

February 29, 2000

Mr. Pedro B. Perez, Associate Director
Department of Nuclear Engineering
North Carolina State University
P. O. Box 7909
Raleigh, North Carolina 27695-7909

SUBJECT: NRC INSPECTION REPORT NO. 50-297/00-201

Dear Mr. Perez:

This refers to the inspection conducted on February 7-10, 2000, at your PULSTAR research reactor facility. The inspection included a review of activities authorized for your facility. The enclosed report presents the results of that inspection.

Various aspects of your safety and security programs were inspected including selective examinations of procedures and representative records, interviews with personnel, and observation of activities in progress. Within the scope of the inspection, no safety significant issues were identified.

In accordance with 10 CFR 2.790 of the NRC's "Rules of Practice," a copy of this letter and its enclosure will be placed in the NRC Public Document Room.

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

Sincerely,

/RA/

Ledyard B. Marsh, Director
Events Assessment, Generic Communications
and Non-Power Reactors Branch
Division of Regulatory Improvement Programs
Office of Nuclear Reactor Regulation

Docket No. 50-297

License No. R-120

Enclosure: NRC Inspection Report No. 50-297/00-201

cc w/enclosure:
Please see next page

North Carolina State University
(NRC INSPECTION REPORT)

Docket No. 50-297

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

Docket No: 50-297

License No: R-120

Report No: 50-297/00-201

Licensee: North Carolina State University

Facility: PULSTAR Reactor

Location: North Carolina State University, Raleigh, NC

Dates: February 7-10, 2000

Inspector: Craig Bassett

Approved by: Ledyard B. Marsh, Chief
Events Assessment, Generic Communications,
and Non-Power Reactors Branch
Division of Regulatory Improvement Programs
Office of Nuclear Reactor Regulation

EXECUTIVE SUMMARY

North Carolina State University
Report No: 50-297/00-201

The primary focus of this routine, announced inspection was the on-site review of selected aspects of the licensee's Class II non-power research reactor operation including: organization and staffing; review and audit functions; procedures; radiation protection and ALARA programs; effluent and environmental monitoring; the shipment of radioactive material; the safeguards and security program; and the material control and accounting program.

Organization and Staffing

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

Review and Audit Functions

- Audits were being conducted by the Radiation Safety Committee (RSC) and the Reactor Safety and Auditing Committee (RSAC) in compliance with the requirements specified in the Technical Specifications.

Procedures

- Procedures were being reviewed and approved by the RSC and RSAC as required.

Radiation Protection Program

- Surveys were being completed and documented acceptably to permit evaluation of the radiation hazards present.
- Postings met the regulatory requirements specified in 10 CFR Parts 19 and 20.
- Personnel dosimetry was being worn as required and doses were well within the licensee's procedural action levels, and NRC's regulatory limits.
- Radiation monitoring equipment was being maintained and calibrated as required.
- The Radiation Protection and ALARA Programs satisfied regulatory requirements.

Effluent and Environmental Monitoring

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

Transportation of Radioactive Materials

- Radioactive material, including waste, was transferred to the Campus Radiation Safety Division for shipment and/or disposal according to procedure.

Safeguards and Security

- The NRC-approved security program at the facility was acceptably carried out.

Material Control and Accountability

- No deficiencies were identified in the licensee's Material Control and Accounting program.

REPORT DETAILS

Summary of Plant Status

The licensee's one megawatt (1 MW) PULSTAR research reactor continues to be operated in support of undergraduate instruction and laboratory experiments, reactor operator training, and various types of research. During the inspection, the reactor was being started-up, operated, and shut down as required to support training and research.

1. Changes, Organization, and Staffing (69001)

a. Inspection Scope

The inspector reviewed the following regarding the licensee's organization and staffing to ensure that the requirements of Technical Specification (TS) Section 6.1 were being met:

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

b. Observations and Findings

Through discussions with licensee representatives, the inspector determined that management responsibilities and the organization at the facility had not changed since the previous NRC inspection in February 1999 (Inspection Report No. 50-297/99-201). However, it was noted that the person who had been serving as the Head of the Department of Nuclear Engineering had retired. The person chosen to fill the position was an individual who had previously held the position from 1980 to 1988. Also, the person who had been the Chief Reactor Operator at the facility had left the area and the licensee was interviewing to fill that position.

