of the following:

- Current NCNR organization and staffing
- 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 No. 44
- Reactor Console Logbooks Nos. 165 through 168
- Management and staff responsibilities outlined in the TSs
- Selected reactor operations shift turnover log notebook entries
- Various reactor operations records from October 2018 to the present
- NBSR Administrative Rules (AR) 1.0, "Responsibilities of Operations Personnel"
- NBSR AR 2.0, "Personnel Requirements"
- NBSR AR 9.0, "Reactor Startup and Operation"
- Selected NBSR Operating Instructions (OIs) (i.e., operating procedures)
- Selected Non-TS Maintenance Schedules for each month for the period from January to October 2018, which indicated what maintenance activities were due for completion during that month
- NBSR EI 0.2, "Emergency Organization and Phone Numbers," listing emergency contact information for Reactor Operations personnel
- Operations Report No. 69 (sic), "NBSR Annual Report," for the period from January 1, 2017, through December 31, 2017, issued April 2, 2018
- Operations Report No. 71, "NBSR Annual Report," for the period from January 1, 2018, through December 31, 2018, issued April 25, 2019

b. Observations and Findings

(1) Organization

The licensee's organizational structure remained consistent with the requirements of TS Section 6.1 and Figure 6.1. The inspector found that the various management and supervisory personnel in the Reactor Operations Group met or exceeded the minimum qualifications specified in the TSs with regard to education and experience. During a previous inspection it was noted that the person filling the Chief, Reactor Operations position had retired. Another person in the organization with the proper qualifications had been appointed the Acting Chief, Reactor Operations. In May of this year, an individual was hired to permanently fill the vacant position. That person was currently in the process of being cleared for work at the facility and becoming familiar with the various aspects of the operations at NCNR.

In discussing staffing with management personnel, the inspector determined that there were 19 qualified SROs at the facility (as noted above) who were assigned to the various operating crews, or in management positions, or working in the Reactor Engineering group. 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 composed of individuals who normally only worked during the weekdays, but also

provided coverage on occasion when individuals from the other crews were unavailable. Each crew was typically staffed with three individuals who were licensed SROs. New hires, while in operator training, were also assigned to one of the four crews.

Through a review of selected entries in the console logbooks for the period from October 2018 to the present and through observations of operations crew 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 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 July 24, 2019.

(2) Operations

Because the licensee was in the process of completing a routine end of cycle shutdown, the inspector had the opportunity to observe a portion of the fuel handling operation, a reactor start-up, and subsequent routine reactor operations during the inspection. Through these observations and reviews of logs and related records, the inspector noted that reactor operations were conducted in accordance with facility procedures as required. The logs and records were clear and provided an indication of ongoing activities. Direct observation and records review also demonstrated that shift staffing during reactor operation was being maintained as required by TS 6.1.3.

The records reviewed showed that operational conditions and parameters were consistent with TS and procedural requirements and that these conditions and requirements were satisfied as well. Reactor startup procedure, NBSR OI 1.1, required verification of each of the limiting conditions for operations specified in TSs 3.1 through 3.9 prior to startup. These verifications were completed and recorded as required and documented on reactor control room and reactor area log sheets and in the Console Log Books. The inspector noted that various other procedural requirements were also being met.

Through logbook review and 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 to ensure all operators were aware of ongoing work and current plant conditions. 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.

(3) Maintenance

As noted above, the licensee was just completing a routine reactor shutdown during the inspection. As a result, the inspector was unable to

observe any in-progress maintenance activities. However, the inspector was able to review 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. Major preventative and corrective maintenance operations having safety significance were being included in the facility Annual Reports submitted to the NRC as required by TS 6.7.1(3).

c. Conclusion

The established organization was consistent with TS 6.1 requirements and the operations staffing maintained on each crew appeared to be adequate for the current level of operations. Operations were being conducted in accordance with procedures. The maintenance program was being conducted and documented as required by procedure.

4. Review and 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 and 10 CFR 50.59 were being implemented effectively:

- NCNR SEC Charter, approval dated June 16, 2016
- NCNR SEC meeting minutes for April 2018 through the present (Meeting Nos. 386 through 388)
- NBSR Procedure No. NBSR-0007-DOC-04, "Engineering Manual," Revision 4, which included procedures and instructions for completing changes at the facility
- 2018 reactor audit conducted in accordance with TS 6.2.4, "SEC Audit Function," (1-4) by the NCNR Audit Subcommittee of the SEC, dated September 15, 2018
- "2018 Annual [Audit] Report of the Safety Assessment Committee," audit conducted during November 16, 2018, and report dated February 11, 2019
- NBSR Engineering Change Request/Engineering Change Notice (ECR/ECN) No. 1043, "New Shim Arm Drive Mechanism," ECR Level II review dated July 31, 2017, and ECN Level II review and approval dated September 25, 2017, (with the associated 10 CFR 50.59 Evaluation) and Closed out as of August 12, 2019
- NBSR ECR/ECN No. 1063, "Removal of Experimental Interlock and Scram Relays," ECR Level II review dated February 9, 2018, and ECN Level II review and approval dated March 14, 2018, (with the associated 10 CFR 50.59 Evaluation) and Closed out as of October 24, 2018
- Facility "NBSR Annual Reports," for the past 2 years (as referenced in Paragraph 3 above)

b. Observations and Findings

(1) Review and Audit Functions

The inspector reviewed the charter of the SEC required by the TSs. 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 NCNR Audit Subcommittee, (2) the BES, (3) the Irradiation Subcommittee, and (4) the Procedure Review Subcommittee (PRS). 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 April 2018 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. During the inspection, the inspector was also able to attend a semiannual meeting of the SEC.

