

NUCLEAR REGULATORY COMMISSION

UNIVERSITY OF FLORIDA

DOCKET NO. 50-083

UNIVERSITY OF FLORIDA TRAINING REACTOR

ENVIRONMENTAL ASSESSMENT AND FINDING OF

NO SIGNIFICANT IMPACT

[NRC-2010-0293]

The U.S. Nuclear Regulatory Commission (NRC or the Commission) is considering issuance of a renewed Facility Operating License No. R-56, to the University of Florida (the licensee), which would authorize continued operation of the University of Florida Training Reactor (UFTR) located in Gainesville, Alachua County, Florida. Therefore, as required by Title 10 of the *Code of Federal Regulations* (10 CFR) Section 51.21, the NRC is issuing this Environmental Assessment and Finding of No Significant Impact.

ENVIRONMENTAL ASSESSMENT

Identification of the Proposed Action:

The proposed action would renew Facility Operating License No. R-56 for a period of 20 years from the date of issuance of the renewed license. The proposed action is in accordance with the licensee's application dated July 18, 2002, as supplemented by letters dated July 25, July 29, and July 31, 2002, February 25, 2003, August 8, 2006, February 2, 2007, April 7 and November 26, 2008, September 28 and October 20, 2009, and February 26, March 11, March 26, May 3, and June 1, 2010. In accordance with 10 CFR 2.109, the existing license remains in effect until the NRC takes final action on the renewal application.

Need for the Proposed Action:

The proposed action is needed to allow the continued operation of the UFTR to routinely provide teaching, research, and services to numerous institutions for a period of 20 years.

Environmental Impacts of the Proposed Action:

The NRC staff has completed its draft safety evaluation of the proposed action to issue a renewed Facility Operating License No. R-56 to allow continued operation of the UFTR for a period of 20 years and tentatively concludes there is reasonable assurance that the UFTR will continue to operate safely for the additional period of time. The details of the NRC staff's final safety evaluation will be provided with the renewed license that will be issued as part of the letter to the licensee approving its license renewal application. This document contains the environmental assessment of the proposed action.

The UFTR is located in the Nuclear Reactor Building in the northeast quadrant of the University of Florida campus, approximately 1600 meters (1 mile) southwest of downtown Gainesville, Florida. Gainesville is located in the approximate center of Alachua County, which covers 975 square miles in the north-central part of Florida about midway between the Gulf of Mexico and the Atlantic Ocean. The reactor is housed in a vault-type building which serves as a confinement. The Nuclear Reactor Building and its annex, the Nuclear Sciences Center, are located in an area with laboratory and classroom buildings comprising the College of Engineering and the College of Journalism. The nearest permanent residence is the East Hall Housing facility, located 190 meters (210 yards) due west of the Nuclear Reactor Building. The UFTR site is 30 meters (33 yards) due south of Reed Laboratory; 122 meters (134 yards) due north of the J. W. Reitz Union building; 15 meters (16 yards) due west of the Journalism Building (Weimer Hall) and 76 meters (83 yards) due east of the Materials Building (Rhines Hall). The J. Hillis Miller Health Center complex is 795 meters (870 yards) southeast of the UFTR and most of the University of Florida residence halls, fraternity houses, and Lake Alice

are found within 850 (930 yards) to 1,220 meters (1334 yards) from the UFTR. There are no industrial, transportation, or military facilities in the immediate vicinity of the UFTR. The nearest airport is approximately 8 kilometers (5 miles) due northeast.

The UFTR is a modified Argonaut type, graphite-moderated, graphite-reflected, light water cooled reactor. It is currently licensed for 100 kilowatts thermal (kW(t)) steady state power with a maximum power of 125 kW(t) limited by the protection system. The reactor is used for instruction and university research activities. The reactor is fueled with low-enriched uranium-aluminum fuel contained in MTR-type plates assembled in bundles. Reactivity control is provided by 3 safety control blades and 1 regulating control blade. A detailed description of the reactor can be found in the UFTR Safety Analysis Report (SAR). The major modification since 1981 was the conversion from high enriched uranium fuel to low-enriched uranium fuel in 2006.

The licensee has not requested any changes to the facility design or operating conditions as part of this renewal request. No changes are being made in the types or quantities of effluents that may be released off site. The licensee has systems in place for controlling the release of radiological effluents and implements a radiation protection program to monitor personnel exposures and releases of radioactive effluents. As discussed in the NRC staff's safety evaluation, the systems and radiation protection program are appropriate for the types and quantities of effluents expected to be generated by continued operation of the reactor. Accordingly, there would be no increase in routine occupational or public radiation exposure as a result of license renewal. As discussed in the NRC staff's safety evaluation, the proposed action will not significantly increase the probability or consequences of accidents. Therefore, license renewal would not change the environmental impact of facility operation. The NRC staff evaluated information contained in the licensee's application and data reported to the NRC by the licensee for the last 6 years of operation to determine the projected radiological impact of

the facility on the environment during the period of the renewed license. The NRC staff found that releases of radioactive material and personnel exposures were all well within applicable regulatory limits. Based on this evaluation, the NRC staff concludes that continued operation of the reactor would not have a significant environmental impact.

