APPLICATION TO USE RADIOACTIVE MATERIAL AT THE UNIVERSITY OF WYOMING

DIRECTIONS: This application is divided into nine sections. Please print, type, or provide legible copies of printed material in response to the questions.

Sections 1-6 Complete by filling in the blanks to the best of your ability. Additional information can be supplied from the Radiation Safety Manual or by Radiation Safety Office. If you require more space, use the back page or attach a separate sheet. Do not leave any answers blank. If a question is not applicable to your situation, say so.

Section 7 This section consists of four forms: two of which are to be completed and posted in a conspicuous location in your workplace; and two forms for Radiation Safety records. A copy of each form must accompany the application.

Section 8 Attach a brief description of the proposed use(s) of the radionuclide, followed by a more detailed description of the procedures or any other information that would aid in the evaluation of the application.

Section 9 This space is reserved for any additional remarks by the applicant, Radiation Safety Officer or Radiation Safety Committee. The application is signed and dated at the bottom by the applicant and the person granting temporary approval.

A separate application form is required for each radionuclide. If you have addressed an item in a previous application, refer to the previous application by radionuclide and date. On completion, detach these directions and return the application to the Radiation Safety Office, Room 102, Wyoming Hall. A copy of your application should be kept in your office or workplace.

Radioactive Materials Safety Plans and other radiation safety information will be supplied by the Radiation Safety Office, 102 Wyoming Hall (766-2638).

The applicant is invited to attend the Radiation Safety Committee meeting at which this application will be reviewed, otherwise the applicant will be notified of the committee's final decision.

Attachments:

1. Safety Regulations Related to Radioactive Materials
2. Radiation Survey Guidelines
3. Training in Use of Radioactive Materials
4. Occupational External Radiation Exposure History (NRC Form 4)
5. University of Wyoming Radioactive Materials Safety Plan

USEFUL INFORMATION FOR COMPLETING RADIOISOTOPE APPLICATIONS

Radionuclide (type of decay)	ALI (µCi) inhalation /ingestion	DAC (µCi/cm^3)	External dose (mR/hr at 1 m/Ci)	Half-life
C-14 (CO_2) (B- 0.156MeV)	2 E5 / 2000 (cmpds)	9 E-5	< 10	5730 y
Ca-45 (B- 0.252 MeV)	800 / 2000	4 E-7	< 10	163 d
Cd-109 (EC, X-ray 0.088 MeV)	40 / 300	1 E-8		464 d
Cr-51 (EC,X-ray 0.320 MeV)	5 E4 / 4 E4	2 E-5	----------	27.704 d
Cu-64 (B- 0.578 MeV, X-ray 1.3 MeV)	3 E4 / 1 E4	1 E-5		12.701 h
H-3 (B- 0.-0186 MeV)	8 E4 / 8 E4	2 E-5	< 0.2	12.35 y
I-125 (EC,X-ray 0.035 MeV)	60 / 40	3 E-8		60.14 d
Na-22 (B+ 1.82MeV), (X-ray 1.275)	600 / 400	3 E-7		2.602 y
P-32 (B- 1.71 MeV)	900 / 600	4 E-7	< 10	14.29 d
P-33 (B- 0.25 MeV)	8000 / 6000	4 E-6		25.4 d
S-35 (B- 0.167 MeV)	2 E4 / 1 E4	7 E-6	< 10	87.44 d
Se-75 (EC,X-ray 0.4, 0.28 MeV)	700 / 500	3 E-7		119.8 d

Typical Survey Instruments[1]

Portable Instruments Used for Contamination and Ambient Radiation Surveys			
Detectors	**Radiation**	**Energy Range**	**Efficiency**
Exposure Rate Meters	Gamma, X-ray	µR-R	N/A
Count Rate Meters			
GM	Alpha	All energies (dependent on window thickness)	Moderate
	Beta	All energies (dependent on window thickness)	Moderate
	Gamma	All energies	< 1%
NaI Scintillator	Gamma	All energies (dependent on crystal thickness)	Moderate
Plastic Scintillator	Beta	C-14 or higher (dependent on window thickness)	Moderate
Stationary Instruments Used to Measure Wipe, Bioassay, and Effluent Samples			
Detectors	**Radiation**	**Energy Range**	**Efficiency**
LSC*	Alpha	All energies	High
	Beta	All energies	High
	Gamma		Moderate
Gamma Counter (NaI)*	Gamma	All energies	High
Gas Proportional	Alpha	All energies	High
	Beta	All energies	Moderate
	Gamma	All energies	< 1%

[1] Table from The Health Physics & Radiological Health Handbook, Revised Edition, 1992 (except for * items).

