

1979

GEORGIA INSTITUTE OF TECHNOLOGY  
SCHOOL OF NUCLEAR ENGINEERING  
ATLANTA, GEORGIA 30332

FRANK H. NEELY  
NUCLEAR RESEARCH CENTER  
TELEPHONE (404) 894 3600

February 28, 1980

U.S. Nuclear Regulatory Commission, Region II  
101 Marietta Street, N.W.  
Atlanta, Georgia 30303

Reference: Docket 50-160; License R-97

Gentlemen:

Pursuant to section 6.7a of the Technical Specifications for the Georgia Tech Research Reactor (license R-97), the following annual report is submitted. The reporting period is January 1, 1979 through December 31, 1979 (calendar year 1979). The designation of the paragraphs follow the title and order of Section 6.7a of our Technical Specifications.

1. Operations Summary

a. Changes in Facility Design

There were no reportable changes in facility design during this reporting period.

b. Performance Characteristics

During the reporting period, the reactor was operated at power levels up to 5000 kW(t) using a 17 element core. Fuel performance has continued to be satisfactory with no known problems.

c. Changes in Operating Procedures (Safety Related)

There were no reportable changes in operating procedures during the reporting period.

d. Results of Surveillance Tests and Inspections

The surveillance tests and inspections of the facility required by the Technical Specifications were performed. Results of each of these tests and inspections are available at the site for review.

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e. Changes, Tests and Experiments Approved by USNRC

There were no changes, tests or experiments that required the approval of USNRC pursuant to 10CFR 50.59 (a).

f. Changes in Plant Staff and Committee Membership

The current plant operating staff is as follows:

Dr. M.V. Davis, Director, Nuclear Research Center  
Mr. R.S. Kirkland, Associate Director and Reactor Supervisor  
Mr. R.S. Kirkland, Acting Reactor Engineer  
Mr. R.M. Boyd, Radiological Safety Officer

The current organization of the Nuclear Safeguards Committee is as follows:

Mr. R.M. Boyd	Dr. R.N. MacDonald
Dr. M.V. Davis	Dr. D.W. Martin
Dr. B. Kahn	Dr. J.H. Russell
Mr. R.S. Kirkland	Dr. J.W. Poston

2. Power Generation

For the period January 1, 1979 through December 31, 1979, the total power generation of the reactor was 837 megawatt hours.

3. Shutdowns

During the reporting period, there were 24 unscheduled shutdowns of the reactor. These are tabulated in Table I as to the cause and preventive action taken.

4. Maintenance (Safety-related systems and components)

In July and in November, repairs were made to the regulating rod drive mechanism. The repairs included replacement of the right-angle gear drive and replacement of a broken shaft key.

In September, repairs were made to the TRA-D1 recorder. A broken lead was replaced and a lead length adjust potentiometer was cleaned.

In October, the purification pump MD-4 failed due to excessive bearing wear. In December, companion pump MD-3 failed for similar reasons. New bearings and a replacement rotor were installed in MD-4 and the unit returned to service.

In November, the motor and bearings for the Kanne circulating pump were replaced following failure of the unit.

In December, the uncompensated Ion chamber position H-18 was removed in an effort to locate the source of the many Ion Chamber Voltage Scrams. Evidence was found of loose or broken pin connections at the high temperature cable/chamber connection. A replacement chamber was installed and the high temperature cables were re-worked.

5. Changes, Tests and Experiments Without Prior USNRC Approval.

During the reporting period there were 69 approved experiments for the Georgia Tech Research Reactor. Each of these was evaluated prior to its approval with regard to Section 3.4 of our Technical Specifications. Records of each experiment are available at the site for review.