#### I. Radiological Impact

##### Environmental Effects of Reactor Operations:

Gaseous effluents from the UFTR are discharged through the reactor stack which is 9 meters (30 feet) high and has a volumetric flow rate of approximately 7.4 cubic meters (261 cubic feet) per second. Other release pathways do exist; however, they are normally secured during reactor operation and they have insignificant flow rates compared to the facility stack exhaust system. The only significant nuclide found in the gaseous effluent stream is argon-41 (Ar-41). The licensee performed measurements of Ar-41 production during reactor operation. Licensee calculations, based on those measurements, indicate that the annual Ar-41 releases resulted in an offsite concentration of  $8.81 \text{ E-}10$  microcuries per milliliter ( $\mu\text{Ci/ml}$ ) of air, which is below the limit of  $1.0 \text{ E-}8 \mu\text{Ci/ml}$  specified in 10 CFR Part 20, Appendix B, for Ar-41 effluent releases in air. The NRC staff performed an independent calculation and found the licensee's calculation to be reasonable. The potential radiation dose to a member of the general public resulting from this concentration is approximately 0.044 milliSieverts (mSv) (4.4 millirem) per year and this demonstrates compliance with the annual dose limit of 1 mSv (100 millirem) set by 10 CFR 20.1301. Additionally, this potential radiation dose demonstrates compliance with the air emissions dose constraint of 0.1 mSv (10 millirem) per year specified in 10 CFR 20.1101(d).

The licensee disposes of liquid radioactive wastes from the UFTR by discharge into an outside above-ground Waste Water Holdup Tank. Liquid from the tanks is analyzed for radioactivity to verify activity levels are within 10 CFR 20.2003 limits prior to disposal to the sanitary sewer. The licensee also disposes of liquids by transfer to a radioactive waste disposal

facility, in the infrequent event that the liquid waste would not meet the requirements for discharge to the sanitary sewer. During the past 6 years, the licensee reported only routine releases of liquid radioactive waste once or twice each year to the sanitary sewerage system. The maximum concentration was less than  $5.0 \text{ E-}9 \text{ } \mu\text{Ci/ml}$ , which is well within the 10 CFR Part 20, Appendix B, limit for monthly average concentration of  $1 \text{ E-}7 \text{ } \mu\text{Ci/ml}$  for beta/gamma emitters released to the sewer.

The licensee may transfer solid low-level radioactive waste from the UFTR to the University of Florida Radiation Control Office for appropriate disposal, or may transfer solid low-level waste directly to an authorized carrier or waste processor. The waste consists of irradiated samples, packaging materials, contaminated gloves and clothing, demineralizer resins, filters, and other similar items. The licensee did transfer spent nuclear fuel to the U.S. Department of Energy (DOE) from the site following the conversion to low-enriched uranium fuel. To comply with the Nuclear Waste Policy Act of 1982, the University of Florida has entered into a contract with the DOE that provides that DOE retains title to the fuel utilized at the UFTR and that DOE is obligated to take the fuel from the site for final disposition.

As described in Chapter 11 of the UFTR SAR, personnel exposures are well within the limits set by 10 CFR 20.1201 and are as low as is reasonably achievable (ALARA). The licensee tracks personnel exposures which are usually less than  $0.5 \text{ mSv}$  (50 millirem) per year. The University of Florida ALARA program requires the Radiation Control Officer to investigate any annual personnel exposures greater than  $1.25 \text{ mSv}$  (125 millirem) in a calendar quarter for UFTR Operations Personnel and greater than  $0.5 \text{ mSv}$  (50 millirem) in a calendar quarter for Non-Operations personnel. No changes in reactor operation that would lead to an increase in occupational dose are expected as a result of the proposed action.

The licensee conducts an environmental monitoring program to record and track the radiological impact of UFTR operation on the surrounding unrestricted area. The program

consists of quarterly exposure measurements at twenty monitoring stations immediately surrounding the UFTR and 6 monitoring stations within 8 kilometers (5 miles) of the UFTR. In addition, samples are collected of water, soil, and vegetation at twenty-two locations within 300 meters (328 yards) of the UFTR. The Radiation Control Officer administers the program and maintains the appropriate records. Over the past 6 years, the survey program indicated that radiation exposures and sample results at the monitoring locations were not significantly higher than those measured at the control locations. Year-to-year trends in exposures and sample results are consistent between monitoring locations. Also, no correlation exists between total annual reactor operation and annual exposures and sample results at the monitoring locations. Based on the NRC staff's review of the past 6 years of data, the NRC staff concludes that operation of the UFTR does not have any significant radiological impact on the surrounding environment. No changes in reactor operation that would affect off-site radiation levels are expected as a result of license renewal.

