FORM AEC-374A
(2-65)

U. S. ATOMIC ENERGY COMMISSION
BYPRODUCT MATERIAL LICENSE
Supplementary Sheet

License Number 11-00197-02

Amendment No. 09

University of Idaho
Physical Science Department
Moscow, Idaho 83843

In accordance with application dated May 17, 1968, License Number 11-00197-02 is amended as follows:

The expiration date in Item 4 is changed to May 31, 1973.

For the U. S. Atomic Energy Commission

Original Signed by
John E. Bowyer 5-31-68
by Isotopes Branch
Division of Materials Licensing
Washington, D. C. 20545

Date MAY 31 1968

JEB/cjk
A/2

FORM AEC-374C
(4-66)

U. S. ATOMIC ENERGY COMMISSION
BYPRODUCT MATERIAL LICENSE
Supplementary Sheet

License Number 11-00197-02

Amendment No. 08

University of Idaho
Physical Science Department
Moscow, Idaho 83843

In accordance with letter dated October 19, 1966, signed by Richard A. Porter, License Number 11-00197-02 is amended as follows:

To add:

6. Byproduct material (element and mass number)	7. Chemical and/or physical form	8. Maximum amount of radioactivity which licensee may possess at any one time
E. Hydrogen 3	E. Tritiated Titanium targets (Texas Nuclear Corporation Model 9591)	E. 50 curies (not to exceed 5 curies per target)

9. Authorized use

E. To be used in a Texas Nuclear Corporation Model 9591 neutron generator.

Condition 16.B. is added:

16. B. Letter dated October 19, 1966, signed by Richard A. Porter.

For the U. S. Atomic Energy Commission
Original Signed By
John E. Bowyer 11-15-66
by Isotopes Branch
Division of Materials Licensing
Washington, D. C. 20545

Date NOV 15 1966

rjd/ec ppt

FORM AEC-374
(1-66)
10 CFR 30

U. S. ATOMIC ENERGY COMMISSI
BYPRODUCT MATERIAL LICENS

License No. 11-00197-02
Page 1 of 3 Pages
Amendment No. 07

Pursuant to the Atomic Energy Act of 1954 and Title 10, Code of Federal Regulations, Chapter 1, Parts 30, 32, 33, 34, and 35, and in reliance on statements and representations heretofore made by the licensee, a license is hereby issued authorizing the licensee to receive, acquire, own, possess, transfer and import byproduct material listed below; and to use such byproduct material for the purpose(s) and at the place(s) designated below. This license shall be deemed to contain the conditions specified in Section 183 of the Atomic Energy Act of 1954, and is subject to all applicable rules, regulations, and orders of the Atomic Energy Commission now or hereafter in effect and to any conditions specified below.

Licensee	
1. Name University of Idaho Physical Science Department	In accordance with application dated April 11, 1966 3. License number 11-00197-02 is amended in its entirety to read as follows:
2. Address Moscow, Idaho 83843	4. Expiration date May 31, 1968
	5. Reference No.

6. Byproduct material (element and mass number)	7. Chemical and/or physical form	8. Maximum amount of radioactivity which licensee may possess at any one time
A. Cobalt 60	A. Sealed Source (Western Radiation Laboratory CCT-1)	A. 10 millicuries
B. Phosphorus 32	B. Any	B. 1 millicurie
C. Carbon 14	C. Any	C. 25 millicuries
D. Sulfur 35	D. Any	D. 50 millicuries

9. Authorized use

A. through D. Laboratory experiments in nuclear science. Student instruction. Instrument calibration.

CONDITIONS

10. Unless otherwise specified, the authorized place of use is the licensee's address stated in Item 2 above.

11. The licensee shall comply with the provisions of Title 10, Part 20, Code of Federal Regulations, Chapter 1, "Standards for Protection Against Radiation."

12. Byproduct material shall be used by, or under the supervision of, E.K. Raunio, P.K. Freeman or R.A. Porter.

13. Sealed sources containing byproduct material shall not be opened.

(continued) CONDITIONS

14. A(1) Each sealed source containing byproduct material, other than Hydrogen 3, with a half-life greater than thirty days and in any form other than gas shall be tested for leakage and/or contamination at intervals not to exceed six months. In the absence of a certificate from a transferor indicating that a test has been made within six months prior to the transfer, the sealed source shall not be put into use until tested.

A(2) Notwithstanding the periodic leak test required by the preceding paragraph, any licensed sealed source containing byproduct material is exempted from periodic leak tests provided the quantity of byproduct material contained in the source does not exceed ten times the quantity specified for the byproduct material in Column II, Schedule A, Section 31.100, 10 CFR 31.

A(3) The periodic leak test required by this condition does not apply to sealed sources that are stored and not being used. The sources excepted from this test shall be tested for leakage prior to any use or transfer to another person unless they have been leak tested within six months prior to the date of use or transfer.

B. The test shall be capable of detecting the presence of 0.005 microcurie of radioactive material on the test sample. The test sample shall be taken from the sealed source or from the surfaces of the device in which the sealed source is permanently mounted or stored on which one might expect contamination to accumulate. Records of leak test results shall be kept in units of microcuries and maintained for inspection by the Commission.