Through review of records and logs and through discussions with licensee personnel, the inspector determined that the staffing at the facility was acceptable to support the work and ongoing activities. The staffing met the requirements of the TS.

c. Conclusions

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

2. Review and Audit Functions (69001)

a. Inspection Scope

The inspector reviewed the following to ensure that the audits and reviews stipulated in the requirements of TS Section 6.2 were being completed:

- Radiation Safety Committee (RSC) meeting minutes
- Reactor Safety and Audit Committee (RSAC) meeting minutes

- Nuclear Reactor Program (NRP) Administrative Procedures
- TS duties specified for the RSC and the RSAC including the committees' review and audit functions

b. Observations and Findings

The inspector reviewed the RSC's and RSAC's meeting minutes from January 1998 to the present. These meeting minutes showed that each committee met as required by the TS with a quorum being present. The inspector also noted that the RSC and the RSAC had considered the types of topics outlined by the TS.

It was noted that both committees completed audits of generally different but complimentary aspects of the reactor facility operations and programs. The inspector noted that, since the last NRC inspection, audits had been completed in those areas outlined in the TS. Audits were varied so that all aspects of the licensee's safety program were reviewed every two years. The inspector noted that the audits and the resulting findings were acceptable. If the audit findings noted deficiencies or contained recommendations for possible improvements, the licensee responded and took corrective actions as necessary.

c. Conclusions

Audits were being conducted by the RSC and the RSAC according to the requirements specified in the TS.

3. Procedures (69001)

a. Inspection Scope

The inspector reviewed the following to ensure that the requirements of TS Section 6.3 were being met concerning written procedures:

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

b. Observations and Findings

The inspector determined that the licensee's written procedures concerning health physics (HP) and radiation protection activities were being revised as required by procedures. New procedures and major changes were reviewed and approved by the RSAC and the RSC. Minor changes were reviewed by the two committees.

c. Conclusions

Procedures were being reviewed and approved by the RSC and RSAC as required.

4. Radiation Protection Program (69001)

a. Inspection Scope

The inspector reviewed the following to verify compliance with 10 CFR Part 20 and the applicable licensee TS requirements and procedures:

- health physics survey records
- radiological signs and postings
- NRP dosimetry records
- calibration and periodic check records for radiation monitoring instruments
- the Radiation Protection Program
- the ALARA Program

The inspector also toured the licensee's facility to note any changes that may have been made and observed the use of dosimetry and radiation monitoring equipment. Licensee personnel were interviewed as well.

b. Observations and Findings

(1) Surveys

Weekly, monthly, and other periodic contamination and radiation surveys were completed by the Reactor Health Physicist (RHP) as required by TS and licensee procedures. Results were evaluated and corrective actions taken when readings or results exceeded set action levels.

(2) Postings and Notices

Postings at the entrances to the controlled areas, including the reactor control room, were acceptable for the hazards present. The facility's radioactive material storage areas were properly posted. No unmarked radioactive material was noted. Copies of current notices to workers required by 10 CFR Part 19 were posted in appropriate areas in the facility.

(3) Dosimetry

The licensee used a National Voluntary Laboratory Accreditation Program (NVLAP) accredited vendor to process personnel dosimetry. An examination of the records for the past two years through the date of the inspection showed that all exposures were well within NRC limits and typically within licensee action levels. Most of the records suggested no exposure above background. Dosimetry was acceptably used by facility personnel.

(4) Radiation Monitoring Equipment

The calibration of portable survey meters was typically completed by Radiation Safety Division personnel. Calibration frequency met procedural requirements and records were maintained as required.

(5) Radiation Protection Program

The licensee's Radiation Protection Program was established in the North Carolina State University (NCSU) Radiation Safety Manual, Revision 1, dated December 3, 1998, and in procedure, HP 1, "Radiation Protection Program," Revision 2, with an effective date of June 1, 1998. The program included requirements that all personnel who had unescorted access to the facility receive training in radiation protection, policies, procedures, requirements, and facilities. The program was being reviewed annually and appeared to be acceptably implemented.

The licensee's Respiratory Protection Program was being carried out as outlined by procedure. Training was being conducted, bioassays were being completed, annual personnel physicals were being conducted, and the equipment was being checked and maintained as required.

The inspector reviewed the Radiation Work Permits (RWPs) that had been written and used during the past two years. It was noted that the controls specified in the RWPs were acceptable and applicable for the work being done. The RWPs had been reviewed and approved as required.

(6) ALARA Program

The ALARA Program was also outlined and established in the licensee's procedure, HP 1, and in the NCSU Radiation Safety Manual. The ALARA program provided guidance for keeping doses as low as reasonably achievable and was consistent with the guidance in 10 CFR Part 20.

(7) Facility Tours

The inspector toured the control room, pool area, and selected support laboratories and areas. Control of radioactive material and control of access to radiation and high radiation areas were acceptable.

c. Conclusions

Surveys were being completed and documented acceptably to permit evaluation of the radiation hazards that might exist. Postings met regulatory requirements. Personnel dosimetry was being worn as required and doses were well within the licensee's procedural action levels and the NRC's regulatory limits. Radiation monitoring equipment was being maintained and calibrated as required. The Radiation Protection Program and the ALARA Program satisfied regulatory requirements.

