

1978

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

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

March 7, 1979

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

Gentlemen:

REFERENCE: Docket 50-160; License R-97

Pursuant to Section 6.7a of the Technical Specification for our facility license R-97, the following annual report is being submitted. The reporting period is January 1, 1978 through December 31, 1978 (calendar year 1978). 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:

1. In June 1978, installation was completed on a remote send/receive station for the pneumatic transfer system H-16. The station is located in room 127 of the Nuclear Research Center.
2. The operating system of the main airlock doors for the reactor containment building was modified by installing a vacuum supply and control system which functions to assist in deflating the door seals during normal opening and closing.

b. Performance Characteristics:

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

c. Changes in Operating Procedures (Safety Related)

A group of Health Physics procedures was issued and approved on 2-28-78. All the procedures carry a 9000 series number designation.

8107090169 810630  
PDR ADOCK 05000160  
R PDR

Procedures 2002 and 2003, Weekly and Daily Precritical Startup Checklists were revised to incorporate testing of certain radiation monitoring channels.

Procedure 1502, Fuel Handling In The Core, was revised to more clearly define specific limitations and restrictions.

Procedure 2500, Containment Building Health Physics Procedures, was modified to incorporate a method of checking for tritium inside the containment building.

A new Procedure, No. 3101, was issued to be used when operating certain of the experimental facilities of the reactor.

d. Results of Surveillance Tests and Inspections

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

e. Changes, Tests and Experiments Approved by USNRC

There were no tests or experiments that required the approval of the 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, 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, 1978 through December 31, 1978, the total power generation of the reactor was 1066 megawatt hours.

3. Shutdowns

During the reporting period there were 18 unscheduled shutdowns. These are tabulated in Table I as to the cause and preventive action taken.

4. Maintenance (Safety-related systems and components)

In January and again in February 1978 the power supply for the area radiation monitors failed. Repair was effected by replacement of several electronic parts.

In January, 1978, the filter paper drive motor for the moving particulate air monitor (MAP-1) failed and was replaced.

The vent system low flow alarm failed to function in June and again in November, 1978. In June, the mechanical movement was repaired. In November, a new mercury switch was installed.

5. Changes, Tests and Experiments Without Prior USNRC Approval

During the period there were 65 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) 197.43
- 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:  
 $3.0 \times 10^{-4} \mu\text{Ci/cc}$  or 472.50  $\mu\text{Ci/sec}$
- d. Percent of technical specification limit: 80.8%

2. Iodine Release

- a. Total iodine radioactivity released: None detected.  
Minimum detectable release is 400  $\mu\text{Ci/yr}$ .

b. Percent of technical specification limit:  $\leq 1.7\%$

3. Particulate Release

a. Total gross radioactivity ( $\beta, \gamma$ ) 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:  $\leq 0.01\%$

b. Liquid Effluents

1. Total gross radioactivity ( $\beta, \gamma$ ) released excluding tritium and average concentration:

Total:  $96.27 \mu\text{Ci} *$

Average Concentration:  $1.70 \times 10^{-7} \mu\text{Ci/cc}$  before dilution  
with other Georgia Tech water.

2. Maximum concentration radioactivity ( $\beta, \gamma$ ) released to unrestricted area:  $9.25 \times 10^{-7} \mu\text{Ci/cc}$  before dilution

3. Total alpha radioactivity released: None detected (minimum detectability  $2 \mu\text{Ci/yr.}$ )

4. Total volume of liquid waste released:  $3.26 \times 10^8 \text{ ml}$

5. Total volume of dilution water:  $6.750 \times 10^{10} \text{ ml}$

6. Total radioactivity and concentration released by nuclide:  
 $85,994 \mu\text{Ci}$  Tritium

Average concentration:  $2.60 \times 10^{-4} \mu\text{Ci/cc}$  tritium

7. Percent of technical specification limit for total radioactivity from site:

$< .01\%$  for gross  $\beta, \gamma$  excluding tritium

$8.60\%$  for tritium

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

7. Environment Mointoring

- 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	32	(Station 2)
Lowest	0	(Station 2)
Highest Annual Avg. Radiation Level	8.9	(Station 2)

- e. Maximum cumulative radiation dose from

1. Direct radiation and gaseous effluent: <50 mrem/yr.
2. Liquid effluents: none or <1% 10CFR20 limits

8. Total Occupational Personnel Radiation Exposure For 1978

Two persons received greater than 500 mrem (one was 780 mrem).  
No persons under the age of 18 years received greater than 10 mrem.