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 Section 6.2.4. The audits appeared to be appropriate. The audits were reviewed by the full SEC and licensee management responded to the subcommittee's findings and recommendations. In addition, corrective actions were taken as warranted.

Other records reviewed by the inspector showed that, as required by TS Section 6.2.5, a SAC was convened annually to conduct an independent audit. The 2018 audit was conducted by individuals from two Research and Test Reactors including representatives from the University of Maryland and Massachusetts Institute of Technology. The SAC audit provided good insight into the licensee's program and made various worthwhile recommendations for program improvement. The licensee responded to the findings and took actions/corrective actions as needed.

(2) Design Change Functions

The inspector reviewed selected requests for changes to the facility (i.e., changes to structures, systems, and components (SSCs)) that had been proposed and/or closed out within the last year. 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 results of the 10 CFR 50.59 screens, 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, the associated ECN was implemented which contained various sections. The sections detailed the design description, safety considerations and analysis, a safety evaluation, and the 10 CFR 50.59 screening or review criteria results.

A review of selected ECRs and ECNs demonstrated that changes to SSCs, as well as certain procedures, 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, such as procedure revisions and drawing updates, were being completed as necessary. It was noted that the changes were being tracked to completion by the licensee.

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.

5. Procedures

a. Inspection Scope (IP 69008)

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

- Procedure change, review, and approval process
- NBSR AR 5.0, "Procedures and Manuals," Revision A
- NBSR-0005-CH-00, "Charter for the NCNR Safety Evaluation Committee Procedure Review Subcommittee," approval dated June 16, 2016
- NCNR SEC meeting minutes for April 2018 through the present (Meeting Nos. 386 through 388)
- Facility "NBSR Annual Reports," for the past 2 years (as referenced in Paragraph 3 above)

b. Observations and Findings

Written procedures for the activities listed in TS Section 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 completed revising and reformatting all procedures associated with operation of the reactor so that they were all in a standard format.

The PRS, which was initially established in 2014, was created to review new procedures and substantive changes to existing ones. The inspector verified that new and revised procedures were being reviewed by the SEC PRS as required. The procedures were then forwarded for review and approval to the Chief of Reactor Operations or the Chief of Reactor Operations and Engineering as required in the TSs. The inspector also verified that the official, approved copies of reactor operations procedures were kept in the control room as stipulated.

c. Conclusion

The procedure revision, control, and implementation program satisfied 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 TS Sections 3.9 and 5.3:

- Reactor Console Logbooks Nos. 165 through 168
- NBSR Reactor Shift Supervisor Logbook No. 44
- Core reload/refuel and core defuel/refuel verification and sign-off sheets for Core Nos. 643 through 648 which were completed to ensure accurate records were maintained in the Control Room, at the reactor top, and in the storage pool room
- NBSR OI 6.1, "Fueling and Defueling Procedures," Revision C
- NBSR OI 6.2, "Operation of Fuel Transfer System," Revision F
- NBSR OI 3.3, "Operation of the Storage Pool Cooling System," Revision A

b. Observations and Findings

Licensee procedures and operator instructions provided approved methods to move and handle fuel consistent with the provisions of the TSs and the licensee safety analysis. During the inspection, the inspector had the opportunity to observe a portion of the fuel handling operation process following the removal of four used/spent fuel elements. The operation was carried out in accordance with the applicable procedures. Various other records of fuel loading/reloading and fuel examination documented that fuel was moved and controlled as required. The records also showed that the fuel movements were verified by assigned individuals as required and that fuel elements were maintained in the authorized and specifically designated locations. The inspector verified that fuel handling and monitoring equipment was operable. Personnel were knowledgeable of the procedural requirements that ensured criticality control and fuel integrity.

c. Conclusion

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

7. Surveillance

a. Inspection Scope (IP 69010)

To determine that surveillance activities and calibrations were being completed as required by TS Section 4.0, the inspector reviewed selected aspects of:

- Reactor Console Logbooks Nos. 165 through 168
- Selected TS Surveillance Schedules for each month for the period from January to October 2019, which indicated what 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
- OI 1.1 CL-A, "Reactor Startup Checklist (Shutdown >24 hours)," Revision J
- OI 1.1 CL-B, "Reactor Startup Checklist (Shutdown <24 hours)," Revision A
- Facility "NBSR Annual Reports," for the past 2 years (as referenced in Paragraph 3 above)

b. Observations and Findings

The inspector reviewed various surveillance and calibration records. The completion and results of these activities 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 revised and updated as the tasks were completed. 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 TSs 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 TSs or procedurally prescribed parameters.

c. Conclusion

The surveillance program was being conducted as specified by TS requirements.

