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Nuclear Regulatory Commission
Washington DC 20555

Dear Sir:

Please find enclosed the annual report for The Ohio State University Research Reactor, Docket No. 50-150. 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 Mr. Richard Myser, Associate Director of the Nuclear Reactor Laboratory.

Sincerely,

David B. Ashley
Dean, College of Engineering and
The John C. Geupel Chair in
Civil Engineering

DBA:nlk
c: Nuclear Regulatory Commission Region II (w/enc)
Theodore S. Michaels (w/enc)
Don W. Miller (w/enc)

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THE OHIO STATE UNIVERSITY
RESEARCH REACTOR

ANNUAL REPORT FOR FY 99/00

SEPTEMBER 21, 2000

Introduction

As stated in The Ohio State University Research Reactor Technical Specifications, Section 6.6.1 Operating Reports, an annual report shall be made to the NRC by September 30 of each year. This report is to include the following seven sections.

1. A narrative summary of operating experience (including experiments performed) and of changes in facility design, performance characteristics, and operating procedures related to reactor safety occurring during the reporting period.
2. A tabulation showing the energy generated by the reactor (in Kilowatt hours) and the number of hours the reactor was in use.
3. The results of safety-related maintenance and inspection. The reasons for corrective maintenance of safety-related items shall be included.
4. A table of unscheduled shutdowns and inadvertent scrams, including their reasons and the corrective actions taken.
5. A summary of changes to the facility or procedures, which affect reactor safety and performance of tests or experiments carried out under the conditions of sections 50.59 of 10CRF50.
6. A summary of the nature and amount of radioactive gaseous, liquids, and solid effluents released or discharged to the environs beyond the effective control of the licensee as measured or calculated at or prior to the point of such release or discharge.
7. A summary of radiation exposures received by facility personnel and visitors, including the dates and times of significant exposures.

These seven sections are discussed below. These are all for the period July 1, 1999 through June 30, 2000, except as noted for exposure records.

1.A. Experiments Performed

The staff of The OSU Research Reactor are generally involved in four types of experiments at the Nuclear Reactor Laboratory. Included are introductions to nuclear research, neutron activation analysis, material irradiations, and classes that measure various reactor parameters. Typically when we introduce students, faculty or other experimenters to nuclear research, we do the following:

- a. Discuss nuclear reactions and radiological safety.
- b. Operate the reactor at 10kW-100kW
- c. Have the individuals observe control room operations.
- d. Complete a tour and demonstrate irradiation techniques.

Neutron activation analysis experiments are routinely completed for students ranging from high school to graduate school. The facilities normally utilized are the "rabbit" (pneumatic tube) and the "CIF" (Central Irradiation Facility). Much of the NAA work is geological samples.

Material irradiations, other than for NAA, are in four basic areas: isotope production; detector, electronic component and fiber optic testing; boron neutron capture therapy (BNCT); and irradiation of biological samples. Isotope production is done often for medical research. Detector and electronic component testing is done routinely. This testing is usually completed in the thermal column, or one of the beam ports, while fission chamber testing is in the Central Irradiation Facility. The reactor thermal column is also utilized for other BNCT studies. Typically it is the location for cell samples to determine their boron content.

Various nuclear engineering or physics classes throughout Ohio utilize the reactor for the following basic experiments:

- a. Approach to critical (using banked control rods rather than fuel loading).
- b. Control rod calibration by rod drop, positive period, and subcritical multiplication.
- c. Measurement of the Reactor Transfer function.
- d. Void coefficient measurements.
- e. Radiological surveys.

The reactor utilization for July 1, 1999 through June 30, 2000 is summarized in the following reports.

Funding for colleges and universities (other than OSU) that utilize the OSU Research Reactor is provided in part by the DOE funded Reactor Sharing Program.

