

3K 6/30/78

Form AEC-313  
(2-73)  
10 CFR 30

UNITED STATES ATOMIC ENERGY COMMISSION  
APPLICATION FOR BYPRODUCT MATERIAL LICENSE

Form approved  
Budget Bureau No. 38-80027

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).

1. (a) NAME AND STREET ADDRESS OF APPLICANT. (Institution, firm, hospital person, etc. Include ZIP Code and telephone number.)

John Carroll University  
North Park & Mirimar Blvd.  
University Heights, Ohio 44118

(b) STREET ADDRESS(ES) AT WHICH BYPRODUCT MATERIAL WILL BE USED. (If different from 1(a). Include ZIP Code.)

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.)

renewal application for license  
34-07198-03

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. Fenton D. Moore, Assoc. Prof.  
of Biology  
Dr. Jean Cummings, Prof. of Biology  
Dr. T.L. Pearce, Ph.D., Chairman,  
Department of Biology

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.)

Dr. Robert C. Bohinski  
Assoc. Professor of Chemistry

6. (a) BYPRODUCT MATERIAL. (Elements and mass number of each.)

Carbon-14  
Sulfur-35  
Phosphorous-32  
Tritium

(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.) Maximum amount

as $\text{HCO}_3^-$	and acetate	10 millicuries
as $\text{SO}_4$		2 millicuries
as $\text{PO}_4$		2 millicuries
as amino acids, purines, or pyrimidines		1 millicurie

RECEIVED BY LFMB

Date. 6/6/78  
Log. June 78-5 Ren  
By. JG  
Orig. To. 8/1/78

Applicant.....  
Check No. 40162  
Amount/Fee Category A-150-3K  
Type of Fee. License  
Date Check Rec'd. 7/31/78  
Received By. Jackson

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.)

Materials will be used exclusively as radioactive tracers for research and teaching in plants and animals.

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dd 5/24/78

## 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	John Carroll University	5 months	Yes No	<input checked="" type="radio"/> Yes <input type="radio"/> No
b. Radioactivity measurement standardization and monitoring techniques and instruments	" " "		Yes No	<input checked="" type="radio"/> Yes <input type="radio"/> No
c. Mathematics and calculations basic to the use and measurement of radioactivity	" " "		Yes No	<input checked="" type="radio"/> Yes <input type="radio"/> No
d. Biological effects of radiation	" " "		Yes 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
14-C	12 mc.	John Carroll University	Total of 11 years	(see attachment) Tracer studies
32-P	2 mc.	and Case Western Reserve University		
35-S				

## 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 <sup>2</sup> )	USE (Monitoring, surveying, measuring)
see attachment					

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

Instruments will be calibrated against appropriate standard reference sources.

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

Film badges will be issued to personnel on a monthly basis. Badges will be processed by Nuclear-Chicago Corp. and records of monthly exposures will be strictly maintained.

## 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 \$ \_\_\_\_\_

Fee Enclosed \$ \_\_\_\_\_

Date May 24, 1978

John Carroll University

Applicant named in Item 1

By: Arthur J. Noetzel

Academic Vice President

Title of certifying official

WARNING.—18 U. S. C., Section 1001; Act of June 25, 1948; 62 Stat. 749; makes it a criminal offense to make a willfully false statement or representation to any department or agency of the United States as to any matter within its jurisdiction.

Item 8. Training and experience for Dr. Jean Cummings  
a. Syracuse University 6 wks. formal course  
b. " " " " "  
c. " " " " "

Training and experience for Dr. T. L. Pearce  
a. University of Virginia 4 wks. formal course  
b. " " " " "  
c. " " " " "  
d. " " " " "

Item 9. Experience with radiation for Dr. Jean Cummings

Isotope	Max. amt.	Where gained	Duration	Use
S-35	100 uc	Syracuse University	6 wks.	Trace
Br-80=	10 uc	" "	"	experi-
In-116	50 uc	" "	"	ments &
P-32	100 uc	" "	"	counting
I-131	100 uc	" "	"	techniques
Fe-55-59	100 uc	" "	"	"
Cs-137	10 uc	" "	"	"
C-14	10 uc	John Carroll University	7 years	"
P-32	50 uc	" " "	"	"
S-35	20 uc	" " "	"	"
Fe-55-59	10 uc	" " "	"	"

Experience with radiation for Dr. T. L. Pearce

Isotope	Max. amt	Where gained	Duration	Use
Tritium (only)	10 mc	University of Virginia	4 years	molecular tracer studies

Item 13.

The isotopes will be stored in a lead brick vault in the radio-chemical laboratory of the chemistry department. Normal laboratory facilities will be used during experimentation. These facilities include a fume hood with auxillary fan, and a sink for washing contaminated glassware. Plastic gloves and platic-backed, absorbant lab matting will be used at all times. Any tranfers involving radioactive gas ( $^{14}\text{C}\text{O}_2$ ) or gas in solution ( $\text{H}^{14}\text{C}\text{O}_2+$ ) will be performed in the fume hood with a  $\text{BaOH}$  trap.

Item 14.

The initial radiation survey and the radiation protection will be under the supervision of Dr. Robert C. Bohinski, radiation protection officer.

Item 15.

The waste materials will be accumulated and stored in the lead brick vault until sufficient materials have been accumulated for the services of a commercial disposal service.

Types of Instruments	Number Available	Radiation detected	Sensitivity Range (mr/hr)	Window Thickness (mg/cm <sup>2</sup> )	Use
Nuclear-Chicago Decade Scaler-Timer Model No. 8775	4	-	-	-	measuring
Nuclear-Chicago Geiger Tube Detector System Model No. 404	4	B,	-	1.5	measuring
Nuclear Chicago Gas Flow Detector Assembly Model No. 411	2	B,	-	-	measuring
Nuclear-Chicago Scintillation Detector Assembly Model No. 412	1	B,	-	-	measuring
Nuclear-Chicago Proportional Detector System Model No. 451	1	B,	-	-	measuring
Picker-Nuclear Liquid Scintillation Detector (Ansitron II)	1	B,	-	-	measuring
Hunkar Instrument Gas Flow Counter	2	B,	-	-	measuring
Hunkar Instrument Scintillation Well Detectors	2	B,	-	-	measuring
Baird-Atomic Gm Survey Meter Model 4-121	1	B,	0-100	-	monitoring
Baird-Atomic Gm Tube Model 8-151	1	B,	-	1.4-2.0	monitoring
Nuclear-Chicago Survey Meter Model No. 2651	1	B,	0-100	1.4-2.0	monitoring