APPLICATION TO USE RADIOISOTOPES
AT THE UNIVERSITY OF WYOMING

Fill in the blanks concerning the radionuclide for which approval is being requested.

1. Principal User (Applicant) Information

a) Name of Principal User:

b) Building(s) and room(s) where radioactivity will be used or stored

c) Principal User's office address

d) Principal User's work phone number(s)

e) Principal User's home phone number

f) Principal User's E-mail address

2. Radionuclide Usage Information

a) Name of radionuclide (one form for each):

b) Maximum amount of radionuclide to be used per experiment:

c) Maximum frequency of experiments: (number/unit of time)

d) Maximum possession amount:

e) Approximate amount to be used/year:

f) Duration of time approval is requested: (max. of 3 years)

g) Overall hazard rank of workplace, based on toxicity of and proposed usage amounts of radionuclide (refer to Radiation Safety Manual, section II-E) (check one)

Type C low ☐ Type B medium ☐ Type A high ☐

3. Radionuclide Hazard Information

a) Diagram the decay scheme from the radionuclide to a stable nuclide

b) List the type(s) and energ(y)(ies) of radiation emitted by the radionuclide

c) Body part(s) exposed to external radiation during procedures using radionuclide

For the following questions, refer to the table provided with the directions:

d) Maximum gamma exposure rate (mR/hr, if applicable)

h) Annual limit on intake (ALI), inhalation
ingestion

i) Derived air concentration (DAC)

j) Maximum permissible concentrations in air and water for a 40 hour week — air
water

k) Half-life of radionuclide

4. Chemical Hazard Information

a) Name the principle chemical compounds that are labeled or that will be labeled with the radionuclide.

b) Describe any chemical hazards (flammability, corrosivity, toxicity, reactivity, mutagen, etc.) or physical hazards, (volatility, powdered physical state, compressed gases, etc.) associated with compounds used or produced in the experiment. For each hazard identified, describe the procedures you will use to ensure the safety of all personnel who may potentially exposed to the hazard.

5. Exposure Control and Monitoring

a) List the monitoring method(s) required for external exposures, and what frequency

b) List the monitoring method(s) required for internal exposures, and what frequency

c) Specify the protective apparel or shielding required (lab coat, eye protection, shoe covers, lead aprons, respirator, etc.)

d) Are safety showers and eye wash stations available in the work area? Y ☐ N ☐

If not, justify why they are not needed or what steps have been taken to provide substitutes.

e) Are written directions available for all experiments involving radioactivity before and during the experiment? Y ☐ N ☐

f) Are hoods, glove boxes or other special safety equipment required? Y ☐ N ☐

If so, describe the situations when they are employed.

g) If hoods are required, what provisions ensure that the maximum permissible air concentration in the work area and hood exhaust system are not exceeded?

h) List the counting and monitoring instrumentation available to you. If you are using someone else's instrumentation then submit a letter signed by the person responsible for the instrument permitting you to use the instrument along with any conditions of usage.