5. Effluent and Environmental Monitoring (69001)

a. Inspection Scope

The inspector reviewed the following to verify compliance with the requirements of 10 CFR Part 20 and TS Sections 4.4 and 6.7.4:

- environmental monitoring program
- annual reports

- release records
- counting and analysis records

b. Observation and Findings

The inspector determined that gaseous releases continued to be calculated as required and were adequately documented. The releases were determined to be well within the annual dose constraint of 10 CFR 20.1101 (d), 10 CFR Part 20 Appendix B concentrations, and TS limits. Liquid releases were approved by the RHP after analyses proved that the releases would meet regulatory requirements for discharge into the sanitary sewer.

c. Conclusion

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

6. Transportation (86740)

a. Inspection Scope

The inspector interviewed licensee personnel and reviewed various records to verify compliance with procedural requirements for transferring licensed material.

b. Observations and Findings

Through records reviews and discussions with licensee personnel, the inspector determined that the licensee continued to transfer most radioactive material, including solid radioactive waste, to the Campus Radiation Safety Division for shipment and/or disposal. The transfers were in compliance with procedure.

c. Conclusions

Radioactive material was transferred to the Campus Radiation Safety Division for shipment and/or disposal according to procedure.

7. Physical Security (81401, 81402, 81431)

a. Inspection Scope

To verify compliance with the licensee's NRC-approved Physical Security Plan (PSP) and to assure that changes, if any, to the plan had not reduced its overall effectiveness, the inspector reviewed:

- logs, records, and reports
- the security organization
- access and key controls
- intruder detection and physical barriers
- maintenance and PSP implementing procedures

b. Observations and Findings

The inspector determined that the licensee's physical protection program conformed to NRC requirements and to the licensee's PSP and implementing procedures.

c. Conclusion

The NRC-approved security program at the facility was acceptably carried out.

8. Material Control and Accounting (85102)

a. Inspection Scope

To verify compliance with 10 CFR Part 70, the inspector reviewed:

- control of storage areas
- procedures for tracking the quantity, identity, and location of Special Nuclear Material (SNM)
- annual inventory results
- associated records and reports

b. Observations and Findings

Licensee procedures for controlling and tracking SNM were acceptably implemented. Records showed that physical inventories were conducted at least annually as required by 10 CFR 70.51(d). Nuclear Material Transaction Reports (DOE/NRC Form 741) and Material Status Reports (DOE/NRC Form 742) had been submitted by the licensee as required by 10 CFR 74.13(1).

c. Conclusion

No deficiencies were identified in the licensee's Material Control and Accounting program.

9. Exit Interview

The inspection scope and results were summarized on February 10, 2000, with members of licensee management. The inspector described the areas inspected and discussed in detail the inspection findings. No dissenting comments were received from the licensee. The PSP was identified as proprietary information.

PARTIAL LIST OF PERSONS CONTACTED

Licensee

S. Bilyj, Reactor Operations Manager
K. Kincaid, Chief of Reactor Maintenance
C. Mayo, Nuclear Reactor Program Director
P. Perez, Nuclear Reactor Program Associate Director
P. Turinsky, Nuclear Engineering Department Head
G. Wicks, Reactor Health Physicist

Campus Environmental Health and Safety Center

N. Couch, Campus Radiation Safety Officer
D. Howell, Associate Radiation Safety Officer

Public Safety Office

J. Barnwell, Alarm System Coordinator, Public Safety

INSPECTION PROCEDURES USED

IP 69001 Class II Non-Power Reactors
IP 81401 Plans, Procedures, and Reviews
IP 81402 Reports of Safeguards Events
IP 81431 Fixed Site Physical Protection of Special Nuclear Material of Low Strategic Significance
IP 85102 Material Control and Accounting - Reactors
IP 86740 Inspection of Transportation Activities

ITEMS OPENED, CLOSED, AND DISCUSSED

Opened

None

Closed

None

LIST OF ACRONYMS USED

ALARA	As low as reasonably achievable
CFR	Code of Federal Regulations
HP	Health physics
IP	Inspection Procedure
MW	Megawatt
NCSU	North Carolina State University
NRC	Nuclear Regulatory Commission
NRP	Nuclear Reactor Program
NVLAP	National Voluntary Laboratory Accreditation Program
PSP	Physical Security Plan
RHP	Reactor Health Physicist
RSC	Radiation Safety Committee
RSAC	Reactor Safety and Auditing Committee
RWP	Radiation Work Permit
SNM	Special Nuclear Material
TS	Technical Specification

