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

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Report No.: 50-83/88-01

Licensee: University of Florida
202 Nuclear Sciences Center
Gainesville, FL 32601

Docket No.: 50-83 License No.: R-56

Facility Name: University of Florida Training Reactor

Inspection Conducted: March 14-17, 1988

Inspector: Gary B Kuzo 31 March 1989
G. B. Kuzo Date Signed

Approved by: C M Hosey 4/4/88
C. M. Hosey, Section Chief Date Signed
Division of Radiation Safety and Safeguards

SUMMARY

Scope: This routine, unannounced inspection involved onsite review of radiation protection program areas including radiation control activities, environmental surveillance and monitoring, transportation activities, and review of licensee actions concerning previously identified followup items, enforcement issues, and NRC Information Notices.

Results: Two violations were identified - failure to have approved procedures for environmental surveillances and effluent monitoring required by Technical Specifications and failure to conduct adequate surveys for liquid and gaseous effluents.

REPORT DETAILS

1. Licensee Employees Contacted

*D. Munroe, Radiation Control Officer, Environmental Health and Safety Office
*M. Ohanian, Chairman, Reactor Safety Review Subcommittee
J. Tulenko, Director of Nuclear Facilities
*W. Vernetson, Director, University of Florida Training Reactor
*P. Whaleys, Acting Reactor Manager

Other licensee employees contacted included operators, and office personnel.

*Attended exit interview

2. Exit Interview (30703)

The inspection scope and findings were summarized on March 17, 1988, with those persons indicated in Paragraph 1 above. Two apparent violations concerning failure to have approved procedures for environmental surveillance and monitoring requirements (Paragraph 5.a) and inadequate liquid and gaseous effluent measurements (Paragraph 5.b) 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.

3. Licensee Action on Previous Enforcement Matters

a. (Closed) Violation (50-83/87-01-01) Failure to follow RWP procedure. The inspector reviewed and verified implementation of corrective actions stated in the University of Florida's (UF) response dated March 19, 1987.

b. (Closed) Violation (50-83/87-01-02) Failure to post 10 CFR 19.11 documents. The inspector reviewed and verified implementation of corrective actions in the University of Florida's response dated March 19, 1987.

c. (Closed) Violation (50-83/87-01-03) Failure to meet DOT requirements for shipping papers, placarding, and dose rates on external surface of package. The inspector reviewed and verified implementation of corrective actions stated in the University of Florida's response dated April 23, 1987.

4. Radiation Control (83743)

a. Organization and Staffing

Technical Specification (TS) Sections 6.2.1 and 6.2.2 detail organizational structure and management responsibility for safe operation of the University of Florida Training Reactor (UFTR) facility.

The independence of the campus Radiation Control Officer to oversee facility activities was discussed. The campus Radiation Control Officer does not report directly to UFTR management but does provide assistance with environmental monitoring and surveillance activities, and selectively reviews radiation protection issues at the facility. Furthermore, the University of Florida's Radiation Control Guide authorizes the Radiation Control Officer to suspend any UFTR operations as rapidly and safely as possible, if warranted.

From discussions with, and observations of personnel conducting routine duties at the UFTR, the inspector verified that the facility management responsibilities and organizational structure met TS requirements. Review of activities at the facility indicated that management and staff personnel from both the UFTR facility and the Radiation Control Office appeared to interact and operate efficiently and competently for routine and non-routine issues which were observed during the inspection.

UFTR and Radiation Control Office (RCO) personnel supporting radiation protection activities for the reactor facility were reviewed. The current UFTR staff includes one Class B and three Class A operators. In addition, three persons, two of which were undergoing training at the time of the inspection, were scheduled to be licensed by May 30, 1988. The majority of required radiation protection surveillances and general health physics monitoring activities within the UFTR facility are performed by the UFTR operations staff. In addition, the RCO has approximately six radiation control technicians available to conduct environmental radiation surveillances and/or assist with reactor health physics monitoring when requested. Of the six radiation control technicians, two individuals have been involved in the majority of UFTR routine surveillances and special health physics coverage activities.

No violations or deviations were identified.

b. Audits and Review

TS 6.2.5 requires an independent review and audit of safety aspects of reactor facility operations to advise management. The review and audit functions are to be conducted by the Reactor Safety Review Subcommittee (RSRS). TS 6.2.5(1) and 6.2.5(2) detail RSRS committee

member composition and qualifications, and also meeting and audit frequency.

