U.S. NUCLEAR REGULATORY COMMISSION
REGION II

Docket No.:	50-62
License No.:	R-66
Report No.:	50-62/97-01
Licensee:	University of Virginia
Facility:	University of Virginia Reactor (UVAR)
Location:	Charlottesville, VA 22901
Inspection Conducted:	April 14-17, 1997
Inspectors:	C. Bassett, Senior Radiation Specialist M. Mendonca, Project Manager
Accompanying Personnel:	V. Krokhine, Head of Inspection of Gosatomnadzor, Central Region, Russia A. Safronov, Deputy Head of Gosatomnadzor, Central Regional Office, Russia
Approved by:	E. J. McAlpine, Chief Fuel Facilities Branch Division of Nuclear Materials Safety

Enclosure

EXECUTIVE SUMMARY

University of Virginia Reactor (UVAR)
NRC Inspection Report No. 50-62/97-01

The primary focus of this routine, announced inspection was the on-site review of the operations of this Class I non-power reactor including organization, maintenance, audits, design changes, operator requalification, operating procedures, fuel movement, surveillances, and experiments.

ORGANIZATION, OPERATIONS, AND MAINTENANCE ACTIVITIES

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

- The licensee was operating and maintaining the facility in accordance with the requirements specified in the Technical Specifications and approved procedures.

REVIEW, AUDIT, AND DESIGN CHANGE FUNCTIONS

- Audits were being conducted in accordance with the requirements specified in the Technical Specifications.

- Design changes were being developed, reviewed, and approved as required by 10 CFR 50.59, the Technical Specification, and the applicable procedure.

OPERATOR LICENSES, REQUALIFICATION, AND MEDICAL ACTIVITIES

- With the exception of a minor violation for failure to have all operators attend and/or review the required classes/class material in the requalification program, the program for operator requalification was in accordance with the requalification program requirements.

- The requirements of 10 CFR 55.21 for completing medical evaluations and examinations for licensed operators were satisfied.

PROCEDURES

- The procedures were acceptable to meet the licensee's objectives and provide guidance to the operators. The procedures were up-to-date, acceptably reviewed, and approved and were being used by the operators.

FUEL MOVEMENT

- Proper fuel handling techniques were used during core manipulations on April 16, 1997, and the procedures used were adequate to meet the licensee's objectives and provided appropriate guidance to the operators.

SURVEILLANCE ACTIVITIES

- The licensee was performing safety surveillances in accordance with approved procedures and at the required frequencies. Also, records of the results of the completed surveillances were complete and being maintained as required.

EXPERIMENTS

- The licensee had documented a new experiment to be conducted at the facility by properly identifying the apparent potential hazards involved. Also, the experiment had been reviewed and approved for initial testing by the RSC.

Attachment:
Persons Contacted During the Inspection
Inspection Procedures Used
List of Items Opened, Closed, and Discussed
List of Acronyms

REPORT DETAILS

I. Non-Power Reactor (NPR) Operations

A. Organization, Operations, and Maintenance Activities (39745)

1. Organization and Staffing

a. Inspection Scope

The inspectors reviewed the licensee's organization to ensure that it met the requirements of Technical Specification (TS) Sections 6.1.1, 6.1.2, and 6.1.3 which detail the organizational structure, management responsibilities and met the staffing requirements for safe operation of the UVAR 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 of reactor operations in June 1995 (Inspection Report No. 50-62/95-01). The inspector determined that the MANE Department Chairman retained overall responsibility for management of the facility as specified in the TS.

Through observation of operations and discussions with licensee personnel, the inspectors determined that the staffing at the facility was adequate to support the work and ongoing activities and met the requirements of the Technical Specification.

c. Conclusions

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

2. Operations

a. Inspection Scope

The inspectors reviewed the licensee's operations and maintenance to determine that those activities were being conducted in accordance with regulatory requirements and to assure a high availability of safety systems.

b. Observations and Findings

The inspectors reviewed the UVAR operations logbooks for several time periods from January 1996 through the present. The logbook entries reflected the progress of activities at the facility and corroborated the surveillance and experimental activities performed at UVAR. The inspectors reviewed the UVAR Daily Checklists which illustrated the day-to-day activities at the facility.

