1980

GEORGIA INSTITUTE OF TECHNOLOGY
SCHOOL OF NUCLEAR ENGINEERING
ATLANTA, GEORGIA 30332
March 13, 1981

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

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 Gerogia Tech Research Reactor (License R-97), the following annual report is submitted. The reporting period is January 1, 1980 through December 31, 1980 (calendar year 1980). The designation of the sections below 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 the 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

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. Documentation of each of the tests and inspections are available at the site for review.

e. Changes, Tests and Experiments Approved by USNRC

There were no changes, 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. J.L. Russell, 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.L. Russell
Mr. R.S. Kirkland	Dr. J.W. Poston

2. Power Generation

For the period January 1, 1980 through December 31, 1980, the total power generation of this reactor was 1007 megawatt hours.

3. Shutdowns

During the reporting period there were thirty-six (36) 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)

a. In March and April, gasket failure in heat exchanger HX-D1 caused partial tube blockage in downstream heat exchanger HX-D2. A new gasket was installed.

b. In March and April, a series of spurious power trip scrams led to the replacement of an uncompensated ion chamber in one of the high flux monitor channels.

c. In April, following a containment building pressure test, the gasket of the inner personnel air lock ruptured. A new gasket was installed and tested.

d. In July, a reactor outlet isolation valve failed to close during a test because a failed retainer ring impeded the closing mechanism. The valve operator mechanism was overhauled and tested.

e. In August and again in December, a leak developed in the containment building truck door gasket. Repairs and testing were done each time. The gasket is scheduled for replacement in spring 1981.

5. Changes, Tests and Experiments Without Prior USNRC Approval

During the reporting period there were sixty (60) 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}A (only detectable noble gas)		237.49
b). Average normal steady state concentration released out of stack.	At 1 MW:	3.0×10^{-5} µCi/cc
	5 MW:	1.8×10^{-4} µCi/cc
c). Maximum instantaneous concentration released:		2.0×10^{-4} µCi/cc
		or
		378.00 µCi/sec
d). Percent of technical specification limit:		64.6%

2. Iodine Release

a). Total iodine radioactivity released: None detected. Minimum detectable release is 400 µCi/year	None
b). Percent of technical specification limit:	$\leq$1.7%

3. Particulate Release

a). Total gross radioactivity (β,γ) released:	$\leq$1µCi

b). Gross alpha radioactivity released:	$\leq$1 µCi
c). Total gross radioactivity of nuclides with half-lives greater than eight days:	$\leq$1 µCi
d). Percent of MPC for particulates with half-lives greater than eight days:	$\leq$0.01%

b. Liquid Effluents

1. Total gross radioactivity (β,γ) released excluding tritium and average concentration: Total	59.3 µCi*
Average Concentration:	2.0×10^{-7} µCi/cc before dilution with other Georgia Tech water.
2. Maximum concentration radioactivity (β,γ) released excluding tritium to unrestricted area:	1.7×10^{-6} µCi/cc before dilution
3. Total alpha radioactivity released: (minimum detectability 2 µCi/year)	None
4. Total volume of liquid waste released:	3.2×10^{8} ml
5. Total volume of dilution water:	6.750×10^{10} ml
6. Total radioactivity and concentration released by nuclide:	68,920 µCi Tritium
Average concentration:	2.1×10^{-4} µCi/cc tritium
7. Percent of technical specification limit for total radioactivity from site:	.01% for gross β,γ excluding tritium
	7.0% 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. Environmental Montoring

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. Film badges are at 30 of the same locations as the TLD's

	TLD Dose mrem**	
Highest	349***	(Station 9)
Lowest	0	(Station 9)
Highest Annual Average Radiation Level	87	(Station 9)

** Minimum sensitivity is 3 mrem

*** This dose was not from GTRR operations but rather from sealed sources used for calibration of health physics instruments.

e. Maximum cumulative radiation dose from:

1. Direct radiation and gaseous effluent: ≤16 mrem/yr.

2. Liquid effluents: none or ≤1% 10CFR20 limits

8. Total Occupational Personnel Radiation Exposure For 1980

Three persons received greater than 500 mrem (The highest was 1820 mrem). No persons under the age of 18 years received greater than 10 mrem.

