UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION II
101 MARIETTA STREET, N.W.
ATLANTA, GEORGIA 30323

SEP 29 1988

Report No.: 50-62/88-03

Licensee: University of Virginia
Charlottesville, VA 22901

Docket No.: 50-62 License No.: R-66

Facility Name: University of Virginia Reactor UVAR and Cavalier

Inspection Conducted: August 22-25, 1988

Inspector: G. B. Kuzo 9/28/88
Date Signed

Approved by: C. M. Hosey, Section Chief 9/28/88
Division of Radiation Safety and Safeguards
Date Signed

SUMMARY

Scope: This routine, unannounced inspection involved onsite review of the licensee's radiation protection program including staff organization, training, radiation control and surveillance activities, and environmental monitoring issues.

Results: Program strengths were identified for radiation surveillance and monitoring activities as noted by licensee initiatives to improve analytical measurement accuracy for environmental samples, new staff involvement with portable instrument calibrations, changes to improve personnel dosimetry monitoring, and aggressive performance of routine surveillance activities. Identified weaknesses included "housekeeping" practices within the reactor room, documentation of self-reading dosimeter (SRD) and environmental exposure measurement records, and also the need to improve the timeliness of portable air sampling equipment calibrations.

Within the areas inspected no violations or deviations were identified.

REPORT DETAILS

1. Licensee Employees Contacted

*P. Benneche, Reactor Services Supervisor
*B. Copcutt, Radiation Safety Officer
J. Farrar, Reactor Administrator
*G. Glennie, Radiation Safety Technician
*O. Hale, Reactor Health Physicist
*J. Hall, Reactor Health Physics Technician
*A. Jackson, Health Physicist
*T. Williamson, Chairman, Department of Nuclear Engineering

*Attended exit interview

2. Organization and Management Controls (83743)

a. Organization and Staffing

Technical Specification (TS) Sections 6.1.1 and 6.1.2 detail organizational structure, management responsibility and the chain of command for safe operation of the University of Virginia Reactor (UVAR) facility.

From discussions with, and observations of personnel conducting routine duties at the UVAR, the inspector verified that the facility management responsibilities and organizational structure have not changed since the previous NRC inspection of radiation protection activities (Inspection Report No. 50-62/88-01).

UVAR staff levels and training for UVAR and Environmental Health and Safety (EHS) Office personnel supporting radiation protection activities for the reactor facility were reviewed. The EHS Office has hired an additional health physicist who is providing limited assistance with routine UVAR duties. Currently, the individual's assigned duties involved revising and upgrading procedures for and also the actual calibration of portable radiation monitoring instrumentation. The new individual has prior experience in medical health physics and had completed the appropriate training requirements to perform the calibrations using the reactor facility equipment. Licensee representatives stated that, although not assigned to the reactor facility organization, the new staff member would be provided additional detailed training regarding UVAR Health Physics policies and procedures.

No violations or deviations were identified.

b. Audits

TS 6.2 requires the Reactor Safety Committee (RSC) to review and audit reactor operations to ensure that the facility is operated in a manner consistent with public safety and within the terms of the facility license. The RSC will meet semiannually and review and approve untried experiments, changes to the reactor, facility license, TS and Standard Operating Procedures (SOPs). TS 6.2.1 and TS 6.2.2 detail RSC committee member composition and qualifications and also meeting and audit frequency.

The inspector discussed the status of RSC audit program with cognizant licensee representatives. No new audits of the reactor radiation safety programs have been conducted since the previous NRC HP inspection in April 1988, Inspection Report (IR) No. 50-62/88-01. The inspector reviewed selected issues identified during the previous audits, for example, detection sensitivity for air sampling analyses, and verified that the issues were addressed and resolved in a timely manner.

No violations or deviations were identified.

3. Training (83743)

10 CFR 19.12 requires the licensee to instruct all individuals working in or frequenting any portion of the restricted area in the health protection problems associated with exposure to radioactive material or radiation, in precautions or procedures to minimize exposure, and in the purpose and functions of protective devices employed, applicable provisions of Commission Regulations, individuals responsibilities and the availability of radiation exposure data.

The licensee's training programs for personnel using the UVAR facilities were discussed. All personnel at the UVAR facility must attend an annual general employee training program to receive appropriate dosimetry required for entry to UVAR facilities. The general training includes discussion of UVAR security, 10 CFR Part 19 requirements and general HP practices at the facility. Prior to this inspection, testing was only conducted for security issues, however, the licensee stated that subsequent training would include testing of individuals regarding both security and HP issues. In addition to the general employee training, personnel handling or working with radioactive material or sources are required either to be trained as a "restricted user" or approved by the RSC as a "qualified user" of radioactive material. Restricted user training included review of general work practices, procedures, and survey requirements at the UVAR facilities. Personnel are required to pass a written test to achieve restricted user status. The status of qualified user is based on an individual's knowledge of and the amount of experience in handling and working with radiation or radioactive material. Testing is not required for this user category. Both the general employee and restricted user training are on videotape to provide additional review and

training concerning the material as needed. The general employee training for all UVAR personnel is conducted annually and previously was given on September 7, 1987. The inspector was informed that this training was scheduled for September 1988. Based on interviews for selected individuals conducting work at the UVAR, the inspector verified that the required training had been conducted.