8. Emergency Preparedness

a. Inspection Scope (IP 69011)

In order to verify compliance with the NBSR E-Plan dated December 2008 (as amended July 1, 2017), the inspector reviewed selected aspects of:

- Emergency preparedness training records for 2017 and 2018
- Selected NIST reactor area inspection log sheets for the past 12 months
- Assistance provided by support groups (i.e., NIST Fire Department (FD), NIST Police Department (PD), and law enforcement officials from Montgomery County, Maryland)
- Records documenting annual evacuation drills and the latest biennial emergency exercise
- Documentation of inventories of emergency response supplies, equipment, and instrumentation
- NBSR EI Manual (containing the E-Plan implementing procedures)
- NBSR EI Procedure 0.2, "Emergency Organization Phone Numbers"
- NBSR EI Procedure 0.3, "Emergency Classification and Criteria"
- NBSR EI Procedure 4.4, "Emergency Equipment"

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 operators were required to review the emergency procedures and be cognizant of their responsibilities in case of an emergency. The inspector verified that operators were reviewing the emergency procedures and understood their duties in response to emergency conditions.

Communications capabilities were checked periodically and phone numbers for the various support organizations were verified annually. 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 were available as stipulated.

The most recent biennial emergency exercise was conducted February 1, 2018. (The exercise was originally due, and scheduled to be completed, in the last quarter of 2017. An unforeseen personnel issue precluded the licensee from conducting the drill at that time.) A critique was held following the exercise to discuss those things that were done well and how to correct the problems that occurred. The inspector inquired about the timing of the next exercise. The licensee indicated that they were aware that an exercise was due and had scheduled it, to include participation from the FD, for October. The inspector also noted that evacuation drills were conducted annually as required in the E-Plan.

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 biennial refresher training provided for all NCNR employees. The licensee's health physics group conducted biennial emergency

response training for the NIST FD and PD personnel, as well. The inspector verified that the last training for these groups had been conducted during June and July 2018.

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 annually.

The inspector verified that the memorandum of understanding between Montgomery County and NIST concerning enforcement, remained in effect.

During the inspection, the inspector and two licensee management representatives visited the NIST Emergency Services building which housed the PD and FD offices and the central Dispatch Center. The inspector met with a PD representative and a FD Captain and discussed staffing and the actions each group would take in response to an emergency at the NCNR. The PD representative indicated that the group was understaffed but that plans were being finalized to get more personnel. It was also indicated that compensatory measures and the option of additional help (perhaps from the surrounding county) were being pursued. The FD Captain indicated that the department was essentially fully staffed. Through these discussions the inspector determined that each group understood their respective roles and responsibilities. There appeared to be a good working relationship between the NCNR and these support groups.

c. Conclusion

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

9. Exit Interview

The inspection scope and results were summarized on September 12, 2019, with members of licensee management. The inspectors 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

T. Barvitskie	Health Physicist and Chair of the Irradiation Subcommittee
J. Brady	Senior Reactor Operator
P. Brand	Chief, Reactor Engineering and Chair, Hazards Review Committee
F. Clark	Reactor Supervisor/Senior Reactor Operator
R. Dimeo	Director, NCNR
T. Fitt	Senior Reactor Supervisor
D. Flynn	Chief, Reactor Operations Acting
D. Griffin	Security Specialist
B. Kirby	Chair of the Beam Experiment Subcommittee
S. MacDavid	Senior Engineering Technician
T. Newton	Chief, Reactor Operations and Engineering; and, Deputy Director, NCNR
M. Nydegger	Chief, Reactor Operations
D. Pierce	Chair, Safety Evaluation Committee
J. Seiter	Senior Reactor Operator
S. Slaughter	Shift Supervisor and Senior Reactor Operator
R. Strader	Quality Assurance Program Manager
R. Sprow	Reactor Supervisor/Senior Reactor Operator
J. Tracy	Acting Leader, Reactor HP Group and Senior Reactor Health Physicist

Other Personnel

K. Clark	Shift Captain, Fire Protection Group, Emergency Services Division, Office of Facilities and Property Management, NIST
M. Snyder	Supervisory Security Specialist, Emergency Services Division, Office of Facilities and Property Management, NIST

INSPECTION PROCEDURES USED

IP 69003:	Class I Research and Test Reactor Operator Licenses, Requalification, and Medical Examinations
IP 69005:	Class I Research and Test Reactors Experiments
IP 69006:	Class I Research and Test Reactors Organization and Operations and Maintenance Activities
IP 69007:	Class I Research and Test Reactors Review and Audit and Design Change Functions
IP 69008:	Class I Research and Test Reactor Procedures
IP 69009:	Class I Research and Test Reactors Fuel Movement
IP 69010:	Class I Research and Test Reactors Surveillance
IP 69011:	Class I Research and Test Reactors Emergency Preparedness

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>
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
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
PRS	Procedure Review Subcommittee
SAC	Safety Assessment Committee
SEC	Safety Evaluation Committee
SRO	Senior Reactor Operator
SSCs	Structures, Systems, and Components
TS	Technical Specification