

REPORT ON REACTOR OPERATIONS

**For the Period
January 1, 2019 to December 31, 2019**

**PURDUE UNIVERSITY REACTOR-1 (PUR-1)
Facility Docket No. 50-182
PURDUE UNIVERSITY
West Lafayette, Indiana 47907**

March 2019

**Prepared by
Clive Townsend, Reactor Supervisor**

*A020
NRR*

1. INTRODUCTION

This report is submitted to meet the requirements set forth in the Technical Specifications of the Purdue University Reactor (PUR-1) and 10 CFR 50.59 for the period January 1, 2019 to December 31, 2019.

2019 was a year of monumental change for the PUR-1. Following the approval of a License Amendment Request, the facility fully commissioned its digital Instrumentation and Control system. This will allow the facility to continue its teaching and research mission far into the future.

During the reporting period of 2019, over 1300 individuals visited the reactor facility as parts of 250 groups. Those people included many different cohorts for the purpose of classroom instruction and pre-scheduled tours.

2. PLANT DESIGN AND OPERATIONAL CHANGES

2.1 Facility Design Changes

Finalizing work begun over the prior years, the facility began the utilization of its new I&C system. The bulk of the construction was done in 2018 with final modifications taking place in early 2019.

2.2 Performance Characteristics

The overall status of the PUR-1 facility was sustained satisfactorily during the reporting period. The facility maintained all required surveillances. Monthly surveillances of process water showed no fission product contamination, thereby verifying fuel integrity.

2.3 Changes in Operating Procedures Concerning Safety of Facility Operations

Due to the significant changes to the instrumentation and control system, nearly all of the established facility procedures were deprecated and simplified. Basic start-up and shutdown procedures were modified to account for the new controls. As other procedures are required, they will be re-instated as approved by the CORO.

2.4 Results of Surveillance Tests and Inspections

2.4.1 Reactivity Limits

The reactivity worths of the control rods was measured as part of the startup plan for return to normal operations. On August 28, 2019, the

rods Excess Reactivity was logged as 0.0041 and the Shutdown Margin as 0.0176. These are within the Technical Specification Limits.

A visual inspection of the control rods was performed during the reporting period. This surveillance had been suspended following CORO approval.

2.4.2 Reactor Safety Systems

The Reactor Safety Systems went through rigorous testing during the reporting period as part of the start-up plan.

2.4.3 Primary Coolant System

During the checks the conductivity of the primary coolant was measured and the values never exceeded 3 micromhos/cm.

Monthly samples of the primary coolant were collected and analyzed by personnel from Radiological and Environmental Management for gross alpha and beta activity. No activity which would indicate failure of the fuel plates was identified in the samples.

2.4.4 Confinement

No operation or fuel handling was performed while the air pressure was below -0.05 inches of water.

The air system isolation was tested and correct operation of the louvres was observed. The Condensate Valve was also inspected.

2.4.5 Experiments

No experiments were performed.

2.5 Changes, Tests and Experiments Requiring Commission Authorization

Major changes in the facility were undertaken to upgrade the Instrumentation and Control. These changes (removal of old I&C) were started prior to commission authorization, however no operation was performed without licensed equipment while the LAR was under review. As part of this work, CORO authorized the movement of all non-control fuel elements to the storage racks. This action was completed on March 27, 2018. The fuel was returned during the reporting period and the systems fully tested. The I&C

replacement constitutes a major change in facility equipment that required commission authorization.

2.6 Changes in Facility Staff

There were no changes in facility staff in 2019.

3. POWER GENERATION

2019 saw a return to operations for the PUR-1. Over the course of 40 operational runs, the reactor generated 24.67 kW-hr of thermal energy.

4. UNSCHEDULED SHUTDOWNS

There were four unscheduled shutdowns in 2019 which can be attributed to expected calibrations and setup of new equipment in the facility.

5. MAINTENANCE

The HEPA filter for the room supply and exhaust air was checked upon during normal maintenance checks quarterly. Filters were replaced as needed.

6. RADIOACTIVE EFFLUENT RELEASES

No measurable amount of radioactive effluent was released to the environs beyond our effective control, as measured at or prior to the point of such release.

7. OCCUPATIONAL PERSONNEL RADIATION EXPOSURE

No radiation exposures greater than 25% of the appropriate limits of 10 CFR 20 were received during the reporting period.