PURDUE
UNIVERSITY

SCHOOL OF NUCLEAR ENGINEERING

March 30, 2018

Cindy Montgomery
U.S. NRC
One White Flint North
11555 Rockville Pike
Rockville, MD 20852

RE: Submission of 2017 Annual Report for PUR-1, Docket Number 50-182

Dear Ms. Montgomery:

Enclosed please find one copy of the Annual Report for the Purdue University Research Reactor, PUR-1, for the operating year 2017.

During review of annual operations for this Annual Report, a violation of Technical Specification 4.6 was discovered. The specification reads that representative fuel plates shall be inspected annually, with no interval to exceed 15 months. However, the last fuel inspection was done on August 1, 2016 followed by one performed on March 27, 2018, a duration of approximately 20 months. During this time, there were no reactor operations from June 5, 2017 onwards and no indication of elevated levels of coolant activity indicating fuel compromise. Some facility personnel wrongly believed the specification had been altered to be every two years not to exceed 30 months. The issue was furthered through the facility construction and new operating license. The corrective action taken has been to direct all facility personnel to review the Technical Specifications and to review surveillance schedules. All monthly staff meetings will now include a summary of upcoming surveillance requirements.

Should you have any questions or require further information, please contact me at 765.494.5764, or by e-mail at clive@purdue.edu.

I declare under penalty of perjury that the foregoing is true and correct. Executed on March 30, 2018.

Regards,

Clive Townsend
PUR-1, Reactor Supervisor

A020
NRR

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REPORT ON REACTOR OPERATIONS

For the Period
January 1, 2017 to December 31, 2017

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

March 2018

Prepared by
Clive Townsend, Reactor Supervisor

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, 2017 to December 31, 2017.

During the reporting period of 2017, a total of 1085 people visited the reactor facility. Those people included many different groups for the purpose of classroom instruction, pre-scheduled tours, and our reactor sharing program.

2. PLANT DESIGN AND OPERATIONAL CHANGES

2.1 Facility Design Changes

The building began a refresh and update in the summer of 2016. This is the first update to the building since the original installation of the reactor in the early 1960s. Activities being done include completion of a previously unused storage area, accessibility improvements to come into compliance with the Americans with Disabilities Act (ADA). These improvements include the widening of doorways and installation of an elevator for greater access. Legacy duct work, conduit, and wiring is being removed for clarity, modernization and aesthetic purposes. The majority of this work was done in portions of the building not involving the reactor room. Work was completed in the Fall of 2017.

The facility was operated under the renewed license which was granted in October of the prior year. Very few operations were done as much work has gone into preparations for the digital Instrumentation & Control license amendment. Legacy issues with aging Instrumentation and Control prevented operations..

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

No changes were made to Operating Procedures concerning safety of facility operations. One temporary procedure was approved by the Committee On Reactor Operations to move from 1 kW to 10 kW operations. This procedure was started but never finished.

2.4 Results of Surveillance Tests and Inspections

2.4.1 Reactivity Limits

The reactivity worths of the control rods was not measured during 2017. No operations were performed in the second half of the year due to issues with the Channel #1. This surveillance was suspended by the Committee on Reactor Operations.

A visual inspection of the control rods was not performed during the reporting period. This surveillance has been suspended following CORO approval.

2.4.2 Reactor Safety Systems

All surveillances regarding the Reactor Safety System, except radiation area monitoring, were suspended with CORO approval due to prolonged instrumentation issues.

During the reporting period, the radiation area monitors and the continuous air monitor's PMs were maintained and checked for normal operation.

2.4.3 Primary Coolant System

During the checks the conductivity of the primary coolant was measured and the values never exceeded 1.60 micromhos/cm. This represents a resistivity of more than 625,000 ohm-cm, which exceeds the lower limit of 330,000 ohm-cm as given in the specifications.

The specification for coolant height above the core to be 13 feet was always either met or exceeded.

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 at this time.

2.4.5 Experiments

One experiment was performed during the reporting period to measure the metal content in Toe nail samples. The experiment was performed under the supervision of the Radiological and Environmental Management Team and followed standard procedures.

2.5 Changes, Tests and Experiments Requiring Commission Authorization

During 2016, there were three facility changes which was made under 10 CFR 50.59. These did not require prior authorization. These changes are detailed in internal memorandums dated May 22, May 23, and June 23. Changes involved the installation of a new air handling unit, exhaust fan, and changes to the room layout due to ongoing construction.

Work was begun to move the reactor power level from 1 kW to 10 kW of maximum power as permitted by the License Renewal approved in October of 2016. Instrumentation issues prevented this work from being completed and resulted in a long term shutdown as noted in Section 4.

2.6 Changes in Facility Staff

There were no changes in facility staff in 2017.

3. POWER GENERATION

Operation of the PUR-1 during 2017 consisted of 7 runs which generated 2.58 kWh of energy and covered an integrated running time of 8.9 hours. This gives an average power level of 290 Watts during operation.

4. UNSCHEDULED SHUTDOWNS

There were one unscheduled shutdown in 2017. A noise spike in Channel #1, a consistent issue with the analog instrumentation and control, caused a spurious scram on June 5, 2017. Rods were lowered per procedure and reactor secured. No resolution was found for the noise and the reactor has not returned to criticality since this shutdown. The next criticality, in 2018, will be performed on the new digital Instrumentation and Control.

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.