University of Lowell
One University Avenue
Lowell, Massachusetts 01854
(617) 452-5000

January 17, 1985

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Date 1/30/85
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By Brown
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U.S. Nuclear Regulatory Commission
Nuclear Materials Section B
Division of Engineering and Technical Programs
Region I
631 Park Avenue
King of Prussia, PA 19406

Subject: Renewal of Special Nuclear Material License No. SNM-714

Gentlemen:

This is to request renewal of Special Nuclear Material License No. SNM-714 presently held by the University of Lowell and subject to expiration on January 31, 1985.

We have reviewed our current license which includes Amendment No. 2 (our last renewal of SNM-714) dated January 23, 1982, by the U.S. Nuclear Regulatory Commission; Amendment No. 3, dated September 23, 1982; Amendment No. 4, dated February 23, 1983; Amendment No. 5, dated August 31, 1983, and Amendment No. 6, dated September 20, 1984. The pertinent supporting documents previously submitted by the University of Lowell include the University of Lowell Radiation Safety Guide dated August 20, 1976; a letter (request for Amendment No. 2) dated December 11, 1979; a letter (request for Amendment No. 3) dated May 27, 1982; a letter (request for Amendment No. 4) dated January 18, 1983; letters (request for Amendment No. 5) dated December 30, 1982, and July 26, 1983; and a letter (request for Amendment No. 6) dated July 27, 1984. These materials in conjunction with our current license accurately reflect the future requirements of our licensed operations/program with one exception which is discussed below.

Exception Requiring Modification of Current License

License Amendment No. 6 presently allows the possession and use of up to 0.5g of plutonium-239 in a fission chamber as described in our letter of July 27, 1984. Plans are presently underway to construct another fission detector using uranium-235; the chamber would be used to continue work on the measurement of delayed and fast neutron spectra associated with the fission of U-235. The precise details of the chamber design have not been completed as yet, but the design would be approximately as shown in the attached Figure 1.

Applicant
Check No. 56154 #120/15
Amount/Fee Category
Renewal
3/26/85
Brown

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24 JAN 1985

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REG1 LIC70
SNM-0714 PDR

The uranium foils would be sandwiched between thin sheets of Pilot-U plastic scintillator. The uranium foils would be approximately 5mg cm^{-2} in thickness and appoximately 5cm square. A single sandwich or a multilayered sandwich of scintillator sheets and uranium foils would be used. The scintillator would be contained in a light tight aluminum or steel can with an internally reflecting surface to direct light to the photocathodes of photomultiplier tubes mounted on each end of the reflecting can. The total mass of U-235 in the detector would be somewhat less than 5 grams in a multilayered system. The detector will be subjected to neutron fluence rates of about $10^{6}cm^{-2}s^{-1}$ and total fluences during the duration of the experimental work of less than $10^{13}cm^{-2}$; the total number of fissions, protracted over several hundred hours of experimental work, will be about 10^{13}. No more than a few microcuries of long lived fission products will be produced. Most of the fission product activity produced will remain confined in the uranium foils and scintillator sandwich. Small amounts of fission products may escape from the foils to the can in which the detector is contained. Prior to and during operation we will monitor for contamination of air and of equipment surfaces. Collected samples will be assayed for beta and alpha emission; if any alpha activity is detected, the sample(s) will be analyzed for U-235. If U-235 or fisson product activity is identified in any samples in quantities of concern from a health physics standpoint, the operation will be shut down until the problem is identified and remedied.

The experimental work will be carried out in the accelerator and reactor areas at the University of Lowell and will be subject to radiological control by operations staff and by the health physics group. Storage, maintenance, and accountability of the U-235 will be carried out in accordance with present requirements.

This request for 5g of U-235 is in addition to the 0.5g of Pu-239 presently authorized by Amendment No. 6.

No further additions beyond that described above and no deletions to our current license are requested in this renewal application.

If you require additional information to evaluate this renewal request, please notify us.

Very truly yours,

George E. Chabot

George E. Chabot
Radiation Safety Officer
Tel: (617) 452-5000 Ext. 2736

GEC:dmm

Cross Sectional View of Scintillation Fission Chamber

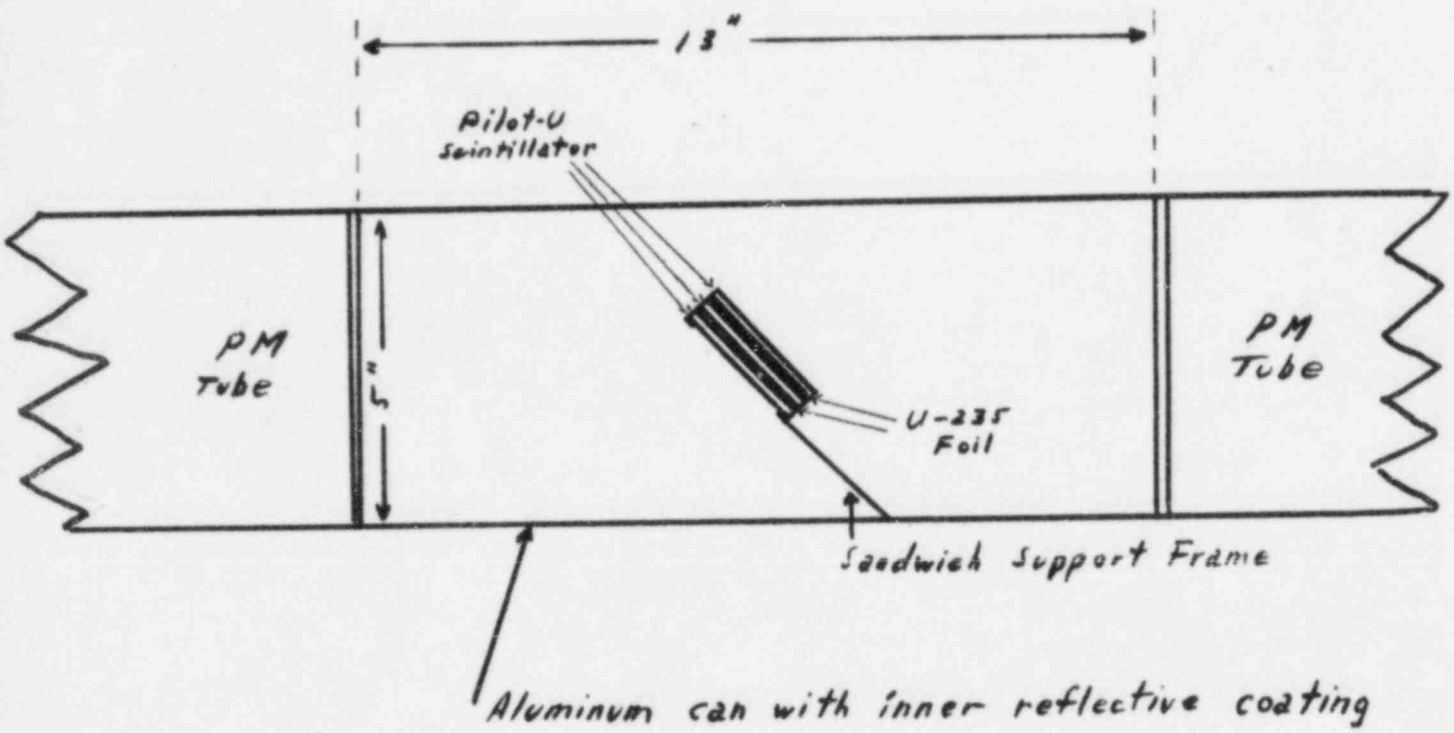

Figure 1