6. Radioactive Effluent Releases

a. Gaseous Effluents:

1. Gross Radioactivity Released

- a. Total gross radioactivity - noble gases:  
Curies of  $^{41}\text{Ar}$  (only detectable isotope) 73.01
- b. Average normal steady state concentration released out of stack. At 1 MW:  $3.0 \times 10^{-5} \mu\text{Ci/cc}$   
5 MW:  $1.8 \times 10^{-4} \mu\text{Ci/cc}$
- c. Maximum instantaneous concentration released:  
 $2.1 \times 10^{-4} \mu\text{Ci/cc}$  or 396.69  $\mu\text{Ci/sec}$
- d. Percent of technical specification limit: 67.8%

2. Iodine Release

- a. Total iodine radioactivity released: None detected.  
Minimum detectable release is 400  $\mu\text{Ci/year}$ .
- b. Percent of technical specification limit:  $\leq 1.7\%$

3. Particulate Release

- a. Total gross radioactivity (B, $\gamma$ ) released:  $\leq 1\mu\text{Ci}$
- b. Gross alpha radioactivity released:  $\leq 1\mu\text{Ci}$
- c. Total gross radioactivity of nuclides with half-lives greater than eight days:  $\leq 1\mu\text{Ci}$
- d. Percent of MPC for particulates with half-lives greater than eight days:  $\leq 0.01\%$

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b. Liquid Effluents

1. Total gross radioactivity ( $\beta, \gamma$ ) released excluding tritium and average concentration:  
 Total:  $1.636 \times 10^2 \mu\text{Ci}^*$   
 Average Concentration:  $3.64 \times 10^{-7} \mu\text{Ci/cc}$  before dilution with other Georgia Tech water.
2. Maximum concentration radioactivity ( $\beta, \gamma$ ) released excluding tritium to unrestricted area:  $3.84 \times 10^{-6} \mu\text{Ci/cc}$  (Co-60) before dilution
3. Total alpha radioactivity released: None detected (minimum detectability  $2 \mu\text{i/yr.}$ )
4. Total volume of liquid waste released:  $4.5 \times 10^8 \text{ ml}$
5. Total volume of dilution water:  $6.750 \times 10^{10} \text{ ml}$
6. Total radioactivity and concentration released by nuclide:  
 $103,500 \mu\text{Ci}$  Tritium  
 Average concentration:  $2.3 \times 10^{-4} \mu\text{Ci/cc}$  tritium
7. Percent of technical specification limit for total radioactivity from site:  
 $.01\%$  for gross  $\beta, \gamma$  excluding tritium  
 $9.02\%$  for tritium

7. Environment Monitoring

- a. through d. Environmental monitoring is done with 43 TLD's and 30 film badges. See Figure 1. "Environmental Monitoring Stations". TLD's are changed on a three month basis and film badges on a one month bases. The film badges are at 30 of the same locations as the TLD's

TLD Dose mrem\*\*

Highest	11	(Station 2)
Lowest	0	(Station 2)
Highest Annual Avg. Radiation Level	2.8	(Station 2)

\* The majority of this is for the laboratory sinks or operations outside the reactor containment building and is not necessarily attributable to reactor operations.

\*\* Minimum sensitivity 3 mrem

e. Maximum cumulative radiation dose from

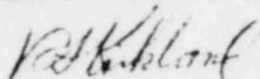
1. Direct radiation and gaseous effluent: <15 mrem/yr.
2. Liquid effluents: none or <1% 10CFR20 limits

8. Total Occupational Personnel Radiation Exposure For 1979

Three persons received greater than 100 mrem (The highest was 1820 mrem). No persons under the age of 18 years received greater than 10 mrem.

