



UNITED STATES  
 NUCLEAR REGULATORY COMMISSION  
 REGION II  
 101 MARIETTA STREET, N.W., SUITE 2900  
 ATLANTA, GEORGIA 30323-0199

Report No.: 50-83/94-01

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 21-25, 1994

Inspector: C. H. Bassett  
 C. H. Bassett

4/1/94  
 Date Signed

Approved by: E. J. McAlpine  
 E. J. McAlpine, Chief, Chief  
 Radiation Safety Projects Section  
 Nuclear Materials Safety and Safeguards Branch  
 Division of Radiation Safety and Safeguards

4/6/94  
 Date Signed

SUMMARY

Scope:

This routine, announced inspection involved the biennial review of the University of Florida's Class II Operations. The onsite inspection included review of radiation protection program activities and emergency planning.

Results:

The licensee's staffing and current organizational structure met Technical Specification (TS) requirements and were adequate to implement the licensee's radiation protection program. The radiation protection and emergency preparedness programs were adequate to ensure the safety of the facility personnel as well as that of the general public.

Strengths in the radiation protection program were noted in the areas of management involvement in facility operations, low facility radioactive contamination levels, and low radiation dose received by personnel. Analysis and evaluation of the measurements and results of required surveys met regulatory requirements.

Within the scope of the inspection, one violation and one non-cited violation (NCV) were identified. The violation involved failure to comply with all portions of the respiratory protection program (Paragraph 4). The NCV involved failure to submit the annual reports within 3 months following the end of the prescribed year as required by Technical Specification (Paragraph 5.d).

## REPORT DETAILS

### 1. Persons Contacted

#### Licensee Employees

- \*D. Munroe, Radiation Control Officer, Environmental Health and Safety (EHS) Division
- W. Properzio, Director, Environmental Health and Safety Division
- D. Simpkins, Reactor Manager, University of Florida Training Reactor (UFTR)
- \*J. Tulenko, Chairman, Nuclear Engineering Sciences Department
- \*W. Vernetson, Facility Director, UFTR

Other licensee employees contacted included operators, Radiation Control technicians (RC techs), and office personnel.

- \*Attended the exit interview on March 25, 1994.

### 2. Organization and Staffing (40750)

Technical Specifications (TS) 6.2.1, 6.2.2, and 6.2.3 detail organizational structure and management responsibility for safe operation of the UFTR facility.

The inspector reviewed and discussed with cognizant licensee personnel the current staffing associated with operating the UFTR and providing radiation protection coverage for daily work. There have been no changes in the organization as outlined in the TS since the last inspection. The person, who had been the Acting Reactor Manager previously, was hired to fill the position of Reactor Manager on a full-time basis. The Reactor Manager, a qualified Senior Reactor Operator (SRO), routinely operates the reactor, gives training as needed, reviews documents, provides updates to procedures as needed, and provides an over-check of the reactor operations in general.

The licensee also has two part-time SROs and one part-time Reactor Operator (RO), as well as the Director of Nuclear Facilities who is an SRO. These individuals operate the reactor as required, perform the required surveillances and most of the maintenance, and complete the associated records. Currently, this provides sufficient coverage and support during operation of the reactor for experiments, training, and reactor sharing projects.

Concerning the radiation protection program, the operators complete certain weekly contamination surveys and provide limited job coverage. However, the majority of radiation protection coverage is provided by two RC technicians who work for the Radiation Control Officer (RCO) in the University of Florida's EHS Division. These individuals perform monthly and quarterly radiation level and contamination surveys in the restricted and unrestricted areas of the facility and ensure that

adequate dosimetry is available for use. They also perform other environmental monitoring functions for the facility including preparation of liquid radioactive waste tank releases. In addition, they calibrate certain radiation protection equipment used in the UFTR cell and provide job coverage for non-routine jobs such as fuel movement and maintenance activities.

During the inspection and tours of the facility, the inspector noted that the current staffing level, composed of both UFTR and EHS Division personnel, appeared adequate to safely conduct the operational and radiation protection activities at the facility.

No violations or deviations were identified.

### 3. Radiation Control (40750)

- a. 10 CFR 20.1101 requires each licensee to develop, document, and implement a radiation protection program commensurate with the scope and extent of licensed activities and sufficient to ensure compliance with the regulations. The licensee is also required to achieve occupational doses and doses to members of the public that are as low as reasonably achievable (ALARA).

