

Form AEC-313 (2-73) 10 CFR 30	UNITED STATES ATOMIC ENERGY COMMISSION APPLICATION FOR BYPRODUCT MATERIAL LICENSE	Form approved Budget Bureau No. 38-20027																								
<p>INSTRUCTIONS.—Complete Items 1 through 16 if this is an initial application or an application for renewal of a license. Information contained in previous applications filed with the Commission with respect to Items 8 through 15 may be incorporated by reference provided references are clear and specific. Use supplemental sheets where necessary. Item 16 must be completed on all applications. Mail two copies to: U.S. Atomic Energy Commission, Washington, D.C., 20545, Attention: Materials Branch, Directorate of Licensing. Upon approval of this application, the applicant will receive an AEC Byproduct Material License. An AEC Byproduct Material License is issued in accordance with the general requirements contained in Title 10, Code of Federal Regulations, Part 30, and the Licensee is subject to Title 10, Code of Federal Regulations, Part 20, and the license fee provisions of Title 10, Code of Federal Regulations, Part 170. The license fee category should be stated in Item 16 and the appropriate fee enclosed. (See Note in Instruction Sheet).</p>																										
1. (a) NAME AND STREET ADDRESS OF APPLICANT. (Institution, firm, hospital person, etc. Include ZIP Code and telephone number.) Eastern Montana College 1500 North 27th Street Billings, Montana 59101		(b) STREET ADDRESS(ES) AT WHICH BYPRODUCT MATERIAL WILL BE USED. (If different from 1(a). Include ZIP Code.) Same as 1a with the exception of Hydrogen-3 and Carbon-14, which will be employed in field studies.																								
2. DEPARTMENT TO USE BYPRODUCT MATERIAL Department of Biology		3. PREVIOUS LICENSE NUMBER(S). (If this is an application for renewal of a license, please indicate and give number.) #25-12923-01																								
4. INDIVIDUAL USER(S). (Name and title of individual(s) who will use or directly supervise use of byproduct material. Give training and experience in Items 8 and 9.) Dr. Jay F. Kirkpatrick, Associate Prof. Dr. Gary L. Bintz, Associate Prof.		5. RADIATION PROTECTION OFFICER. (Name of person designated as radiation protection officer if other than individual user. Attach resume of his training and experience as in Items 8 and 9.) Same as users																								
6. (a) BYPRODUCT MATERIAL. (Elements and mass number of each.) A. Calcium-47 B. Carbon-14 Carbon-14 C. Cobalt-60 D. Hydrogen-3 Hydrogen-3 E. Iodine-131 F. Iron-59 G. Manganese 54 H. Phosphorus-32 I. Sulfur-35 J. Zinc-65	(b) CHEMICAL AND/OR PHYSICAL FORM AND MAXIMUM NUMBER OF MILLICURIES OF EACH CHEMICAL AND/OR PHYSICAL FORM THAT YOU WILL POSSESS AT ANY ONE TIME. (If sealed source(s), also state name of manufacturer, model number, number of sources and maximum activity per source.) <div style="text-align: center;">Form</div> <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 70%;">Any -----</td> <td style="width: 30%;">0.075 millicuries</td> </tr> <tr> <td>Organic metabolites (eg:glucose) -----</td> <td>10 millicuries</td> </tr> <tr> <td>H₂CO₃ -----</td> <td>1 millicurie</td> </tr> <tr> <td>Any ³ -----</td> <td>0.01 microcuries</td> </tr> <tr> <td>Organic metabolites and hormones -----</td> <td>2 millicuries</td> </tr> <tr> <td>Water -----</td> <td>2 millicuries</td> </tr> <tr> <td>Any -----</td> <td>0.10 millicuries</td> </tr> <tr> <td>Any -----</td> <td>0.20 millicuries</td> </tr> <tr> <td>Any -----</td> <td>0.10 millicuries</td> </tr> <tr> <td>Any -----</td> <td>0.15 millicuries</td> </tr> <tr> <td>Any -----</td> <td>0.20 millicuries</td> </tr> <tr> <td>Any -----</td> <td>0.15 millicuries</td> </tr> </table>		Any -----	0.075 millicuries	Organic metabolites (eg:glucose) -----	10 millicuries	H ₂ CO ₃ -----	1 millicurie	Any ³ -----	0.01 microcuries	Organic metabolites and hormones -----	2 millicuries	Water -----	2 millicuries	Any -----	0.10 millicuries	Any -----	0.20 millicuries	Any -----	0.10 millicuries	Any -----	0.15 millicuries	Any -----	0.20 millicuries	Any -----	0.15 millicuries
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7. DESCRIBE PURPOSE FOR WHICH BYPRODUCT MATERIAL WILL BE USED. (If byproduct material is for "human use," supplement A (Form AEC-313a) must be completed in lieu of this item. If byproduct material is in the form of a sealed source, include the make and model number of the storage container and/or device in which the source will be stored and/or used.) A. All isotopes will be employed in laboratory studies involving laboratory animals and plants. B. Carbon 14 and Hydrogen-3 will be employed in field studies in ground squirrels. The species of ground squirrel studied inhabits semiarid prairies and a study site is available which is at least one mile from standing or running water, and 4 miles from human habitation. Animals to which isotopes will be administered will be recovered. C. Human use will not occur.																										
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TRAINING AND EXPERIENCE OF EACH INDIVIDUAL NAMED IN ITEM 4 (Use supplemental sheets if necessary)