Sincerely yours,

GEORGIA INSTITUTE OF TECHNOLOGY

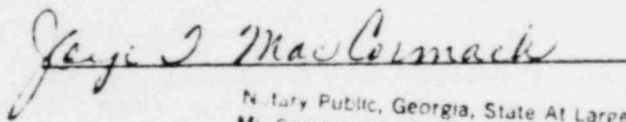


R.S. Kirkland  
Associate Director

RSK:lrn

cc: Members, Nuclear Safeguards Committee  
L.D. McDowell

Sworn to and subscribed before me  
this 27 day of Feb, 1980

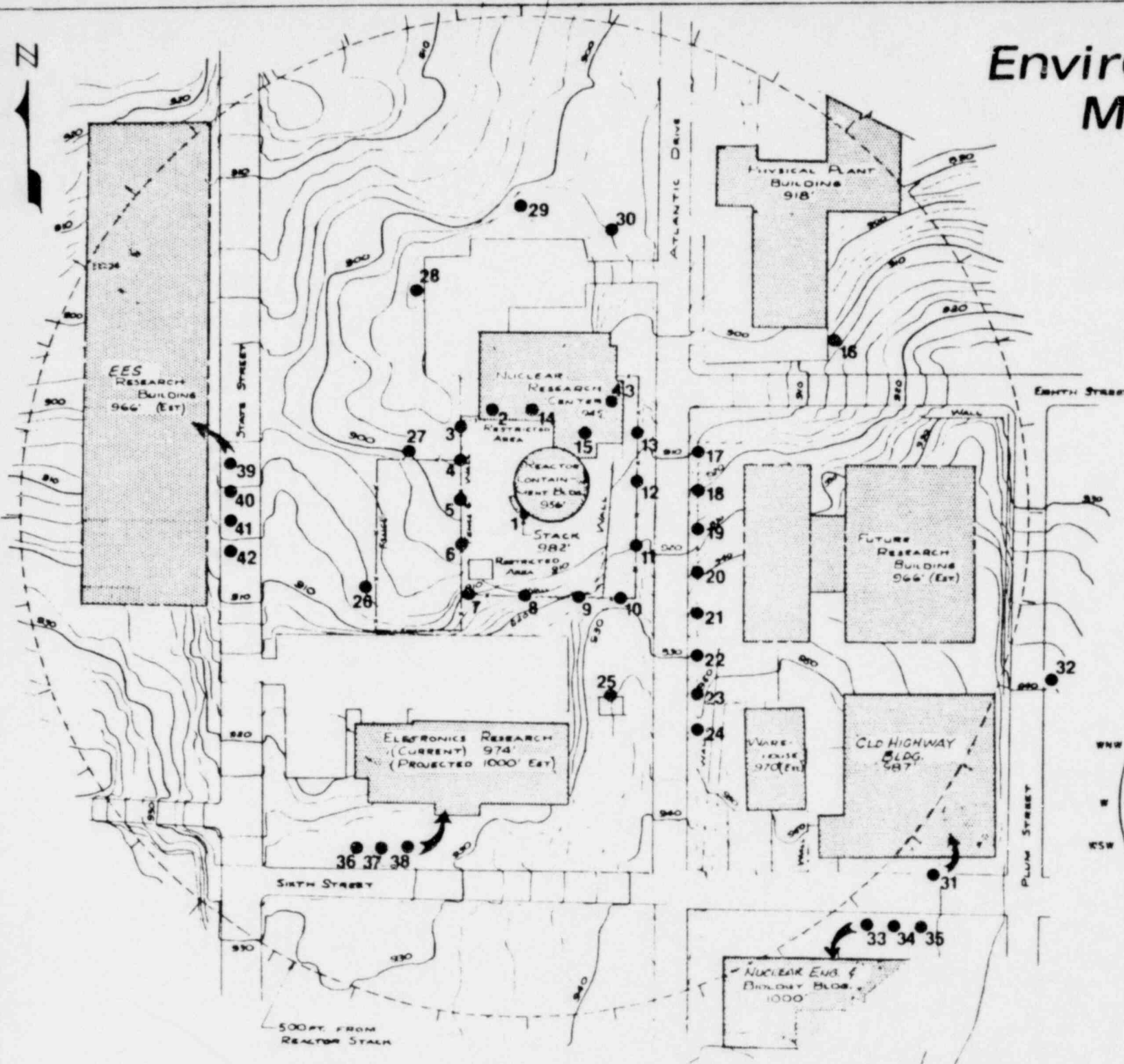
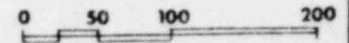


Notary Public, Georgia, State At Large  
My Commission Expires May 24, 1983

# Environmental Monitoring Stations

SEPTEMBER, 1975

SCALE  $\frac{3}{4}$  in. = 100 ft.



