NORTH CAROLINA STATE UNIVERSITY | AT RALEIGH

SCHOOL OF ENGINEERING

DEPARTMENT OF NUCLEAR ENGINEERING
NUCLEAR REACTOR PROGRAM
BOX 5636 ZIP 27607

4 January 1980

ADM 1-1-15

Mr. William Gammill
Acting Assistant Director for
Operating Reactors
US Nuclear Regulatory Commission
Washington, D.C. 20555

Docket No. 50-111

SUBJECT: Supporting Information to our Letter dated December, 1979.

Reference is made to our letter of 10 December 1979, signed by the NCSU Chancellor and me, subject "Modification to Request for an Extension to the R-63 Reactor License". The following information was most recently requested by your office, (Mr. Pete Erickson).

1. Safety Analysis as pertains to our request to delete area and stack monitors, daily air samples and weekly smear surveys; i.e. radiation and contamination surveillance.

Basis: The shipment of the irradiated fuel to SROO and the transfer of unirradiated fuel to the PULSTAR Bay removes all fissile material from the R-3 Bay. The shipment of irradiated fuel removes all fission products. Our weekly smear surveys in the R-3 Bay are negative, hence, the surfaces (floor, etc.) are not contaminated. The daily air samples do not evidence any airborne activity. The water was drained from the reactor system in February 1974, and the system has been dry since.

The activation products in the reactor system and in the biological shield remain in place. The biological shield is effectively sealed in that all beam ports and thermal columns are locked each by a three combination tumbler lock. The top of the reactor (top of shield and tank) is closed by a 2" steel plate. The crane control box, required to move this plate, is locked to prevent unauthorized use.

The R-3 Bay will be retained as a Restricted Area (and Radiation Area) for two reasons:

a. The activation products cited above; and

b. The Gamma Facility that is located there, and which is licensed by the State of North Carolina.

1735 027 A020 S 1/1

8001110422

Therefore, the potential hazards related to the presence of fissile material (irradiated and unirradiated) has been removed. Hence, the surveillance associated with this hazard is now unnecessary. Pages 15, 16 and 81, Hazards Summary Report for the North Carolina State University Training Reactor are germane to this request and a copy of each is attached. Those paragraphs that we request to be deleted are:

Page 15-16, f.	Building Monitoring - in its entirety.
Page 16, g.	Campus Monitoring - that part as changed by "Change 1, dated 8-2-72".
Page 81 G.	Sabotage, (5) - Weekly inspection. Delete (5) in its entirety.

2. A request to transfer the remaining R-3 unirradiated SNM and the 5 Ci, PuBe start-up source to our R-120 license (Docket No. 50-297) will be forwarded in the very near future. This action, if approved, will remove all SNM from the R-63 license.

3. A plan to dismantle/decommission the R-3 reactor will be prepared promptly, submitted to our Radiation Protection Council for their review and approval, and then transmitted to NRC.

Respectfully submitted,

R.F. Saxe, Head
Department of Nuclear Engineering

RFS:RDC:nws

Enclosure

cc: R.F. Saxe
T.C. Bray
R.D. Cross

channels, the two separate safety channels usually found in instrumentation systems are eliminated. An additional factor of safety is provided since a difference trip is used between the two channels which will detect failure of either channel and shut down the reactor before a possible runaway could get started.

e. Gamma Channel

The reactor gamma level is monitored by an ionization chamber and current amplifier. A fast trip is incorporated in this channel.

E. f. Building Monitoring

The facility monitoring is done by beta-gamma sensitive geiger counters and ionization chambers. ~~Three~~ Two air equivalent ionization chambers are located in the reactor building for direct radiation monitoring. Their outputs are amplified and fed into a multipoint recorder for a permanent record. If the level becomes excessive at any chamber, an alarm is sounded in the control room. | 2

The exhaust air from the reactor building is monitored in the stack by a geiger counter feeding a rate meter and recorder, or by D.M. monitor feeding the same recorder. An alarm is given in case of an excessive | 2

1735 029

radiation level.

The waste water from the building is monitored in holdup tanks before release to the sewage system. If the radiation level becomes too high in any holdup tank it is automatically shut off so that no more waste is released to the sewage system and an alarm is given.

g. Campus Monitoring

Thermoluminescent (TLD) dosimeters are located at least four locations on the campus around the reactor building. These dosimeters consist of LiF chips sealed in a weather/light-proof packet. The dosimeters measure the ambient radiation in the vicinity of their particular location. The locations of the dosimeters with respect to both the reactor building and the facility stack are such that the campus is monitored in a representative way, and stack effluents are monitored with the consideration of the prevailing wind being taken into account. The dosimeters are read monthly and the records are maintained permanently.

Change 1 dated 8-2-72

The automatic control system provides both for control of the reactor operating level and for the reactor period. A signal from one of the linear level current amplifiers is used to provide an indication of the reactor power. The output of the Log N channel is differentiated to give reactor period information. These two signals are added together to produce a voltage which is compared to a "level set"

1735 030

Change 2 dated 3-18-74

building is constructed is sufficiently high above the surrounding area so that the possibility of flood damage in the reactor is negligible.

G. Sabotage

A considerable number of precautions against sabotage have been incorporated into the reactor design:

(1) All doors, windows and other outside openings in the building are kept closed and locked except when authorized personnel are present.

(2) The doors to the reactor room, particularly, are provided with good locks, which can be opened only after electric release of the lock from the Control Room.

(3) Electrical current to the crane is turned off and the switches are locked except when authorized personnel are present.

(4) All external openings into the concrete shield of the reactor are closed when not in use, by "burglar proof", combination-lock, safe doors.

(5) A ~~daily~~ weekly inspection of the reactor and its control apparatus is made by a staff member. These inspections are made on normal working days and on the holidays and Sundays that the reactor is used. 2

(6) The reactor building and the area about the building is kept well lighted at night.

1735 031

Revised 3-18-74