

**FORD NUCLEAR REACTOR**  
Docket No. 50-2, License No. R-28

**REPORT OF REACTOR OPERATIONS**

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This report reviews the operation of the University of Michigan's Ford Nuclear Reactor for the period January 1 to December 31, 2005. The report is to meet the requirement of Technical Specifications for the Ford Nuclear Reactor. The format for the sections that follow conforms to Section 6.6.1 of Technical Specifications.

**1. OPERATIONS SUMMARY**

On January 29, 2004 the license for the Ford Nuclear Reactor was modified with the following condition: "Maximum Power Level: The licensee shall not operate the reactor nor place fuel elements in the reactor grid." and the condition allowing for the possession of reactor fuel under 10CFR70 was removed.

**1.1 Facility Design Changes**

None

**1.2 Equipment and Fuel Performance Characteristics**

The reactor was shutdown permanently and ceased further operation on July 3, 2003 at 15:34 hours. No new fuel assemblies were received.

**1.3 Safety-Related Procedure Changes**

Area Monitor Calibration Procedure – updated to use of a calibrated radiation source on the bench top.

**1.4 Maintenance, Surveillance Tests, and Inspection Results as Required by Technical Specifications.**

Systems required by the Limiting Conditions for Operations of the Technical Specifications are being maintained as required by the Technical Specifications.

**1.5 Summary of Changes, Tests, and Experiments for Which NRC Authorization was Required.**

None

**1.6 Operating Staff and Safety Review Committee Changes**

Nuclear Reactor Manager – No changes

Health Physicist – No changes

Safety Review Committee – No changes

**2. POWER GENERATION SUMMARY**

Final Reactor Shutdown 07/03/2003

**3. UNSCHEDULED REACTOR SHUTDOWN SUMMARY**

Final Reactor Shutdown 07/03/2003

**4. CORRECTIVE MAINTENANCE ON SAFETY RELATED SYSTEMS AND COMPONENTS**

None

**5. CHANGES, TESTS, AND EXPERIMENTS CARRIED OUT WITH PRIOR NRC APPROVAL PURSUANT TO 10CFR50.59(a)**

None

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**6. RADIOACTIVE EFFLUENT RELEASE**

Quantities and types of radioactive effluent releases, environmental monitoring locations and data, and occupational personnel radiation exposures are provided in this section.

6.1 Gaseous Effluents - <sup>41</sup>Ar Releases – the production of Ar-41 is not possible without reactor operation.

6.2 Radiohalogen Releases - Total iodine radioactivity by nuclide based upon a representative isotopic analysis is not required because iodine was not identified in primary coolant samples nor were fueled experiments are conducted at the facility.

**6.3 Particulate Releases**

Particulate activity for nuclides with half lives greater than eight days.

	Quantity	Unit
a. Total gross radioactivity.	0.0	μCi
b. Average concentration.	0.0 x 10 <sup>-12</sup>	μCi/ml
c. Percent of 10CFR20 AEC (Airborne Effluent Concentration) limits or 1.0x10 <sup>-12</sup> μCi/ml without dilution factor.	0.0	Percent
d. Percent of AEC with a dilution factor of 400.	0.0	Percent

Gross alpha activity was not required to be measured because neither operational activities nor experimental programs could result in the release of alpha emitters.

**6.4 Liquid Effluents**

No radioactive liquid effluents were released from the facility in 2005.

**6.5 Environmental Monitoring**

The accident evaluation, monitoring, program for the Ford Nuclear Reactor facility consists of direct radiation monitors (TLD), air sampling stations located around the facility, and selected water and sewer sampling stations.

**a. TLD Monitors (Landauer X9 Aluminum Oxide)**

TLDs located at stations to the north (lawn adjacent to the reactor building), northeast (Fluids), east (Beal Avenue), south (Glazier Way), and west (School of Music) of the reactor facility are collected and sent to a commercial dosimetry company for analysis.

Location	Yearly Total (mRem)
Fluids (NE)	29.1
Glazier Way (S)	26.7
FNR Lawn (N)	33.0
Beal (E)	12.9 <sup>1</sup>
School Of Music (W)	27.2
Environmental Control	26.4

<sup>1</sup> Exposure for the 3<sup>rd</sup> quarter for Beal (E) was estimated. TLD was not recovered.

