



UNITED STATES  
 NUCLEAR REGULATORY COMMISSION  
 REGION II  
 101 MARIETTA STREET, N.W.  
 ATLANTA, GEORGIA 30303

Report No.: 50-062/83-03 and 50-396/83-03

Licensee: University of Virginia  
 Charlottesville, VA 22901

Facility Name: University of Virginia Reactor UVAR and Cavalier

Docket Nos.: 50-062 and 50-396

License Nos.: R-66 and R-123

Inspector: P. K. Harden 5/17/84  
 M. B. Shymlock Date Signed

Approved by: [Signature] 5/17/84  
 Paul R. Bemis, Chief, Project Section IC Date Signed  
 Division of Project and Resident Programs

SUMMARY

Inspection on December 19-21, 1983

Areas Inspected

This routine, unannounced inspection involved 19 inspector hours on site in the areas of Licensee Action on Previous Enforcement Matters, Followup on Previously Identified Items, Followup on Items from Enforcement Conference, and Facility Operations.

Results

No violations or deviations were identified.

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## REPORT DETAILS

### 1. Persons Contacted

#### Licensee Contacted

- \*T. G. Williamson, Chairman, Nuclear Engineering and Engineering Physics Department
- \*J. S. Brenizer, Director, Nuclear Reactor Facility
- \*J. P. Farrar, Reactor Supervisor
- \*P. Benneche, Research Engineer
- \*B. G. Copcutt, University Radiation, Safety Officer
- \*J. R. Gilchrist, Radiation Safety Specialist

\*Attended exit interview.

### 2. Exit Interview

The inspection scope and findings were summarized on December 21, 1983, with those persons indicated in paragraph 1 above.

### 3. Licensee Action on Previous Enforcement Matters

- a. (Closed) Violation 50-062/82-01-01 and 50-396/82-01-01: Failure to observe individual licensed operators performance and properly evaluate; also failure to maintain a review log containing up-to-date procedure changes (related to the requalification program). The licensee has implemented an operator evaluation check sheet that evaluates eight specific areas and then allows for general comments. Changes to equipment or procedures and systems are currently reviewed with all licensed operators at the monthly requalification lectures.
- b. (Closed) Violation 50-062/82-01-03, Failure to conduct required daily swipe surveys. Standard Operating Procedures (SOP) Radiation Control Procedure, was revised February 1983. The procedure requires that survey of the controlled areas be accomplished weekly and the adjacent uncontrolled areas in the UVAR room shall be surveyed daily. These surveys were being conducted.
- c. (Closed) Violation 50-062/82-01-04 and 50-396/82-01-03, Review of temporary procedures, and procedure changes were not being kept for the required time period. The licensee currently maintains a folder which contains temporary procedures and procedure changes for the required time interval. The Reactor Safety Committee files also contain duplicate information.
- d. (Closed) Violation 50-062/79-02-01, The demineralizer/filter room door constituted an unlocked, non-alarmed access point into a high radiation area. On September 20, 1979, the door was locked to limit access. The

keys for this door were placed in the safe used for other administratively controlled keys. These keys are not released without the approval for the Reactor Supervisor or his designee.

- e. (Closed) Violation 50-062/83-02-01, Failure to maintain the technical specification (TS) required shutdown margin. SOP 5.5, Procedure for Determining Shutdown Margin and Excess Reactivity, was issued in June 1983. This procedure provides requirements as to when and how these measurements shall be conducted. SOP 5.4, Core Manipulation, was issued in June 1983 and gives a specific definition of what constitutes a core configuration change. Training on shutdown margin has been conducted for all licensed operators and is part of the operator requalification training program.
- f. (Closed) Violation 50-062/83-02-02, Failure to perform required shim rod reactivity worth measurements following a new core configuration. The licensee issued SOP Section 5.4, Core Manipulation, in June 1983. It specifically and quantitatively defines a core configuration change. SOP 7.4, Control Rod Calibration, was revised in June 1983. It is also specific as to when and how control rod calibrations shall be accomplished. These changes and training associated with these changes should prevent recurrence.
- g. (Closed) Violation, see the Notice of Violation dated October 6, 1983, failure to have written approved procedures for determining shutdown margin or for calculating an estimated critical position. The licensee has issued SOP 5.5, Shutdown Margin and Excess Reactivity, dated June 1983. In the revised SOP 5.1, Procedure for Reactor Startup, there is a requirement to determine and log the minimum permissible critical rod position (MPCRP) for the xenon-free core to ensure that the required shutdown margin is maintained. The procedure further requires evidence of increasing subcritical multiplication within one inch of the established minimum permissible critical rod position for a given core configuration or else the reactor is to be shutdown. Minimum permissible critical rod position is determined by adding the minimum shutdown margin (0.4%  $\Delta k/k$ ) to the total reactivity worth of the highest worth rod. This total reactivity is then compared to the current rod worth curves to determine rod positions needed to remove this amount of reactivity from a shutdown, xenon-free core.