No violations or deviations were identified.

3. Facility Tours

During tours of the reactor building and associated UVAR laboratories, the inspector noted that all portable and fixed radiation survey instruments were calibrated properly.

Standard Operating Procedure, 10.4.b.5, requires airborne activity concentration surveys to be performed weekly by the Reactor Health Physicist or his designee. Particulate air samples are to be collected in the UVAR room of the facility. The procedure also requires that the reactor HP evaluate and record the results of the survey.

On August 23, 1988, while touring the UVAR room, the inspector noted a portable low-volume air sampler with an affixed calibration sticker indicating a calibration due date of May 1988.

Licensee representatives indicated that the sampler was used to conduct the weekly grab samples required by procedure. Discussions with cognizant licensee representatives and review of applicable procedures indicated that, although not required by the procedure, the sampler was calibrated twice per year as a good operating practice. Guidance regarding the performance frequency of calibration of air samplers was not found during a preliminary review of applicable Regulatory Guides and/or industry standards. Licensee representatives tested and verified the accuracy of the air sampler flow rate at the time of the inspection. The inspector noted that weekly air sampling in the reactor room was required by TS, however, the resultant measurements were not utilized to quantify effluent releases or personnel exposure from airborne radioactive contaminants at the facility. A review of other instrumentation at the facility did not indicate a programmatic problem in performing required calibrations. Licensee representatives stated that to ensure the timely calibration of the air sampler, the equipment would be added to the "calibration due" list maintained by the reactor Health Physicist. In addition, the licensee agreed to verify all other applicable UVAR instrumentation was listed on the calibration due list.

During tours of the facility, the inspector noted and identified the following poor health physics practices.

- Housekeeping within the UVAR room was in need of improvement, that is, scrap paper, used paper toweling and absorbent paper, and unused

equipment were scattered through the open, that is, unrestricted/unbarricaded, areas of the room.

- Potentially contaminated or contaminated tools and equipment were maintained in contaminated research areas and also storage areas without being labeled.

No similar poor housekeeping issues were identified for other areas within the UVAR facilities. Prior to the exit interview on August 25, 1988, the inspector verified that licensee personnel had removed all miscellaneous trash paper and also had organized tool and equipment storage within the UVAR room. Cognizant licensee representatives stated that the issue of labeling and segregating contaminated or potentially contaminated tools within the work and/or storage areas would be evaluated.

No violations or deviations were identified.

4. Surveys (83743)

10 CFR 20.201(b) requires the licensee to perform such surveys as may be necessary and are reasonable under the circumstances to evaluate the extent of the hazards that may be present.

a. Contamination Surveys

The inspector observed routine daily contamination surveys being conducted by the reactor HP technician, reviewed selected survey data, and discussed contamination limits for the UVAR room and associated facility areas.

Contaminated areas are defined as surface areas having activity levels at or greater than 1000 disintegrations per minute per 100 square centimeters (dpm/100 cm^2). All accessible areas of the UVAR reactor room and laboratory facilities were classified as noncontaminated. A review of licensee survey data since the previous inspection conducted in April 1988, IR No. 50-62/88-01, indicated the activity on surface areas has been maintained successfully below 50 dpm/100 cm^2. Infrequently, routine surveys indicated selected areas of elevated surface activity measurements, that is, 50 to 100 dpm/100 cm^2, for the reactor room bridge surfaces near the remote transfer system "rabbit" holdup area. The inspector noted that all areas indicating greater than 50 dpm/100 cm^2, immediately were decontaminated to activity levels below 50 dpm/100 cm^2.

From discussion with and observations of the surveys conducted the inspector noted that the technician was knowledgeable of his duties, the systems and areas surveyed, and the routine contamination and exposure levels expected at the UVAR and associated facilities. The HP technician's knowledge and awareness of duties and responsibilities, appears to have enhanced the licensee's ability to maintain the low levels of activity observed for the facilities.

No violations or deviations were identified.

b. External Exposure Review

10 CFR 20.101 delineates the quarterly radiation exposure limits to whole body, skin of the whole body, and the extremities.

The inspector reviewed and discussed the licensee's exposure records for persons working at or visiting UVAR facility for the reporting period from January 1, 1988 to April 31, 1988. Highest reported accumulated doses for the review period were 10 millirem (mrem) to the whole-body and 690 mrem to the hand (extremity). These doses were assigned to an operator and were attributed to handling activated materials associated with the licensee's "rabbit" facility.