8. TYPE OF TRAINING	WHERE TRAINED	DURATION OF TRAINING	ON THE JOB (Circle answer)	FORMAL COURSE (Circle answer)
a. Principles and practices of radiation protection	G.L.Bintz, Univ. of New Mexico J.F.Kirkpatrick, Cornell Univ.	6 months 5 months	<input checked="" type="radio"/> yes <input type="radio"/> no <input checked="" type="radio"/> Yes <input type="radio"/> No	<input checked="" type="radio"/> yes <input type="radio"/> no <input checked="" type="radio"/> Yes <input type="radio"/> No
b. Radioactivity measurement standardization and monitoring techniques and instruments	G.L.Bintz, Univ. of New Mexico J.F.Kirkpatrick, Cornell Univ.	6 months 5 months	<input checked="" type="radio"/> yes <input type="radio"/> no <input checked="" type="radio"/> Yes <input type="radio"/> No	<input checked="" type="radio"/> yes <input type="radio"/> no <input checked="" type="radio"/> Yes <input type="radio"/> No
c. Mathematics and calculations basic to the use and measurement of radioactivity	G.L.Bintz, Univ. of New Mexico J.F.Kirkpatrick, Cornell Univ.	1 year 5 months	<input checked="" type="radio"/> yes <input type="radio"/> no <input checked="" type="radio"/> Yes <input type="radio"/> No	<input checked="" type="radio"/> yes <input type="radio"/> no <input checked="" type="radio"/> Yes <input type="radio"/> No
d. Biological effects of radiation	G.L.Bintz, Univ. of New Mexico J.F.Kirkpatrick, Cornell Univ.	6 months 1 year	<input checked="" type="radio"/> yes <input type="radio"/> no <input checked="" type="radio"/> Yes <input type="radio"/> No	<input checked="" type="radio"/> yes <input type="radio"/> no <input checked="" type="radio"/> Yes <input type="radio"/> No

9. EXPERIENCE WITH RADIATION (Actual use of radioisotopes or equivalent experience)

ISOTOPE	MAXIMUM AMOUNT	WHERE EXPERIENCE WAS GAINED	DURATION OF EXPERIENCE	TYPE OF USE
P-32	100 micro-curies	Cornell University/ University of New Mexico	4 weeks	studies in laboratory animals
I-131	50 "	Cornell Univ/Univ.of New Mexico	4 weeks	" "
Na-22	100 "	Cornell Univ/Univ.of New Mexico	10 weeks	" "
(See attached sheet)				

