15-108-4

Form AEC-313 (9-55)

ATOMIC ENERGY COMMISSION

APPLICATION FOR BYPRODUCT MATERIAL LICENSE

Form approved, Bureau of the Budget

DUPLICATED

INSTRUCTIONS: Complete Items 1 through 19 if this is a new application. If you are applying for renewal complete only Items 1 through 11 provided that with respect to the other items there has been no change in the information previously submitted. Mail two copies to: U. S. Atomic Energy Commission, P. O. Box E, Oak Ridge, Tennessee, Attention: Isotopes Extension, Division of Civilian Application. Upon approval of this application, the applicant will receive an AEC Byproduct Material License. General requirements for issuance of an AEC Byproduct Material License are contained in Title 10, Code of Federal Regulations, Part 30.

1. (a) NAME AND SHIPPING ADDRESS OF APPLICANT (Institution, firm, hospital, person, etc.)

Indiana University
Jordan Hall Group

(b) ADDRESS(ES) AT WHICH BYPRODUCT MATERIAL WILL BE USED (If different from shipping address)

Jordan Hall, Indiana University
Bloomington, Indiana

2. DEPARTMENT TO USE BYPRODUCT MATERIAL

Bacteriology, Botany, Zoology

3. INDIVIDUAL USER (Name and title of individual(s) who will use or directly supervise use of byproduct material)

Professors Wm. R. Breneman, Ph.D.'s
Dean Fraser, Chas. W. Hagen, Jr., Roy Repaske, W. J. van Wagtendonk

4. RADIOLOGICAL SAFETY OFFICER (Name of person qualified in radiological safety, if other than individual user)

Charles W. Hagen, Jr.

5. PREVIOUS LICENSE OR AUTHORIZATION NUMBER (If this is an application for renewal of a license for byproduct material obtained under a prior license or authorization for radioisotope procurement)

Not applicable

BYPRODUCT MATERIAL OR IRRADIATION SERVICE DESIRED

6. BYPRODUCT MATERIAL (Element and mass number)	7. CHEMICAL AND/OR PHYSICAL FORM (Or catalog number)	8. MAXIMUM AMOUNT OF RADIOACTIVITY IN MILLICURIES THAT YOU WILL POSSESS AT ANY ONE TIME
Any product atomic number 3-83 inclusive.	Any	200 mc of one isotope; one curie total.

9. IF IRRADIATION SERVICE IS DESIRED, STATE PERTINENT DETAILS SUCH AS: CHEMICAL COMPOSITION AND WEIGHT IN GRAMS OF TARGET MATERIAL, RADIOACTIVITY, IRRADIATION TIME IN DAYS, AND NEUTRON FLUX

Not at present

STATEMENT OF USE

10. (a) DESCRIBE PURPOSE FOR WHICH BYPRODUCT MATERIAL WILL BE USED. (If material is for "human use" complete Supplement A in lieu of this item. If material is to be used in or manufactured as a "sealed source" complete Supplement B in addition to this item.)

Tracer investigation of metabolic reactions in animals, plants, and bacteria. Biosynthesis of labeled intermediates. Addition labeling of proteins, etc.

(b) DESCRIBE PROCEDURES WHICH WILL BE OBSERVED TO MINIMIZE HAZARD FROM HANDLING, STORAGE, AND DISPOSAL OF THE BYPRODUCT MATERIAL

Periodic surveys of work areas. Higher level work confined to special areas (see #18). Disposal through sewers or by burning and burying ash.

Appropriate shielding and remote handling equipment will be used as required during operations.

CERTIFICATE

11. 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 do solemnly swear (or affirm) that all information contained herein, including any supplements attached hereto, is true and correct to the best of our knowledge and belief.

State of Indiana
County of Monroe

Subscribed and sworn to before me this 29 day of January, 1957

Leslie Burks
Notary Public

My commission expires Nov. 15, 1957

INDIANA UNIVERSITY
Applicant named in Item 1

By J. A. Franklin
J. A. Franklin, Vice-President & Treasurer
Title of Certifying Official

January 29, 1957
Date

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.

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Form AEC-313 | ATOMIC ENERGY COMMISSION | APPLICATION FOR BYPRODUCT MATERIAL LICENSE | Page Two

INSTRUCTIONS: Complete Items 12 through 19 if this is a new application. This information may be omitted from subsequent applications provided there is no change in the information previously submitted, and reference is made in Item 5 to the application on which this information appears.

TRAINING AND EXPERIENCE WITH RADIOACTIVITY OF INDIVIDUAL USER NAMED IN ITEM 3

12. TYPE OF TRAINING — Charles W. Hagen, Jr.

TYPE OF TRAINING	WHERE TRAINED	DURATION OF TRAINING	ON THE JOB (Circle answer)	FORMAL COURSE (Circle answer)
1. Principles and practices of radiological health safety	Metallurgical Labs. Univ. of Chicago (Manhatten District, U.S. Army)	3 yrs.	(Yes) No	(Yes) No
2. Radioactivity measurement standardization and monitoring techniques and instruments	"	"	(Yes) No	Yes (No)
3. Mathematics and calculations basic to the use and measurement of radioactivity	"	"	(Yes) No	(Yes) No
4. Biological effects of radiation	"	"	(Yes) No	(Yes) No
5. Actual use of radioisotopes in the types and quantities for which application is being made, or equivalent experience	"	"	(Yes) No	Yes (No)