The inspector reviewed the documentation associated with the licensee's radiation protection program. It was noted that the licensee did not have a program outlined in a document per se but they did have in place a campus Radiation Control Guide, approved procedures, required surveillances, and a recent addition to their Technical Specification outlining their ALARA program. Through discussions with licensee representatives, the inspector determined that it was generally understood that these items constituted the facility's radiation protection program. Also, the ALARA program, "UFTR ALARA Program", Revision 0, dated December 1993, was comprehensive and adequate. It outlined management's commitment to ALARA and the duties of the Facility Director and the campus Radiation Control Officer with respect to ALARA. The ALARA program also established specific investigational levels for UFTR exposures and gaseous and liquid effluent releases. The inspector noted that the campus Radiation Control Guide outlined various aspects of radiation safety such as who is authorized to use radioactive material and established the maximum permissible exposure for individuals. The guide also delineated what radiation detection instrumentation and safety equipment was available for use and outlined the bioassay program, a campus training program, the procedures for transferring radioactive material, and established safety criteria and an enforcement policy for the use of radioactive material.

The inspector determined that, although no specific written radiation protection program had been established, the items that the licensee had in place and was using as a "program" were adequate.

b. Training

10 CFR 19.12 requires the licensee to instruct all individuals working in or frequenting any portion of the restricted area in health physics protection problems associated with exposure to radioactive material or radiation, in precautions or procedures to minimize exposure, and in the purposes and functions of protective devices employed, applicable provisions of Commission regulations, individuals' responsibilities and the availability of radiation exposure reports which workers may request pursuant to 10 CFR 19.13.

The inspector discussed the training provided to those individuals who provide the radiation protection coverage for daily operation of the UFTR facility. Applicable radiation protection training is given to the operators during their initial qualification training or biennial requalification. Initial and subsequent annual training is provided to all the RC personnel who may work in the reactor cell by one of the qualified RC technicians in the EHS Division.

The inspector reviewed the training records of the operators and selected personnel authorized to use the laboratories in the reactor area. The training records were complete and subjects outlined as having been presented appeared to be appropriate and adequate for radiation protection and control.

c. Posting and Labeling

10 CFR 19.11 requires each licensee to conspicuously post current copies of: 1) 10 CFR Parts 19 and 20; 2) the license; 3) the operating procedures; and 4) any notice of violation involving radiological working conditions and any response by the licensee. All these documents must be posted in sufficient places to permit individuals engaged in licensed activity to observe them on the way to and from any licensed activity location. If posting of the documents specified in 1), 2), and 3) is not practicable, the licensee may post a notice which describes the documents and states where they may be examined. The licensee is also required to post a copy of Form NRC-3. 10 CFR 20.1902 specifies the requirements for posting radiation areas and high radiation areas, and 10 CFR 20.1904 stipulates the requirements for labeling containers of radioactive materials.

All routine entries into the UFTR restricted area are made through the reactor control room. During tours of the facility, the inspector noted that the applicable documents and/or references to their locations were posted at the entrance to the control room. The posted documentation indicated that copies of the license and procedures were maintained in the control room and in the Facility Director's office.

During tours of the facility, the inspector noted that entrances into the restricted area were posted as required and that containers of radioactive material were labeled. During a previous inspection it was noted that one door, leading out of the building from the reactor cell, was not posted on the outside of the door. Although this was not a normal access to the reactor cell and the actual radiation area existed inside the door, the licensee agreed to post a radiation area sign on a chain outside the door to give anyone on the outside of the building an indication of what to expect if they were to enter through that door. During this inspection, it was noted that this sign had been posted.

d. Restricted Area Surveys

10 CFR 20.1501(a) requires the licensee to make or cause to be made surveys that 1) may be necessary for the licensee to comply with regulations of this part and 2) are reasonable under the circumstances to evaluate the extent of radiation levels, concentrations or quantities of radioactive material, and the potential radiological hazards that could be present.

TS 3.9.2(2)(a) requires weekly measurements of surface contamination in the restricted area.

TS 3.9.2(2)(b) requires airborne particulate contamination to be measured using a high volume air sampler during the weekly checkout.

TS 3.9.2(3)(a) requires surveys measuring the radiation doses in the restricted area to be conducted quarterly, at intervals not to exceed four months, and at any time a change in the normal radiation levels is noticed or expected.

The licensee's procedures outlining various aspects of the radiation protection program were reviewed. Only one procedure had been modified significantly since the last inspection. This procedure was:

- UFTR Radiological Procedure D.1, "UFTR Radiation Protection and Control", Rev. 5, dated January 4, 1994.

The procedure had been revised to reflect the latest revisions made to 10 CFR Part 20. It appeared to be adequate.