10. RADIATION DETECTION INSTRUMENTS (Use supplemental sheets if necessary)

TYPE OF INSTRUMENTS (Include make and model number of each)	NUMBER AVAILABLE	RADIATION DETECTED	SENSITIVITY RANGE (mr/hr)	WINDOW THICKNESS (mg/cm ²)	USE (Monitoring, surveying, measuring)
1. Liquid Scintillators					
a. Nuclear Chicago 724	1	beta	0-1million cpm		measuring
b. Beckman LS 100	1	beta	0-1million cpm		measuring
2. Geiger & Muller detectors					
a. Baird-Atomic					
b. Abacus GM Scalar Model 1238	4	beta gamma	0-100,000 cpm		Surveying, measuring

11. METHOD, FREQUENCY, AND STANDARDS USED IN CALIBRATING INSTRUMENTS LISTED ABOVE.

The instruments undergo calibration by service representatives, at three to six month intervals.

12. FILM BADGES, DOSIMETERS, AND BIO-ASSAY PROCEDURES USED (For film badges, specify method of calibrating and processing, or name of supplier.)

Bioassay. When work involves Hydrogen-3 blood and urine samples of users are assayed.

INFORMATION TO BE SUBMITTED ON ADDITIONAL SHEETS IN DUPLICATE

13. FACILITIES AND EQUIPMENT. Describe laboratory facilities and remote handling equipment, storage containers, shielding, fume hoods, etc. Explanatory sketch of facility is attached. (Circle answer) ☒ Yes ☐ No
14. RADIATION PROTECTION PROGRAM. Describe the radiation protection program including control measures. If application covers sealed sources, submit leak testing procedures where applicable, name, training, and experience of person to perform leak tests, and arrangements for performing initial radiation survey, servicing, maintenance and repair of the source.
15. WASTE DISPOSAL. If a commercial waste disposal service is employed, specify name of company. Otherwise, submit detailed description of methods which will be used for disposing of radioactive wastes and estimates of the type and amount of activity involved.

CERTIFICATE (This item must be completed by applicant)

16. THE APPLICANT AND ANY OFFICIAL EXECUTING THIS CERTIFICATE ON BEHALF OF THE APPLICANT NAMED IN ITEM 1, CERTIFY THAT THIS APPLICATION IS PREPARED IN CONFORMITY WITH TITLE 10, CODE OF FEDERAL REGULATIONS, PART 30, AND THAT ALL INFORMATION CONTAINED HEREIN, INCLUDING ANY SUPPLEMENTS ATTACHED HERETO, IS TRUE AND CORRECT TO THE BEST OF OUR KNOWLEDGE AND BELIEF.

License Fee Category 3

Fee Enclosed \$ 10.00

Date May 30 1978

Eastern Montana College

Applicant named in item

By: Robert J. McRae

Acting Academic Vice President

Title of certifying official

SUPPLEMENT SHEET NUMBER 1

9. Experience with Radiation

Na-22	100 microcuries	Cornell Univ./Univ. of New Mexico	10 weeks	studies in laboratory animals
H-3	1.0 millicurie	Cornell, New Mexico, Eastern Montana College	6 months	" "
C-14	1.0 millicurie	Cornell, New Mexico, Eastern Montana College	5 years	" "

→ 11. Source 1125, 3 mm, measuring

13. Facilities and Equipment.

- The radioisotope laboratory is located well away from most traffic in the Science Building and is subject to very little use other than that for radioisotopes. The lab is 12 x 28 feet and includes a sink, 36 feet of counter and storage space, a refrigerator, and a safe for storing radioisotopes. Nearly all isotope work is conducted in this laboratory.
- A second room is available for work with volatile materials, including isotopes in volatile forms. This room is 6 x 8 feet and contains counterspace, a sink, and a fume hood. The room is reserved for work of this type.
- Field work with Carbon-14 and Hydrogen-3 is also anticipated. The work consists of administration of Carbon-14 or Hydrogen 3 (5-10 microcuries/animal) to wild Richardson's ground squirrels, Spermophilus richardsoni. The ground squirrels will be marked with food coloring for identification and released. Ground squirrels will be recovered the next day and the fate of the injected label will be determined. Not all ground squirrels can be recovered, but in one trial during which label was not injected, we recovered 14 of 19 ground squirrels which had been trapped and released.

