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September 24, 2001

Document Control Desk
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,

James C. Williams
Dean, College of Engineering and
Honda Professor

JCW:nlk

Enclosure

C: Nuclear Regulatory Commission Region II (w/enc)

Marvin Mendonca (w/enc)

Don W. Miller (w/enc)

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THE OHIO STATE UNIVERSITY
RESEARCH REACTOR

ANNUAL REPORT FOR FY 2000/2001

SEPTEMBER, 2001

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, 2000 through June 30, 2001, 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 has been 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 by noise analysis.
- d. Temperature coefficient measurements.
- e. Radiological surveys.

The reactor utilization for July 1, 2000 through June 30, 2001 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, 2000

User / Activity	Hours
Fission Chamber Testing for GE Reuter Stokes	37
Tours	11
Cleveland Clinic Re Production	4
OSU Nuclear Engineering 744, 505, Classes	39
Boron Neutron Capture Therapy Research	10.5
NAA for Case Western Reserve University	5
Na Production for Proctor and Gamble	1
Na Production for Miami University	1
Radiation Damage Study for OSU Physics	4.5
Br in Plastics for Styrochem	1
NAA of Bullet Fragments for Wittenburg	5.5
Reactor Operator Training and Requalification	8
Maintenance Activities	27.5
Activation of Carbon Compounds	3
NAA for OSU Materials Science Engineering	17
	175

January 1 - June 30, 2001

User	Hours
Fission Chamber Testing for GE Reuter Stokes	28
Tours	18
OSU Nuclear Engineering 742, 744, 505 Classes	29
Boron Neutron Capture Therapy Research	9
NAA for Case Western Reserve University	7
Hf Production for Miami University	2
Reactor Operator Training and Requalification	14
NAA for OSU Materials Science Engineering	6
NAA of Ink for BASF	5
Irradiation of Electronic Components for AFIT	3
NAA of Soils for Oklahoma State University	3
Measurements in the LVEC Facility for OSUNE	5
Irradiation of Sensors for OSUNE	6
	135

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. of this report.

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. 10CFR50.59 changes are described in section 5.B. of this report.

2.A. Kilowatt-Hours of Operation – 21,992

2.B. Hours of Utilization - 310

3. Safety Related Maintenance

None

4. Unscheduled Shutdowns

From July 1, 2000 to June 30, 2001 there were 12 unplanned shutdowns. These are summarized below.

Reason		Corrective Action
Period Safety Amplifier noise	(7)	Switched signal cables
No pumps on at 120 kW	(2)	Discussed with operators
Fuse in pump sensing module failed	(1)	Repaired pump sensing module
Effluent monitor turned off	(1)	Discussed with operators
Low pool level trip – moving experiment caused waves	(1)	Discussed with operators

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

- A. During the period July 1, 2000 to June 30, 2001, 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, 2000 to June 30, 2001 in accordance with Administrative Procedure AP-05, entitled Format for Writing, Revising, and Approving Procedures.

Procedure Number	Procedure Title	Revision Date
AP-01	Obtaining Use of the OSURR	4/25/01
AP-07	Review of Procedures	3/1/00
AP-14	OSURR Modification Requests	4/25/01
OM-07	Fuel Element Inspections	4/25/01
OM-15	Process System Checks	4/25/01
OM-16	Power Calibration	5/1/01
RS-02	Radioactive Waste Disposal	5/8/01
RS-03	Calibrating Gaseous Effluent Monitor	4/24/01
RS-04	Particulate Air Sampling	4/24/01
RS-08	NRL Smear Survey	5/3/01
RS-11	Routine Shipment of Radioactive Material	5/4/01
RS-17	Ar-41 Release Calculations	5/4/01
IM-05	Core Reactivity Data	4/26/01
IM-12	Reactor Instrumentation Calibration / Checks	4/26/01
SP-01	Personnel Authorized Access to NRL	3/14/00
SP-02	Security Call List	12/29/99
SP-03	Access Control to NRL	4/30/01
SP-04	Security Orientation	4/30/01
SP-05	Monthly Security Alarm Test	4/30/01
SP-06	Operation of Security System	5/2/01
SP-08	Alarm Failure Guide	5/2/01
SP-09	OSUPD Response	5/2/01
SP-11	Protection of Special Nuclear Material	5/2/01
EP-01	Emergency Procedures	5/8/01
EP-04	Emergency Equipment Inventory	5/8/01

6. Radioactive Effluents

- A. Gaseous Effluent – The only effluent we measure is the release of Ar-41. For the period July 1 - Dec. 31, 2000, Ar-41 releases measured 0.99 % of the annual average concentration limit. From Jan. 1 - June 30, 2001, releases measured 1.02 % 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 July1, 2000 - June 30, 2001 of 149.08 mCi. Using level 2 in the code, the effective dose equivalent rate at the facility fence was computed to be 0.1 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 made; a total of 4.15 mCi of H-3, 34 µCi of Na-24, and 0.75 µCi of Co-60 were released.

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, 2000 to December 31, 2000. Five 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	2.412	1.346	2.419	1.220	2.412
2	0.893	0.485	1.141	3.070	0.893
3	1.409	0.794	1.441	1.170	1.409
4	1.515	0.711	1.516	0.760	1.515
5	0.933	0.572	0.993	0.500	0.933

COMPLY: V1.5d.

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40 CFR Part 61
National Emission Standards
for Hazardous Air Pollutants

REPORT ON COMPLIANCE WITH
THE CLEAN AIR ACT LIMITS FOR RADIONUCLIDE EMISSIONS
FROM THE COMPLY CODE, VERSION 1.5d

Prepared by:

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Nuclear Reactor Lab
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Richard Myser
614-688-8220

Prepared for:

U.S. Environmental Protection Agency
Office of Radiation Programs
Washington, D.C. 20460

COMPLY: V1.5d.

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SCREENING LEVEL 2

DATA ENTERED:

Nuclide	Release Rate (curies/YEAR)
AR-41	1.490E-01

Release height 10 meters.

Building height 11 meters.

The source and receptor are not on the same building.

Distance from the source to the receptor is 15 meters.

Building width 25 meters.

Default mean wind speed used (2.0 m/sec).

NOTES:

Input parameters outside the "normal" range:

None.

RESULTS:

Effective dose equivalent: 0.1 mrem/yr.

*** Comply at level 2.

This facility is in COMPLIANCE.

It may or may not be EXEMPT from reporting to the EPA.

You may contact your regional EPA office for more information.

***** END OF COMPLIANCE REPORT *****