The inspector reviewed selected UFTR restricted area weekly and quarterly radiological survey results conducted from February 1992 to March 1994. Surface contamination within the restricted area of the Reactor Cell was seldom detected. Survey data indicated that beta-gamma contamination levels were generally maintained below the facility limit of 100 disintegrations per minute per one

hundred square centimeters (dpm/100 cm<sup>2</sup>). Anytime surface contamination levels above that level were encountered, the area was decontaminated, resurveyed, and released.

During the review of the records of weekly survey results and routine checks in the Reactor Cell, the inspector noted that the records for the week of February 1, 1993 were not filed with the other weekly results. Upon investigation, the licensee could not locate these records. Licensee representatives were certain that the surveys and checks were made in accordance with the procedure but presumed that the records were either misplaced or misfiled. The inspector noted that this was an isolated incident and that all other records reviewed for 1993 through February 1994 were available.

Airborne particulate radioactive material levels were also low. Survey data indicated that airborne particulate beta-gamma activity concentrations varied generally from approximately 1.0 E-13 to 5.5 E-13 microCuries per milliliter (uCi/ml).

Radiation survey results performed by the inspector in the Reactor Cell indicated general area levels from 1 to 8 millirem per hour (mr/hr) around the reactor at 100% power. Licensee survey records indicated general area levels from 1 to 4 mr/hr around the reactor at 100% power. The survey results also indicated the existence of "hot spots" (as measured at twelve inches from reactor shielding or shielded beam ports) with radiation levels from 7 to 30 mr/hr.

e. External Exposure Reviews

10 CFR 20.1201(a) delineates the annual occupational dose limits for individual adults.

The inspector reviewed the exposure records of persons working in or frequenting the UFTR facility from January 1992, through February 1994. Personnel exposure measurements were obtained using film badges and thermoluminescent dosimeters (TLDs) provided by a National Voluntary Laboratory Accreditation Program (NVLAP) accredited vendor. During the time frame reviewed, the licensee had changed from one vendor to another. The licensee found that the results received from the second vendor were not very reliable and had changed back to the original vendor.

Current vendor specifications reported a detection limit of 5 millirem (mrem) for the film badges provided to the licensee and of 20 mrem for the TLDs provided (used to detect neutrons). The highest reported dose for 1992 was 240 mrem (150 beta-gamma and 90 neutron) and was assigned to a reactor operator. The highest reported dose for 1993 was 100 mrem (beta-gamma), which was also assigned to a reactor operator. The majority of the exposure received during 1992 resulted from activities associated with fuel

inspection and work on thermocouples. The majority of the exposure received during 1993 resulted from activities associated with work on thermocouples. All other cumulative annual doses assigned to personnel working in or frequenting the UFTR facility for either year were less than 100 mrem per individual for the period.

f. Continuous Air Monitoring

TS 3.4.4 requires the reactor cell environment to be monitored by at least one air particulate monitor, capable of audibly warning personnel of radioactive particulate airborne contamination in the cell atmosphere.

During a previous inspection, the inspector had reviewed the operations logs of the licensee which detailed that the air particulate detector (APD) or continuous air monitor in the reactor cell was checked to verify that it was operational prior to reactor startup. When asked about the APD alarm set point and detection capabilities, the licensee had indicated that the APD was set to alarm at 30,000 counts per minute (cpm) but that number could not be related to any Maximum Permissible Concentration in air (MPCa), the applicable limit at that time. The licensee had agreed that a new or different APD with greater sensitivity would improve the radiation protection program of the facility and provide a better indication of any airborne activity present. During a subsequent inspection, it was noted that a new APD had been purchased but that it was not functioning as had been anticipated.

During this inspection, the inspector noted that the licensee had obtained yet another APD for use in the reactor cell. The inspector also noted that the APD was not operational at the time of the inspection. The licensee indicated that progress was being made on its installation and that it would give a better indication of the air activity in the cell because it was designed to subtract out the effects of radon, as well as ambient gamma background, and only give the results of the airborne activity present.

No violations or deviations were identified.

4. Respiratory Protection Program (40750)

10 CFR 20.1703 stipulates that, when respiratory protection equipment is used to limit intakes of radioactive material in air, the licensee shall: 1) use only equipment that is tested and certified by the National Institute for Occupational Safety and Health/Mine Safety and Health Administration (NIOSH/MSHA) and 2) implement and maintain a respiratory protection program. The respiratory protection program is

to include: a) air sampling, b) surveys and bioassays, c) testing of respirators, d) written procedures regarding selection, fitting, issuance, maintenance, and testing of respirators, and e) determination by a physician initially and every 12 months thereafter that the user is physically able to use a respirator. The licensee is also required to issue a written policy statement on respirator usage and advise each respirator user that the user may leave the area at any time for relief.