The inspector reviewed and discussed with cognizant licensee representatives, the RSRS meeting minutes and audits conducted from January 1987 through February 1988. During the period reviewed the RSRS met approximately on a monthly basis. The Committee reviewed current status of the facility, procedural changes, experiments submitted for approval, and regulatory issues. Issues discussed during the RSRS meetings and requiring subsequent review were tracked by the licensee. All licensee actions regarding identified issues appeared to be completed in a timely manner as indicated by the tracking record. In addition, the inspector noted that an Executive RSRS as detailed in TS 6.2.5(2)(b) selectively met during the period to evaluate operating abnormalities in a timely manner. During the inspection, the executive committee met to review and evaluate the safety significance, corrective actions and reporting requirements concerning failure of a Safety Channel No. 1 circuit for the UFTR (Letters from W. G. Vernetson, Director Nuclear Facilities, UFTR, to J. N. Grace, Regional Administrator, NRC Region II, dated March 15, and 16, 1988). Licensee actions regarding this issue appeared to be thorough and were conducted in a timely manner.

The inspector reviewed and discussed with cognizant licensee representatives, results and licensee actions for audits conducted from January 1986 to February 1987. The audits focused on the performance of routine surveillance activities. The inspector questioned whether technical issues regarding surveillance and effluent measurement systems had been audited. Licensee representatives indicated that such review had not been conducted recently, but that the professional expertise to conduct such a review was available within the UF staff. The licensee noted that in light of the concerns regarding measurement of radioactive effluents identified during the current inspection (Paragraph 5.b) the need for a thorough review of all surveillance and effluent analytical measurements would be evaluated.

No violations or deviations were identified.

c. Facility Tours

During tours of the reactor cell (building) and associated laboratories of the UFTR facility the inspector noted that all portable and fixed radiation survey instruments were calibrated properly. Licensee representatives identified a new screen enclosed storage area located in the reactor cell used for storage of potentially contaminated material. Storage areas for fuel were verified to be controlled and secured by locks. All areas within the reactor cell were maintained as non-contaminated, including the reactor shield top.

Frisking requirements for exiting the reactor cell were discussed. Licensee representatives stated that a hand and foot frisk was required only for persons subsequent to handling and manipulating potentially contaminated materials. However, all personnel who enter the reactor cell are required to pass through a portal monitor for a whole-body survey when exiting the area. Licensee representatives indicated that a potential requirement of a hand and foot frisk at all times when exiting the reactor cell in addition to the use of the portal monitor was being evaluated.

No violations or deviations were identified.

d. External Exposure Review

The inspector discussed the licensee's personnel exposure records for persons working at or visiting the UFTR facility for the three reporting periods from September 1, 1984, through August 31, 1987. Whole-body exposures were measured by film badges provided by an NAVLAP accredited vendor laboratory. Highest whole-body exposure values were reported for the September 1, 1985, to August 31, 1986, reporting period and were attributed to extensive reactor maintenance work. The highest individual exposure for that period was approximately 1,140 millirem (mrem). In general, exposures for RCO personnel providing HP assistance during the maintenance were less than 100 mrem. For the two other reporting periods reviewed, UTRF and RCO staff exposure values did not exceed 100 mrem.

During review of licensee exposure records, the inspector noted and discussed with licensee representatives potential radiological conditions which may have resulted in an assigned dose of 130 mrem to a UFTR individual for May 1986. A review of records indicated the exposure value to be a typographical error. Licensee representatives stated that the error and the correct dose assignment would be presented in the next annual report.

No violations or deviations were identified.

e. Radiation control during Experiments

Technical Specification 3.5 specifies limitations on experiments including experimental review requirements for acceptability of reactor power level and irradiation times.

The following standard operating procedure (SOP) and selected SOP data sheets were reviewed and discussed with licensee representatives.

SOP A.5, Experiments, Rev. 3, dated April 1983

SOP D.4.A, Record of Sample Irradiation and Disposition, January through December 1987

SOP D.5.A, Request for UFTR Operation, September 1984 through April 1987

The inspector noted that physical restrictions on handling experiment materials, for example, use of fume hoods for opening enclosed samples subsequent to irradiation, were specified in procedures. In addition, specific radiation levels for shielding and/or removal of irradiated materials from the reactor cell were detailed.