13. ISOTOPE HANDLING EXPERIENCE

ISOTOPE	MAXIMUM AMOUNT	WHERE EXPERIENCE WAS GAINED	DURATION OF EXPERIENCE	TYPE OF USE
Sr^{89}	3 mc	Metallurgical laboratories	2 months	beta source preparation
Sr^{89}, (Ba-La)^{140}	ca. 40 mc	" "	2-3 months.	effect of immersion of fish

14. If Radiological Safety Officer named in Item 4 is different from individual user named in Item 8, use supplementary sheet to provide equivalent information on "Training and Experience With Radioactivity of Radiological Safety Officer." Supplementary sheet is attached (Circle answer) (Yes) No

PHYSICAL FACILITIES, EQUIPMENT, AND RADIATION INSTRUMENTATION

15. RADIATION DETECTION INSTRUMENTS (Use separate sheet if necessary)

TYPE OF INSTRUMENTS (Include make and model number of each)	NUMBER AVAILABLE	RADIATION DETECTED	SENSITIVITY RANGE (mr/hr)	WINDOW THICKNESS (mg/cm²)	USE (Monitoring, surveying, measuring)
Tracerlab SU-[illegible]	1	gamma, beta	5-200mr		Pocket dosimeter
Tracerlab SU-3C	1	gamma, beta alpha	5-20000 cpm	< 2mg/cm²	Survey meter

(see attached sheet for measuring instruments.)

16. FILM BADGES, DOSIMETERS, AND OTHER PERSONNEL MONITORING DEVICES INCLUDING BIO-ASSAY PROCEDURES

One pocket dosimeter is available. Others will be acquired.
On this campus regularly exposed personnel receive periodic blood counts. In this group exposure will be intermittent and only small activities are anticipated, hence neither blood counts nor film badge service will be acquired initially.

17. METHOD, FREQUENCY, AND STANDARDS USED IN CALIBRATING INSTRUMENTS LISTED ABOVE (For film badges specify method of calibration and processing, or name supplier)

Uncalibrated sources on hand: carbon-14, cobalt-60, radio-lead.
Victoreen is calibrated periodically by manufacturer.

18. (a) DESCRIBE BRIEFLY REMOTE HANDLING EQUIPMENT, STORAGE CONTAINERS, SHIELDING, AND LABORATORY FACILITIES (Working areas, fume hoods, etc.)

Tracerlab B-18A remote pipettor; Remote handling tongs; Leaded gloves. Concrete storage area - Room 075A. Approved hoods (Kewaunee), stainless steel work surfaces; Rooms 075 & 363. Stainless steel trays, paper covers in all work areas. Marked disposal cans in all areas. Lead bricks and vertical shields.

(b) SKETCHES OF SUCH FACILITIES ARE ATTACHED (Circle answer) Building layout, radiation areas indicated (Yes) No

19. DESCRIBE BRIEFLY RADIATION SURVEYING PROCEDURES AND METHODS OF DISPOSING OF RADIOACTIVE WASTES Work areas to be surveyed every 6 mos. & on call from investigator. Hand surveys after individual operations. Soluble materials disposed through sewers in quantities < 10 mc in 24 hours after great dilution. Papers, carcasses and other insolubles to be burned and ashes burned. Short-lived materials may be stored until activity is negligible.

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Supplementary information

12. Training and experience of individual users other than radiological safety officer.

Professor William R. Breneman has no previous experience with isotopes but intends to use a student who has spent two years at Brookhaven working with I^{131} and P^{32}.

Professor Dean Fraser has used C^{14} for somewhat less than 1 year while at University of California, Berkeley. Training was entirely on the job.

Professor Roy Repaske has used μC quantities of C^{14} and P^{32} at the University of Wisconsin. Most of this experience was during a formal course in Plant Biochemistry which included a section on tracer techniques with instruction in radiological health safety, necessary calculations, and actual use of radioisotopes.

Professor Willem van Wagtendonk has used P^{32}, S^{35} and I^{131} in maximal quantities of 50 μC during 2 years at Indiana University. All experience was on the job in the course of his own research program.

15. Measuring instruments on hand.

Type of Instrument	Number Available	Radiation Detected	Sensitivity Range	Window Thickness	Use
Victoreen condenser r-Meter	1	x-ray, gamma	0.25-2500 r-max.	< 2mg/cm^2	Dosage Measurement
RCL Mark 9 Model 15	1	alpha, beta, gamma		0 (flow)	Measurement
RCL Mark 13 Model 1	1	beta, gamma		< 2mg/cm^2	Measurement
Tracerlab autoscaler SC-51	1	beta, gamma		> 2mg/cm^2	Measurement
Nuclear Model 163	1	alpha, beta, gamma		< 2mg/cm^2 0 flow	Measurement

18. In the attached brochure describing Jordan Hall, areas in which radioactive materials may be used have been marked with a cross (x). Only very low levels of activity will be permitted in areas so marked. Rooms 075 and 363, marked with a check (✓) have been specially equipped for work with radioactivity. Chemical preparations and primary dilutions can be made in these areas. Room 075A is surrounded by thick concrete walls and provided with cubbyholes which will serve for storage of higher levels of radioactive preparations.