

30 March 2009

Mr. Duane A. Hardesty
Project Manager
Research & Test Reactors
US Nuclear Regulatory Commission
Mail Stop: O-12 D03
Washington, DC 20555-0001

RE: Submission of 2008 Annual Report for PUR-1, Docket Number 50-182

Dear Mr. Hardesty:

Enclosed please find one copy of the Annual Report for the Purdue University Research Reactor, PUR-1, for the operating year 2008 (1 January 2008 – 31 December 2008).

Should you have any questions or require further information, please contact me at 765.496.3573, or by e-mail at jere@purdue.edu.

Very Truly Yours,



Jere H. Jenkins

Cc: James F. Schweitzer, Chair CORO, Radiation Safety Officer
File

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REPORT ON REACTOR OPERATIONS

**For the Period
January 1, 2008 to December 31, 2008**

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

March 2009

**Prepared by
E. C. Merritt
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, 2008 to December 31, 2008.

During the reporting period a total of 434 people visited the reactor facility. Those people included 98 different groups, of which 46 groups were for the purpose of maintenance, fuel loading or surveillance testing, 14 groups were for class purposes, 34 groups were tours, and 4 groups participated in our reactor sharing program.

2. PLANT DESIGN AND OPERATIONAL CHANGES

2.1 Facility Design Changes

There were no design changes to the facility in 2008.

2.2 Performance Characteristics

The operation of the PUR-1 facility continued satisfactorily during the reporting period. During the visual inspection of the fuel no changes were identified. This inspection included any defects that might compromise the integrity of the cladding including any evidence of corrosion. Satisfactory performance of the fuel continued throughout the year.

2.3 Changes in Operating Procedures Concerning Safety of Facility Operations

There were no changes to the operating procedures of the facility during 2008.

2.4 Results of Surveillance Tests and Inspections

2.4.1 Reactivity Limits

The reactivity worths of the control rods were determined after the LEU was installed and were found to be as follows:

Shim-safety #1:	3.93%
Shim-safety #2:	2.22%
Regulating Rod:	0.272%

These values are consistent with previous reported values. The worth curves of the control rods were checked after the loading and the excess was determined to be 0.42%, and the shutdown margin was determined to be 1.80% based on these values.

The inspection of the control rods was completed on December 19, 2008 with no evidence of change or deterioration observed.

No experiments were performed during 2008 that required a determination of the reactivity worth of the experiment per Technical Specification 4.1.c.

2.4.2 Reactor Safety Systems

Each pre-startup check included a channel test for each safety system, provided the shutdown exceeded 8 hours or if the system was repaired or de-energized.

Each reactor safety system had a channel check performed at time intervals of 4 hours during operation.

On February 15, 2008, the electronic calibration of all safety channels was completed.

The required 2008 irradiation of gold foils for a power calibration was done on March 28, 2008. The calibration indicated that the actual power was below (i.e., conservative) the indicated power level (i.e. the actual power being 645 watts when the indicated power level was at 750 watts).

During the pre-startup, which precedes each run, the radiation area monitors and the continuous air monitor were checked for normal operation. During 2008, the calibration of the radiation area monitors was completed on January 10 and July 16 and the continuous air monitor was completed on January 4 and July 25.

The rod drop times were measured on December 22, 2008. The rod drop times fell between 609 and 678 milliseconds. These values are consistent with past measurements and are well within the specification limit of one second.

2.4.3 Primary Coolant System

The weekly measurements of the pH of the primary coolant consistently gave readings between 4.9 and 5.2 during 2008. These values are within the specification limits of 5.5 ± 1.0 . During the weekly checks and the pre-startup check, which precedes each run, the conductivity of the primary coolant was measured and the values never exceeded 1.16 micromhos-cm. This represents a resistivity of more than 862,000 ohm/cm, which exceeds the lower limit of 330,000 ohm/cm as given in the specifications.

The specification of 13 feet of water was always either met or exceeded, according to the pre-startup checklist that was completed prior to each reactor run.

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 was identified in the samples, which would indicate failure of the fuel plates.

2.4.4 Containment

Readings between 0.09 and 0.22 inches of water were recorded weekly for the negative pressure in the reactor room.

The semi-annual checks for the proper operation of the inlet and outlet dampers and the air conditioner were completed on June 27 and December 10, 2008. All worked satisfactorily.

The fuel was visually inspected on March 17, 2009. The surface condition of the fuel plates indicated no change from the last inspection, and the cladding of the other inspected plates identified no changes. The LEU fuel was X-rayed, photographed, measured and each plate has a visual inspection record prior to installation in November of 2007.

2.4.5 Experiments

The mass of the singly encapsulated samples and the flux of the reactor are such that the complete release of all gaseous, particulate, and volatile components of the samples would not result in doses in excess of 10% of the equivalent annual doses as stated in 10 CFR 20.

No samples of unknown composition were irradiated in 2008.

2.5 Changes, Tests and Experiments Requiring Commission Authorization

During 2008 no changes, or experiments, which required authorization from the Commission pursuant to 10 CFR 50.59 (a), were performed.

2.6 Changes in Facility Staff

There were no changes in the Facility Staff during the year. During 2007 there were three licensed operators, at the facility.

3. POWER GENERATION

Operation of the PUR-1 during 2008 consisted of 39 runs, which generated 223,020 watt-minutes of energy and covered an integrated running time of 108.9 hours.

4. UNSCHEDULED SHUTDOWNS

Two unscheduled shutdowns occurred during 2008. On March 28 Control and Safety Amplifier-one (CSA-1) drifted to a lower current thus dropping a control rod. This shutdown is considered to be a part of the safety features of our equipment. There are few cases of the CSA drifting higher that are not controlled in such a way as to reduce magnet current and drop the rod. Also on March 28 the control rod was being jogged to achieve very close adjustment and a rod fell with no other indications.

5. MAINTENANCE

There were five instances of non-routine and one of routine maintenance during the reporting period. Two had to do with standard parts (resistor) replacement, or substitution one was a broken belt on the air monitor. In September and October there was a make-up water flow problem in the automatic system. This was corrected, but it required manual water additions prior to runs to maintain the required 13 foot level. All problems of this type can be expected in our equipment.

6. CHANGES, TESTS AND EXPERIMENTS

No changes, tests or experiments were carried out without prior Commission approval pursuant to the requirements of 10 CFR 50.59 (b).

7. 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.

8. OCCUPATIONAL PERSONNEL RADIATION EXPOSURE

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