\*Minimum sensitivity 3 mrem

If you have any questions on the above information, please contact me.

Sincerely yours,

GEORGIA INSTITUTE OF TECHNOLOGY

R.S. Kirkland  
Reactor Supervisor

RSK:lrn

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

Sworn to and subscribed before me  
this 8 day of March 1979

Doris L. Manning

TABLE I

## GTRR UNSCHEDULED SHUTDOWNS

January 1, 1978 - December 31, 1978

Report No.	Date	Circuit	Cause	Preventive Action
78-1	3-15-78	Control Air Low Pressure	Sticking solenoid valve	Monitor system performance; replace valve
78-2	3-16-78	Period #2 (Positive)	Operator error	Caution operating staff
78-3	4-6-78	Magnet Actuator Amplifier	Possible loose connector	Replace connector
78-4	4-20-78	Power Trip #1	Spurious	Check for faults and monitor performance
78-5	5-5-78	Magnet Actuator Amplifier	Possible loose connector	Replace connector
78-6	7-13-78	High D <sub>2</sub> O Temp. (#1)	Operator error	Caution operating staff
78-7	7-18-78	Period Trip #2 (Negative)	Spurious	Check for faults and monitor performance
78-8	8-7-78	High D <sub>2</sub> O Temp. (#2)	Operator error	Consider replacement of channel #2
78-9	8-7-78	Magnet Actuator Amplifier	Spurious	Check for faults and monitor performance
78-10	8-7-78	High D <sub>2</sub> O Temp. (#2)	Operator error	See 78-8
78-11	8-7-78	Power Trip #2	Operator error	Caution operating staff
78-12	8-7-78	Period Trip (Negative)	Spurious	Check for faults and monitor performance
78-13	8-8-78	Magnet Actuator Amplifier	Spurious	Check for faults and monitor performance
78-14	8-8-78	Magnet Actuator Amplifier	Spurious	Check for faults and monitor performance
78-15	9-20-78	Control Air Low Pressure	Sticking control valve	Monitor system performance; change valve
78-16	11-14-78	Low Shield Coolant Flow	Pump cavitation; low tank level	Add water to system, repair coil
78-17	12-12-78	Doors Open	Spurious	Check for faults and monitor performance
78-18	12-18-78	High Bismuth Coolant Temp.	Mechanical binding in recorder	Cleaned contacts and oiled drive mechanism