The inspector noted that the licensee maintains a small number of respirators and two self-contained breathing apparatus (SCBAs) for response to emergency situations. Through discussions with the licensee, the inspector determined that the respirators are not routinely used for any other purpose.

The inspector also noted that the licensee did not have a documented respiratory protection program. When this requirement was discussed, the licensee indicated that they were already in compliance with certain portions of the regulation. It was noted that the licensee uses NIOSH/MSHA approved respirators. The licensee routinely collects air samples in the Reactor Cell and performs surveys of the area for contamination. The respirators are checked prior to use and are maintained by another group in the EHS Division on campus, the Occupational/Research Safety Section. No written procedures were maintained by the licensee; however, the EHS Division had procedures and a campus respiratory protection guide governing respirator usage. The inspector also determined that the licensee had recently initiated the requirement that those possibly required to respirators were to have a physical examination prior to using respiratory protection.

The inspector informed the licensee that they were not in total compliance with the regulations in that they did not have a written policy statement on respirator usage and did not advise users that they could leave the area at any time for relief. Also, the potential respirator users had not been fit tested for any type of respiratory protection at the facility. The licensee indicated that they would develop a written policy statement as soon as time permitted and it would include the items specified in the regulations. The licensee also indicated that the individuals who might use respirators or SCBAs would to be fit tested as soon as the tests could be coordinated with responsible section in EHS.

The licensee was informed that failure to comply with all portions of the respiratory protection program was an apparent violation of 10 CFR 20.1703 (50-83/94-01-01).

5. Environmental Protection Program (40750)

a. Liquid Waste Disposal

10 CFR 20.2003 outlines the provisions for disposal of radioactive material by release into the sanitary sewerage system.



TS 3.4.5 requires liquid waste from the radioactive liquid waste holding tanks to be sampled and the activity to be measured, with the results to be within limits specified in 10 CFR 20, Appendix B, Table 1, Column 2, before release to the sanitary sewer.

The inspector reviewed the data from the one reported discharge that had been made from the facility from September 1, 1991, through August 31, 1992. During this period, the total measurable concentration in the liquid released from the facility's holdup tanks was  $1.4 \text{ E-6 uCi/ml}$  of tritium in approximately 84,400 liters of liquid. This resulted in the release of approximately 118 microCuries (uCi) of activity. These data reflect a reduction in the amount of radioactivity discharged compared to the previous year.

Although the final figures were not available for the period from September 1, 1992 through August 31, 1993, the data appeared to indicate a similar pattern in the quantity of liquid and activity released.

b. Airborne Effluents

TS 3.4.2 requires the average Ar-41 concentration averaged over a consecutive 30-day period to be less than  $4.0 \text{ E-8 uCi/ml}$ .

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

Through discussions with licensee representatives and review of release data, the inspector determined that calculation of the licensee's total releases and average monthly concentrations are based upon semiannual Ar-41 release concentration measurements made at equilibrium full power (100 Kw) conditions. During the period from September 1, 1991 to August 31, 1992, average monthly concentrations of gaseous releases from the facility ranged from  $0.057$  to  $5.039 \text{ E-9 uCi/ml}$ . This resulted in approximately 83.146 Ci of Ar-41 being released from the stack.

Final figures were not available for gaseous releases for the period from September 1, 1992 through August 31, 1993. However, based on the measurement of the stack samples taken in February 1994, the average monthly concentration of gaseous releases from the licensee's stack for January 1994 was  $0.9849 \text{ E-9 uCi/ml}$ . Total Ar-41 activity released for January was approximately 3.775 Ci. These numbers are consistent with those of past reporting periods and past analyses and within the limit of  $1.0 \text{ E-8 uCi/ml}$  stipulated in the new 10 CFR Part 20.

c. Environmental Monitoring with TLDs and Film Badges

TS 3.9.2(1) requires monthly environmental radioactivity surveillance outside the restricted area to be conducted by measuring the gamma doses at selected fixed locations surrounding the UFTR facility.

Environmental radiation exposure as a result of UFTR operations was considered minimal. The total yearly exposure recorded during the period from September 1, 1991 through August 31, 1992, ranged from 10 to 90 mrem as measured by film badge and from less than 10 to 70 mrem as measured by TLD. These results were somewhat higher than previous years. However, an evaluation performed by the licensee indicated that the months in which the film badges and/or TLDs received the "highest" exposure were generally not the months of highest UFTR energy generation. The licensee concluded that the recorded exposures were probably close to background in all cases.