The final pages of the UVAR operating logs are used to summarize the reactor scrams. Most of the scrams were ascribed to instrument noise or power fluctuation. None could be described as resulting from improper operation of the facility. The inspectors concluded that the logbooks were legible, sufficiently thorough, and complete. The inspector also witnessed ongoing operation activities including one reactor startup and the completion of the shim rod surveillance. The inspector concluded that the operators responded appropriately at the control console.

The inspectors also reviewed maintenance records for various pieces of equipment and instruments including the secondary coolant system heat exchanger, the power range monitor, and the pool level indicators. No recurring problems were noted except for the continuing pool leak. The maintenance records reviewed were completed as required and reviewed the Reactor Supervisor and the Facility Director. Maintenance activities were also being performed at the frequencies required by procedure.

c. Conclusions

The licensee was operating and maintaining the facility in accordance with the requirements specified in the Technical Specifications and approved procedures.

B. Review, Audit, and Design Change Functions (40745)

1. Review and Audit Functions

a. Inspection Scope

The inspectors toured the licensee's facility to note any changes that had been made and reviewed the program established by the licensee to ensure that all activities at the facility were reviewed and audited as required. TS Section 6.2 outlines the composition, charter, and duties of the Reactor Safety Committee (RSC) including the committee's review and audit functions.

b. Observations and Findings

The inspector toured the control room, pool area, beam port areas, and selected laboratories. Control of radioactive material and control of access to radiation areas were acceptable in all cases. Improvements in housekeeping was noted in all areas of the facility. Also, it had been noted during a previous inspection that was no personnel monitoring device (frisker) in the NAA area. During this inspection, the inspectors noted that a frisker had been installed in a room adjacent to the NAA area for personnel to use upon exiting the NAA room.

The inspectors reviewed the RSC's meeting minutes from July 1995 to the present. The inspectors noted that the RSC was meeting

more frequently than required by the TS. The meeting minutes indicated that the RSC had considered appropriate topics including the facility annual report, NRC inspection reports and the licensee's responses, proposed TS changes, revisions to the Standard Operating Procedure (SOP), facility modifications, current problems including the reactor pool leak, the results of emergency drills, new experiment requests, and operator and experimenter training. The RSC also performed and reviewed the results of audits of the reactor facility operations. The inspectors noted that, since the last NRC operations inspection, audits had been performed by the RSC in December 1995, July and December 1996, and April 1997. The audits were varied so that all facets of the licensee's operation was reviewed every two years except for reactor operations which was audited every year. The inspectors noted that the audits and the resulting findings were detailed and that the licensee's responses and corrective actions appeared to be adequate.

c. Conclusions

Audits were being conducted in accordance with the requirements specified in the Technical Specifications.

2. Design Changes

a. Inspection Scope

The inspectors reviewed the most recent changes to the licensee's facility to ensure that they had been made consistent with the requirements of 10 CFR 50.59, the TS, and the licensee's administrative controls so that the margin of safety outlined in the original design of the facility was maintained.

b. Observations and Findings

The inspectors reviewed an electronics modification, an equipment modification involving release of liquid waste to the sanitary sewer, and a new experimental facility installation (the Small Animal Irradiation Neutron Tube [SAINT] facility). The inspectors noted that the licensee had completed a Quality Assurance (Q/A) form for each of the changes as required. The forms had subsequently been reviewed and approved by the Facility Director and the RSC in accordance with the TS and the applicable procedure. New operating procedures had been developed for using the SAINT facility and for releasing water to the sanitary sewer.

c. Conclusions

Design changes were being developed, reviewed, and approved as required by 10 CFR 50.59, the Technical Specification, and the applicable procedure.