Standard Operating Procedure 10.3, Personnel Monitoring, dated March 1987, requires a direct reading dosimeter to be worn when in high radiation areas or using and/or handing radioactive materials which could result in an exposure greater than 100 mrem to the whole body in one day.

The inspector reviewed the self-reading dosimeter (SRD) results entered in the licensee's exposure logbook from October 1987 through May 1988. No readings exceeding 50 milliRoentgen (mR) for any job were noted. Highest exposures were recorded for HP surveillance of demineralizers and heat exchangers (40 mR) and performance of instrument calibrations (10 mR). The inspector noted that only 14 SRD exposure data entries were recorded into the log book since January 1988. Licensee representatives stated that if a zero exposure reading is obtained, no data entry is made in the exposure logbook. Licensee representatives stated that the SRD result is not utilized as the official wholebody exposure record and the practice of not recording results indicating zero exposure was initiated to reduce record keeping problems. The inspector stated that all SRD results, including zero exposures, should be recorded and would serve to verify that the appropriate monitoring instrumentation was being utilized, and also permit a verification of their official exposure monitoring. Licensee representatives agreed to evaluate the need to record all readings when using SRDs for potential exposure measurements.

Licensee representatives discussed recent changes regarding their external exposure monitoring program. Based on dissatisfaction with their vendor's timeliness in processing their film badges and concerns regarding a conservative biased assignment of dose to all personnel at the University, the licensee implemented a review of potential vendors to supply acceptable and reliable dosimetry with improved processing timeliness. The licensee informed the inspector that on July 1, 1988, the facility had changed vendors and also monitoring devices, from the use of film badges to thermoluminescent dosimeters (TLDs) for implementation of the external dose measurement

program. The inspector verified that the new vendor was accredited by the National Voluntary Laboratory Accreditation Program (NAVLAP). At the time of the inspection no results had been received from the new vendor regarding assigned doses at the facility.

No violations or deviations were identified.

5. Environmental (80745)

a. Monitoring and Surveillance Procedures

10 CFR 20.201(b) requires the licensee to make or cause to be made such surveys as (1) may be necessary for the licensee to comply with regulations in this part, and (2) are reasonable under the circumstances to evaluate the extent of radiation hazards that may be present.

Standard Operating Procedure 10.4, Facility and Environmental Survey, dated March 1987, details the frequency and required environmental surveillances for the facility.

The inspector reviewed facility and environmental survey records for the second and third quarters of 1988. In addition, the inspector accompanied the HP technician and verified the exposure rates measured within and adjacent to the UVAR facilities. Exposure rates for unrestricted areas were below 0.5 milliRoentgens per hour (mR/hr). For restricted areas, the highest exposure rate, 19 mR/hr, was measured at an area located directly above the reactor heat exchanger on the facility roof with the reactor operating at one megawatt power (thermal). The inspector noted that for some survey records, additional data regarding the status of the facility, for example, power level, needed to be included to permit proper interpretation and comparison of data collected for various times at the facility. Licensee representatives agreed to improve the use of descriptive details in subsequent survey records.

No violations or deviations were identified.

b. Analytical Measurements

The inspector toured the UVAR laboratory facilities, and reviewed and discussed changes to analytical techniques used to measure liquid effluents. During a previous inspection, IR No. 50-62/87-02, the inspector noted that a standard self-absorption curve (Radiological Health Handbook) was utilized for correcting gross beta-gamma activity measurements for selected environmental sample matrices. Licensee representatives stated that a new self-absorption curve has been developed for use. The new self-absorption data resulted in a 5 to 20 percent (%) reduction in the licensee gross beta-gamma results. The inspector noted that previous licensee/EPA cross-check results indicated a positive bias of 7 to 45%, and could have been attributed

to the improper absorption curve. Licensee representatives stated that, at the time of the inspection, they have not analyzed any additional EPA liquid samples for gross beta-gamma activity using the new methodology. The licensee stated that the new methodology would be incorporated into UVAR effluent measurement analyses in a timely manner.

The inspector reviewed and discussed selected gamma analysis results for a March 1988, EPA gamma-in-water sample. All nuclides, excluding cesium 137 (Cs-137), were within one standard deviation of the known value. Licensee representatives were reviewing and investigation trends in the data and the low bias observed for the CS-137 results. At the time of the inspection no definite conclusions had been reached. Licensee representatives stated that geometry differences may be responsible for the observed results. The inspector noted that EPA cross-check results would be reviewed in detail during subsequent inspections (50-62/88-03-01).

No violations or deviations were identified.

6. Exit Interview

The inspection scope and findings were summarized on August 25, 1988, with those persons indicated in Paragraph 1. Improvements in analytical measurements, personnel dosimetry, and performance of surveillance activities were noted. Weaknesses in "housekeeping" practices, record documentation and the timeliness of air sampler calibrations were discussed. Licensee representatives acknowledged the inspector's comments. The licensee did not identify as proprietary any of the material provided to or reviewed by the inspector during this inspection.