## ANNUAL SURFACE WIND ROSE

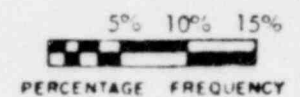
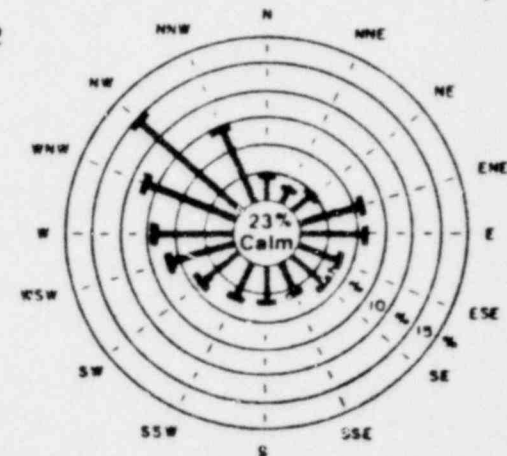


TABLE 1  
GTRR UNSCHEDULED SHUTDOWNS  
January 1, 1979 through December 31, 1979

REPORT NO.	DATE	CIRCUIT	CAUSE	PREVENTIVE ACTION
S-79-1	1-25-79	Negative Period No. 2	Clutch circuit deenergized	Cleaned switch and relay contacts
S-79-2	2-2-79	No D <sub>2</sub> O Overflow	Loss of suction on MD-4	Charge additional D <sub>2</sub> O to TD-1
S-79-3	2-2-79	No D <sub>2</sub> O Overflow	Loss of suction on MD-4	Charge additional D <sub>2</sub> O to TD-1
S-79-4	2-7-79	ALL	Operator error-electrical short	Caution operating staff
S-79-5	3-26-79	High Shield Coolant Temp	Operator error-TR2 recorder	Caution operating staff
S-79-6	6-11-79	Low Ion Chamber Voltage	Spurious	Check for faults and monitor system performance
S-79-7	6-14-79	Low Ion Chamber Voltage	Spurious	Check for faults and monitor system performance
S-79-8	6-15-79	Low Ion Chamber Voltage	Spurious	Check for faults and monitor system performance
S-79-9	7-24-79	Manual Scram	Operator Action -procedural	Caution Health Physics Staff
S-79-10	9-5-79	Manual Scram	Operator error	Caution Operating Staff
S-79-11	9-26-79	Doors Open	Electrical Power Surge	None
S-79-12	9-27-79	Low D <sub>2</sub> O Flow	Fault in FRA-D1 recorder	Repair fault
S-79-13	10-8-79	Doors Open	Leaking air connector	Replaced swivel connectors
S-79-14	10-23-79	Doors Open	Operator error	Caution operating staff
S-79-15	10-29-79	Doors Open	Door control improperly adj.	Corrected adjustment
S-79-16	11-12-79	No D <sub>2</sub> O Overflow	Operator error	Caution operation staff
S-79-17	11-27-79	Low Ion Chamber Voltage	Spurious	Check for faults and monitor system performance
S-79-18	11-29-79	Low Ion Chamber Voltage	Spurious	Check for faults and monitor system performance
S-79-19	11-29-79	Low Ion Chamber Voltage	Spurious	Check for faults and monitor system performance
S-79-20	11-29-79	Low Ion Chamber Voltage	Spurious	Check for faults and monitor system performance
S-79-21	11-29-79	Low Ion Chamber Voltage	Spurious	Check for faults and monitor system performance
S-79-22	11-30-79	Low Ion Chamber Voltage	Spurious	Check for faults and monitor system performance
S-79-23	12-12-79	Power Level	Spurious	Check for faults and monitor system performance
S-79-24	12-13-79	Magnet Actuator Amplifier	Spurious	Check for faults and monitor system performance