#### 4. Unresolved Items

Unresolved items were not identified during this inspection.

#### 5. Followup on Previously Identified Items

- a. (Closed) Inspector followup item 50-062/82-01-02 and 50-396/82-01-02: Entries for completion of makeup test for operator requalification lectures missed were not entered. Records reviewed indicated that, for individual operator missing requalification lectures, written tests

were administered. The results were then entered in the individual requalification training folders.

- b. (Closed) Inspector followup item 50-062/81-02-01, 50-396/81-02-01: Improvement in surveillance records of safety rod reactivity worths. The licensee currently posts all safety rod reactivity worth data in the control room for the UVAR and on the wall beside the Cavalier reactor.

A new data sheet for taking rod worth measurements was developed, and additional space was provided to record shutdown margin, excess reactivity and other observations.

- c. (Closed) Inspector followup item 50-062/82-01-05 and 50-396/82-01-04: Lack of documentation to determine whether or not an experiment constituted a new experiment. SOP 6, Material Irradiation and Post-Irradiation Handling, revised September 1983, Section C identifies when the Reactor Safety Committee's (RSC) approval is required. The new Irradiation Request Form also requires the date of RSC approval.
- d. (Closed) Inspector followup item 50-062/83-02-03: Agreement by licensee to develop and institute use of xenon curves. Due to the licensee's use of minimum permissible critical rod position (as explained in 3.g.), the use of xenon curves on a xenon-free core is not applicable.

The licensee had generated curves (by solving the xenon equations) for determining time after shutdown to a xenon-free condition, by August 11, 1983. These curves were normalized experimentally on October 10, 1983.

#### 6. Followup of Items from Enforcement Conference

- a. (Closed) Chapter 4, Checklist, and Chapter 6, Material Irradiation and Post-Irradiation Handling, were reviewed by the UVAR staff on August 31, 1983 and reviewed by the Reactor Safety Committee on September 30, 1983. The SOP was issued on that date for implementation.
- b. (Closed) Chapter 7, System Calibration and Maintenance, was reviewed by the UVAR staff on October 31, 1983, and reviewed by the Reactor Safety Committee on December 31, 1983: SOP Chapter 9 was deleted and inserted in Chapter 11, Abnormal Conditions.
- c. (Closed) Chapter 11, Abnormal Conditions and Chapter 12 Emergency Procedures were reviewed by the UVAR Staff on November 30, 1983. The Reactor Safety Committee received and approved Chapter 12 on December 16, 1983 and Chapter 11 December 31, 1983. The Access to UVAR room part of Chapter 13 has been added to the UVAR Security Plan.

- d. (Closed) A parallel document to SAR Chapter 9 will be completed for the eighteen plate fuel assemblies by October 31, 1983. That document will be based upon submittals made earlier to support licensing of and TS for the eighteen plate fuel assemblies. The SAR was revised to include analysis for the eighteen plate fuel.
- e. (Open) A broader review of the SAR will be completed by January 31, 1984. The licensee is updating the SAR. The resulting document will be known as "The UVAR Design and Analysis Handbook." This item is identified for future review as an open item (50-062/83-03-01).

#### 7. Facility Operations

Tours of facility included control room operations, following an experiment activation, and spot checks for procedural compliance.

The areas reviewed indicated good control and no violations or deviations were identified.