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March 18, 2011

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**SUBJECT: Annual Report for University of Florida Training Reactor, License R-56,  
Docket 50-83**

Please find enclosed the 2009-10 annual report for the University of Florida Training Reactor (UFTR), Docket No. 50-83. This report is being submitted as required by our Technical Specifications, Section 6.6.1.

If you have questions on the content of this report, please contact Dr. David Hintenlang, Interim Director of the UFTR, at 352-1401.

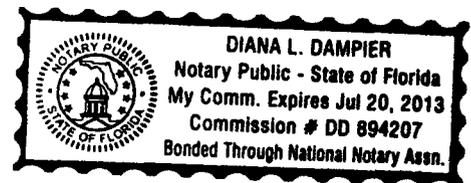
I declare under penalty of perjury that the foregoing is true and correct.

Executed on March 18, 2011

Sincerely,



David E. Hintenlang, PhD  
Interim Director of UFTR  
Interim Chair of  
Nuclear & Radiological Engineering



*Diana L. Dampier*  
*Alachua County Florida*  
*March 18, 2011*

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University of Florida Training Reactor  
Annual Progress Report

September 1, 2009- August 31, 2010

Submitted by  
Dr. David Hintenlang  
Interim Facilities Director, UFTR

Department of Nuclear and Radiological Engineering  
University of Florida  
Gainesville, FL

March 2011

## **Introduction**

As stated in the University of Florida Training Reactor (UFTR) Technical Specifications, Section 6.7.1 Operating Report, routine annual reports covering the activities of the reactor facility during the previous calendar year shall be submitted to the Commission within six (6) months following the end of the prescribed year. The prescribed year ends August 31 for the UFTR. This annual operating report includes 7 sections:

- (1) a narrative summary of reactor operating experience including the energy produced by the reactor and the hours the reactor was critical;
- (2) the unscheduled shutdowns including, where applicable, corrective actions taken to preclude recurrence;
- (3) tabulation of major preventative and corrective maintenance operations having safety significance;
- (4) tabulation of major changes in the reactor facility and procedures, and a tabulation of new tests or experiments, that are significantly different from those performed previously and are not described in the Safety Analysis Report, including conclusions that no unreviewed safety questions were involved;
- (5) A summary of the nature and amount of radioactive effluents release or discharged to the environs beyond the effective control of the facility operator as determined at or before the point of such release or discharge. (The summary shall include to the extent practicable an estimate of individual radionuclides present in the effluent. If the estimated average release after dilution or diffusion is less than 25% of the concentration allowed, a statement to this effect is sufficient.);
- (6) A summarized result of environmental surveys performed outside the facility;
- (7) A summary of exposure received by facility personnel and visitors where such exposures are greater than 25% of that allowed.

The following discussion on the above seven sections covers the period from September 1, 2009 to August 31, 2010, except as noted otherwise.

### **1. Summary of Operation Experience**

The UFTR was disassembled for major maintenance early in 2008, in the previous reporting year (2008-2009), and was not operated during the current reporting period. The maintenance performed had involved removing the fuel from the reactor and replacing a substantial portion of original piping of the primary coolant system that was located underneath the reactor core. Repairs were completed and the UFTR was reassembled and refueled in May-

June 2010. While the facility was returned to operational status at this time, the facility has not been operated due to a shortage of qualified reactor staff.

## **2. Unscheduled Shutdowns**

The UFTR was not operated during this reporting period and there were no unscheduled shutdowns.

## **3. Safety Related Maintenance Operations**

Maintenance operations during the current reporting period involved the replacement of a substantial portion of the primary coolant system's piping. The reactor had been unfueled in the previous reporting year. Maintenance operations included fabrication and replacement of piping below the reactor core, and the fabrication of new fuel boxes. A number of other hardware components were simultaneously replaced during these operations.

## **4. Major Changes in Reactor Facility, Procedures and Experiments**

No major changes to procedures or experiments were instituted during this reporting period. Some changes to the facility configuration occurred as a result of the significant maintenance operations performed at the facility.

New fuel boxes were fabricated during the course of maintenance. The new fuel boxes are dimensionally correct, and match the original plans for the facility. The dimensions are slightly different from the previous fuel boxes that were removed from operation. It is expected that the age and thermal cycles of the original fuel boxes has resulted in some distortion from the original dimensions over many years of operation.

