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Technical Specifications 6.7.1
License R-56, Docket 50-83

Subject: CY2018 Annual Report for the UFTR

Please find enclosed the UFTR annual report for calendar year 2018. This report is being submitted as required by our Technical Specifications, Section 6.7.1.

I declare under penalty of perjury that the foregoing and attached are true and correct to my knowledge.

Executed on June 19, 2019.

A handwritten signature in black ink, appearing to read 'Brian Shea'.

Brian Shea
Reactor Manager, University of Florida Training Reactor

cc: Duane Hardesty, Project Manager, NRC

University of Florida Training Reactor
Annual Report for Calendar Year 2018

The following annual report is submitted in accordance with Section 6.7.1 of the UFTR Technical Specifications.

Summary of Reactor Operations

Total Energy Output for CY2018:	6,315 kW-hrs
Cumulative Energy Output Since Conversion to LEU in 2006:	35,826 kW-hrs

Reactor operations were limited to surveillance purposes from mid-November 2017 until early April 2018 primarily due to maintenance on the Wide Range drawer.

Periodic routine reactor operations resumed mid-April and ran through the end of CY2018 with brief periods of unavailability for maintenance.

Unscheduled Shutdowns

There was one unscheduled shutdown during CY2018. On 8/23/18, the reactor tripped automatically from 10 kWth (10% RTP) due to actuation of the Safety Channel 2 low detector voltage trip bistable. Troubleshooting revealed that the detector high voltage adjustment potentiometer was noisy. The potentiometer was replaced, and the channel was retested and returned to service.

Major Maintenance

A listing of all major maintenance is presented in Table I.

In Table I the first date for each entry is the date when the Maintenance Log Page (MLP) was opened; in quite a few cases, this date may be one or more days after the original problem was noted. The second date indicates the day the MLP was closed which can also be one or more days after work completion.

Table I
Major Maintenance Performed

MLP Number	Date Opened	Date Closed	Summary
17-4	4/4/17	5/2/18	Troubleshooting and repair of high plume exhaust fan controls circuitry to identify and repair/replace components damaged during an apparent lighting strike.
17-9	11/15/17	4/6/18	Performance of factory calibration, alignment, and repairs/replacements as needed on the Wide Range drawer.
18-1	2/12/18	2/12/18	Routine addition of makeup water to the Primary Coolant Tank.
18-2	2/13/18	2/13/18	Routine replacement of the Demineralized Water Makeup system resin and filter.
18-3	2/14/18	2/14/18	Routine replacement of the Shield Water Tank system resin and filter.
18-4	2/19/18	4/6/18	Replacement of the linear channel picoammeter resistor to allow the potentiometer sufficient span to calibrate the linear channel.
18-5	5/29/18	5/29/18	Routine addition of makeup water to the Primary Coolant Tank.
18-6	7/10/18	7/10/18	Routine addition of makeup water to the Shield Tank.
18-7	7/12/18	7/12/18	Routine replacement of the Primary Coolant Demineralized Water system resin and filter with addition of makeup water to the Primary Coolant Tank.
18-8	7/19/18	7/19/18	Troubleshooting and repair of the Primary Coolant Flow indication. Replaced failed Q1 transistor.
18-9	8/23/18	8/31/18	Troubleshooting and repair of the Safety Channel 2 detector high voltage circuit. Replaced noisy high voltage adjustment potentiometer.
18-10	8/24/18	8/31/18	Troubleshooting and correction of high resistivity readings on the SOLU bridge. Cleaned the resistivity probes and flow indicator. Replaced the SOLU bridge vacuum tubes.
18-11	12/10/18	12/10/18	Routine addition of makeup water to the Primary Coolant Tank.
18-12	12/11/18	12/11/18	Replaced the cell wastewater holdup tank.

Changes, Tests, and Experiments Implemented under 10 CFR 50.59

A listing of changes, tests, and experiments implemented under 10 CFR 50.59 is presented in Table II. All changes, tests, and experiments implemented during CY2018 screened-out from full evaluation.

