3/29/63

Form AEC-313 (5-58)

ATOMIC ENERGY COMMISSION

APPLICATION FOR BYPRODUCT MATERIAL LICENSE

Form approved. Budget Bureau No. 38-R027.4.

INSTRUCTIONS.–Complete Items 1 through 16 if this is an initial application. If application is for renewal of a license, complete only Items 1 through 7 and indicate new information or changes in the program as requested in Items 8 through 15. Use supplemental sheets where necessary. Item 16 must be completed on all applications. Mail three copies to: U. S. Atomic Energy Commission, Washington 25, D. C. Attention: Isotopes Branch, Division of Licensing and Regulation. 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.

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

Dr. Charles J. Kensler
Arthur D. Little, Inc.
30 Memorial Drive
Cambridge 42, Massachusetts

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

30 Memorial Drive, Cambridge 42, Mass.

2. DEPARTMENT TO USE BYPRODUCT MATERIAL

Life Sciences Division

3. PREVIOUS LICENSE NUMBER(S). *(If this is an application for renewal of a license, please indicate and give number.)*

Renewal of license number 20-1489-4 (E63)

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.)*

C. J. Kensler, Vice President
Life Sciences Division

A. Sivak, Biochemist

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.)*

A. Sivak

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

Hydrogen 3
Carbon 14
Phosphorus 32
Sulfur 35

(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.)*

Hydrogen 3	(any)	80 millicuries
Carbon 14	(any)	5 millicuries
Phosphorus 32	(any)	5 millicuries
Sulfur 35	(any)	5 millicuries

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.)*

To study the metabolic fate of cancer chemotherapeutic agents in various species of animals.

To study basic metabolic processes of normal and neoplastic cells.

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(Continued on reverse side)

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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	C. J. Kensler Cornell Univ. Med. College	1 year	(Yes) No	Yes (No)
b. Radioactivity measurement standardization and monitoring techniques and instruments	Cornell Univ. Med. College	1 year	(Yes) No	Yes (No)
c. Mathematics and calculations basic to the use and measurement of radioactivity	Cornell Univ. Med. College	1 year	(Yes) No	Yes (No)
d. Biological effects of radiation	Cornell Univ. Med. College	1 year	(Yes) No	Yes (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
C^{14}	1 millicurie	C. J. Kensler Cornell Univ. Med. Coll.	4 years	metabolic studies

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/cm²)*	USE *(Monitoring, surveying, measuring)*
See attached sheet					

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

C^{14} as $BaC^{14}O_3$ - yearly

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

The service will be obtained from Controls for Radiation, Incorporated.

INFORMATION TO BE SUBMITTED ON ADDITIONAL SHEETS

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 See attached sheet.

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. See attached sheet.

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. See attached sheet.

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.

RECEIVED MAR 29 1963 U.S.A.E.C. Isotopes Branch Div. of L & R

Date March 26, 1963

Applicant named in item 1

By: Charles J. Kensler, Vice President
Arthur D. Little, Inc.
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.

* U.S. GOVERNMENT PRINTING OFFICE : 1961 O—615963

8. Training and Experience of Andrew Sivak

Type of Training	Where Trained	Duration of Training	On the Job	Formal Course
a. Principles and practices of radiation protection	Rutgers Univ.	2 years	Yes	No
	Oak Ridge Inst. for Nuclear Studies	1 month	Yes	Yes
	Arthur D. Little, Inc.	1 year	Yes	No
b. Radioactivity measurement standardization and monitoring techniques and instruments	Rutgers Univ.	2 years	Yes	No
	Oak Ridge Inst. for Nuclear Studies	1 month	Yes	Yes
	Arthur D. Little, Inc.	1 year	Yes	No
c. Mathematics and calculations basic to the use and measurement of radioactivity	Rutgers Univ.	2 years	Yes	No
	Oak Ridge Inst. for Nuclear Studies	1 month	Yes	Yes
	Arthur D. Little, Inc.	1 year	Yes	No
d. Biological effects of radiation	Rutgers Univ.	2 years	Yes	No
	Oak Ridge Inst. for Nuclear Studies	1 month	Yes	Yes
	Arthur D. Little, Inc.	1 year	Yes	No

9. Experience with Radiation - Andrew Sivak

Isotope	Max. Amount	Where Experience was Gained	Duration of Experience	Type of Use
C^{14}	1 mc	Rutgers Univ.	2 years	Chemical and metabolic studies
	1 mc	Oak Ridge Inst. for Nuclear Studies	1 month	Laboratory experiments
	0.5 mc	Arthur D. Little, Inc.	1 year	Metabolic studies
H^3	1 mc	Rutgers Univ.	2 years	Metabolic studies
P^{32}	10 μc	Arthur D. Little, Inc.	1 month	Metabolic studies
Co^{60}	50 C	Oak Ridge Inst. for Nuclear Studies	1 month	Laboratory experiments
RaDEF	10 μC	Rutgers Univ.	2 years	Calibration
	1 mc	Oak Ridge Inst. for Nuclear Studies	1 month	Laboratory experiments

10. Radiation Detection Instruments

Type	Number	Radiation	Sensitivity Range	Window Thickness	Use
Anton CDV-700 Survey Meter	1	β, γ	0.1 mr/hr		Monitoring
Nuclear Chicago C110B Automatic sample changer, C111B printing timer and D47 gas flow detector	1	β, γ			Measuring
Nuclear Chicago 186A Scaler	1	β, γ			Measuring
C100B strip feeder Nuclear Chicago, 1620 rate meter and geiger tube detector	1	β, γ			Measuring
Cary Model 32 Electrometer and Flow Detector	1	β			Measuring, monitoring

13. Facilities and Equipment

General Description: The floor is covered with linoleum tile. The laboratory benches in the area where labeled material will be used are steel construction and the laboratory bench tops are of stainless steel. The fume hood is a five foot standard by-pass hood vented through an absolute filter system (Cambridge Filter Corp.) and is equipped with external controls and a stainless steel working surface.

The primary storage facility is a locked steel box which is kept in the fume hood. Dilutions of labeled material and working solutions are kept in a freezer reserved for only labeled compounds.

14. Radiation Protection Program

Monthly film badge assays for all persons in area. Monthly wipe tests of benches and surfaces where labeled materials are used.

15. Waste Disposal

Allied-Crossroads Nuclear Corp., Dorchester, Mass.

Arthur D. Little, Inc.

UNIVERSITY
4-5770

ESTABLISHED 1886

THIRTY MEMORIAL DRIVE
CAMBRIDGE 42, MASSACHUSETTS

March 27, 1963

Mr. Robert E. Brinkman
Isotopes Branch
Division of Licensing and Regulation
United States Atomic Energy Commission
Washington 25, D.C.

Re: Renewal of License No. 20-1489-4 (E63)

Dear Mr. Brinkman:

Enclosed in triplicate is our application for renewal of Byproduct Material License No. 20-1489-4 (E63), Form AEC-313.

Very truly yours,

Charles J. Kensler, Ph.D.
Vice President
Life Sciences Division

CJK:tjb
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