The final figures for the period from September 1, 1992 through August 31, 1993 were not available. However, the data indicated that the exposures for the period were very similar to those recorded in past years and somewhat lower than those of the previous reporting year.

d. Annual Reports

TS 6.6.1(5) requires the licensee to submit to the NRC a routine annual report covering the activities of the reactor facility during the previous calendar year (which ends August 31 for the UFTR) within 3 months following the end of each prescribed year.

The licensee informed the inspector that the material for the annual report for the period from September 1, 1991 to August 31, 1992 had been compiled but the report had not been completed or issued. It was also noted that the annual report for the period from September 1, 1992 through August 31, 1993 had not been completed as of the date of the inspection. The inspector reviewed this issue with the Facility Director who indicated that the annual report for 91-92 would be completed by May 15, 1994, and the annual report for 92-93 would be completed by June 30, 1994.

The licensee was informed that failure to submit the annual reports within 3 months following the end of the prescribed year was an apparent violation of TS 6.6.1(5). However, this violation will not be subject to enforcement action because the licensee's efforts in identifying and correcting the violation meet the criteria specified in Section VII.B of the Enforcement Policy (50-83/94-01-02).

## 6. Emergency Planning (40750)

## a. Procedures

The inspector reviewed the following licensee's emergency preparedness procedures:

- UFTR Operating Procedure B.1, Radiological Emergencies, Rev. 4, dated December 1988, with TCN dated October 1989,
- UFTR Operating Procedure B.2, Emergency Procedure - Fire, Rev. 8, dated May 1985, with TCN dated October 1989,
- UFTR Operating Procedure B.4, Emergency Procedure - Flood, Rev. 1, dated April 1983, with TCN dated October 1989.

(UFTR Operating Procedure B.3 had been superseded by and placed into the facility Security Procedures).

The procedures appeared to be adequate and outlined the actions to be taken in case of the particular emergency described. Licensee representatives indicated that all these procedures were being revised and were in process of being formally reviewed. These procedures will be reviewed during a subsequent inspection.

## b. Emergency Drills

TS 4.2.6(3) requires that evacuation drills for facility personnel be conducted quarterly, at intervals not to exceed 4 months, to ensure that facility personnel are familiar with the emergency plan.

The inspector reviewed the licensee's surveillance file, Q-3, Quarterly Radiological Emergency Evacuation Drill. Eight quarterly emergency drills had been held since the last inspection. Most drill scenarios were based upon the sounding of an evacuation alarm due to removal of irradiated material from the reactor. Two scenarios involved a simulated injury to a person resulting in contamination entering the wound and requiring the person to be taken to the university hospital for treatment.

During the most recent drill in December 1993, personnel from a nearby nuclear power plant were present to observe and evaluate the exercise. The scenario included a simulated contaminated, injured person who was subsequently sent to the campus medical center for treatment. The power plant observers made numerous comments and suggestions concerning the drill and the hospital participation. The exercise was considered adequate.

## c. Training

Section 10.1 of the Emergency Plan requires licensed ROs and SROs to attend a biennial cycle of requalification on emergency preparedness. In addition, Radiation Control personnel are to be trained along with the reactor operations personnel. University Police Department personnel attend an annual orientation lecture while Gainesville Fire Department and other emergency response agency personnel attend a biennial orientation lecture.

Through a review of the training records, the inspector verified that the licensed operators were receiving training in emergency response during their biennial requalification lecture series. University Police Department personnel were trained and given a tour of the facility on an annual basis. Fire Department personnel were given biennial training during their tour of the facility. It was noted that campus medical personnel received separate training in handling radiological medical emergencies through their own training system.

No violations or deviations were noted.

## 7. Exit Interview (30703)

The inspection scope and findings were summarized on March 25, 1994, with those persons indicated in Paragraph 1. The inspector discussed and detailed the findings for each area reviewed. Dissenting comments were not received from the licensee.

The licensee's staffing and current organizational structure met TS requirements and were adequate to implement the licensee's radiation protection and operational programs. The radiation protection and emergency preparedness programs were adequate to ensure the safety of the facility personnel as well as that of the general public.

Strengths in the radiation protection program were noted in the areas of management involvement in facility operations, low facility radioactive contamination levels, and low radiation dose received by personnel. Analysis and evaluation of the measurements and results of required surveys met regulatory requirements.

One violation (VIO) and one non-cited violation were identified.

<u>Item Number</u>	<u>Description and Reference</u>
50-83/94-01-01	VIO - Failure to comply with all portions of the respiratory protection program (Paragraph 4).
50-83/94-01-02	NCV - Failure to submit the annual reports within 3 months following the end of the prescribed year as required by Technical Specification (Paragraph 5.d).