Table II
Changes, Tests, And Experiments Implemented Under 10 CFR 50.59

Number	Date Approved	Summary
18-1	2/6/18	Procedure Change - SOP-0.5, Quality Assurance Program, was revised to incorporate editorial changes consistent with creation of new surveillance A-3.
18-2	2/6/18	Procedure Change – Creation of the new A-3 Surveillance that combines the Q-6 and S-10 surveillances. Combining the two surveillances into one with an annual frequency exceeds the biennial requirement and eliminates unnecessary administrative burden while still maintaining the periodic checks of postings and communications readiness.
18-3	2/6/18	Procedure Change – SOP-E.4, UFTR Nuclear Instrumentation Calibration Procedure, was revised to enhance the procedure and incorporate Technical Specification requirements associated with the renewed operating license.
18-4	2/6/18	Modification - Resistors R2 and R6 on the Wide Range Signal Selector Card (Card A6) were changed from 1.78 k Ω to 985 ohms and 562 ohms to 550 ohms respectively to meet the calibration requirements specified in the Gulf Atomic Manual and Section 7.1.4 of SOP-E.4 (MLP 17-9).
18-5	2/6/18	Modification - Resistor R30 in the fission chamber preamplifier circuit was changed from 124 k Ω to 121 k Ω to re-zero the preamplifier output bias thereby reducing DC error into the downstream Campbell circuit (MLP 17-9).
18-6	2/6/18	Modification - Two Wide Range drawer amplifiers were replaced with functionally equivalent amplifiers. Amplifier A1 on the Log Rate & Summer board (card A4) required replacement due to excessive offset voltage indicating an amplifier malfunction. Amplifier A1 on the Period Rate board (card A7) also required replacement due to potting material leaking from the amplifier. Due to the age of these amplifiers, procurement of exact replacement amplifiers (by part number) was impossible (MLP 17-9).
18-7	2/6/18	Modification - Resistor R26 was changed from 7.5 k Ω to 10 k Ω to allow enough range of adjustment in period meter span adjustment resistor R22 to meet the calibration requirements specified in Step 7.1.5.8 of SOP-E.4 (MLP 17-9).
18-8	2/12/18	Experiment - Comprehensive Run Request for Lectures, Tours, Demonstrations, and Labs.
18-9	3/15/18	Modification - Linear channel picoammeter resistor R25 was changed from 51.1 k Ω to 54.9 k Ω . Replacement of this fixed resistor allowed the linear channel picoammeter potentiometer R34 sufficient span to calibrate the linear channel (MLP 18-4).
18-10	3/26/18	Procedure Change – Creation of new A-6 Surveillance to replace Q-3. Rev. 12 of the Operator Training and Requalification Program (OTRP) was approved February 16, 2018. Under the revised OTRP, drills frequency is required annually rather than quarterly. This revision implemented the new drill requirement by revising and renaming the Q-3 surveillance to A-6.
18-11	3/15/18	Procedure Change - SOP-0.5, Quality Assurance Program, was revised to incorporate editorial changes consistent with creation of new surveillance A-6.

18-12	4/2/18	Procedure Change - SOP-E.4, UFTR Nuclear Instrumentation Calibration Procedure, was revised to incorporate lessons learned from NRC Event Report #53222 and other enhancements / lessons learned from recent use of this maintenance procedure.
18-13	4/2/18	Procedure Change - SOP-E.3, Shield Tank and Shield Tank Recirculating System Maintenance, was revised to update the procedure instructions consistent with license renewal and replacement of the shield tank recirculating system.
18-14	6/22/18	Experiment - Neutron Beam Tests on Scintillating Boron-10 Enriched Glass Samples.
18-15	12/10/18	Modification - The 225-gallon poly cell waste water tank was replaced with a new 100-gallon poly tank. The old tank bulged when full of water and had no volume markings. The new tank has volume markings and is designed to maintain its shape even when full (MLP 18-12).

Radioactive Effluents

Liquid Waste

No wastewater releases were made to the sanitary sewer during CY2018.

Gaseous Waste

The total activity of Argon-41 released during CY2018 was 28.05 curies. Using the calculation method described in the UFSAR, the maximum potential dose to a member of the public from UFTR Ar-41 emissions during CY2018 was 0.1 mrem/year. This is significantly less than 25% of the ALARA constraint of 10 mrem/yr.

Environmental Surveys

In addition to periodic radiation surveys using hand-held instruments, environmental monitoring is accomplished using radiation dosimetry badges. Areas monitored are located around the exterior of the Reactor Building (RB) and nearby buildings, including the Nuclear Sciences Building (NSB), the Reed Lab (RL), and the Journalism Building (JB). The environmental dosimetry reports are tabulated and presented in Table III. Dose equivalents below the minimum measurable quantity are reported as “M”.

Table III
Total Effective Dose Equivalent (TEDE) at Monitored Locations

Area	Quarterly TEDE (mrem)				Annual TEDE (mrem)
	Jan-Mar	Apr-Jun	Jul-Sep	Oct-Dec	
1. Reed Lab south wall (from annex roof)	13	14	11	11	49
2. SE corner of stack near release point	2	8	2	5	17
3. NSB Rm. 316 window - inside	M	M	M	M	M
4. NSB Rm. 316 window - outside	M	M	M	M	M
5. RB east wall under the light	9	10	5	10	34
6. Greenhouse SW corner - NSB roof	M	M	M	M	M
7. Ladder Post Leading to Annex Transformer Area	7	8	4	7	26
8. Stand on north side of NSB roof	2	1	M	M	3
9. Cooling tower east lighting arrestor	M	1	M	1	2
10. JB Third Floor Roof – Stand on west roof edge	M	M	M	1	1
11. JB Third Floor Roof – Stand on south roof edge	M	M	M	1	1
12. Control Badge - Building 683 west wall on electrical box	M	M	M	1	1
13. JB First Floor Roof – Stand in SW corner of roof	M	1	M	2	3

The dosimetry badges located in areas 1, 5, and 7 consistently registered a small dose with no apparent correlation to reactor operations or radiation levels in the reactor cell. These doses are primarily attributed to background radiation from the red brick and mortar used in construction of the Reactor Building and the Reed Lab in the 1950’s and 1960’s. None of the other badges are attached, or in tight proximity, to this red brick and mortar. Environmental dosimetry badge 2, located at the stack release point, registered dose readings that correlate with reactor operations.

Radiation Exposures

There were no exposures received by facility personnel or visitors that were greater than 25% of that allowed in 10 CFR Part 20. Five individuals received measurable occupational exposures during CY2018. The maximum Total Effective Dose Equivalent (TEDE) received by any individual in CY2018 was 5 mrem for the year. The maximum extremity dose (SDE, ME) received by any individual in CY2018 was 57 mrem for the year.