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U.S. Nuclear Regulatory Commission
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Dear Reader:

SUBJECT: ADDITIONAL INFORMATION

This responds to a letter from T.S. Michaels dated August 16, 1996. It responds to questions regarding requests for exemption from certain parts of the regulation, the bases for such requests, and detailed information regarding the facility.

The response to questions as posed is attached. Should you need further information, please contact me or Mary Montesalvo, Radiation Services Manager.

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Reactor Supervisor

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RESPONSES TO 8/16/96 REQUEST FOR ADDITIONAL INFORMATION

EXEMPTION REQUESTS FOR GAMMA CAVE AT THE UNIVERSITY OF MASSACHUSEITS LOWELL RESEARCH REACTOR

1. The minimum number of Cobalt strips meeting the scenario posed is one strip. The source strengths vary from 70 Ci to 1100 Ci. Treating the weakest source as a point and taking the distance to the door opening of 12 feet, D calc = 7 R/hr. This is consistent with repeated measurements using a 3-strip rack of activity 251 Ci which gave 50R/hr at 8 3/4 ft from the window. The meter used for cave entry monitoring is used on a low scale of 0-5 millirem/hr.

2. See above.
The strips continue to provide useful radiation levels after 3 half-lives at Lowell; no projection has been made regarding the end of useful life of the cobalt strips. This question will need to be revisited near the time of reactor license expiration in 2015.

3. In the first 8 months of 1996, the radiation monitoring system was checked on 69 days of 143 days available for reactor operation. At the time of system checkout on 13 of those days, the gamma cave was in use and that portion of the system could not be tested since entry to the access corridor was prohibited. The contact Q1 is a normally closed relay contact in the Radiation Monitoring System module (Tracerlab TA-30 Station Indicator) which is held open by bypass current flowing through a parallel gated SCR. Removal of power or failure of components on the module results in Q1 closing and initiating the warnings and alarms as though a high radiation level were detected. Once the contact has closed, manual action is required for reset.

4. The in-cave detector and the in-cave cable ends failed from a combination of high radiation levels and damp environment. The in-cave system has not functioned at any time in the memory of present staff members.

5. The bell warning of cobalt source move can be heard clearly in the Gamma Cave.

6 In order to answer the question in detail, the wiring would have to be disassembled. Functional tests show that the red light is activated when the in-cave alert switch is thrown.

7. The radiation survey meter is held against a check source fastened to the wall to the left of the cave door prior to unlocking the door.

8.	<u>36.33 Requirement</u>	<u>UMLRR TS or Design Feature</u>
(c)	A means to replenish water losses to the pool.	TS 2.1.3 The true value of pool water level shall not be less than 24 feet above

	the center line of the core. A supply system described in Safety Report fulfills this TS requirement.
(d) A visible indicator must be provided in a clearly visible location if the pool water level is below normal low water level.	An audible and visible alarm is sounded at the continuously manned police dispatch console if pool level is -1 3/4". A low pool level alarm is sounded in the control room at -2 1/2" and a scram occurs (with visible and audible alarms) at -7 1/2" per TS table 3.2.
(e) Pools must be equipped with a purification system capable of maintaining 20 microsiemens per cm or less and with a clarity so that the sources can be seen clearly.	TS 3.8.1 The conductivity of the pool water shall be maintained at a value of 5 microsiemens per cm or less averaged over a month.
(f) A physical barrier must be used around or over irradiator pools during normal operation to prevent personnel from accidentally falling into the pool.	The UMLRR pool is designed so that a waist-high pool wall surrounds the pool. Workstations such as the gamma cave window and the rolling work platform have railings to further provide protection against falling.
(g) If long handled tools or poles are used in irradiator pools, the radiation dose rate on the handling areas may not exceed 0.02 millisievert per hour.	The handling tools used are water-filled hollow tubes without streaming paths. An area monitor at the handling area alarms in the central control room at 0.03 millsievert per hour and locally and again in the control room at 0.1 millisievert per hour.

9. In regard to 36.37(c), the operator uses an operable and calibrated radiation survey meter located just outside the control room and a flashlight located in the control room to visually assure control blades are inserted into the core. The operator would at this time also note the positions of the cobalt sources. Operator instructions (Emergency Operation 8) then state that containment should be secured (i.e., the cobalt sources and experiment left in their positions prior to the loss of electrical power. No attempt would be made to move sources or access experiments until power is restored or an Emergency Team under an Emergency Director takes action under the Emergency Plan.

10. UMLRR Technical Specifications state,"T.S. 4.5.2 The radioactivity in the pool water shall be analyzed weekly." The technical specification change which accompanied the license amendment for cobalt possession stated that the analysis shall be capable of detecting levels of 1×10^{-7} micro Ci per ml. If sample analysis reveals a significant increase of activity in the water or a contamination level greater than 1×10^{-6} micro Ci per ml, prompt action shall be

taken to prevent further contamination. If the gross activity of the sample is less than 1×10^{-7} micro Ci per ml, specific analysis for Co-60 need not be performed. These analyses have been performed since 1982. An analysis of sample results for the past two years showed that detectable levels of Co-60 are absent when the reactor does not operate at significant megawatt-day levels. Co-60 is only occasionally detectable as a result of reactor operation and has not exceeded 1.5 E-8 micro Ci/ml in the past two years.

11. Requirement of §36.61(a)	UMLRR TS
(1) Operability of each access control system.	4.3.2 Radiation Monitoring System semi annual calibration. The access control system is tested in an appendix to the test of this system.
(2) Functioning of the source position indication.	Exemption requested; there is no source position indicator as explained often.
(3) Operability of radiation system and (4) monitors	4.3.1 Radiation monitoring system checked prior to each [reactor] operation.
(7) Leak tightness of systems through which pool water circulates.	2.1.3 Pool water level 2.2.2 Pool water level
and (9) Operability of the means of pool water replenishment.	3.2 Pool water level 4.2.2 Pool water level
and (10) Operability of the indicator of high and low pool water levels.	4.2.4 Pool water level
(11) Operability of the intrusion alarm.	Security Plan, p. 27
(14) Amount of water added to pool to determine if pool is leaking.	Good practice to insure TS 2.1.3, 2.2.2, 3.2, 4.2.2, and 4.2.4 are met.
(15) Electrical wiring on required safety systems for radiation damage.	4.3 Radiation Monitoring system requires maintenance, surveillance, and quality assurance.