NRC FORM 374
(10-89)

U.S. NUCLEAR REGULATORY COMMISSION

MATERIALS LICENSE

Amendment No. 07

Pursuant to the Atomic Energy Act of 1954, as amended, the Energy Reorganization Act of 1974 (Public Law 93-438), and Title 10, Code of Federal Regulations, Chapter I, Parts 30, 31, 32, 33, 34, 35, 39, 40 and 70, and in reliance on statements and representations heretofore made by the licensee, a license is hereby issued authorizing the licensee to receive, acquire, possess, and transfer byproduct, source, and special nuclear material designated below; to use such material for the purpose(s) and at the place(s) designated below; to deliver or transfer such material to persons authorized to receive it in accordance with the regulations of the applicable Part(s). This license shall be deemed to contain the conditions specified in Section 183 of the Atomic Energy Act of 1954, as amended, and is subject to all applicable rules, regulations and orders of the Nuclear Regulatory Commission now or hereafter in effect and to any conditions specified below.

Licensee	
1. University of Pennsylvania Radiation Safety Office 1412 Blockley Hall 2. 418 Service Drive Philadelphia, Pennsylvania 19104-6021	In accordance with letter dated July 29, 1992, 3. License number SNM-114 is amended in its entirety to read as follows: 4. Expiration date October 31, 1997 5. Docket or Reference No 070-00123

6. Byproduct, source, and/or special nuclear material	7. Chemical and/or physical form	8. Maximum amount that licensee may possess at any one time under this license
A. Plutonium (Principal isotope Pu-239) B. Uranium enriched in U-235 (20%)	A. Sealed neutron sources (Mound Laboratories) B. Sealed in a fission counter tube (Westinghouse Model WL-6376)	A. 50 grams contained in 3 sources B. 2 grams

9. Authorized use

A. To be used for laboratory studies, instrument calibration, and student instruction.
B. Sealed in a fission counter tube for educational purposes or in storage.

CONDITIONS

10. Licensed material may be used only at the licensee's facilities at the University of Pennsylvania, Philadelphia, Pennsylvania.

11. A. Licensed material shall be used by, or under the supervision of, individuals designated by the licensee's Radiation Safety Committee, Robert Roosa, Ph.D., Chairman.

B. The Radiation Safety Officer for this license is Mark H. Selikson, Ph.D.

12. Sealed sources or detector cells containing licensed material shall not be opened or sources removed from source holders or detector cells by the licensee.

13. A. Sealed sources and detector cells shall be tested for leakage and/or contamination at intervals not to exceed 6 months or at such other intervals as are specified by the certificate of registration referred to in 10 CFR 32.210, not to exceed 3 years.

B. Notwithstanding Paragraph A of this Condition, sealed sources designed to emit alpha particles shall be tested for leakage and/or contamination at intervals not to exceed 3 months.

MATERIALS LICENSE
SUPPLEMENTARY SHEET

License number
SNM-114
Docket or Reference number
070-00123
Amendment No. 07

(13. Continued) CONDITIONS

C. In the absence of a certificate from a transferor indicating that a test has been made within six months prior to the transfer, a sealed source or detector cell received from another person shall not be put into use until tested.

D. Each sealed source fabricated by the licensee shall be inspected and tested for construction defects, leakage, and contamination prior to any use or transfer as a sealed source.

E. Sealed sources and detector cells need not be leak tested if:

(i) they contain only hydrogen 3; or

(ii) they contain only a gas; or

(iii) the half-life of the isotope is 30 days or less; or

(iv) they contain not more than 100 microcuries of beta and/or gamma emitting material or not more than 10 microcuries of alpha emitting material; or

(v) they are not designed to emit alpha particles, are in storage, and are not being used. However, when they are removed from storage for use or transfer to another person, and have not been tested within the required leak test interval, they shall be tested before use or transfer. No sealed source or detector cell shall be stored for a period of more than 10 years without being tested for leakage and/or contamination.

F. The test shall be capable of detecting the presence of 0.005 microcurie of radioactive material on the test sample. Records of leak test results shall be kept in units of microcuries and shall be maintained for inspection by the Commission. If the test reveals the presence of 0.005 microcurie or more of removable contamination, a report shall be filed with the U.S. Nuclear Regulatory Commission and the source shall be removed from service and decontaminated, repaired, or disposed of in accordance with Commission regulations. The report shall be filed within 5 days of the date the leak test result is known with the U.S. Nuclear Regulatory Commission, Region I, ATTN: Chief, Nuclear Materials Safety Branch, 475 Allendale Road, King of Prussia, Pennsylvania 19406. The report shall specify the source involved, the test results, and corrective action taken.

G. The licensee is authorized to collect leak test samples for analysis by the licensee. Alternatively, tests for leakage and/or contamination may be performed by persons specifically licensed by the Commission or an Agreement State to perform such services.

