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## RADIATION LABORATORY

October 22, 1998

USNRC  
Document Control Desk  
Washington, D.C. 20555

Re: Facility Docket Number 50-223, Facility License Number R-125

Dear Mr. Dragoun:

This letter is being submitted as required under the University of Massachusetts Research Reactor (UMLRR) Technical Specifications, Section 6.6 for reporting Unusual Events within 30 days.

A routine semi-annual surveillance was recently performed to verify operability of the reactor safety system protective channels (Technical Specification 4.2.2, UMLRR Special Procedure 23). During this surveillance, it was determined that a condition now exists involving a possible single failure that could potentially result in the safety system losing the capability to perform its safety function. The condition only affects operations in the natural convection (up to 100 kW).

### DESCRIPTION

As part of instrumentation upgrades to replace original vacuum tube based instruments, new power measuring instruments were purchased from Sorrento Electronics (General Atomics) and received in March 1996. The replacement instruments included two linear power channels (NMP 1000) and one logarithmic/period channel (NLI 1000). A safety review of the new channels was completed and submitted to the reactor safety subcommittee in February 1997. The channel that is the subject of this report is one linear power channel installed in March 1998. The second (redundant) linear power channel is still the original General Electric pico-ammeter.

The original linear power channels and new linear power channels have several differences. Two such differences relate directly to the reactor safety system.

The first difference concerns the electronic or "fast" scram (see UMLRR FSAR 4.4.14-15). The original channel included an internal 12v.d.c. power supply that fed directly into the external trip logic element. The trip logic element in turn provides a 12v.d.c. signal to the trip actuator amplifiers (scram magnet power supplies). A reactor high-power trip on the original linear power channel will cause an electronic loss of the 12v.d.c. signal. In addition, a relay will open that is connected in series to a scram bus relay which provides operating power to the logic element. The new linear power channel does not have an internal 12v.d.c. power supply for purposes of an electronic scram. The new linear power channel does have a trip logic output that operates via an optically isolated phototransistor. To reproduce the electronic scram function, the trip logic output has been interfaced to the original trip logic element using an in-house designed interface circuit and a commercial 12v.d.c. power supply.

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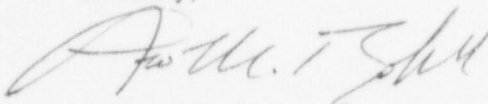
The second difference is the item of concern. The UMLRR can be operated in two modes, natural convection (up to 100 kW) and forced convection (up to 1MW). A power mode selector switch on the control room nuclear instrumentation cabinet can be placed in either the 0.1 or 1 MW position. In the lower power position, a relay is energized by a circuit through the original linear power channels' manual range switch, and the coolant header gate. If the coolant header gate is open (no forced flow present) and the operator up-ranges the switch beyond 100 kW, the relay opens and the reactor will scram. The new linear power channel is currently not wired to operate in the same manner. The second linear power channel is still the original General Electric pico-ammeter that is capable of operating as designed. Under this configuration, in the natural convection mode, this portion of the reactor safety system does not appear to meet the single failure criterion.

#### CORRECTIVE ACTION

The UMLRR is in the process of contracting with an electronics engineer to make modifications to both the installed and the uninstalled new linear power channels that will meet the original design as described in the UMLRR Final Safety Analysis Report. In the interim, a Standing Order has been issued and the operating staff informed that all UMLRR operations, regardless of power level, are to be in the forced convection mode. The present configuration of the linear power channel meet the design criteria for forced convection mode as described in the FSAR.

For further information or questions concerning this matter, please contact me at the above telephone number.

Sincerely,



Leo M. Bobek,  
Reactor Supervisor

Cc: Mr. Thomas Dragoun, NRC Region I  
UML Reactor Safety Subcommittee  
Mr. Ronald Tooker, Chief Reactor Operator