GEORGIA INSTITUTE OF TECHNOLOGY

R.S. Kirkland
Associate Director

RSK:lrm

CC: Members, Nuclear Safeguards Committee
L.D. McDowell (3)

Sworn to and subscribed before me
this 16 day of March, 1981

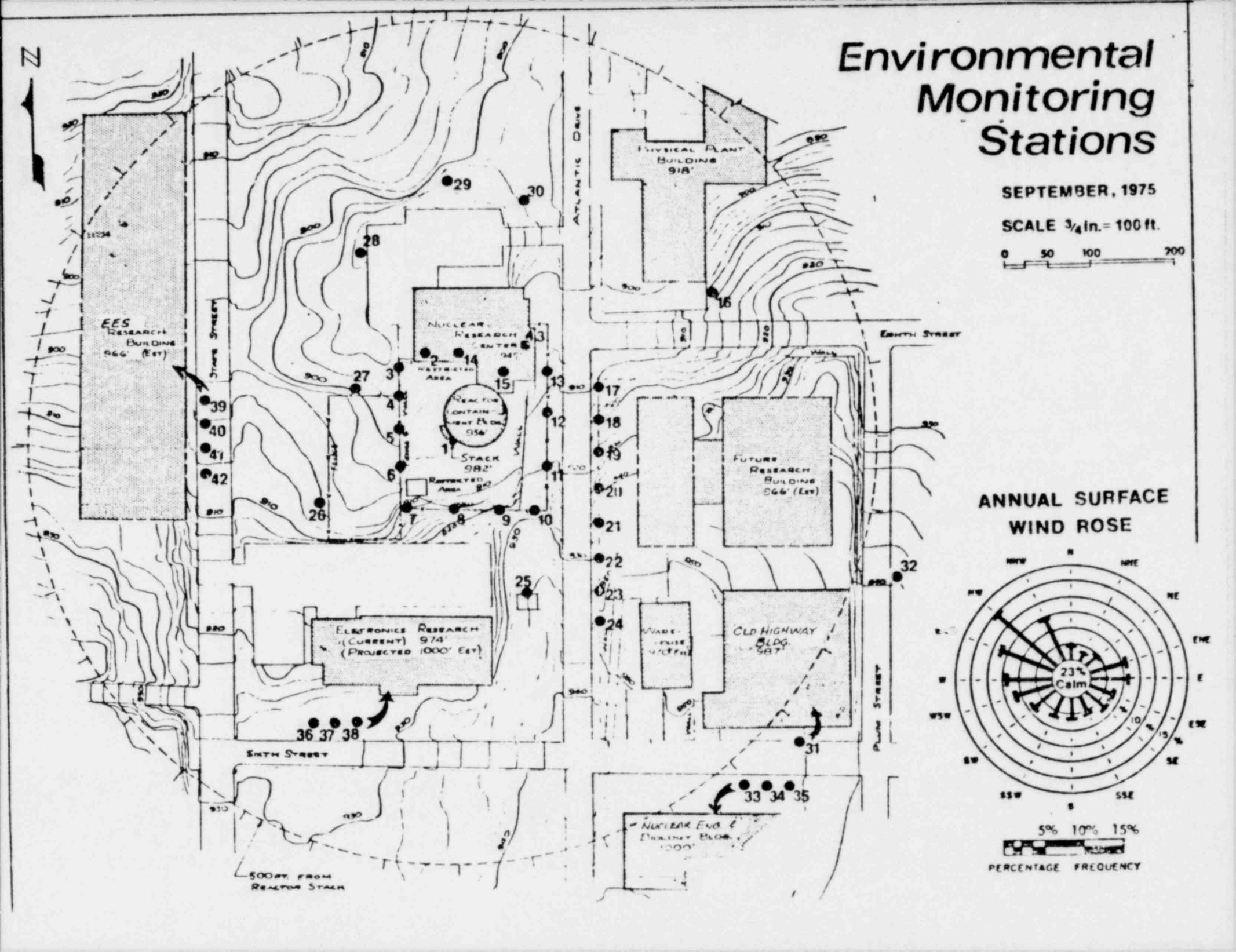
Joyce I. MacCormack

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

TABLE I
GTRR UNSCHEDULED SHUTDOWNS
January 1, 1980 through December 31, 1980

REPORT NO.	DATE	PRIMARY CIRCUIT	CAUSE	PREVENTIVE ACTION
80-1	1-8-80	Period Trip - Neg.	Spurious	Monitor System performance
80-2	1-15-80	Period Trip - Neg.	Operator error (trainee)	Cautioned operating staff
80-3	1-18-80	Period Trip-Neg.	Spurious-possible loose conn.	Monitor system performance
80-4	1-18-80	Power Level No. 1	Spurious	Monitor system performance
80-5	1-21-80	Period Trip - Neg.	Found loose connections in power supply - see 80-2,3,4	
80-6	1-23-80	Low D_2O Flow	Apparently spurious	Monitor system performance
80-7	2-22-80	Low D_2O Flow	Slide wire contact came loose	Monitor, investigate replacement of slidewire assembly
80-8	3-3-80	No D_2O Overflow	Operator error	Cautioned operating staff
80-9	3-3-80	Doors Open	Operator error	Cautioned operating staff and students
80-10	3-5-80	Low D_2O Flow	Gasket plugging tubes-HXD2	Replaced gasket in HX-D1
80-11	3-27-80	Magnet Actuator Amplifier	Apparently spurious	Monitor system performance
80-12	3-27-80	Power Trip No. 2	Apparently spruious	Monitor system performance
80-13	3-27-80	Magnet Actuator Amplifier	Apparently spurious	Monitor system performance
80-14	3-2-80	Magnet Actuator Amplifier	Operator error-manual scram	Establish better communication for alarm testing
80-15	4-10-80	Power Level No. 2	Spurious-suspect faulty chamber	Monitor system performance
80-16	4-10-80	Power Level No. 2	Spurious-suspect faulty chamber	Monitor system performance
80-17	4-10-80	Power Level No. 2	Spurious-suspect faulty chamber	Monitor system performance
80-18	4-10-80	Power Level No. 2	Spurious-suspect faulty chamber	Monitor system performance
80-19	4-11-80	Power Level No. 2	Spurious-suspect faulty chamber	Replace chamber
80-20	4-23-80	Doors Open	Operator error	Cautioned operating staff and students

REPORT NO.	DATE	PRIMARY CIRCUIT	CAUSE	PREVENTIVE ACTION
80-21	5-6-80	Magnet Actuator Amplifier	Faulty detector being tested	Replace detector
80-22	5-22-80	Doors Open	Operator error	Cautioned staff and students
80-23	6-15-80	Magnet Actuator Amplifier	Apparently Spurious	Monitor system performance
80-24	6-24-80	High D_2O Temperature	Apparent recorder malfunction	Monitor system switch, consider replacement of the switch mechanism
80-25	6-25-80	High D_2O Temperature	Apparent recorder malfunction	Cleaned scanner switch; consider replacement of the switch mechanism.
80-26	7-23-80	Low D_2O Flow	Apparently spurious	Monitor system performance
80-27	9-5-80	All	Power failure	None
80-28	10-27-80	Magnet Actuator Amplifier	Apparently spurious	Monitor system performance
80-29	10-27-80	Power Level No. 2	Apparently spurious	Monitor system performance
80-30	10-28-80	Low D_2O Flow	Slidewire malfunction	Monitor performance, replace amplifier and possibly the slidewire unit
80-31	10-28-80	Low D_2O Flow	Slidewire malfunction	Monitor performance, replace amplifier and possibly the slidewire unit
80-32	10-29-80	Low D_2O Flow	Recorder malfunction	See 80-31
80-33	10-30-80	Low D_2O Flow	Recorder malfunction	See 80-31
80-34	10-31-80	Low D_2O Flow	Recorder malfunction	See 80-31
80-35	11-4-80	Doors Open	Operator error	Cautioned staff and students
80-36	12-2-80	Period Trip	Operator error	Cautioned operation staff


Environmental Monitoring Stations
SEPTEMBER, 1975
SCALE 3/4 in. = 100 ft.
0 50 100 200
N
ANNUAL SURFACE WIND ROSE
23% Calm
5% 10% 15%
PERCENTAGE FREQUENCY
EES Research Building 966' (Est)
Physical Plant Building 918'
Nuclear Research Center 947'
Restricted Area
Reactor Containment Bldg. 956'
Stack 982'
Future Research Building 966' (Est)
Electronics Research (Current) 974' (Projected 1000' Est)
Old Highway Bldg. 987'
Nuclear Eng. & Physics Bldg. 1000'
Atlantic Drive
Stark Street
Eighth Street
Ninth Street
Plum Street
500 ft. from Reactor Stack