A volume of sand was removed from below the reactor core in the process of replacing the piping below the reactor core. The original pipes were embedded in this sand which appears to have retained moisture, contributing to the corrosion of the piping. This sand has not been replaced at this time, which may result in slight changes to reactivity and the ambient radiation fields around the reactor core. Possible changes will be thoroughly evaluated as the reactor is returned to operation.

## **5. Radioactive Effluents**

Liquid release:

The UFTR is equipped with a waste water holdup tank. The tank is released two or three times per year. The radioactivity in the release water is measured. Wastewater shall be sampled and monitored prior to tank discharge. No isotopic analysis is required if the estimate average release concentration is less than 25% of the concentration limit allowed in 10CFR20, Appendix B, Table 2. The current limit is  $5.0 \times 10^{-9}$   $\mu\text{Ci/mL}$  for releases to the sanitary sewer. Table I presents the amount and activity of the released waste water.

**Table I – Amount and activity of the released waste water**

Time Period	Water Released (Gallon)	Activity Released ( $\mu\text{Ci}/\text{mL}$ )
December 21, 2009	921.7	$6.44 \times 10^{-10}$

Argon-41 Release:

The Argon-41 release concentration is normally measured about every six months during facility operation. The annual Argon-41 release is estimated by such measurement and operation hours. Discharge concentrations of Argon-41 shall not exceed  $1.08\text{E-}8 \mu\text{Ci}/\text{mL}$  per 10CFR20 Appendix B, Table 2 when averaged over 30 days. The UFTR characteristically produces Ar-41 concentrations of approximately  $1.0 \times 10^{-7} \mu\text{Ci}/\text{ml}$  at full power, or a  $4780 \mu\text{Ci}/\text{kW-hr}$  release per unit energy generation. Since the facility was not operated during this reporting period, the Argon-41 release during the period is  $0.0 \mu\text{Ci}/\text{ml}$ .

## 6. Environmental Surveys

The following area monitor exposures are for the period September 1, 2009 to August 31, 2010. Thirteen areas (numbered from 1 to 13) were monitored for the entire calendar year. These areas are typically located around the exterior of the reactor building and nearby buildings, including the Nuclear Sciences Center and the Journalism Building. A detailed list of these numbered areas can be found in the UFTR and Radiation Control Office SOP's. The reactor cell is separately monitored during the same period. The area radiation exposures are tabulated and presented in Table II.

The area badges are meant to indicate exposures due to normal reactor operation. The elevated value at location 2 is attributed to its close proximity to activated reactor components being stored in an unoccupied area within the reactor cell. The decrease in readings is due to the reinstallation of those activated reactor components. Other exposures are attributed to normal activities and to the reactor being disassembled for maintenance early in 2008 and remaining disassembled in 2009.

**Table II** - Total Effective Dose Equivalent (TEDE) at monitored locations at the UFTR. Monitoring is performed by the Radiation Control Office of the Environmental Health and Safety Division at the University of Florida.

Area No.	Quarterly TEDE (mrem)				Annual TEDE (mrem)
	Sep - Nov	Dec - Feb	Mar-May	Jun-Aug	
1	7	8	12	7	34
2	732	417	180	71	1400
3	0	0	0	0	0
4	0	0	0	0	0
5	10	8	6	5	29
6	0	0	0	0	0
7	2	3	6	0	11
8	0	0	0	0	0
9	5	1	0	0	6
10	0	0	0	0	0
11	0	0	0	0	0
12	7	0	0	0	7
13	1	0	0	0	1
Room 101C	0	0	0	0	0
Room 103	0	1	0	0	1

#### 7. Radiation Exposures

Note that UFTR Tech Specs require only a summary of exposure received by facility personnel and visitors, where such exposures are greater than 25% of the permissible limit.

**Table III** - Total Effective Dose Equivalents (TEDE) for the UFTR Staff, September 1, 2009 – August 31, 2010.

Individual	Quarterly TEDE (mrem)				Annual TEDE (mrem)
	Sep - Nov	Dec - Feb	Mar-May	Jun-Aug	
Berglund	195	288	2	26	511
Shea	239	798	51	5	1093
Sly	1	0	0	0	1
Yenatsky	498	0	0	0	498

The higher than normal personnel exposures during the first two quarters of this reporting period were the result of the extensive reactor maintenance work, which included disassembly, removal and reassembly of portions of the reactor.