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## b. Air Particulate Samples

Five air grab samples are collected weekly from continuously operating monitors located to the north (Northwood Apartments), east (Industrial and Operations Engineering), south (Institute of Science and Technology), and west (Media Union) of the reactor facility. Each filter sample is counted for net beta activity. There are 43 samples included in this report for each location. Gas proportional counter backgrounds have been subtracted from the concentrations reported. Environmental background (University of Michigan Botanical Gardens) has not been subtracted from the mean radioactivity concentrations shown below.

Station Description	Mean Concentration	Unit
Northwood (N)	$8.5 \times 10^{-14}$	$\mu\text{Ci/ml}$
Industrial and Operations Engineering (E)	$5.1 \times 10^{-14}$	$\mu\text{Ci/ml}$
Media Union (W)	$5.0 \times 10^{-14}$	$\mu\text{Ci/ml}$
Institute of Science and Technology (S)	$4.4 \times 10^{-14}$	$\mu\text{Ci/ml}$
Environmental Control (Background)	$8.2 \times 10^{-14}$	$\mu\text{Ci/ml}$

The results of air sampling expressed in percentages of the Effluent Release Limits ( $1.0 \times 10^{-12} \mu\text{Ci/ml}$ ) are shown below.

Station Description	Percent AEC	Unit
Northwood (N)	8.5	Percent
Industrial and Operations Engineering (E)	5.1	Percent
Media Union (W)	5.0	Percent
Institute of Science and Technology (S)	4.4	Percent
Environmental Control (Background)	8.2	Percent

## c. Water Samples

No radioactive liquid effluents were released from the facility in 2005.

## d. Sewage Samples

No radioactive liquid effluents were released from the facility in 2005.

## e. Maximum Cumulative Radiation Dose

The maximum cumulative radiation dose, which could have been received by an individual continuously present in an unrestricted area during reactor operations from direct radiation exposure, exposure to gaseous effluents, and exposure to liquid effluents:

1. Direct radiation exposure to such an individual is negligible since a survey of occupied areas around the reactor building shows insignificant radiation dose rates above background from the reactor.

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## 2. Airborne Effluents

The airborne effluents from the reactor and the contiguous laboratory facility are as follows:

<u>Isotope</u>	<u>Total Release</u> ( $\mu\text{Ci}$ )	<u>Concentration</u> ( $\mu\text{Ci/ml}$ )	<u>%AEC Undiluted</u>	<u>% AEC Diluted</u>
Gross Particulate	$0.0 \times 10^{+2}$	$0.0 \times 10^{-13}$	0	0.0
Equivalent Radiation Dose (mrem)				0.0

The total airborne effluent releases are well within the allowed release concentrations when the conservative dilution factor of 400 is applied.

The equivalent total dose from all airborne effluent releases is well below the 10 mrem per year constraint described in NRC Information Notice 97-04, "Implementation of a New Constraint on Radioactive Air Effluents."

## 3. Liquid Effluents

No radioactive liquid effluents were released from the reactor and the contiguous laboratory facility in 2005.

- f. If levels of radioactive materials in environmental media, as determined by an environmental monitoring program, indicate the likelihood of public intake in excess of 1% of those that could result from continuous exposure to the concentration values listed in Appendix B, Table 2, 10CFR20, the facility is required to estimate the likely resultant exposure to individuals and to population groups and the assumptions upon which those estimates are based. Exposure of the general public to 1 AEC would result in a whole body dose of 50 mrem. The maximum public dose based on airborne and liquid effluent releases of 0.1% AEC is negligible. This dose is based on a member of the public being continuously present at the point of minimum dilution near the reactor building.

## 6.6 Occupational Personnel Radiation Exposures

Individuals for whom the annual whole body radiation exposure exceeded 500 mrem (50 mrem for person under 18 years of age) during the reporting period:

The final dosimetry reports for calendar year 2005 revealed that no staff member received an annual whole body dose greater than 500 mrem.