Radiation levels recorded for experiment materials removed from the reactor were discussed. Exposure values ranged from below detection up to 16 roentgens per hour (R/hr). The inspector noted that many SOP D.5.A, Request for UFTR Operation, data forms indicated estimated activity of 200 mR/h when many experiments resulted in higher radiation levels when initially removed from the reactor. Licensee individuals stated that the values presented on the sheet indicated the expected radiation levels when released from the UFTR facility. The inspector questioned the importance of this data because the 200 mrem value was already assigned as the maximum value allowed for release as specified by procedure. In addition, the inspector noted that the use of several separate data sheets to record parameters for a single irradiation experiment was confusing. Licensee representatives stated that the need to include maximum radiation levels expected from the experiment material immediately upon removal from the reactor and also the collection of data for multiple irradiations for a single experiment would be evaluated.

No violations or deviations were identified.

5. Environmental (80745)

a. Monitoring and Surveillance Procedures

Technical Specification 6.3 requires the facility to be operated and maintained in accordance with approved written procedures. All procedures and major revisions will be reviewed and approved by the Director of Nuclear Facilities before going into effect.

Technical Specification 3.4.5 requires liquid waste from the radioactive liquid waste holding tanks to be sampled and the activity measured before release to the sanitary sewer system.

Technical Specification 3.9.2(3)(b) requires quarterly radiation level surveys to be conducted in unrestricted areas surrounding the UFTR complex.

The inspector reviewed and discussed TS required and environmental surveillances and liquid waste monitoring procedures with cognizant licensee representatives. Liquid waste tank sampling, analysis, and subsequent releases, and also radiation monitoring surveys of areas outside the restricted area are performed by RCO staff and the data

are then provided to appropriate management at the UFTR. Guidance to conduct the surveys and measurements are detailed in the following Radiation Control Technique procedures:

(1) Radiation Control Technique No. 1, Instructions for Obtaining and Preparing Liquid Samples for Analysis

(2) Radiation Control Technique No. 13, Instructions for Calibration and Use of Laboratory Detection Equipment

(3) Radiation Control Technique No. 2, Instructions for Sampling and Discharging Waste Holdup Tanks

(4) Radiation Control Technique No. 3, Instructions for Performing UFTR Environmental Monitoring

The applicability and technical details of the procedures to adequately address the TS and 10 CFR Part 20 requirements were discussed with licensee representatives. The inspector noted that guidance to address instrument sensitivity limitations required by 10 CFR Part 20 (i.e., lower limit of detection (LLD) requirements to be less than 25 percent of 10 CFR Part 2 MPC values, were not addressed in the procedures. The failure to provide this guidance resulted in the TS violation regarding liquid waste tank effluent releases (Paragraph 5.b). From review of procedures and discussion with licensee representatives the inspector noted that the Radiation Control Technique procedures had not been approved by the Director of the Nuclear Facilities. The failure to have adequate and approved procedures for liquid effluent releases and the failure to have approved procedures for environmental radiation surveys was identified as an apparent violation of TS 6.3 [50-83/88-01-01].

b. Analytical Measurement Capability

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.

Technical Specification 4.2.4(2) requires the Argon-41 (Ar-41) concentration in the stack effluents to be measured semiannually at intervals not to exceed 8 months.

Technical Specification 6.6.1(5) requires a routine annual report covering the activities of the reactor facility during the previous calendar year. Each annual operating report shall include a summary of the nature and amount of radioactive effluents released or discharged to the environs. The summary shall include an estimate of individual radionuclides present. If the estimated average release

after dilution is less than 25% of the concentration allowed, a statement to that effect is sufficient.

UFTR liquid waste tank effluent discharges to the sanitary sewer for the three annual reporting periods from September 1, 1984, through August 31, 1987, were reviewed. Licensee representatives stated that the holdup tanks receive liquid waste directly from the UFTR facility and also from approximately 20 laboratories in the building. Only one or two batch releases occurred during each reporting period, with volumes ranging from approximately 64,000 to 73,950 liters (l) and radioactive concentration values ranging from less than 3.5 E-9 to less than 1.08 E-7 microcurie per milliliter (uCi/ml) based on the LLD for the analyses. The inspector noted that the LLD for the liquid waste tank analysis conducted in April 1987 increased from previous analyses that is, from 1.3 E-8 to 1.08 E-7 uCi/ml. Further review of the issue with cognizant licensee personnel determined that for the liquid waste tank analysis conducted in April 1987, both the counting time and also the sample volume were reduced relative to analyses conducted previously. The inspector noted that 10 CFR 20.303, Disposal for Release into Sanitary Sewage Systems, restricts the average concentration of radioactivity in sanitary sewage to less than or equal to the values specified in 10 CFR 20 Appendix B, Table I, Column 2. Appendix B, Table I, Column 2 limits gross radioactive maximum permissible concentration (MPC) in liquid releases to 4 E-7 uCi/ml. The inspector noted that the LLD for liquid effluent release made in 1987, was lower than this MPC but the licensee's survey was inadequate to evaluate if the radioactive concentrations were greater than 25% of MPC in which case identification of individual radionuclides was required as specified in TS. The failure to establish a LLD less than 25% of MPC or to identify individual isotopes present in effluents was identified as an apparent violation of 10 CFR 20.201(b) requirements (50-83/88-01-02).

