NORTHROP

March 14, 1983

U.S. Nuclear Regulatory Commission
Region V
Office of Inspection and Enforcement
1450 Maria Lane, Suite 210
Walnut Creek, California 94596

Attention: Director, Office of Inspection and Enforcement

Reference: (a) Technical Specifications for the Northrop Corporation TRIGA Mark F Reactor, dated 18 February 1971

Enclosure: (1) Northrop Research and Technology Center, "Natural Environmental Radioactivity Survey for the period of September 1981 through August 1982"

Gentlemen:

The following information is submitted, pursuant to Section H.7.e. of reference (a):

1. Administrative and Personnel

In July, 1982, Mr. David Wood joined the reactor staff, and is presently a reactor operator trainee.

The immediate administration of the reactor remained unchanged during the year, but in October, 1982 Dr. Steve Lukasic succeeded Dr. William Chalmers as Vice President and General Manager of the Northrop Research and Technology Center.

2. Experiments

During the calendar year, 125 experiments were performed at the Northrop Reactor. The following is a summary of the types and locations of the experiments:

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a) Types of Experiments — Number of Experiments

	Types of Experiments	Number of Experiments
i)	Radiation Effects	107
ii)	Isotope Production	4
iii)	Miscellaneous (dosimetry detector calibration, etc.)	14

b) Location of Experiments — Number of Experiments

	Location of Experiments	Number of Experiments
i)	Dry Exposure Room	119
ii)	In-Core	5
iii)	Beam Ports	1
iv)	In-Pool	Ø
v)	Pneumatic Tubes	Ø

3. Operating Data

Operating data for the reactor during 1982 is as follows:

a)	Time Critical	80.173 Hours
b)	Integrated Power	23.250 MwH
c)	Number of Pulses	51
d)	Worth of Pulses	$137.50
e)	Times Taken Critical	219

4. Facility Changes

The only facility changes made during 1982 were related to the "Phase II" upgrading (modification) of reactor instrumentation:

a) Due to incompatability with the new instrumentation, the "new", recently installed regulating rod drive motor was removed and replaced with the older reg. rod drive motor;

b) The range switch, flux controller, NV/NVT, recorder, and related circuits were modified and/or replaced, according to the manufacturers instructions;

5. Inadvertent Scrams

During the year there were seven(7) inadvertent scrams:

a) A drop in the incoming electrical power caused a loss-of-power scram. The power supply was checked, some vacuum tubes replaced, and the system returned to operation.

b) A period meter scram occurred when its needle stuck momentarily, then overshot after it became free. The meter was checked and found to operate properly.

c) Sensitive settings in the recorder scram circuit of the new flux controller module caused one scram. These settings were adjusted and rechecked prior to resumption of operation.

d) While making a 1 megawatt run, the ambient temperature and gamma buildup caused enough of an increase in the percent power meter reading to scram the reactor. This meter was checked, and found to operate normally.

e) During one run, the regulating rod magnet power lamp burned out, interrupting power to the magnet, and allowing the regulating rod to drop back into the core. The bulb was replaced, checked, and the operation resumed. It should be noted that this involved only the regulating rod, and did not scram the other control rods.

f) Two consecutive recorder scrams occurred while conducting a reactor run to check the setting of a compensated ionization chamber. They both were caused by electrical transients: the first, when changing the linear recorder switch from the "1 Mw" to the "Calibrate" position; and the second, when later switching out of the "Calibrate" position. The switch was checked and appeared to be functioning properly.

6. Maintenance

The more significant maintenance performed during the year consisted of:

a) Inspection and calibration of the control rods;

b) Inspection and measurement of the fuel elements;

c) Replacing the filters in the water treatment loop of the primary coolant system;

d) Replacing the vacuum tubes in the regulated power supply which may have been affected by a dip in the incoming electrical power and the subsequent reactor scram;

e) Substitution of temporary power supplies for the "resident" power supply in the log channel circuit, after the latter was damaged by an electrical short;

f) Replacing the op-amp in the new range switch circuit, after the former was damaged by an electrical transient;

g) Replacing the air pump motor on the stack (RM1) monitor, a couple of times and then, finally, replacing the motor and the air pump, after the problem with the short life of the motors was discovered to be caused by a defect in the pump itself.

7. Experiments

Only routine experiments were performed during the year.

8. Radioactive Effluent

A summary of the radioactive effluent released during 1982 is as follows:

a) Effluent released to the air:

1) Monthly averages of Argon-41 (in μ Ci/ml)

January	none released
February	2.73×10^{-10}
March	1.97×10^{-10}
April	7.25×10^{-10}
May	1.12×10^{-11}
June	7.49×10^{-10}
July	5.94×10^{-11}
August	1.15×10^{-9}
September	1.80×10^{-10}
October	6.66×10^{-10}
November	4.59×10^{-10}
December	2.41×10^{-10}

2) Total activity of Argon-41 released to the air was 3.805 curies.

b) There was no liquid waste released during 1982.

9. Environmental Survey

A description of the environmental survey program performed outside the facility is attached as enclosure 1.

10. Personnel Radiation Exposures

Personnel radiation exposures during 1982 are summarized as follows:

a) Radiation exposures to Reactor and Health Physics Personnel averaged 6.2 milliroentgens per individual per week.

b) Radiation exposures to Reactor visitors averaged 0.77 milliroentgens per individual per day. This average does not include exposures to the visitors from one customer whose experiments required higher than average exposures. Treated separately this latter group averaged 8.01 milliroentgens per visitor per day. If this group is included in the overall total, the radiation exposures to all reactor visitors would average 2.18 milliroentgens per day.

c) No personnel over-exposure occurred during this period of Reactor operation.

11. Reactor Surveys

a) Significant radiation levels documented in the following facility areas:

i) The shielded door to the dry exposure room is monitored every time it is opened. There were 196 such openings with an average radiation level of 11.7 milliroentgens per hour per opening, and a maximum level for one opening of 100 milliroentgens per hour.

ii) The maximum recorded level in a restricted area (where visitors are normally not allowed without staff supervision) was 2.25 roentgens per hour. This occurred on the Reactor deck during a transfer of an in-core experiment. Non-staff, non-essential personnel are not allowed in the vicinity during such operations.

b) Radioactive contamination surveys within the Reactor were made throughout the year.

i) In the general area (where Reactor visitors have free access) the maximum contamination level found was 71 disintegrations per minute (α, β, γ) on a work table used in the Hot Cell in loading calibrators. The table was decontaminated.

ii) Maximum contamination levels found in restricted areas were 239 disintegrations per minute (α, β, γ) on a pair of Hot Cell manipulator fingers and 153 disintegrations per minute (α, β, γ) on a Reactor deck table used during the transfer of in-core experiments. The fingers and table were decontaminated.

Very truly yours,

Daniel W. Avant, Executive Secretary
Corporate Radiation Committee

DWA:rb

Encl.

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