#### Environmental Effects of Accidents:

Accident scenarios are discussed in Chapter 13 of the UFTR SAR. The maximum hypothetical accident (MHA) is a core-crushing accident which would result in the uncontrolled release of the gaseous fission products from exposed fuel surfaces to the reactor building and into the environment. The licensee conservatively calculated doses to facility personnel and the maximum potential dose to a member of the public. NRC staff performed independent calculations to verify that the doses represent conservative estimates for the MHA. Occupational doses resulting from this accident would be well below 10 CFR 20.1201 limit of 50 mSv (5000 millirem). Maximum doses for members of the public resulting from this accident would be well below 10 CFR 20.1301 limit of 1 mSv (100 millirem). The proposed action will not increase the probability or consequences of accidents.

## II. Non-Radiological Impact

The UFTR core is cooled by a light water primary system consisting of a 200-gallon coolant storage tank, a heat removal system, and a processing system. Primary coolant water from the reactor core flows by gravity into the primary storage tank where the primary pump circulates water from the primary storage tank through the heat exchanger and returns it into the fuel boxes of the core. Heat is removed by the secondary coolant system, which uses well water. The secondary coolant water is discharged into the storm sewer with no mixing of water between the two systems. The secondary system water pressure is maintained slightly higher than the primary system to minimize the likelihood of primary system contamination entering the secondary system if a heat exchanger leak were to develop. The licensee conducts periodic tests of the heat exchanger to further reduce the likelihood of secondary system contamination.

Release of thermal effluents from the UFTR will not have a significant effect on the environment. Given that the proposed action does not involve any change in the operation of the reactor and the heat load dissipated to the environment, the NRC staff concludes that the proposed action will not have a significant impact on the local water supply.

### National Environmental Policy Act (NEPA) and Other Considerations:

NRC has responsibilities that are derived from NEPA and from other environmental laws, which include the Endangered Species Act (ESA), Coastal Zone Management Act (CZMA), National Historic Preservation Act (NHPA), Fish and Wildlife Coordination Act (FWCA) and Executive Order (EO) 12898 Environmental Justice. Preparing this EA satisfies the agency's obligations under NEPA. The NRC also uses this EA to address the requirements of the laws and EO mentioned above. The following presents a brief discussion of impacts associated with these laws and other requirements:

I. Endangered Species Act

Federally- or State-listed protected species have not been found in the vicinity of the UFTR. Effluents and emissions from the UFTR have not had an impact on critical habitat.

II. Costal Zone Management Act

The UFTR is not located within any managed coastal zones nor would UFTR effluents and emissions impact any managed costal zones.

III. National Historical Preservation Act

The NHPA requires Federal agencies to consider the effects of their undertakings on historic properties. The National Register of Historic Places (NRHP) lists several historical sites located on or near the University of Florida campus. The nearest historical site is the College Hill West Historical District, located 0.8 km (0.5 miles) from the UFTR site boundary. Given the distance between the facility and the College Hill West Historical District, continued operation of the UFTR will not impact any historical sites. Based on this information, the NRC finds that the potential impacts of license renewal would have no adverse effect on historic and archaeological resources.

IV. Fish and Wildlife Coordination Act

The licensee is not planning any water resource development projects, including any of the modifications relating to impounding a body of water, damming, diverting a stream or river, deepening a channel, irrigation, or altering a body of water for navigation or drainage.

V. Executive Order 12898 - Environmental Justice

The environmental justice impact analysis evaluates the potential for disproportionately high and adverse human health and environmental effects on minority and low-income populations that could result from the relicensing and the continued operation of the UFTR. Such effects may include human health, ecological, cultural, economic, or social impacts. Minority and low-income populations are subsets of the general public residing around the

UFTR and all are exposed to the same health and environmental effects generated from activities at the UFTR.

Minority populations in the vicinity of the UFTR – According to 2000 census data, 21.4 percent of the population (approximately 855,000 individuals) residing within a 80 kilometer (50-mile) radius of UFTR identified themselves as minority individuals. The largest minority was Black or African American (120,000 persons or 14.1 percent), followed by Hispanic or Latino (41,000 or 4.8 percent). According to the U.S. Census Bureau, about 30.3 percent of the Alachua County population identified themselves as minorities with persons of Black or African American origin comprising the largest minority group (19.3 percent). According to the census data 3-year average estimates for 2006-2008, the minority population of Alachua County, as a percent of the total population, had increased to 32.9 percent.

Low-income Populations in the Vicinity of the UFTR – According to 2000 Census data, approximately 23,000 families and 128,000 individuals (approximately 10.3 and 14.9 percent, respectively) residing within a 50-mile radius of the UFTR were identified as living below the Federal poverty threshold in 1999. The 1999 Federal poverty threshold was \$17,029 for a family of four.

According to Census data in the 2006-2008 American Community Survey 3-Year Estimates, the median household income for Florida was \$48,637, while 12.6 percent of the state population and 9.0 percent of families were determined to be living below the Federal poverty threshold. Alachua County had a lower median household income average (\$40,987) and higher percentages (22.3 percent) of individuals and families (10.3 percent) living below the poverty level, respectively.

Impact Analysis – Potential impacts to minority and low-income populations would mostly consist of radiological effects; however radiation doses from continued operations

associated with this license renewal are expected to continue at current levels, and would be well below regulatory limits.

Based on this information and the analysis of human health and environmental impacts presented in this environmental assessment, the proposed relicensing would not have disproportionately high and adverse human health and environmental effects on minority and low-income populations residing in the vicinity of UFTR.

Environmental Impacts of the Alternatives to the Proposed Action:

As an alternative to license renewal, the NRC considered denying the proposed action. If the NRC denied the request for license renewal, reactor operations would cease and decommissioning would be required. The NRC notes that, even with a renewed license, the UFTR will eventually be decommissioned, at which time the environmental effects of decommissioning would occur. Decommissioning would be conducted in accordance with an NRC-approved decommissioning plan which would require a separate environmental review under 10 CFR 51.21. Cessation of facility operations would reduce or eliminate radioactive effluents and emissions. However, as previously discussed in this environmental assessment, radioactive effluents and emissions from reactor operations constitute a small fraction of the applicable regulatory limits. Therefore, the environmental impacts of license renewal and the denial of the request for license renewal would be similar. In addition, denying the request for license renewal would eliminate the benefits of teaching, research, and services provided by the UFTR.

Alternative Use of Resources:

The proposed action does not involve the use of any different resources or significant quantities of resources beyond those previously considered in the issuance of Amendment No. 13 to Facility Operating License No. R-56 for the University of Florida Training Reactor dated August 30, 1982, which renewed the Facility Operating License for a period of 20 years.

Agencies and Persons Consulted:

In accordance with the Agency's stated policy, on March 15, 2010, the staff consulted with the State Liaison Officer, regarding the environmental impact of the proposed action. The consultation involved a thorough explanation of the environmental review, the details of this environmental assessment, and the NRC staff's findings. The State official stated that he understood the NRC review and had no comments regarding the proposed action.

The NRC staff also provided information about the proposed activity to the State Office of Historical Preservation on March 16, 2010. The Office of Historical Preservation agreed with the NRC regarding the conclusions of the historical assessment.

Finding of No Significant Impact:

On the basis of the environmental assessment, the NRC concludes that the proposed action will not have a significant effect on the quality of the human environment. Accordingly, the NRC has determined not to prepare an environmental impact statement for the proposed action.

For further details with respect to the proposed action, see the licensee's application dated July 18, 2002 [ML022130145 and ML022130185]; as supplemented by letters dated July 25, 2002 [ML022130230 and ML022130244]; July 29, 2002 [ML022130140]; July 31, 2002 [ML081340724]; February 25, 2003 [ML102240048]; August 8, 2006 [ML062230078]; February 2, 2007 [ML102240038]; April 7, 2008 [ML081350571]; November 26, 2008 [ML083450718]; September 28, 2009 [ML093620300]; October 20, 2009 [ML100430693]; February 26, 2010 [ML100610445]; March 11, 2010 [ML100710497]; March 26, 2010 [ML100880334]; May 3, 2010 [ML101250177]; and June 1, 2010 [ML101590221] and annual progress reports [ML090500396, ML092390117, ML092390039, ML092440258, ML092440257 and ML060190085]. Documents may be examined, and/or copied for a fee, at the NRC's Public Document Room (PDR), located at One White Flint North, 11555 Rockville Pike (first floor), Rockville, Maryland. Publicly

available records will be accessible electronically from the Agencywide Documents Access and Management System (ADAMS) Public Electronic Reading Room on the NRC Web site <http://www.nrc.gov/reading-room/adams.html>. Persons who do not have access to ADAMS or who encounter problems in accessing the documents located in ADAMS should contact the NRC PDR Reference staff at 1-800-397-4209, or 301-415-4737, or send an e-mail to [pdr@nrc.gov](mailto:pdr@nrc.gov).

Dated at Rockville, Maryland, this 30<sup>th</sup> day of August 2010.

FOR THE NUCLEAR REGULATORY COMMISSION

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