C. If the test reveals the presence of 0.005 microcurie or more of removable contamination, the licensee shall immediately withdraw the sealed source from use and shall cause it to be decontaminated and repaired or to be disposed of in accordance with Commission regulations. A report shall be filed within 5 days of the test with the Director, Division of Materials Licensing, U. S. Atomic Energy Commission, Washington, D. C., 20545, describing the equipment involved, the test results, and the corrective action taken. A copy of such report shall also be sent to the Director, Region IV, Division of Compliance, USAEC, 10395 W. Colfax, Room 200, Denver, Colorado, 80215.

14. continued. **CONDITIONS** Amendment No. 07

D. Tests for leakage and/or contamination shall be performed by the individual users in accordance with the procedures described in the letter dated February 1, 1961, signed by Peter K. Freeman, or by other persons specifically authorized by the Commission to perform such services.

15. The licensee shall not use byproduct material in or on human beings or in field applications where activity is released except as provided otherwise by specific condition of this license.

16. Except as specifically provided otherwise by this license, the licensee shall possess and use byproduct material described in Items 6, 7, and 8 of this license in accordance with statements, representations, and procedures contained in application dated December 20, 1960 and in related documents and amendments as follows:

A. "Regulations Governing The Safe Handling of Radioactive Isotopes at the University of Idaho" received with application dated December 20, 1960.

For the U. S. Atomic Energy Commission

Original Signed by
John E. Bowyer 5-25-66

by Isotopes Branch
Division of Materials Licensing
Washington, D. C. 20545

Date MAY 26 1966

'R/cc M

FORM AEC-374A
(10-61)

U. S. ATOMIC ENERGY COMMISSION

MATERIAL LICENSE

Supplementary Sheet

License Number 11-197-2
(D66)

Amendment No. 6

University of Idaho
Department of Physical Sciences
Moscow, Idaho 83843

Attention: E. K. Raunio Richard A. Porter
P. K. Freeman

In accordance with letter dated May 7, 1964, License No. 11-197-2 is amended as follows:

To add:

6. Byproduct material (element and mass number)	7. Chemical and/or physical form	8. Maximum amount of radioactivity which licensee may possess at any one time
D. Sulfur 35	D. Any	D. 25 millicuries

9. Authorized use

D. Study of the solubility of barium sulfate as a function of specific activity.

JUN 22 1964

Date

For the U. S. Atomic Energy Commission
6-22-64
Original Signed by
Isotopes Branch John E. Bowyer
Division of Materials Licensing
by

Washington 25, D. C.

FORM AEC-374
(12-57)

U. S. ATOMIC ENERGY COMMISSION

BYPRODUCT MATERIAL LICENS

License No. 11-197-2 (D66)
Amendment No. 5

Pursuant to the Atomic Energy Act of 1954 and Title 10, Code of Federal Regulations, Chapter 1, Part 30, Licensing of Byproduct Material, and in reliance on statements and representations heretofore made by the licensee, a license is hereby issued authorizing the licensee to receive, acquire, own, possess, transfer and import byproduct material listed below; and to use such byproduct material for the purpose(s) and at the place(s) designated below. This license shall be deemed to contain the conditions specified in Section 183 of the Atomic Energy Act of 1954, and is subject to all applicable rules, regulations, and orders of the Atomic Energy Commission now or hereafter in effect and to any conditions specified below.

Licensee	In accordance with application dated March 18, 1964
1. Name: University of Idaho Department of Physical Sciences	3. License number 11-197-2 is amended in its entirety to read as follows:
2. Address: Moscow, Idaho	4. Expiration date: April 30, 1966
	5. Reference No.

6. Byproduct material (element and mass number)	7. Chemical and/or physical form	8. Maximum amount of radioactivity which licensee may possess at any one time
A. Carbon 14	A. Any	A. 10 millicuries
B. Cobalt 60	B. Sealed Source Western Radiation Laboratory CCT-1)	B. 1 millicurie
C. Phosphorus 32	C. Any	C. 1 millicurie

9. Authorized use

A. Chemical exchange and similar laboratory studies.
B. To be used for experiments in gamma ray absorption and scattering, radiation chemistry and in calibration of survey instruments.
C. To be used for experiments in B-ray absorption, radioactive decay and radiochemical separation methods.

CONDITIONS

10. Unless otherwise specified, the authorized place of use is the licensee's address stated in Item 2 above.

11. The licensee shall comply with the provisions of Title 10, Part 20, Code of Federal Regulations, Chapter 1, "Standards for Protection Against Radiation."

12. Byproduct material shall be used by, or under the supervision of, E. K. Ramio, P. K. Freeman, or Richard A. Porter.

13. Sealed sources containing byproduct material shall not be opened by the licensee.

14. A. Each sealed source containing byproduct material, other than Hydrogen 3, with a half-life greater than thirty days and in any form other than gas shall be tested for leakage and/or contamination at intervals not to exceed six months. In the absence of a certificate from a transferor indicating that a test has been made within six months prior to the transfer, the sealed source shall not be put into use until tested.

(See page 2)

Continued from page 1

License Number 11-197-2 (D66)

Amendment No. 5

CONDITIONS

B. The test shall be capable of detecting the presence of 0.005 microcurie of radioactive material on the test sample. The test sample shall be taken from the sealed source or from the surfaces of the device in which the sealed source is permanently mounted or stored on which one might expect contamination to accumulate. Records of leak test results shall be kept in units of microcuries and maintained for inspection by the Commission.

C. If the test reveals the presence of 0.005 microcurie or more of removable contamination, the licensee shall immediately withdraw the sealed source from use and shall cause it to be decontaminated and repaired or to be disposed of in accordance with Commission regulations. A report shall be filed within 5 days of the test with the Director, Division of Materials Licensing, U. S. Atomic Energy Commission, Washington, D. C., 20545, describing the equipment involved, the test results, and the corrective action taken. A copy of such report shall also be sent to the Director, Region IV, Division of Compliance, USAEC, P. O. Box 15266, Denver, Colorado, 80215.

D. Test for leakage and/or contamination shall be performed by the individual users in accordance with the procedures described in the letter dated February 1, 1961, signed by Peter K. Freeman, or by other persons specifically authorized by the Commission to perform such services.

15. Except as specifically provided otherwise by this license, the licensee shall possess and use byproduct material described in Items 6, 7 and 8 of this license in accordance with statements, representations, and procedures contained in application dated December 20, 1960, and in related documents and amendments as follows:

A. "Regulations Governing The Safe Handling of Radioactive Isotopes at the University of Idaho" received with application dated December 20, 1960.

For the U. S. Atomic Energy Commission

Original Signed by 4-21-64
John E. Bowyer
Isotopes Branch
by Division of Materials Licensing
Washington 25, D. C.

Date APR 21 1964

DUPLICATED
FOR DIV. OF COMPLIANCE

FORM AEC-374A
(12-57)

U. S. ATOMIC ENERGY COMMISSIC
YPRODUCT MATERIAL LICENSE
Supplementary Sheet

License Number 11-197-2
(D64)

Amendment Number 4

University of Idaho
Department of Physical Sciences
Moscow, Idaho

Attention: E. K. Raunio
P. K. Freeman

In accordance with letter dated October 17, 1961, signed by Dr. Peter K. Freeman, License No. 11-197-2 is amended as follows:

Item 8-A (Maximum amount of Carbon 14 which licensee may possess at any one time) is changed from 1 millicurie to 5 millicuries.

DUPLICATED
FOR DIV. OF COMPLIANCE

For the U. S. Atomic Energy Commission

Original Signed by
James R. Mason

Date OCT 26 1961

by Chief, Isotopes Branch
Division of Licensing and Regulation
Washington 25, D. C.

1. J E B / Kaufman

FORM AEC-374A
(12-57)

U. S. ATOMIC ENERGY COMMISSION
BYPRODUCT MATERIAL LICENSE
Supplementary Sheet

License Number 11-197-2
(D64)

AMENDMENT NO. 3

University of Idaho
Department of Physical Sciences
Moscow, Idaho

Attention: E. K. Rumio
P. K. Freeman

In accordance with letter dated February 1, 1961 signed by Peter K. Freeman, License No. 11-197-2 is amended as follows:

Condition 13.A. is amended to read:

13. A. Leak tests shall be performed by Dr. Peter K. Freeman.

DUPLICATED
FOR DIV. OF COMPLIANCE

For the U. S. Atomic Energy Commission

Original Signed By
James R. Mason
2-23-61

by _____
Chief, Isotopes Branch
Division of Licensing and Regulation
Washington 25, D. C.

Date February 23, 1961

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FORM AEC-27
(12-57)

U. S. ATOMIC ENERGY COMMISSION
BYPRODUCT MATERIAL LICENSE

11-197-2 (D64) AMENDMENT NO. 2

Pursuant to the Atomic Energy Act of 1954 and Title 10, Code of Federal Regulations, Chapter 1, Part 30, Licensing of Byproduct Material, and in reliance on statements and representations heretofore made by the licensee, a license is hereby issued authorizing the licensee to receive, acquire, own, possess, transfer and import byproduct material listed below; and to use such byproduct material for the purpose(s) and at the place(s) designated below. This license shall be deemed to contain the conditions specified in Section 183 of the Atomic Energy Act of 1954, and is subject to all applicable rules, regulations, and orders of the Atomic Energy Commission now or hereafter in effect and to any conditions specified below.

Licensee	
1. Name: University of Idaho	In accordance with application dated December 22, 1960,
2. Address: Department of Physical Sciences, Moscow, Idaho	3. License number: 11-197-2 is amended in its entirety to read as follows:
	4. Expiration date: April 30, 1964
	5. Reference No.

6. Byproduct material (element and mass number)	7. Chemical and/or physical form	8. Maximum amount of radioactivity which licensee may possess at any one time
A. Carbon 14	A. Any	A. 1 millicurie
B. Cobalt 60	B. Sealed Source (Western Radiation Laboratory CCT-1)	B. 1 millicurie
C. Phosphorus 32	C. Any	C. 1 millicurie

9. Authorized use

A. Chemical exchange and similar laboratory studies.
B. To be used for experiments in gamma ray absorption and scattering, radiation chemistry and in calibration of survey instruments.
C. To be used for experiments in β-ray absorption, radioactive decay and radiochemical separation methods.

CONDITIONS

10. Unless otherwise specified, the authorized place of use is the licensee's address stated in Item 2 above.

11. The licensee shall comply with the provisions of Title 10, Part 20, Code of Federal Regulations, Chapter 1, "Standards for Protection Against Radiation."

12. Byproduct materials shall be used by, or under the direct personal supervision of, E. K. Raunio or P. K. Freeman.

13. Sealed sources shall be tested for leakage and/or contamination in accordance with the following:

A. Leak test shall be performed by persons specifically licensed by the Commission to perform such tests.

(See page 2)

DUPLICATED
FOR DIV. OF COMPLIANCE

U S. ATOMIC ENERGY COMMISSION
YPRODUCT MATERIAL LICENS
Supplementary Sheet

License Number 11-197-2
(D64)

Continued from first page

AMENDMENT NO. 2

CONDITIONS

13. B. Each sealed source containing byproduct material with a half-life greater than thirty (30) days and in any form other than gas, shall be tested for leakage and/or contamination as follows:

(1) An appropriate test for leakage and/or contamination shall be performed on the sealed source surface, or on the accessible surfaces of the device in which such a sealed source is permanently or semipermanently mounted. The test shall be performed upon receipt of a source from another person, unless the licensee receives certification from the person making the transfer that the sealed source had been tested within thirty (30) days prior to transfer and found free of any removable radioactive material.

(2) Following completion of the test prescribed in B(1), each sealed source shall be tested for leakage and/or contamination at intervals not to exceed six (6) months.

C. The test performed pursuant to B shall be sufficiently sensitive to detect 0.05 microcurie of removable beta and/or gamma emitting radioactive material. Records of leak test results shall be maintained by the licensee.

D. If the test performed pursuant to B(1) or B(2) reveals removable radioactive material, the licensee shall take immediate action to prevent spread of contamination and, within thirty (30) days after completion of the test, shall notify the Isotopes Branch, Division of Licensing and Regulation, U. S. Atomic Energy Commission, Washington 25, D.C.

E. Repair of sources shall be performed by the manufacturers of the sources or by persons specifically licensed by the Commission to perform such repairs.

For the U. S. Atomic Energy Commission

Date January 5, 1961

Jack Ballou

by [illegible] 1-6-61
Chief, Isotopes Branch
Division of Licensing and Regulation
Washington 25, D. C.

FORM AEC-374
(12-57)

U. S. ATOMIC ENERGY COMMISSION
BYPRODUCT MATERIAL LICENSE

License Number 11-197-2 (Del)

Amendment Number 1

Pursuant to the Atomic Energy Act of 1954 and Title 10, Code of Federal Regulations, Chapter I, Part 30, Licensing of Byproduct Material, and in reliance on statements and representations heretofore made by the licensee, a license is hereby issued authorizing the licensee to receive, acquire, own, possess, transfer and import byproduct material listed below; and to use such byproduct material for the purpose(s) and at the place(s) designated below. This license shall be deemed to contain the conditions specified in Section 183 of the Atomic Energy Act of 1954, and is subject to all applicable rules, regulations, and orders of the Atomic Energy Commission now or hereafter in effect and to any conditions specified below.

Licensee	
1. Name: University of Idaho, Department of Physical Sciences	In accordance with application dated April 15, 1959,
2. Address: Moscow, Idaho	3. License number 11-197-2 is amended in its entirety to read as follows:
	4. Expiration date: April 30, 1964
	5. Reference No.

6. Byproduct material (element and mass number)	7. Chemical and/or physical form	8. Maximum amount of radioactivity which licensee may posses at any one time.
A. Carbon 14	A. Any	A. 0.5 millicuries

9. Authorized use

A: Chemical exchange and similar laboratory studies.

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CONDITIONS

10. Unless otherwise specified, the authorized place of use is the licensee's address stated in Item 2 above.

11. The Licensee shall comply with the provisions of Title 10, Part 20, Code of Federal Regulations, Chapter 1, "Standards for Protection Against Radiation".

12. Byproduct material shall be used by, or under the direct supervision of, Edgar H. Grahn.

For the U. S. Atomic Energy Commission

Original Signed By
James R. Mason

by _____
Chief, Isotopes Branch
Division of Licensing and Regulation
Washington 25, D. C.

Date April 28, 1959

Anthony/RTA

RLB 4-30-59

Form AEC-374
(9-55)

U. S. ATOMIC ENERGY COMMISSION
BYPRODUCT MATERIAL LICENSE

Pursuant to the Atomic Energy Act of 1954 and Title 10, Code of Federal Regulations, Chapter 1, Part 30, Licensing of Byproduct Material, and in reliance on statements and representations heretofore made by the licensee, a license is hereby issued authorizing the licensee to receive, acquire, own, possess, transfer and import byproduct material listed below; and to use such byproduct material for the purpose (s) and at the place (s) designated below. This license shall be deemed to contain the conditions specified in Section 183 of the Atomic Energy Act of 1954, and is subject to all applicable rules, regulations, and orders of the Atomic Energy Commission now or hereafter in effect and to any conditions specified below.

Licensee	
1. Name **University of Idaho**	3. License number **11-197-2**
2. Address **Dept. of Physical Sciences** **Moscow, Idaho**	4. Expiration date **May 31, 1959**
	5. Reference No.

6. Byproduct material (element and mass number)	7. Chemical and/or physical form	8. Maximum amount of radioactivity which licensee may possess at any one time
Carbon 14	**Any**	**0.5 millicuries**

9. Authorized use

Chemical exchange studies.

CONDITIONS

10. Unless otherwise specified, the authorized place of use is the licensee's address stated in Item 2 above.

11. Byproduct material to be used by, or under the supervision of, Edgar H. Grahn.

12. Except as hereinafter provided the licensee shall comply with provisions of the Atomic Energy Commission's Standards for Protection Against Radiation (10-CFR-20) as published in the Federal Register, January 29, 1957; and the Amendment to said Standards as published in the Federal Register, May 14, 1957.

Amend # 1 4/28/59 [illegible]

For the U. S. Atomic Energy Commission

Date **May 23, 1957**

by RCA/MB 5-23-57

Director, Isotopes Extension
Division of Civilian Application
Oak Ridge, Tennessee

B.P./MB

612 JCB

Form AEC-313 (8-64) 10 CFR 30	NITED STATES ATOMIC ENERGY COMMISSION **APPLICATION FOR BYPRODUCT MATERIAL LICENSE**	Form approved. Budget Bureau No. 38-R027

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: Isotopes Branch, Division of Materials 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.

1. (a) NAME AND STREET ADDRESS OF APPLICANT. *(Institution, firm, hospital person, etc. Include ZIP Code.)*	(b) STREET ADDRESS(ES) AT WHICH BYPRODUCT MATERIAL WILL BE USED. *(If different from 1(a). Include ZIP Code.)*
University of Idaho Moscow, Idaho 83843	
2. DEPARTMENT TO USE BYPRODUCT MATERIAL	**3. PREVIOUS LICENSE NUMBER(S).** *(If this is an application for renewal of a license, please indicate and give number.)*
Department of Chemistry	11-00197-02
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.)*	**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.)*
E. K. Raunio, Professor R. A. Porter, Asst. Prof. C. O. Hower, Asst. Prof.	D. V. Naylor

6. (a) BYPRODUCT MATERIAL. *(Elements and mass number of each.)*	(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.)*	
A. Cobalt-60	A. Sealed source-Western Radiation Laboratory CCT-1, 1 mc	10 millicuries
B. Phosphorus-32	B. Any form	1 millicurie
C. Carbon-14	C. Any form	25 millicuries
D. Sulfur-35	D. Any form	50 millicuries
E. Hydrogen-3	E. tritiated titanium targets-Texas Nuclear Corporation, Model 9591	50 curies, not to exceed 5 curies per target

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. The ^{60}Co source will be used in student experiments in gamma ray absorption and scattering and angular correlations. It is stored in Western Laboratory S-200 lead container for 1 mc ^{60}Co source.

B. C. and D. These isotopes will be used for student experiments and occasional tracer experiments in organic chemistry research.

E. To be used as targets in a Texas Nuclear Corporation Model 9591 neutron generator.

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(Continued on reverse side)

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	See attachment		Yes No	Yes No
b. Radioactivity measurement standardization and monitoring techniques and instruments			Yes No	Yes No
c. Mathematics and calculations basic to the use and measurement of radioactivity			Yes No	Yes No
d. Biological effects of radiation			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
	See attachment			

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)
As in renewal application for license number 11-00197-02, April, 1966 In addition:					
Technical Associates PUG-1	1	beta	0-50,000cpm	1.5	Survey
Texas Nuclear,9146-9145	1	neutrons	0.1-1000	--	monitoring, survey
Texas Nuclear, 9160	1	^3H beta	$10mc/m^3$	zero	monitoring

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

As in renewal application for license number 11-00197-02, April, 1966

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

As in renewal application for license number 11-00197-02, April, 1966

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 As in renewal application, April, 1966

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.

As in renewal application, April 1966

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. As in renewal application Apr.'66

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.

Date MAY 17 1968

University of Idaho
Applicant named in item 1

By: J.W. Watts

J.W. Watts, Business Manager
Title of certifying official

MAY 23 1968

Application completed and approved by: Charles O. Hower

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 : 1964 O—745-382

Item 8

E. K. Raunio: As in renewal application for license number 11-00197-02, April, 1966

R. A. Porter As in renewal application for license number 11-00197-02, April, 1966.

D. V. Naylor: As in renewal application for license number 11-1197-3 with reference to letter signed by Duane LeTourneau, June 24, 1966.

C. O. Hower:

(a) Principles and practices of radiation protection	Trained at the University of Washington from 1957 to 1962. Training by on-the-job experience and formal course.
(b) Radioactivity measurement standardization and monitoring techniques and instruments.	Same as Above
(c) Mathematics and calculations basic to the use and measurement of radioactivity.	Same as above
(d) Biological effects of radiation	Same as above, except no formed course.

Item 9

E. K. Raunio: As in renewal application for license number 11-00197-02, April, 1966

R. A. Porter As in renewal application for license number 11-00197-02, April, 1966

D. V. Naylor: As in renewal application for license number 11-1197-3 with reference to letter signed by Duane LeTourneau, June 24, 1966.

C. O. Hower:

Ten years of experience with cyclotron produced radionuclides: 1956 to 1962, University of Washington; 1962 to 1964, Princeton University; 1964 to 1966; Instituut voor Kemphysich Onderzoek. Experience with radiation levels to 100 mr/hr. Radiochemical separations, decontamination, counting, in-beam experiments.

UNIVERSITY OF IDAHO

MOSCOW, IDAHO 83843

College of Letters and Science

DEPARTMENT OF PHYSICAL SCIENCES

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October 19, 1966

Mr. Ernest Resner
Licensing Reviewer
Isotopes Branch
Division of Licensing and Regulation
United States Atomic Energy Commission
Washington 25, D.C.

Dear Mr. Resner:

We wish to request an amendment to the Department of Physical Sciences By-product Materials License No. 11-197-2. We would like to include 50 curies of tritium in the form of targets (Texas Nuclear Model 9591) for our TNC Model 9700 neutron generator. In answer to specific questions raised by you last spring, we offer the following information about our plans for handling the trituim and the generator:

1. We plan to store the burned targets in labelled jars containing Drierite located in the stainless steel hood of our Radioisotopes laboratory.
2. Wipe surveys of the generator can be taken with moist filter paper which can be analyzed in our 2 windowless Gieger counter or a thin-windowed Gieger tube. We will make these surveys as often as the AEC deems necessary.
3. Tritium in the air will be monitored with a TNC Model 9160 Tritium Monitor.
4. At present, using the D-D reaction which produces 10^8 3 MeV neutrons per second, we have an 18" wall around our generator consisting of cinder blocks filled with mortar. The neutron level outside the wall is negligible with this arrangement. To shield against the D-T reaction which will provide about $2x10^{10}$ 14 MeV neutrons 1 sec. we have purchased a 2-foot extension tube for the target and 500 pounds of paraffin wax. We will stack the paraffin wax at least 2 1/2 feet on each side of the target and at least 4 feet above the target. The generator is in the basement so there will be no hazard underneath. We have a TNC Nemo neutron detector and neutron dosimeters, so we will be able to determine the neutron output outside the walls.
5. We use an ion pump rather than an oil diffusion pump. The fore pump oil will be monitored for tritium when it is used.
6. Urinalysis for the instructors in charge of the generator will be done at the end of a semester's operation, if the instructor has been handling the targets or parts contaminated with tritium.

DUPLICATED
FOR DIV. OF COMPLIANCE

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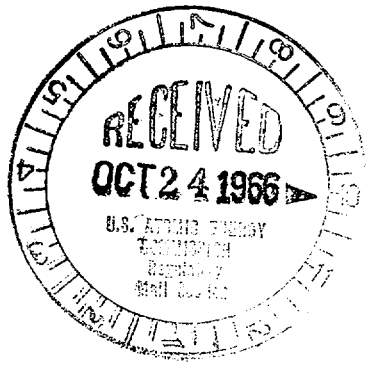
7. The Texas Nuclear Corporation does not have specific recommendations for tritium handling. They only suggested to us that contaminated parts should be wiped clean of surface contamination and labeled before storage. Parts to be discarded can be handled in our usual burial ground.

Sincerely yours,

Richard A. Porter

Richard A. Porter
Assistant Professor of Chemistry

RAP:slr



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Duplicate 61203

Form AEC-313 8-64 10 CFR 30	UNITED STATES ATOMIC ENERGY COMMISSION **APPLICATION FOR BYPRODUCT MATERIAL LICENSE**	Form approved. Budget Bureau No. 38-R027

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 Commisson 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: Isotopes Branch, Division of Materials 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.

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

University of Idaho

Moscow, Idaho 83843

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

Same

2. DEPARTMENT TO USE BYPRODUCT MATERIAL

Physical Sciences

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

11-197-2

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.)*

E.K. Raunio
P. K. Freeman
R. A. Porter

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.)*

G. A. McKean

6. (a) BYPRODUCT MATERIAL. *(Elements and mass number of each.)*	(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.)*
A. Cobalt 60	1 millicurie - Sealed Source Western Radiation Laboratory CCT-1
B. Phosphorus 32	1 millicurie - Any Form
C. Carbon 14	25 millicuries - Any Form
D. Sulfur 35	50 millicuries - Any Form
E. Hydrogen 3	50 curies - Embedded in Titanium Targets of 3-5 curies each For Use In Texas Nuclear Neutron Generator

The last three items represent requested amendments to the current license.

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. Experiments in gamma ray absorption and scattering radiation chemistry and calibration of survey instruments.
B. Experiments in beta-ray absorption, radioactive decay and radio chemical separations.
C. Chemical exchange and similar laboratory studies.
D. Study of the solubility of barium sulfate as a function of specific activity.
E. Studies in neutron activation analysis.

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(Continued on reverse side)

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	Items 8-15 - See Attached Sheet		Yes No	Yes No
b. Radioactivity measurement standardization and monitoring techniques and instruments			Yes No	Yes No
c. Mathematics and calculations basic to the use and measurement of radioactivity			Yes No	Yes No
d. Biological effects of radiation			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

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)*

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

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

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.

G. A. McKean 4/5/66

G. A. McKean
Radiological Safety Officer

Date 11 April 1966

University of Idaho
Applicant named in item 1

Kenneth A. Dick

K. A. Dick
Financial Vice President
Title of certifying official

University of Idaho

RECEIVED APR 21 1966 U.S. ATOMIC ENERGY COMMISSION REGULATORY MAIL SECTION

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 : 1964 O—745-381

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UNIVERSITY OF IDAHO

MOSCOW, IDAHO 83843

College of Letters and Science
DEPARTMENT OF PHYSICAL SCIENCES

May 7, 1964

Mr. John E. Bowyer
Senior Licensing Reviewer
Isotopes Branch
Division of Licensing and Regulation
United States Atomic Energy Commission
Washington 25, D.C.

Dear Mr. Bowyer:

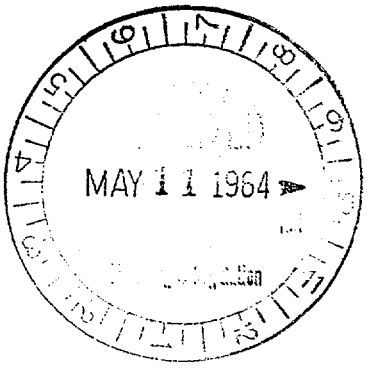
Please consider this a formal request to amend the Department of Physical Sciences Byproduct Materials License No. 11-197-2 (D64), which is now being considered for renewal by your division. We would like to include S^{35}, in any chemical or physical form, with a possession limit of 25 millicuries. Our proposed purpose will be to carry out a study of "The Solubility of Barium Sulfate as a Function of Specific Activity", which is part of our Undergraduate NSF research participation program.

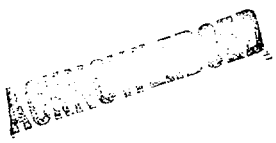
Very truly yours,

Peter K. Freeman

Peter K. Freeman,
Associate Professor of Chemistry

PKF:jj
cc: Dr. R. A. Porter
Mr. G. A. McKean
Dr. E. K. Raunio





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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, D.C., 20545. 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.)*

University of Idaho
Moscow, Idaho

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

2. DEPARTMENT TO USE BYPRODUCT MATERIAL

Department of Physical Sciences

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

Renewal 11-197-2 (D 64)

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.)*

E.K. Raunio, Director of the Radioisotopes laboratory
Richard A. Porter, Assistant Professor
P.K. Freeman, Assistant Professor

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.)*

G. A. McKean

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

Co^{60}

P^{32}

C^{14}

(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.)*

Western Radiation Laboratory CCT-1,
1 millicurie Co^{60} capsule

H_3PO_4, 1 millicurie

10 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.)*

The Co^{60} source will be stored in Western Radiation Laboratory S-200 lead container for 1 mc. Co^{60} source. The Co^{60} source will be used for experiments in gamma ray absorption and scattering, radiation chemistry and calibration of survey meters.

The P^{32} will be used for experiments in β-ray absorption, radioactive decay and radiochemical separation methods.

The C^{14} will be used for tracer techniques in organic chemistry, and physical chemistry.

58456

DUPLICATED
FOR DIV. OF COMPLIANCE

(Continued on reverse side)

Form AEC–313 (5-58) Page Two

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			Yes No	Yes No
b. Radioactivity measurement standardization and monitoring techniques and instruments			Yes No	Yes No
c. Mathematics and calculations basic to the use and measurement of radioactivity			Yes No	Yes No
d. Biological effects of radiation			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

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)*

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

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

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

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.

Reviewed by: W.R. Parish, Chairman
Radioisotopes Committee

Date MAR 18 1964

RECEIVED
MAR 23 1964
U.S. Atomic Energy Commission
DIVISION OF LICENSING & REGULATION

University of Idaho Dept. of Phy. Sci.
Applicant named in item 1

By: Kenneth A. Dick
Name of certifying official

Financial Vice President
Title

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.

GPO 865-815

6. Training and Experience of Dr. R.A. Porter

	Where Trained	Duration of Training	On the Job	Formal Course
a.	University of Idaho. Dr. Porter has taught chemistry 213, "Nuclear Chemistry", at the University of Idaho during the last two years (1962-1964). In addition he has offered Chemistry 216, a laboratory course in "Methods in Radiochemistry", with the consultation of Dr. P.K. Freeman and W.P. Barnes, Mechanical Engineering Department.	2 years	Yes	
b.	University of Idaho	2 years	Yes	
c.	Dr. Porter's Ph.D. thesis was written on "Environmental Effects on Radioactive Decay Rates", UCLA, 1959. He was subsequently employed at the University of California Lawrence Radiation Laboratory at Livermore as a Physicist in the Theoretical Division and in Weapons Design, 1958-1961.	5 years	Yes	Yes
d.	University of Idaho	2 years	Yes	

9. Experience with Radiation. R.A. Porter

Isotope	Maximum Amount	Where Experience was gained	Duration of Experience	Type of Use
C^{14}	5 mc	University of Idaho	one year	Teaching
Na^{22}	1 uc	"	"	"Methods in
Mu^{54}	1 uc	"	"	Radiochemistry",
Fe^{55}	5 uc	"	"	Chemistry 216
Co^{57}	1 uc	"	"	"
Co^{60}	1 mc	"	"	"
Co^{65}	1 uc	"	"	"
Ni^{63}	1 uc	"	"	"
Cs^{137}	1 uc	"	"	"
Ba^{133}	1 uc	"	"	"
Pm^{147}	5 uc	"	"	"
Te^{204}	5 uc	"	"	"
Pb^{210}	5 uc	"	"	"
I^{131}	10 uc	"	"	"
S^{35}	50 uc	"	"	"