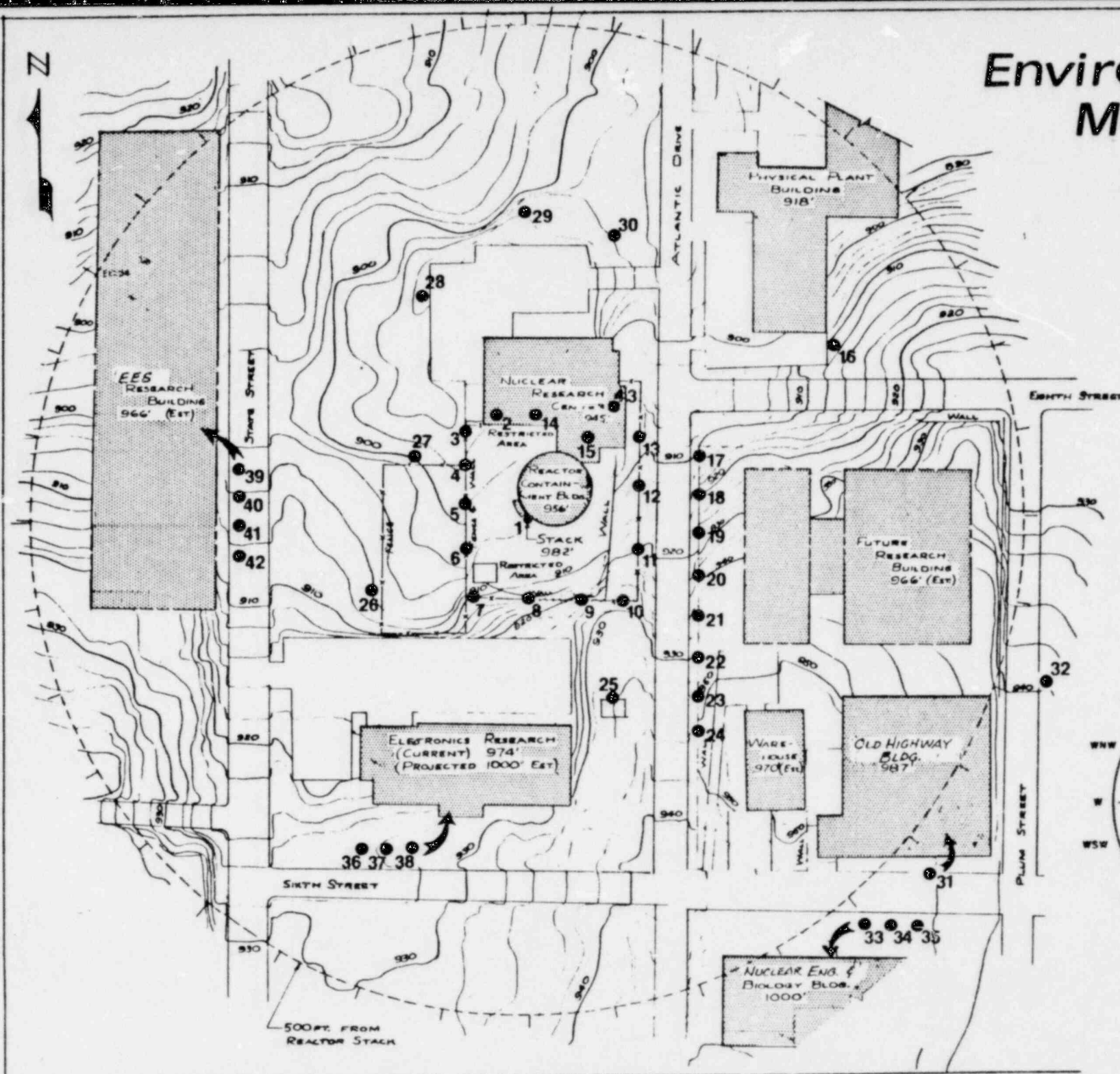


# Environmental Monitoring Stations

SEPTEMBER, 1975

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

0 50 100 200



## ANNUAL SURFACE WIND ROSE

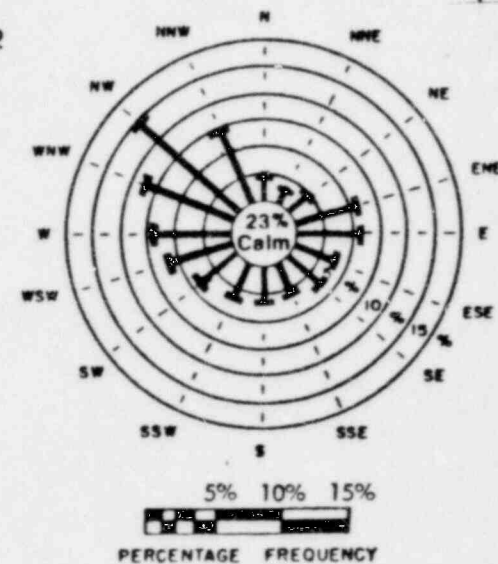


FIGURE 1