A study site has been located which offers a high density of ground squirrels. This site is prairie and is approximately one mile from permanent water and four miles from permanent human habitation. The site is private land.

Field studies will involve less than one millicurie annually.

14. Radiation Protection Program.

- The principal users order radioisotopes and one of these individuals is contacted by the airline delivering the isotope if arrival occurs during off-duty hours. Radioisotopes are stored in a locked safe in the basement of the building in a room with a special lock. All radioisotopes are received by the principal users in the radioisotope lab.
- Initial examination is done with a G-M scalar. The package is then opened over a metal tray, and the content are inspected for leaks. Packing materials are surveyed and disposed of only after it has been confirmed that no leaks have occurred. The date, amount, and form of incoming isotopes are logged.
- Currently no students handle radioisotopes unless directly supervised by one of the principal users. Secondary users are trained on the job.
- See attached, in addition to:
 - There are no sealed sources greater than 410,000 dpm.

14. d) Continued.

Rules for Radioisotope Use

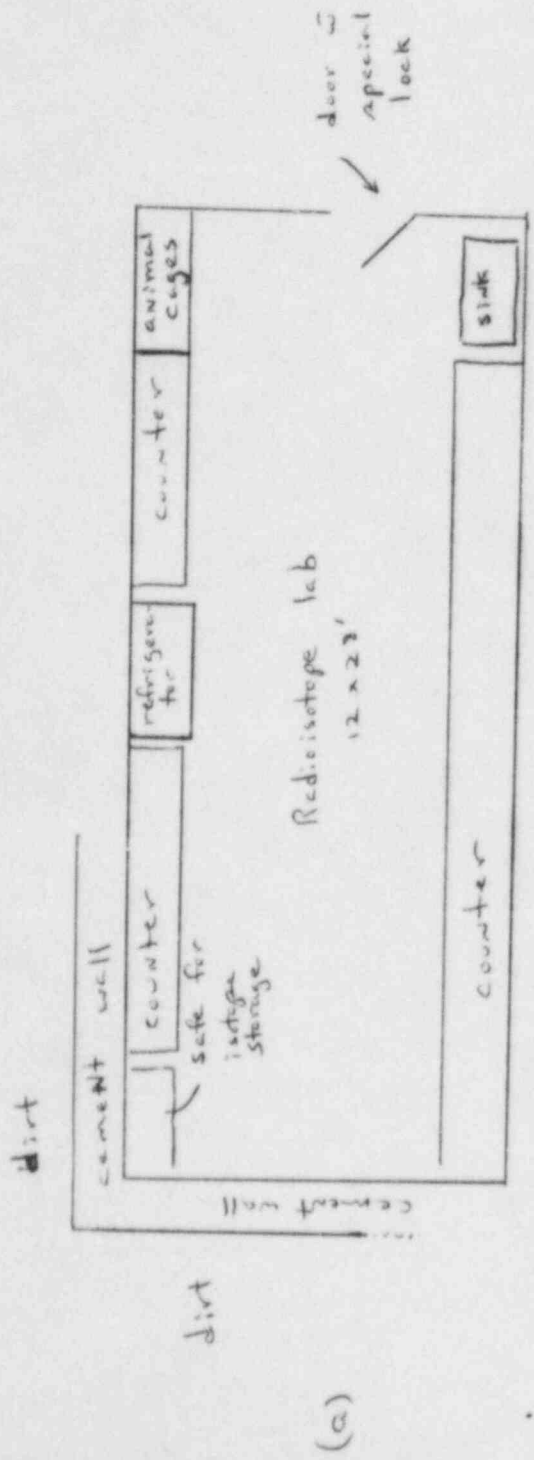
1. Smoking, drinking, or eating will not be allowed in the radioisotope lab.
2. Use of radioisotopes will occur only during the supervision of J.F. Kirkpatrick or G.L. Bintz.
3. During use of radioisotopes proper apparel must be worn (gloves, lab coat or apron). Use of volatile radioisotopes or volatile forms must occur in a fume hood. All stock bottles or radioisotopes must be used only over a metal tray.
4. All spills must be reported.
5. Stock bottles of radioisotopes must not be removed from the radioisotope lab.
6. Radioisotopes of short half life (two weeks) will be stored for two half lives before disposal. Other wastes may be disposed through the sink in the radioisotope lab.
7. Use of radioisotopes and disposal thereof must be recorded in the logbook. Record quantities to the nearest microcurie.
8. If problems arise contact J.F. Kirkpatrick (406)-657-2177 or G. L. Bintz, 657-2342.