**Utilization Report for the
Ohio State University Nuclear Reactor Lab**

I. Reactor Utilization

July 1 - December 31, 1999

User / Activity	Hours
Fission Chamber Testing for GE Reuter Stokes	43
Tours	18
Cleveland Clinic Re Production	04
OSU Nuclear Engineering 744, 505, 606 Classes	38
Air Force Institute of Technology Class	04
NAA for Case Western Reserve University	03
Ar-41 Production for Innovision	01
Na Production for Miami University	01
NAA for OSU Materials Science	04
Maintenance Activities	14
Xenon Feedback for D. Miller (OSU-NE)	08
Br in Plastics for Styrochem	05
LVEC Reactivity Measurements for D. Miller (OSU-NE)	03
	146

January 1 - June 30, 2000

User	Hours
Fission Chamber Testing for GE Reuter Stokes	61
Tours	19
OSU Nuclear Engineering 742, 744, 505 Classes	22
Air Force Institute of Technology Class	04
NAA for Case Western Reserve University	06
Su and Eu Production for Scintiprox	03
Reactor Operator Training	10
NAA for OSU Materials Science	08
NAA for Oklahoma State University	04
Irradiations for Cincinnati Electronics	02
Br in Plastics for Styrochem	05
LVEC Irradicaions for OSU Physics	07
	151

1.B. Changes in Facility Design

There were no facility design changes that required a change to the Technical Specifications. 10CFR50.59 changes are described in section 5. A.

1.C. Changes in Performance Characteristics

There have been no changes in performance characteristics related to reactor safety in the last year.

1.D. Changes in Operating Procedures

There were no changes in operating procedures related to reactor safety in the last year (10 CFR50.59 changes are described in section 5 B.).

2.A. **Kilowatt-Hours of Operation** – 15,942

2.B. **Hours of Utilization** - 297

3. **Safety Related Maintenance**

None

4. **Unscheduled Shutdowns**

From July 1, 1999 to June 30, 2000 there were five unplanned shutdowns. These are summarized below.

Reason	Corrective Action
Bumped Manual Scram Button (1)	None
Period Safety Amplifier Noise (3)	None
No Pumps at 120 kW (1)	Discussed with operator

5. **Changes in Facility Procedures and Performance of Tests or Experiments in Accordance with 10CFR50.59**

A. During the period July 1, 1999 to June 30, 2000, no OSURR Modification Requests were completed by the reactor staff and reviewed by the Reactor Operations Committee.

B. The following is a list of procedure changes made under 10CFR50.59 from July 1, 1999 to June 30, 2000 in accordance with Administrative Procedure AP-05, entitled Format for Writing, Revising, and Approving Procedures.

Procedure Number	Procedure Title	Revision Date
IM-01	Scram Checks	12/30/1999
IM-02	Adjusting Reactor Control Instrumentation Meter Zeros	12/30/1999
IM-12	Reactor Instrumentation Calibration / Checks	02/04/2000

6. **Radioactive Effluents**

A. Gaseous Effluent – The only effluent we measure is the release of Ar-41. For the period July 1 - Dec. 31, 1999, Ar-41 releases measured 0.53% of the annual average concentration limit. From Jan. 1 - June 30, 2000, releases measured 0.57% of the annual average concentration limit.

In accordance with the requirements of 10CFR20.1101(d), the COMPLY code was run using the total Ar-41 release for the period July 1, 1999 - June 30, 2000 of 82.1 mCi. Using level 2 in the code, the effective dose equivalent rate at the facility fence was computed to be 0.057 mrem/yr. This is well below the 10 mrem/yr constraint specified in the regulation.

B. Liquid Releases – Hot sink releases are recorded and reported through the OSU Office of Radiation Safety. Releases from the reactor pool to the sanitary sewer were not made.

C. No releases of solid radioactive material were made to the uncontrolled environment.

7. **Radiation Exposures**

Since the firm that maintains records for The Ohio State University keeps a year to date record, it is easier to report this by the nearest completed calendar year. Therefore film badge exposures in this report are for the period January 1, 1999 to December 31, 1999. Four individuals were monitored as radiation workers for the entire year or a major part of it. These are tabulated below. They are consistent with the ALARA policy for The Ohio State University and represent a fraction of allowed limits. All doses are in rem.

Individual	DDE	LDE	SDE, WB	SDE, ME	TEDE
Visitors	0.000	0.000	0.000	0.000	0.000
1	0.130	0.130	0.130	0.180	0.130
2	0.020	0.020	0.020	0.110	0.020
3	0.010	0.010	0.010	0.310	0.010
4	0.040	0.040	0.040	0.370	0.040