Instrument/ Detector	Make	Model	Serial Number	Radiation Detected	Location (Bldg, rm)	Person in Charge

6. University Policies and Procedures

a) Have you read the University of Wyoming Radiation Safety Manual? Y ☐ N ☐

b) Are you aware that <u>all</u> orders, shipments, and transfers of radioactive material must be processed through Risk Management and Safety? Y ☐ N ☐

c) If radioactive materials are to be transferred between non-connecting rooms, or buildings:

i) What is the maximum activity that will be transported at any one time?

ii) Describe how it will be transported, including packaging and steps taken to prevent accidents.

iii) Describe the labeling that will be attached to containers used in transporting the radioactive material.

iv) List any other special precautions that you will prescribe for transportation.

d) Describe the security of radioactive materials in your workplace and how you will prevent unauthorized use.

e) Describe the radioactive materials storage facilities.

f) Describe the storage facilities for radioactive waste and how the waste will be contained.

g) Describe the mechanisms that will be used to maintain radioisotope inventory from initial receipt to waste disposal.

h) Describe how you will dispose of the radioactive waste.

i) Will the radioactive waste be mixed with other hazardous constituents? (see radioactive waste guidelines in Radiation Safety Manual) **Y** ☐ **N** ☐

If so, list the chemicals and their hazards.

j) Will radioactive materials be used on animals? If so, attach the handling precautions and training for animal care personnel. Attach approval from Animal Care Committee. **Y** ☐ **N** ☐

7. Forms (check with Risk Management & Safety)

Complete the following forms (attached). If these have been completed on a previous application and no changes are involved, just refer to the existing form.

a) **Safety Regulations Related to Radioactive Materials** (a copy of this form must be posted in each lab).
b) **Radiation Survey Guidelines** (a copy of this form must be posted in each lab).
c) **Training in Use of Radioactive Materials** (for each person who will use radionuclides). Attach any additional proof or description of training you have received. Refer to Radiation Safety Manual for training requirements for each level of user.
d) **Occupational External Radiation Exposure History** (NRC Form 4) (for each person who will use radionuclides)

8. Proposed Use of Radionuclide

Give a brief outline of the proposed radionuclide use. Attach a more detailed description of the procedures in which the radionuclide will be used. If the use of the nuclide covers broad areas, then the outline should allow for some flexibility. If you are going to use standard procedures, then attach the standard procedures or an article which describes the experiment. Bear in mind that this approval is for the use of the radionuclide as your specify. It is not a general license to use the nuclide anyway you see fit.

9. Remarks: by the applicant, Radiation Safety Officer or Radiation Safety Committee

Applicant signature _____ Date _____

Temporary approval by _____ Date _____
Name, Title

Final approval in Radiation Safety Committee Minutes dated _____

RADIATION SURVEY GUIDELINES

USER _____BLDG_____ROOM_____
Isotopes used in the workplace _____

Workplace surveys required every (check one): month ☐ week ☐ day ☐ other ☐

Sketch the workplace in the space below and number the locations to be surveyed. Show all exits and permanent room fixtures. Indicate all radioactive usage areas as shown below.

Radiation usage area  Radiation storage  Radiation waste 

Complete the table below for each survey location identified in the workplace sketch.

FOR SURVEYS TAKEN 1" ABOVE SURFACE			FOR WIPE TESTS (100cm^2 wipe)	
Location #	Instrument	Approx. Area	Location #	Instrument for Counting

Person responsible for: surveys _____records

SAFETY REGULATIONS RELATED TO RADIOACTIVE MATERIALS

FOR ROOM(S)_____BUILDING_____

A copy of these regulations will be posted in the workplace.

No food or beverages may be stored or consumed in the radioactive workplace.

The following protective equipment and/or apparel must be worn when working with radionuclides in the workplace.

The following personnel exposure monitors must be worn by persons using radionuclides in this workplace.

The person responsible for personnel dosimeters is

(name)

Workplace surveys are to be conducted every

(time period)

Dates and results of workplace surveys will be recorded in a survey logbook and signed by the person performing the survey. The logbook will be kept:

(location)

A current inventory of radionuclides will be maintained for each principal user in the workplace. The person(s) responsible for the inventory is (are)

(names)

The inventory is kept

(location)

The person responsible for record keeping is

(name)

The person responsible for rule enforcement is

(name)

Authorized Users for P.I. _____ Lab Room(s)_____

First Name, Last Name	Department *	Mailing Address *	Phone Number *	e-mail address	Birth date	W Number	Sex (M/F)	(S)upervised (I)ndependent (P)rincipal

* If Department, Mailing Address and Phone Number are the same as those for the P.I. these may be left blank