C. Operator Licenses, Requalification, and Medical Activities (41745)

1. Requalification

a. Inspection Scope

The inspectors reviewed the licensee's requalification program to ensure that it complied with the regulatory requirements. 10 CFR 55.59 details the requirements for a licensee's requalification program including: 1) conducting the program for a continuous period not to exceed two years, 2) presenting preplanned lectures on a regular and continuing basis throughout the license requalification period, 3) conducting on-the-job training for the operators, and 4) giving a comprehensive requalification written examination and annual operating test for all operators.

b. Observations and Findings

Through a review of training and examination records, the inspectors determined that the reactor operator requalification training program was on schedule and was being conducted in accordance with the licensee's commitments. Training had been conducted on changes as required and the requalification program had been revised as needed to include more emphasis on emergency procedures and scenarios. However, it was noted that one of the qualified operators had no record of attendance of the requalification program lectures nor any record of reading the lecture material. However, records also showed that this operator did pass the written and operational requalification examinations and demonstrated competency in these areas. The licensee was informed that failure to have all operators attend and/or review the required classes in the requalification program was an apparent violation. Because the operator demonstrate proficiency in the requalification program, this failure constitutes a violation of minor significance and is being considered as a Non-Cited Violation (NCV), consistent with Section IV of the NRC Enforcement Policy (NCV 50-62/97-01-01).

c. Conclusions

With the exception of the minor violation noted above, the program for operator requalification was in accordance with the requalification program requirements.

2. Medical Activities

a. Inspection Scope

The inspectors reviewed selected medical records of qualified operators to determine that medical examinations and activities were being conducted in accordance with 10 CFR 55.21 requirements to ensure that the operators are fit for duty to operate the reactor safely.

b. Observations and Findings

Through a review of selected medical and examination records, the inspectors determined that the licensed operators had received the proper medical evaluations and examinations as required. All records reviewed were well documented and indicated that the operators met medical requirements to operate the research reactor at the facility.

c. Conclusions

The requirements of 10 CFR 55.21 were satisfied.

D. Procedures (42745)

a. Inspection Scope

The inspectors reviewed selected facility procedures to determine that they met TS requirements. TS Section 6.3 stipulates that the licensee have written procedures that are reviewed and approved by the Reactor Safety Committee.

b. Observations and Findings

The inspector witnessed one reactor startup and escalation to full power on April 17, 1997. In conjunction with that activity, the inspector reviewed Standard Operating Procedure (SOP) 4.0, Checklists, revised September 1983, including Sections 4.1 - Daily Checklist, 4.2 - Startup Checklist, and 4.3 - Power Checklist. SOP 5, Operating Procedures, revised November 1988, Section 5.1, Reactor Startup was also reviewed.

The inspector concluded that the operator adhered to the procedures without deviation, and the procedures appeared adequate to meet their objectives.

c. Conclusions

The procedures were acceptable to meet the licensee's objectives and provide guidance to the operators. The procedures were up-to-date, acceptably reviewed, and approved and were being used by the operators.

E. Fuel Movement (60745)

a. Inspection Scope

The inspectors observed reactor fuel movement activities to determine that the fuel is inspected, handled, and maintained as required to assure that exposures remain ALARA, that contamination is contained, and that the fuel is maintained as designed for use in the reactor.

b. Observations and Findings

The inspectors observed the licensee perform the semiannual shim rod surveillance on April 16, 1997. In order to perform this surveillance, the licensee needed to move some of the fuel elements. The inspectors reviewed Standard Operating Procedure, SOP 5, "Operating Procedures," Section 5.4, "Core Manipulation," revised November 1988, to ensure that the fuel movements were conducted in accordance with procedure. The inspectors noted that the fuel movement was accomplished by procedure and in accordance with proper radiation protection and ALARA controls. No problems were noted and none were noted during log book review or discussions with licensed operators.

The inspector concluded that the operator adhered to the procedures without deviation and the procedures appeared adequate to meet their objectives.

c. Conclusions

Proper fuel handling techniques were used during core manipulations on April 16, 1997, and the procedures used were adequate to meet the licensee's objectives and provided appropriate guidance to the operators.

F. Surveillance Activities (61745)

a. Inspection Scope

The inspectors observed one surveillance activity and reviewed the surveillance records for other items of equipment. TS Section 4 outlines the various surveillances and the surveillance frequencies that are required to be conducted at the facility. TS Section 4.5 stipulates the surveillance requirements following maintenance of control or safety systems to ensure that a system is operable before being used after maintenance has been performed.

b. Observations and Findings

As noted previously, the inspectors observed the shim rod surveillance performed during the inspection. The inspectors noted that shim rod drop time tests required by TS 4.1.(1) were performed with acceptable frequency and results during the inspection and during the past year. Visual inspection of the rods, including confirmation that each rod would pass through a 0.95-inch gage, were conducted with acceptable results.

The inspector reviewed the records of other completed surveillances conducted at UVAR as well as the process used to track and schedule surveillances. The inspector noted that a systematic schedule that included surveillance requirements, task

description, responsibility, when last performed, and next due date exists and was being effectively utilized.

The visual inspection and measurement of shim rods was observed by the inspectors. Additionally, the inspectors observed rod drop time measurements.

Pursuant to TS 4.1(2), shim rod and regulating rod reactivity worth were measured semi-annually and for each new core configuration. Five sets of measurements, for five different core configurations, were performed in the year immediately preceding this inspection. These tests confirmed that both the shutdown margin (SDM) and excess reactivity were within TS limits. Additionally, the reactivity worth of each experimental facility was remeasured with each change in configuration.

The semiannual calibrations of the power range channels, required by TS 4.2 (3), were performed with acceptable frequency and results during the period since the last inspection. Additional calibrations were performed following detector replacements. In all cases, the as-found condition of the channels were acceptable.

The weekly power range calibration by reactor heat balance, required by TS 4.2(4), was performed with acceptable frequency and results during the year preceding the inspection.

In support of the heat balance measurements, the primary flow monitor and core delta-temperature monitor were calibrated semiannually with acceptable frequency and results. No significant drift was noted in the low flow scram setpoints.

Satisfactory surveillance frequency and results were also confirmed for pool level detectors, pool level trip, pool digital temperature instrument, N-16 monitor, and core gamma monitor.

The inspector also discussed in detail the methodology used to conduct surveillances associated with reactor room confinement as required by TS 4.6 and emergency core spray system as required by TS 4.3. The inspector concluded that required surveillances were satisfactorily completed.

c. Conclusions

The licensee was performing safety surveillances in accordance with approved procedures and at the required frequencies. Also, records of the results of the completed surveillances were complete and being maintained as required.

G. Experiments (69745)

a. Inspection Scope

The inspectors reviewed the records of recent experiments that had been conducted at the facility to determine that they were conducted in accordance with regulatory requirements and the applicable procedures to assure that the experiments were reviewed to address safety issues and allow reactor operation within the design criteria.

b. Observations and Findings

Selected Routine Irradiation Request Forms (RIRFs) and Special Irradiation Request Forms (SIRFs) from 1994 and 1995 were reviewed, along with the Irradiations Log for the same period. All the documented irradiations appeared to be routine in nature and consistent with activities that have been conducted in the past.

Through interviews with licensee representatives and records review, the inspector determined that one new experiment had been reviewed and approved since the last inspection. This involved the use of the SAINT facility and included irradiating tumors grown on rats and/or mice in a container that would be lowered down near the core of the reactor. During the inspection, the licensee was still in the process of performing flux measurements and gathering other data before the SAINT facility was to be placed in operation.

The inspector reviewed the documentation of the new experiment including the review and approval by the RSC. The potential hazards of the experiment had been identified and procedures had been written to ensure proper control of the irradiated items (rats or mice).

c. Conclusions

The licensee had documented the new experiment by properly identifying the apparent potential hazards involved and the experiment had been reviewed and approved for initial testing by the RSC.

H. Follow-up on Inspector Identified Problems (92701)

1. IFI - 50-62/95-01-01 - Follow-up on the licensee's actions to revise SOP 3 and submit it to the RSC for review and approval

a. Inspection Scope

The inspectors reviewed the actions taken by the licensee following identification of this Inspector Follow-up Item.

b. Observations and Findings

During a previous inspection in June 1995, it was noted that SOP 3 had been submitted to the RSC for review and approval on July 8, 1993. However, the RSC did not approve the SOP at that time because it was found to be too detailed and prescriptive. A second revision of the SOP was to be presented to the RSC, but this had not been done at the time of the previous inspection.

It was noted during this inspection that SOP 3 had been revised and sent to the RSC for approval. The revised version of SOP 3 was approved by the RSC and this was documented in the minutes of the RSC meeting which was held on October 10, 1995. The inspectors reviewed the procedure and determined that it was adequate for the intended purpose.

c. Conclusions

This items is considered closed.

2. IFI - 50-62/95-02-01 - Perform modification and testing of the facility evacuation alarm system to demonstrate facility-wide audibility coverage.

a. Inspection Scope

The inspectors reviewed the actions taken by the licensee following identification of this Inspector Follow-up Item.

b. Observations and Findings

During a previous inspection in November 1995, it was noted that, during an evacuation drill, the criticality alarm system was inaudible within certain areas of the facility. The licensee indicated that they planned to modify the facility evacuation alarm system to include the criticality monitoring system alarm.

Through records review and discussions with licensee personnel, it was noted during this inspection that additional audible alarms had been acceptably installed in the location in question.

c. Conclusions

This items is considered closed.

II. Management Meetings

A. Exit Interview

The inspection scope and results were summarized on April 17, 1997, with those persons indicated in the Attachment to this report. The inspectors described the areas inspected and discussed in detail the inspection findings.

No dissenting comments were received from the licensee. The licensee did not identify as proprietary any of the material provided to or reviewed by the inspector.

Attachment

1. PERSONS CONTACTED

Licensee Employees

*P. Benneche, Reactor Supervisor
*C. Bly, Senior Reactor Operator
T. Doyle, Senior Reactor Operator
*P. Farrar, Reactor Administrator
*R. Flack, Chair, Mechanical, Aeronautical and Nuclear Engineering (MANE) Department
B. Hosticka, Senior Reactor Operator
*R. Johnson, Chair, Reactor Safety Committee
*R. Mulder, Director, University of Virginia Reactor (UVAR) Facility

Other licensee employees contacted during this inspection included technicians and administrative personnel.

Other Organizations

*R. Juzaitis, Visitor from Los Alamos National Laboratory
*V. Krokhine, Head of Inspection of Gosatomnadzor, Central Region, Russia
*M. Nikitina, Interpreter, Russia
*A. Safronov, Deputy Head of Gosatomnadzor, Central Regional Office, Russia
D. Steva, Reactor Health Physicist, Environmental Health and Safety Department

*Attended the exit interview on April 17, 1997.

2. INSPECTION PROCEDURES USED

IP 39745	NPR Organization and Operations and Maintenance Activities
IP 40745	NPR Review and Audit and Design Change Functions
IP 41745	NPR Operator Licenses, Requalification, and Medical Activities
IP 42745	NPR Procedures
IP 60745	NPR Fuel Movement
IP 61745	NPR Surveillance
IP 69745	NPR Experiments
IP 92701	Follow-up on Inspector Identified Items

3. LIST OF ITEMS OPENED, CLOSED, AND DISCUSSED

Type	Item Number	Status	Description and Reference
NCV	50-62/97-01-01	Closed	Failure to have all operators attend and/or reviewed the required classes in the requalification program (Paragraph C.2).

IFI	50-62/95-01-01	Closed	Follow-up on the licensee's actions to revise SOP 3 and submit it to the RSC for review and approval (Paragraph H.1).
IFI	50-62/95-02-01	Closed	Perform modification and testing of the facility evacuation alarm system to demonstrate facility-wide audibility coverage (Paragraph H.2).

4. LIST OF ACRONYMS USED

ALARA	As Low As Reasonably Achievable
CFR	Code of Federal Regulations
IFI	Inspector Follow-up Item
IP	Inspection Procedure
MANE	Mechanical, Aeronautical, and Nuclear Engineering (Department)
NAA	Neutron Activation Analysis
NCV	Non-cited Violation
NPR	Non-Power Reactor
NRC	Nuclear Regulatory Commission
NRR	Nuclear Reactor Regulation
RIRF	Routine Irradiation Request Form
RSC	Reactor Safety Committee
SDM	Shutdown margin
SIRF	Special Irradiation Request Form
TS	Technical Specification
UVAR	University of Virginia Reactor