MATERIALS LICENSE
SUPPLEMENTARY SHEET

License number
SNM-114
Docket or Reference number
070-00123
Amendment No. 07

(Continued) CONDITIONS

14. Except as specifically provided otherwise in this license, the licensee shall conduct its program in accordance with the statements, representations, and procedures contained in the documents, including any enclosures, listed below. The Nuclear Regulatory Commission's regulations shall govern unless the statements, representations, and procedures in the licensee's application and correspondence are more restrictive than the regulations.

A. Letter dated July 29, 1992

For the U.S. Nuclear Regulatory Commission

Date OCT 28 1992

By Original Signed By:
Jenny M. Johansen
Nuclear Materials Safety Branch
Region I
King of Prussia, Pennsylvania 19406

OCT 28 1992

License No. SNM-114
Docket No. 070-00123
Control No. 116935

University of Pennsylvania
ATTN: Mark H. Selikson, Ph.D.
Radiation Safety Office
1412 Blockley Hall
418 Service Drive
Philadelphia, Pennsylvania 19104-6021

Dear Dr. Selikson:

Please find enclosed the renewal of your NRC Material License.

Please review the enclosed document carefully and be sure that you understand all conditions. If there are any errors or questions, please notify the Region I Material Licensing Section, (215) 337-5093, so that we can provide appropriate corrections and answers.

Please be advised that you must conduct your program involving licensed radioactive materials in accordance with the conditions of your NRC license, representations made in your license application, and NRC regulations. In particular, please note the items in the enclosed, "Requirements for Materials Licensees."

Since serious consequences to employees and the public can result from failure to comply with NRC requirements, the NRC expects licensees to pay meticulous attention to detail and to achieve the high standard of compliance which the NRC expects of its licensees.

You will be periodically inspected by NRC. A fee may be charged for inspections in accordance with 10 CFR Part 170. Failure to conduct your program safely and in accordance with NRC regulations, license conditions, and representations made in your license application and supplemental correspondence with NRC will result in prompt and vigorous enforcement action against you. This could include issuance of a notice of violation, or in case of serious violations, an imposition of a civil penalty or an order suspending, modifying or revoking your license as specified in the General Policy and Procedures for NRC Enforcement Actions, 10 CFR Part 2, Appendix C.

OFFICIAL RECORD COPY - G:\WPS\MLTR\LSNM114 - 10/07/92

ML 10

We wish you success in operating a safe and effective licensed program.

Sincerely,

Original Signed by:
Jenny M. Johansen

Jenny M. Johansen, Chief
Medical Licensing Section
Division of Radiation Safety
and Safeguards

Enclosures:
1. Amendment No. 07
2. Requirements for Materials Licensees
3. NRC Forms 3 and 313

DRSS:RI	DRSS:RI
Stambaugh/cmm	Johansen
10/ 7/92	10/ /92

AUG 20 1992

Docket No. 070-00123
License No. SNM-114
Control No. 116935

University of Pennsylvania
ATTN: Barry Coopeerman, M.D.
Radiation Safety Office 14th Floor
Blockley Hall/6021
418 Service Drive
Philadelphia, Pennsylvania 19104

Dear Dr. Coopeerman:

Subject: LICENSE RENEWAL APPLICATION

This is to acknowledge receipt of your application for renewal of material(s) license identified above. Your application is deemed timely filed, and accordingly, the license will not expire until final action has been taken by this office.

Any correspondence regarding the renewal application should reference the control number specified above.

Sincerely,

Original Signed By:
Cheryl K. Baraker

for Sheryl Villar, Chief
Licensing Assistance Section
Division of Radiation Safety
and Safeguards

8/20/92

CKB for 8/20/92

UNIVERSITY of PENNSYLVANIA

Radiation Safety Office
1412 Blockley Hall
418 Service Drive
Philadelphia, PA 19104-6021
215-898-7187
Fax: 215-898-0140

070-00123

July 29, 1992

U.S. Nuclear Regulatory Commission
Nuclear Materials Safety Section A
475 Allendale Road
King Of Prussia, PA 19406

Subject : Application for Renewal SNM-114
Program Code 22120

Gentlemen:

In accordance with your letter of May 1, 1992 , the enclosed material is submitted in support of our request to renew Special Nuclear Material License SNM-114.

No license renewal fee is enclosed pursuant to 10 CFR 170.11(a) 4.

Please send the renewal license or direct any inquires to the attention of :

Mark H. Selikson, Ph. D.
University of Pennsylvania
Radiation Safety Office
1412 Blockley Hall 6021
Philadelphia, PA 19104

Sincerely,

Mark H. Selikson, Ph.D.
Director

cc: Dr. Barry Cooperman
Dr. Robert Roosa

Enclosure (1) Renewal application

License Fee Information on Appl.

92-0454 JM/cl

116935

OFFICIAL RECORD COPY ML 10

RECD FM LRS JUL 31 1992

NRC FORM 313
(3-92)
10 CFR 30, 32, 33,
34, 35 and 40

U.S. NUCLEAR REGULATORY COMMISSION

APPLICATION FOR MATERIAL LICENSE

APPROVED BY OMB, NO. 3150-0120
EXPIRES 6-30-93

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST: 3.25 HOURS. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE INFORMATION AND RECORDS MANAGEMENT BRANCH (MNBB 7714), U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON, DC 20555, AND TO THE PAPERWORK REDUCTION PROJECT (3150-0120), OFFICE OF MANAGEMENT AND BUDGET, WASHINGTON, DC 20503.

INSTRUCTIONS: SEE THE APPROPRIATE LICENSE APPLICATION GUIDE FOR DETAILED INSTRUCTIONS FOR COMPLETING APPLICATION. SEND TWO COPIES OF THE ENTIRE COMPLETED APPLICATION TO THE NRC OFFICE SPECIFIED BELOW.

APPLICATION FOR DISTRIBUTION OF EXEMPT PRODUCTS FILE APPLICATIONS WITH:

DIVISION OF INDUSTRIAL AND MEDICAL NUCLEAR SAFETY
OFFICE OF NUCLEAR MATERIAL SAFETY AND SAFEGUARDS
U.S. NUCLEAR REGULATORY COMMISSION
WASHINGTON, DC 20555

ALL OTHER PERSONS FILE APPLICATIONS AS FOLLOWS:

IF YOUR ARE LOCATED IN:

CONNECTICUT, DELAWARE, DISTRICT OF COLUMBIA, MAINE, MARYLDAND, MASSACHUSETTS, NEW HAMPSHIRE, NEW JERSEY, NEW YORK, PENNSYLVANIA, RHODE ISLAND, OR VERMONT, SEND APPLICATIONS TO:

LICENSING ASSISTANT SECTION
NUCLEAR MATERIALS SAFETY BRANCH
U.S. NUCLEAR REGULATORY COMMISSION, REGION I
475 ALLENDALE ROAD
KING OF PRUSSIA, PA 19406-1415

ALABAMA, FLORIDA, GEORGIA, KENTUCKY, MISSISSIPPI, NORTH CAROLINA, PUERTO RICO, SOUTH CAROLINA, TENNESSEE, VIRGINIA, VIRGIN ISLANDS, OR WEST VIRGINIA, SEND APPLICATIONS TO:

NUCLEAR MATERIALS SAFETY SECTION
U.S. NUCLEAR REGULATORY COMMISSION, REGION II
101 MARIETTA STREET, NW, SUITE 2900
ATLANTA, GA 30323

IF YOU ARE LOCATED IN:

ILLINOIS, INDIANA, IOWA, MICHIGAN, MINNESOTA, MISSOURI, OHIO, OR WISCONSIN, SEND APPLICATIONS TO:

MATERIALS LICENSING SECTION
U.S. NUCLEAR REGULATORY COMMISSION, REGION III
799 ROOSEVELT ROAD
GLEN ELLYN, IL 60137

070-00123

ARKANSAS, COLORADO, IDAHO, KANSAS, LOUISIANA, MONTANA, NEBRASKA, NEW MEXICO, NORTH DAKOTA, OKLAHOMA, SOUTH DAKOTA, TEXAS, UTAH, OR WYOMING, SEND APPLICATIONS TO:

MATERIAL RADIATION PROTECTION SECTION
U.S. NUCLEAR REGULATORY COMMISSION, REGION IV
611 RYAN PLAZA DRIVE, SUITE 400
ARLINGTON, TX 76011-8064

ALASKA, ARIZONA, CALIFORNIA, HAWAII, NEVEDA, OREGON, WASHINGTON, AND U.S. TERRITORIES AND POSSESSIONS IN THE PACIFIC, SEND APPLICATIONS TO:

NUCLEAR MATERIALS SAFETY SECTION
U.S. NUCLEAR REGULATORY COMMISSION, REGION V
1450 MARIA LANE
WALNUT CREEK, CA 94596-5368

PERSONS LOCATED IN AGREEMENT STATES SEND APPLICATIONS TO THE U.S. NUCLEAR REGULATORY COMMISSION ONLY IF THEY WISH TO POSSESS AND USE LICENSED MATERIAL IN STATES SUBJECT TO U.S. NUCLEAR REGULATORY COMMISSION JURISDICTIONS.

1. THIS IS AN APPLICATION FOR (Check appropriate item)

- [ ] A. NEW LICENSE
- [ ] B. AMENDMENT TO LICENSE NUMBER _____
- [X] C. RENEWAL OF LICENSE NUMBER SNM - 114

2. NAME AND MAILING ADDRESS OF APPLICANT (Include Zip Code)

University Of Pennsylvania
Radiation Safety Office
1412 Blockley Hall
418 Service Drive, Phila., PA 19104-6021

3. ADDRESS(ES) WHERE LICENSED MATERIAL WILL BE USED OR POSSESSED:

University Of Pennsylvania
Main Campus Area In West Philadelphia
Phila., PA 19104

4. NAME OF PERSON TO BE CONTACTED ABOUT THIS APPLICATION: Mark B. Selikson, Ph.D.
TELEPHONE NUMBER: 215-898-7187

SUBMIT ITEMS 5 THROUGH 11 ON 8½ x 11" PAPER. THE TYPE AND SCOPE OF INFORMATION TO BE PROVIDED IS DESCRIBED IN THE LICENSE APPLICATION GUIDE.

5. RADIOACTIVE MATERIAL: SEE ATTACHED
a. Element and mass number, b. chemical and/or physical form, and c. maximum amount which will be possessed at any one time.

6. PURPOSE(S) FOR WHICH LICENSED MATERIAL WILL BE USED: SEE ATTACHED

7. INDIVIDUAL(S) RESPONSIBLE FOR RADIATION SAFETY PROGRAM AND THEIR TRAINING AND EXPERIENCE: SEE ATTACRED

8. TRAINING FOR INDIVIDUALS WORKING IN OR FREQUENTING RESTRICTRED AREAS: SEE ATTACHED

9. FACILITIES AND EQUIPMENT: SEE ATTACHED

10. RADIATION SAFETY PROGRAM: SEE ATTACHED

11. WASTE MANAGEMENT: SEE ATTACHED

12. LICENSEE FEES (See 10 CFR 170 and Section 170.31)
FEE CATEGORY: 2X1D
AMOUNT ENCLOSED: $

13. CERTIFICATION (Must be completed by applicant) THE APPLICANT UNDERSTANDS THAT ALL STATEMENTS AND REPRESENTATIONS MADE IN THIS APPLICATION ARE BINDING UPON THE APPLICANT.

THE APPLICANT AND ANY OFFICIAL EXECUTING THIS CERTIFICATION ON BEHALF OF THE APPLICANT, NAMED IN ITEM 2, CERTIFY THAT THIS APPLICATION IS PREPARED IN CONFORMITY WITH TITLE 10, CODE OF FEDERAL REGULATIONS, PARTS 30, 32, 33, 34, 35, AND 40 AND THAT ALL INFORMATION CONTAINED HEREIN, IS TRUE AND CORRECT TO THE BEST OF THEIR KNOWLEDGE AND BELIEF.

WARNING: 18 U.S.C. SECTION 1001 ACT OF JUNE 25, 1948, 62 STAT. 749 MAKES IT A CRIMINAL OFFICE TO MAKE A WILLFULLY FALSE STATEMENT OR REPRESENTATION TO ANY DEPARTMENT OR AGENCY OF THE UNITED STATES AS TO ANY MATTER WITHIN ITS JURISDICTION.

SIGNATURE – CERTIFYING OFFICER	TYPED/PRINTED NAME	TITLE	DATE
W. Stuart Watson	W. Stuart Watson	Assistant Director Research Administration	7/31/92

FOR NRC USE ONLY

TYPE OF FEE	FEE LOG	FEE CATEGORY	COMMENTS
REN	Aug 8 I	EX 1D	FEE EXEMPT [170.11 (A)(4)]
AMOUNT RECEIVED	CHECK NUMBER		

APPROVED BY: B Brown
DATE: 8/13/92

NRC FORM 313 (3-92)

OFFICIAL RECORD COPY ML 10 116935 JUL 31 1992

REQUEST FOR RENEWAL OF SPECIAL NUCLEAR MATERIAL LICENSE SNM-114

The application format follows the format stated in REGULATORY GUIDE 10.3

4.1 Specification of Applicant

The Trustees of the University of Pennsylvania, Philadelphia, Pa. 19104.

4.2 Specification of Activities to be Performed

The material will be used as a source of neutrons for calibrating instruments and devices or for investigating the effects of neutrons on materials and systems as part of the University's undergraduate, graduate and professional teaching programs.

4.3 Specification of Special Nuclear Material

Three PuBe neutron sources manufactured by Mound Laboratories

Manufacturer's Serial No.	Total Plutonium Wt. Grams	Pu-239 plus Pu-241 Wt. Grams
M-119	14.85	13.82
M-143	14.91	13.87
M-146	14.74	13.70

One Westinghouse Model WL-6376 fission counter tube containing 1.68 grams of Uranium enriched in U-235 (20%)

4.4 Technical Qualifications of Personnel

Mark H. Selikson directs the radiation safety program and is the Radiation Safety Officer for all the University's licenses. He is certified by The American Board of Radiology in Medical Physics and has over 15 years' experience in University Radiation Safety. His CV is on file with the University's NRC license 37-00118-07.

The use of these materials will be directly supervised by personnel approved by the Radiation Safety Committee . These personnel will , at a minimum, have training and experience in the following:

i) principles and practices of radiation protection,
ii) radioactivity measurements, standardization , monitoring techniques and instruments
iii) biological effects of radiation, and
iv) math and calculations basic to the use of radioactivity

4.5 Description of Equipment, Facilities and Instrumentation

1. Remote handling tools are available. These tools are from one to two meters in length.
2. Metal paraffin filled storage containers are available. Also blocks of paraffin, lucite and concrete are available for additional shielding. All sources are stored and used in locked or attended areas.
3. The sources are normally mounted at the end of a 1 meter metal rod or wire and local shielding is used if the source is removed from the storage container for any length of time. The sources will be placed in a shielded storage container whenever they are transferred between laboratory buildings.
4. Standard university laboratory facilities are available. Sealed source use only.
5. Radiation Detection Instruments

The following is a partial list of the current instruments available for use:

Four ionization chamber survey meters, two Victoreen Model 470A and three Kiethley units, Model 36100, Model 36150 and Model 36155.

Seven Ludlum survey meters; two Model 16 , four Model 3 and one Model 12-4 Neutron counter. Several GM tube detectors, Model 44-2 and 44-3 gamma probes, and a Model 43-1 alpha probe are used with the Ludlum survey meters.

One Nuclear Measurements Corporation Model PC 5 gas flow proportional counter with associated high voltage scalar and timer.

One multi-channel analyzer Tracor Model NT7200 system with a variety of phototube-scintillation crystal detector assemblies.

One Ludlum Model 15 neutron counter.

One LKB Model 1214 liquid scintillation system.

One Harshaw Thermoluminescence dosimetry system with over 100 dosimeters.

We reserve the right to replace these instruments provided our overall measurement capabilities remain unchanged.

Instrument Calibration

The neutron detecting instruments are calibrated annually. Either the PuBe sources are used for this calibration or the instruments are returned to the manufacturer (Ludlum) for calibration.

The gamma survey meters are calibrated annually using a J. L. Shepherd, Model 28-6 Calibrator SN# 10235, Cesium 137 , 600 mCi on 6/9/89.

The alpha, beta and gamma laboratory instruments are calibrated annually using standard reference sources with calibrations traceable to National Institute of Standards and Technology (NIST).

All calibrations performed at the University are done or supervised by individuals approved by the Radiation Safety Committee and who meet the training requirements of Item 4.4 above.

We have established the model procedure for calibrating instruments that was published in Appendix B to Regulatory Guide 10.8 Revision 2. The Cs-137 source and other alpha , beta and gamma sources used in calibrations performed at the university are licensed under the NRC license 37-00118-7 which is under timely renewal.

4.6.1 Specifications of Radiation Safety Responsibilities and Duties

The Radiation Safety Committee (RSC)of the University of Pennsylvania has established policies concerning the use of radioactive materials in all departments of the University. The Composition of the RSC, its responsibilities, duties and current Chairman along with information on the University's Radiation Safety program are detailed in the University's NRC license 37-00118-07. The current Chairman of the RSC is Robert Roosa, Ph. D.

Full authority and responsibility for the program is vested in the Radiation Safety Committee. This Committee meets at least quarterly to review the conduct of the radiation safety program. A fully staffed Radiation Safety Office under the direction of Dr. Mark H. Selikson, carries out the radiation safety program. The current staff of the

Radiation Safety Office consists of seven health physicists, seven technicians, two secretaries, an information management specialist and an office manager.

All prospective users and new uses of radionuclides must be applied for in a manner analogous to application for a specific byproduct material license. Upon receipt of an application, the Radiation Safety Office professional staff evaluates precautions, discusses precautionary measures with applicant(s) and prepares comments upon the application. The application and comments are circulated to a review Committee composed of selected members of the Radiation Safety Committee. The designated review Committee may approve, disapprove or defer pending the need for additional information or evaluation of the application. All actions upon applications are reviewed as part of the agenda at the next regular meeting of the Radiation Safety Committee.

4.6.2 Personnel Monitoring

Personnel monitoring will be provided pursuant to 10 CFR 20: 202 and the exposure from all sources of ionizing radiation at the University is considered. All authorized users register their radiation workers with the Radiation Safety Office. The Radiation Safety Office maintains a computerized listing of all radiation workers that is cross indexed to the list of authorized users which identifies the sources of ionizing radiation to which their personnel may be exposed. NVLAP approved commercial service will be used. Currently R. S. Landauer Jr and Company provides our service.

4.6.3 Radiation Survey Program

The neutron and gamma radiation levels are measured and/or evaluated for all new configurations of use and storage. Surveys are repeated annually or whenever there is a change in the source shielding or use.

4.6.4 Waste Disposal

No wastes are expected. Should there be a need to dispose of the materials it will be transferred to a licensee specifically authorized to receive it.

4.6.5 Record Management

All required records will be reviewed by and kept in the University Radiation Safety Office.

4.5.6 Material Control Provisions

No additional material will be procured (without license amendment).

4.6.7 Sealed Source Leak-Testing Provisions

1. The sources will be leak tested at intervals not exceeding six months. The test sample will be taken from the source or from an appropriate surface of the device in which the source is installed or mounted. The test will be capable of detecting 0.005 microcuries of alpha contamination on the test sample.

2. a) The test will be performed by personnel approved by the Radiation Safety Committee per Item 4.4 above.

   b) Time distance and shielding considerations will be used to minimize personnel exposure. Remote handling tools will be used to handle the source. the time the source is removed form its storage container will be minimized during leak testing.

c) The test procedure involves either wiping the source with moistened filter paper or washing the source in a mild detergent or solvent solution.

The wipe sample is dried and counted and the liquid sample is evaporated and counted.

d) A windowless proportional detector or a liquid scintillation system will be used to assay the test samples.

The windowless proportional counter is a Nuclear Measurements Model PC-5. The liquid scintillation system is a LKB Model 1214.

4.6.8 General Safety Instructions

See enclosure (I).Radiation Safety Users Guide**

4.6.9 Emergency and Decontamination Procedures

All campus Emergency phone numbers connect individuals with campus Security who activate the Emergency response per the Emergency Response Personnel Listing. Enclosure (II). This listing is updated at least yearly. Also see enclosure (I) Radiation Safety Users Guide. **

4.6.10 Procedures for Training Personnel

See enclosure (I) Radiation Safety Users Guide.**

** We reserve the right to revise and update the Radiation Safety Users Guide provided the changes do not diminish the radiation safety practices as related to the use of the Special Nuclear Material authorized by this license.

The following information is provided as a supplement to NRC Form 313 (3-92) in support of our request to renew SNM-114.

Item 5 See item 4.3 above

Item 6 See item 4.2 above

Item 7 See item 4.4 above

Item 8 See item 4.6.1 and 4.6.10 above

Item 9 See item 4.5 above

Item 10 See item 4.6.1 through 4.6.10 above

Item 11 See item 4.6.4 above

ENCLOSURE II

MEMORANDUM

TO: Authorized Users
«title»
«campus add»

FROM: Mark H. Selikson, Ph. D.
Director

DATE: June 30, 1992

SUBJ: EMERGENCY-RESPONSE PERSONNEL LISTING

Following is a listing of numbers to call when there are emergencies involving radioactive materials.

During regular University hours (Monday to Friday, 8 AM to 5 PM except University holidays), please phone **898-7187**.

After hours and on weekends, please phone our beeper at **215-960-8754**. When you hear the tone , enter your phone number; please include your area code.

If there is no response to your page, call the following individuals, in the order in which the names are presented, until contact is made:

Sunita Kurian	215-533-1030
Marc Felice	215-594-8723
Winnie Zhu	215-259-5815
Joseph Kane	215-626-8709
Lily Lodhi	609-424-8895
George MacDurmon	609-778-8132
Joseph McCue	609-468-0521
Mark Selikson	215-293-1365

If you have questions or comments, please contact Louise Chaney at 898-8550 during regular office hours, Monday to Friday, 8 AM to 5 PM.

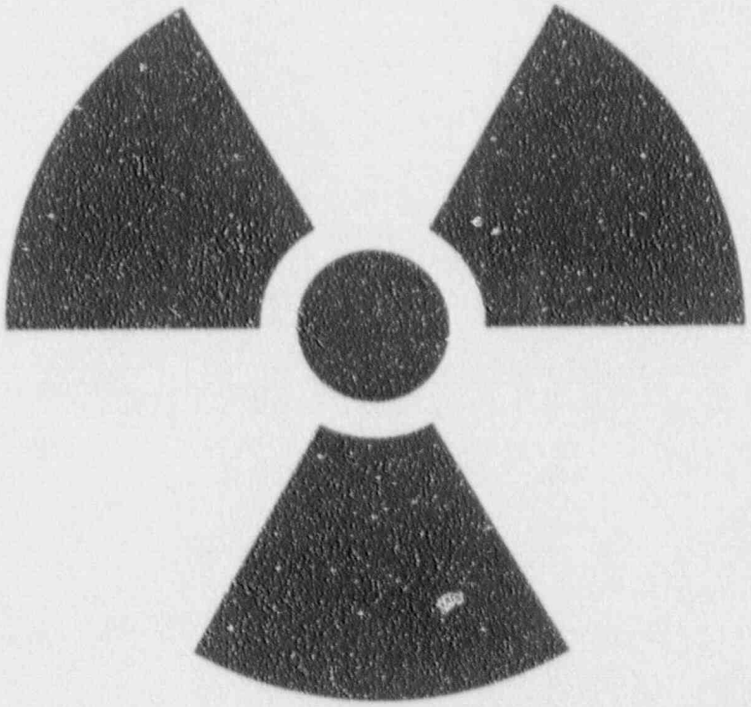
92-0403 LC/cl

ENCLOSURE 1

Revised August 31, 1990

UNIVERSITY OF PENNSYLVANIA

RADIATION SAFETY USERS' GUIDE



This Guide has been prepared as an information manual for University personnel concerned with the use of radioisotopes or other sources of ionizing radiation.

ONE COPY OF THIS GUIDE SHOULD BE READILY AVAILABLE IN EACH LICENSED LABORATORY.

TABLE OF CONTENTS

I. AUTHORIZATION TO USE RADIOACTIVE MATERIALS (LICENSING)

A. Initial application and amendments

1. Licenses to use radioactive materials (RAM), and amendments to existing licenses, are granted by the Radiation Safety Committee (RSC). Application forms are available at the Radiation Safety Office (RSO).

2. Faculty members who are principal investigators are those individuals typically approved for radioactive materials licenses.

3. The review and approval process for a license or amendment application typically takes 4 to 8 weeks.

B. Annual license review

1. The RSO will send annual license review forms to licensees requesting the following information:

a. Current RAM inventory

b. Current list of radiation workers

c. Current protocols involving the use of any licensed RAM

d. Current list of survey meters

e. Current list of sealed sources

2. Completed forms must be returned to the RSO within two weeks.

II. ALARA

A. The acronym ALARA, As Low As Reasonably Achievable, means that persons using sources of ionizing radiation should make every reasonable effort to keep exposures to individuals and releases of radioactive materials to unrestricted areas as far below regulatory limits as is practicable. As a general rule, exposures and releases should be kept below 10% of the regulatory limits.

B. Licensees together with laboratory personnel shall review their experimental protocols, work habits, and available safety equipment for adherence to the ALARA principle.

C. The RSO will notify licensees of individuals receiving personnel dosimeter exposures exceeding ALARA levels. Exposures will be investigated and reviewed by the RSC.

III. TRAINING

A. Persons working in labs where RAM or energized equipment is used or stored are required to attend RSO training prior to beginning work with the source of radiation.

B. A licensee must hold an annual ALARA training session and record the topics covered, the date, and names of attendees. An outline for this training shall include, but is not limited to, the following:

V. RAM INVENTORY

A. Each laboratory must maintain a permanent record of individual RAM stock vial receipts/dispositions which includes the following: radionuclide, chemical form, date of receipt, transfers, and date of final disposal.

B. It is recommended that a running log of all withdrawals from the shipment vial be maintained.

C. A quarterly record of current RAM stock vial inventory is required (the activity on hand should not exceed the licensee's possession limit for each radionuclide).

D. A sewer disposal log must be used to summarize RAM disposed of in the sewer for each sink designated for such disposal.

E. The sewer disposal logs shall be summarized quarterly as follows: Total H-3, total C-14, total for all other radionuclides.

VI. GENERAL RADIATION SAFETY PRACTICES

A. Lab coats or other protective clothing shall be worn when handling radioactive material, or working in an area designated as a RAM work area.

B. Disposable gloves shall be worn when handling RAM.

C. Personnel shall not eat, drink, smoke, store food, or mouth pipette in areas where RAM is used or stored.

D. Careful experimental planning, dry runs, shielding, distance and monitoring shall be required for minimizing exposure.

E. RAM shall be used, stored, and transported in appropriate containers.

F. RAM shall be secured against use or access by unauthorized persons.

G. Smooth work surfaces, protective bench coverings, contamination monitoring, proper equipment, and segregated work areas shall be used to control contamination.

H. Radioactive waste shall be collected in appropriate containers and disposed of according to the RADIOACTIVE WASTE AND DISPOSAL section of the guide.

I. Approved fume hoods or glove boxes shall be used when required in licensing conditions to control possible airborne contamination.

J. Facilities and RAM containers must be labeled according to the POSTING & LABELING section of this guide.

K. Hands should be thoroughly washed after working with RAM.

L. A current copy of the "User's Guide" must be available to personnel within the lab.

M. The RSO must be notified promptly in the event of:

1. personnel contamination

B. Personnel dosimeter program

1. The cost of the personnel dosimeters is paid by the licensee. Current costs can be obtained by contacting the RSO.

2. Description: Personnel dosimeters are devices worn by persons to measure their radiation dose. These dosimeters can consist of film, thermoluminescent crystals, pocket chambers, or integrating dosimeters with settable alarms.

3. Who gets personnel dosimeters?

a. All individuals, unless specified otherwise in license conditions, who **handle** (at any time) RAM with activities exceeding the following limits should wear both whole body and extremity dosimeters.

Radionuclide	Activity
I-125 & Cr-51	5 mCi
P-32 & Rb-86	1 mCi
I-131, Se-75, & Co-57	500 µCi
Zn-65	250 µCi
Fe-59, Co-60, Na-22, & Nb-95	50 µCi
For beta emitters exceeding 250 keV, or other gamma or x-ray emitters	Consult the RSO

b. **Personnel dosimeters are not required when working only with radionuclides which are low energy beta emitters (e.g., H-3, C-14, & S-35).**

c. It is the responsibility of the licensee to notify the RSO of those individuals requiring personnel dosimeters. **Personnel dosimeters will be issued (if necessary) when a completed Radiation Worker Registration form is received.**

d. It is the responsibility of individuals receiving dosimeters for the first time to pick them up in the Radiation Safety Office.

3. Monitoring periods: Workers will be assigned dosimeters monthly or quarterly, depending upon the expected radiation dose. New dosimeters will be delivered on the Wednesday before the last day of the month, and old dosimeters are picked up on the Wednesday after.

4. Obtaining a dosimeter: To get a dosimeter, bring a completed Radiation Worker Registration form to the RSO.

X. RADIOACTIVE WASTE DISPOSAL

The cost of radioactive waste disposal is paid by the licensee. Current waste disposal costs along with radioactive waste collection hours and locations can be obtained by contacting the RSO.

Common waste types and their approved disposal methods are listed below. If your waste material is not included in this list, or is a mixed hazardous waste (e.g., toxic and radioactive) other than scintillation fluid, consult the RSO.

A. Dry Waste

Definition - Dry waste materials potentially contaminated with radioactive material. No free standing liquid or biological material is permissible in this waste.

1. Non-commercial Disposal [This option is only for waste generated from use with gamma or hard (> 250 keV) beta emitters.]

   a. Survey the waste with a suitably sensitive meter (able to detect ≤ 0.1 mR/hr at contact) in a low background area.

   b. Readings shall be made at a distance of 1 inch or less from the surface of the material.

   c. If no reading distinguishable from background on contact with the material is found, obliterate radioactive labels and dispose of as non-radioactive waste.

   d. If readings exceed background, dispose of waste commercially (as described in the next section).

2. Commercial Disposal

   a. Place waste in a five gallon pail which is lined with a clear plastic bag (pail and bags are provided by the RSO).

   b. Complete a waste transfer memo form for each pail of waste.

   c. Transfer waste to the RSO designated waste collection area during specified waste hours.

B. Animal Carcasses/Biological Material

1. Place waste in transparent bags. (Keep waste containing less than 0.05 μCi/gm of ^{3}H or ^{14}C in a separate bag.)

2. Complete a waste transfer form for each bag of waste.

3. Transfer refrigerated (**not frozen**) carcasses to the RSO designated waste collection area during specified waste hours.

E. Short-lived (T 1/2 ≤ 15 days), non-hazardous waste for storage for decay

1. Centralized storage (stored by Radiation Safety)

a. Place waste (segregated into short-lived radionuclides) in a five gallon pail which is lined with a clear plastic bag (pail and bags are provided by the RSO).

b. Complete a waste transfer memo form for each pail of waste.

c. Transfer waste to the RSO designated waste collection area during specified waste hours.

d. The following restrictions apply:

1) Remove or obliterate all radioactive materials labels.

2) No hazardous materials (i.e., lead, organic solvents) may be included.

3) No concrete may be included (small volumes of liquid are acceptable).

2. Local storage (stored by licensee)

a. Stored waste must be properly shielded -- ^{32}P must be stored behind plexiglass shielding with a minimum thickness of 3/8 inch.

b. All radioactive materials labels must be removed or obliterated prior to disposal.

c. All waste must be stored for ≥ 10 half-lives, AND at the time of disposal radiation levels from the unshielded waste container must be indiscernible from background when measured at the surface of the waste with a G-M survey meter.

d. A suitably sensitive survey meter must be available within the lab, and have been labeled with the reading from a dedicated check source by the Radiation Safety Office annually. This source must be mounted to the meter.

BETWEEN:

LICENSE FEE MANAGEMENT BRANCH, ARM
AND
REGIONAL LICENSING SECTIONS

(FOR LFMS USE)
INFORMATION FROM LTS

PROGRAM CODE: 22122
STATUS CODE: 2
FEE CATEGORY: EX 1D
EXP. DATE: 19920831
FEE COMMENTS: 170.11(A)(4)
OFCOM FIN ASSUR RIQD: N

LICENSE FEE TRANSMITTAL

A. REGION

1. APPLICATION ATTACHED
APPLICANT/LICENSEE: PENNSYLVANIA, UNIVERSITY OF
RECEIVED DATE: [illegible]0731
DOCKET NO: 7000123
CONTROL NO.: 116935
LICENSE NO.: SNM-114
ACTION TYPE: RENEWAL

2. FEE ATTACHED
AMOUNT: $0
CHECK NO.: -0-

3. COMMENTS

SIGNED Rebecca J. Brown
DATE 8/4/92

FEE EXEMPT 1/1

B. LICENSE FEE MANAGEMENT BRANCH (CHECK WHEN MILE[illegible] DOCUMENTS RECEIVED)

1. FEE CATEGORY AND AMOUNT: E.X. 1D 170.11(A)(4)

2. CORRECT FEE PAID. APPLICATION MAY BE PROCESSED FOR:
AMENDMENT ----
RENEWAL ✓
LICENSE ----

3. OTHER ----

SIGNED B Brown
DATE 8/13/92