SUPPLEMENTAL SHEET NUMBER 3

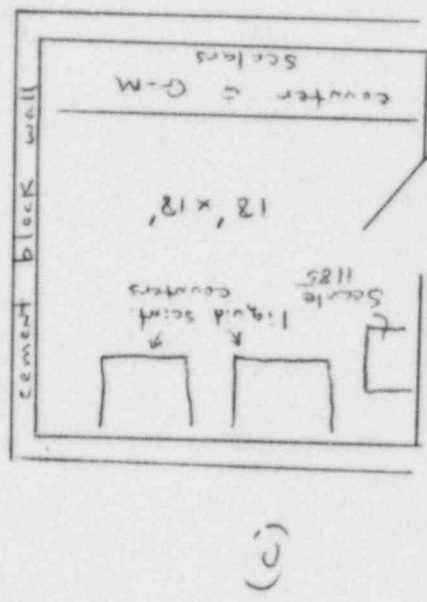
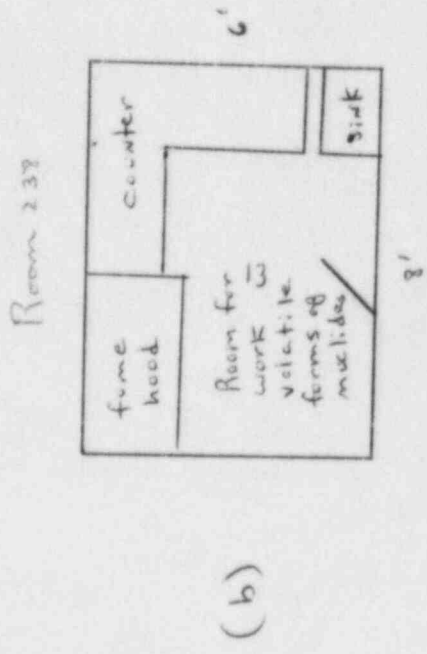
14. Continued

- e) Not applicable, since quantities are small and the principal users will be present during all experiments.
 - f) The animal room is separated from the radioisotope lab. When animals are used in isotopic experiments, they are housed in the radioisotope lab and cared for by the investigator(s). This room is locked except during its use by the principal investigators. Contaminated cages are washed in a sink in the radioisotope lab under the direct supervision of the principal investigators. Carcasses are buried in accordance with Section 20.106 of 10 CFR Part 20.
 - g) The radioisotope lab is surveyed each week during periods of moderate use, and more often with heavy use.
15. Wastes will be disposed into the plumbing system of the Science Building. Isotopes of short half life (eg: P-32) will be stored until activity is low before being disposed. Wastes will be disposed in the radioisotope laboratory, except for that amount lost by failure to recover all animals injected during field studies.

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Rooms for Radioisotope Use



- a) away from traffic and locked
- b) + c) near traffic, but locked: