JC john carroll university

UNIVERSITY HEIGHTS, CLEVELAND, OHIO 44118

AREA CODE 216 - 491-4241

DEPARTMENT OF
CHEMISTRY

1/3-DCS

November 30, 1979

Mr. John E. Bowyer
Regional Licensing Section
Material Licensing Branch
Division of Fuel Cycle and Material Safety
United States Nuclear Regulatory Commission
799 Roosevelt Road
Glen Ellyn, Illinois 60137

RE: Control No. 94790

Dear Mr. Bowyer:

The information below is submitted in response to your letter of September 10, 1979. The information is supplied as items 1 through 7 in agreement with the order used in your letter.

1-A Regulations to be followed by laboratory users are listed on a separate sheet. These were supplied earlier with the application for renewal.

1-B The following procedures will apply for ordering, receipt, monitoring, and storage of radioactive materials.
(a) Any order for radioactive materials will be placed by the radiation safety officer. This will insure that the radiation officer will know that what is being ordered is consistent with the possession limits of the license. In addition the officer will place all orders to insure that delivery is expected on a day that the mail-room is open.
(b) Radioactive materials will be received at the mailroom of the administration building. Incoming packages are received only during open hours of 8 a.m. - 5 p.m. (Monday-Friday), thus there are no difficulties with deliveries during off-duty hours. The director of the mailroom will be instructed to deposit a package of radioactive material in a marked container in a secured area of the mailroom and notify the radiation officer of its arrival.

2. As soon as possible, the radiation officer (and usually the licensed user for whom the material was purchased) will examine the package for leakage, contamination, or damage. If radiation levels are found on the external surface of the package in excess of 200 millirem per hour (or at three feet from the external surface of the package in excess of 10 millirem per hour), the radiation officer will immediately notify the appropriate NRC Regional Office and the final delivering carrier. The monitoring will be done (wearing disposable

safety gloves) with a GM survey meter (Baird-Atomic Model 420 E) equipped with either a beta-gamma probe or an alpha-beta-gamma probe. The actual container of the radioactive material will then be transported by the radiation officer to the proper restricted area for storage and use. In the absence of the radiation officer the performance of these procedures will be delegated to one of the licensed users.

3. The present radiation safety officer (Professor Robert C. Bohinski) has not attended any formal program detailing the responsibilities and performances of a radiation safety officer. I (R. C. Bohinski) have several years of experience in the use of radioactive materials as a doctoral graduate student at Pennsylvania State University (Dept. of Biochemistry; 1962-1965) and during my tenure (1966-present) at John Carroll University as a teaching-research professor in the Department of Chemistry. I have acquired knowledge about the handling and measurement of radioactive materials through self-study and have in fact taught a course dealing with this material. At present there is no administrative statement describing the responsibilities and authority of the radiation officer. The responsibilities are, of course, specified herein. I am not certain what level of authority you make reference to.

4. In the past instrument calibrations were performed on an irregular basis due largely to the irregular use of radioisotopes in our laboratory. When isotopes were used, our instruments were usually calibrated on a monthly basis. It is clear that a more regular program is expected. Accordingly, the following procedures will be operative under this renewal application.

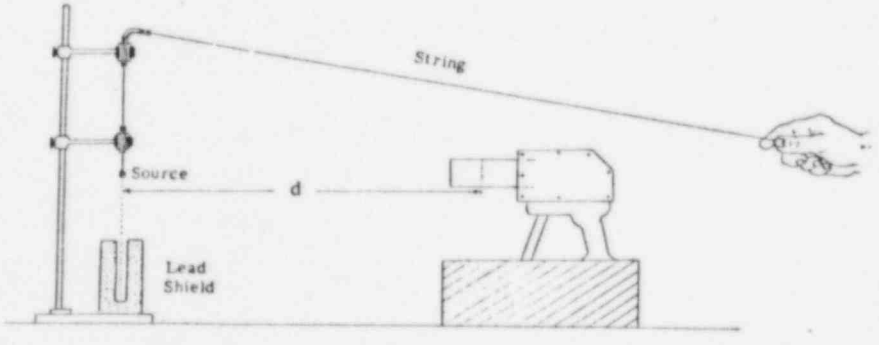
Calibration of survey instruments

A. Daily checks as per manufacturers specifications using built-in check sources.

B. Twice monthly checks using a calibrated radiation source. The source used will be a Co^{60} source (.007 millicurie; Nuclear-Chicago). The source is contained in its own lead storage container which in turn is housed in a lead-brick storage vault. The source itself can be handled safely by an attached chain.

C. Procedure:

a) the physical arrangement for the calibration of the survey meter is shown below



b) allow instrument to warm-up, check the zero setting, and switch to proper range
c) while remaining well behind the instrument, yet in such position that the meter can be observed (no problem here because we are able to confine the arrangement shown above in a glass-enclosed area), raise the source out of the lead storage container by pulling the string
d) observe the meter reading and compare with calculated value from the following equations:

$$r/hr = \frac{(13.2)(C)}{d^2}$$

C = source strength in millicuries
d = distance in cm
13.2 (for Co-60) cm^2 r/mC hr
e) if the meter reading and calculated value do not agree to $\pm$ 10% the calibration potentiometer of the instrument should be adjusted; recheck the calibration
f) proceed to calibrate all other meter ranges
g) return the source to its storage vessel.

D. Two-point calibrations (at two different distances) will be performed annually.
E. The calibrations will be performed by the radiation safety officer.
F. The survey instruments in use are
a) Baird-Atomic Survey Meter - Model 420 E
b) Nuclear-Chicago Survey Meter - Model 2651.

5. The use of tritium will be restricted to the use of non-volatile organic compounds. It is not at all likely that tritium will be ingested, inhaled, or absorbed into the body. Accordingly, no bioassay procedures are planned. (We will accept a downward revision of the H-3 level requested in the renewal application).

6. No formal course work is required of graduate students. Those who will utilize radioisotopes as a research tool are given individual training by the research director (Bohinski, Moore, or Pearce). The training in the past has been sufficient to ensure that the student is capable and knowledgeable.

7. Emergency instructions are attached.

Robert C. Bohinski

RADIOISOTOPE LABORATORY REGULATIONS

(1) Eating, storing, or preparing food, smoking, or applying cosmetics is either forbidden or discouraged in any area where radioactive materials are stored or used.

(2) Direct contact with radioactive materials must be avoided by using protective laboratory coats, wearing rubber or disposable plastic gloves, and employing safety pipetters. Do not pipette any radioactive material by mouth.

(3) All spills of radioactive material must be reported to the person in charge of radiation safety and decontaminated immediately.

(4) Complete records of receipts, transfers, and disposal of radioactive materials must be kept.

(5) A film badge should be worn whenever working in the laboratory.

(6) Work should be carried out under a hood in all cases where radioactive material may be lost by volatilization, dispersion of dust, or by spraying or splattering. Wherever possible, work with closed containers.

(7) All radioactive samples should be properly labeled with the isotope and activity indicated and covered.

(8) Liquid wastes should not be poured into the drain or contaminated apparatus washed in the sink unless the levels of activity entering the sewer system have been calculated as permissible. For example: 100 microcuries g P^{32} per day; 500 microcuries g S^{35} per day (same for C^{14}), 2500 microcuries of H^3 per day. When discharging slightly higher levels than this keep the water running for several hours to dilute the release.

(9) The disposal of solid wastes and contaminated articles (corks, paper wipes, and the like) should be into designated stainless steel containers and, under no consideration, into ordinary trash receptacles.

(10) The disposal of gaseous waste through the hood can be carried out only after careful examination of the air dilution factor.

(11) The storage of all radioactive material must be in properly designated locations.

(12) At the close of a working period the laboratory work surfaces should be carefully monitored.

(13) Before leaving the laboratory after working with active materials, each person should wash his hands thoroughly and check them with a monitoring instrument.

(14) All laboratory glassware and equipment should be properly decontaminated after use before being returned to general usage.

(15) It is desirable to decontaminate one's hands and work surfaces completely, but the following arbitrary surface contamination tolerances (as measured by a G-M survey meter with a thin end-window) may be allowed after efforts at decontamination:

Hands	350 cpm
Working Surface	250 cpm

The arbitrary nature of any such tolerances should be recognized, although, on the other hand, absolutely complete decontamination is not always feasible.

Emergency Instructions

In the event of a spill of radioactive material in the laboratory the following procedure should be followed.

1. Survey your clothing plus (including shoes) and hands. If any activity is detected, wash hands thoroughly and remove contaminated clothing.

2. Confine the spill with absorbant paper.

3. Notify the research director and/or radiation safety officer.
   Dr. Robert C. Bohinski (radiation safety officer)
   John Carroll location: Room SC 265 (491-4241)
   Home: 543-4739

   Dr. Fenton Moore
   John Carroll location: Room SC 108 (491-4251)
   Home: 228-4910

   Dr. Thomas Pearce
   John Carroll location: Room SC 116 (491-4251)
   Home: 321-1605

4. Restrict admission to the laboratory.

5. Clean up the spill.

6. Decontaminate the laboratory.