Ar-41 releases for the UFTR facility during the three reporting periods from September 1, 1984, to August 31, 1987, were reviewed. The average monthly concentrations released during the review periods ranged from 1.8 E-9 uCi/cc to 8.96 E-9 uCi/cc when the facility was operational. The annual total curies (Ci) of Ar-41 released ranged from 97.07 to 153.1 Ci.

The inspector discussed the analytical accuracy of the licensee's Ar-41 measurements. Guidance for sample collection and analyses are detailed in SOP-E.6, Argon-41 Concentration Measurements, Rev. 0, dated January 1984. Cognizant licensee representatives, stated that a liquid matrix standard (1,000 ml marinelli beaker) spiked with Cobalt-60 isotope was utilized for efficiency calibration of the gamma spectroscopy system. The inspector noted that use of a liquid matrix standard which occupied a 1,000 cc beaker volume differed from a matrix gas geometry which has a volume of approximately 1,250 cc. The liquid matrix standard relative to the gas standard would be

positioned closer to the detector and thus, could bias the results in a nonconservative manner. However, the use of a 1,000 cc instead of the 1,250 cc volume of the gas sample collected to calculate the Ar-41 concentration would result in a conservative bias. The licensee stated that the total effect of these identified biases would be evaluated. The failure to use the proper calibration geometry and sample volume to conduct Ar-41 gaseous effluent measurements was identified as an additional example of a violation of 10 CFR 20.201(b) requirements (50-83/88-01-02).

6. Transportation (86740)

Transportation of radioactive waste material for the UFTR was discussed. The inspector verified that the licensee has implemented and conducted training regarding new radioactive transportation procedures. Since the last inspection (IE Report No. 50-83/87-01) no shipments of radioactive waste have been conducted.

No violations or deviations were identified.

7. Inspector Followup Items (IFI) (92701)

a. (Closed) IFI 50-83/78-06-03, Followup of licensee's actions to allow removal of victims from Reactor Building. This item identified potential difficulties with evacuation of accident victims by stretcher from the UFTR facility following a radiological accident. Licensee representatives stated that during Emergency Preparedness drills, problems with movement of accident victims from the UFTR emergency assembly area to the ambulance staging location by medical personnel using a standard ambulance stretcher have not been identified. The inspector toured the pathways between the assembly area and the ambulance staging area and noted no apparent physical obstructions or other difficulties.

b. (Closed) IFI 50-83/87-01-04, Followup on corrective actions for failure to run reactor vent system until stack monitor reads less than 10 counts per second (cps). This issue concerned corrective actions regarding a licensee identified violation of technical specifications which occurred during an emergency preparedness drill when an emergency actuation signal resulted in a secured reactor vent system with the stack monitor measurements greater than 10 cps which violated TS 3.4.3. In letters dated June 2, 1987, and March 7, 1988, from W. G. Vernetson, Director of Nuclear Facilities, UFTR, to the NRC Office of Nuclear Reactor Regulation (NRR), the licensee has submitted TS changes to resolve the initial issue and subsequent concerns identified during review of the licensee's proposed TS changes. If adopted, TS 3.3.1 will require the reactor vent system to be operated until the stack monitor indicates less than 10 cps unless indicated by facility conditions to include loss of building electrical power, equipment failure, cycling console power to dump primary coolant or to conduct test and surveillances and initiating

the evacuation alarm for tests and surveillances including emergency drills. As a result of the licensee's safety review of the issues and subsequent TS change submittals, this item is considered closed.

8. IE Information Notices (IEN) 92717)

The inspector determined that the following NRC IE Information Notices had been received by the licensee, reviewed for applicability, and distributed to appropriate personnel.

a. IEN 87-03: Segregation of Hazardous and Low-level Radioactive Wastes

b. IEN 87-31: Blocking, Bracing and Securing of Radioactive Materials Packages in Transportation

Review of licensee training records and discussion with licensee representatives verified that actions, as appropriate, were taken.