U^{235}, U^{238}	5500 lbs natural	Used in conjunction with a 5 curie PuBe in water moderated sub critical nuclear reactor	One Year	Same as previously
P^{32}	1 mc		One Year	Same as previously

5946

Training and Experience (Item 8) and Experience with Radiation (Item 9) for individual users, E.K. Raunio and P.K. Freeman has been described in previous application for license 11-197-2 (D64) (December 22, 1960). Items 8 and 9 for Radiation Protection Officer, G.A. McKean were transmitted in application for by product Materials License No. 11-197-4 (G6).

11-197-2 Amend.

UNIVERSITY of IDAHO

MOSCOW, IDAHO

Department of Physical Sciences

October 17, 1961

Mr. John E. Bowyer
Senior Licensing Reviewer
Isotopes Branch
Division of Licensing and Regulation
United States Atomic Energy Commission
Washington 25, D. C.

Dear Mr. Bowyer:

At the suggestion of Mr. W. C. Pierce, AEC inspector from the Idaho Operations Office, I now make a formal request to amend the Department of Physical Sciences By-product Materials License No. 11-197-2. We would like to change our possession limit from one millicurie of carbon 14, in any chemical or physical form, to five millicuries of carbon 14, in any chemical or physical form.

The reason for this requested change is that, unknown to those of us presently using radioisotopes in teaching or research, 250 microcuries of carbon 14 previously thought to be on a different license is instead on License No. 11-197-2. Since this brings us over our possession limit by 250 microcuries we request the above change to correct this and allow for some flexibility in the use of carbon 14 in the future.

Very truly yours,

Peter K. Freeman

Peter K. Freeman, Assistant
Professor of Chemistry

PKF:pf

cc: Dr. Raunio
Dr. LeTourneau

38088

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FOR DIV. OF COMPLIANCE

RECEIVED
OCT 20 1961
U.S.A.E.C.
Isotopes Branch
Div. of L & R

Control No. 0714

UNIVERSITY of IDAHO

MOSCOW, IDAHO

Department of Physical Sciences

February 1, 1961

Mr. John E. Bowyer
Senior Licensing Reviewer
Isotopes Branch
Division of Licensing and Regulation
United States Atomic Energy Commission
Washington 25, D. C.

11-197-2
Am 2

Dear Mr. Bowyer:

In reply to your letter of January 5, 1961, (Land R:IB:JEB) I now make a formal request for permission to perform leak tests on our 1 millicurie Co^{60} sealed source. The Department of Physical Sciences recently received byproduct materials license No. 11-197-2 (D64) amendment No. 2 authorizing the possession of this source.

The procedure which will be followed in performing leak tests is adapted from Blatz, Radiation Hygiene Handbook, McGraw-Hill, New York, 1959, pp 11-40.

The 1 mc. Co^{60} sealed source will be wiped or smeared with a filter paper using longhandled tongs or a remote handling tool. The filter paper will be saturated with an organic solvent, such as acetone, in order to increase the efficiency of the operation. The filter paper will be given a preliminary check with one of the following monitoring instruments: Atomic Accessories, Model SM-131 β, γ survey meter, Baird-Atomic Model 414 logarithmic survey meter. The filter paper will then be counted using either our Baird-Atomic Model 810A well type scintillation detector and Baird-Atomic Model 2010 Scalar, or Baird-Atomic Model 810 well type scintillation detector and Baird-Atomic Model A-2-17B single channel scintillation spectrometer.

If no leakage is apparent in the above test, the sealed source will be wrapped in cotton and left for at least a day in a small sealed container. The cotton will then be counted in the same manner as described above for the filter paper.

If leakage is detected in either procedure, the source will be placed in a sealed container and returned to Western Radiation Laboratory for repair and measurement, and your division will be notified of this action as specified in condition 13 of our license. Containers and carriers, as well as any other equipment that has had contact with the leaking source, will be decontaminated with the advice of our radiation protection officer.

My training and experience with radiation is outlined in the University of Idaho's byproduct materials license application of December 22, 1960. In addition, it is pertinent to mention that leak testing procedures were discussed at the Institute in Basic Nuclear Science and Radioisotope Technology at the University of California, which I attended July 11 to August 26, 1960.

Sincerely yours,

Peter K. Freeman

Peter K. Freeman, Assistant
Professor of Chemistry

DUPLICATED
FOR DIV. OF COMPLIANCE

PKF:vm
cc: Dr. Raunio and Dr. LeTourneau

32353

L&R:IB:JEB (11-197-2)

JAN 5 1961

Mr. E. K. Raunio
Mr. P. K. Freeman
University of Idaho
Department of Physical Sciences
Moscow, Idaho

Gentlemen:

Please note that Condition 13 requires that the Cobalt 60 sealed source be leak tested by persons licensed by the Commission to perform such tests. If you desire to do your own testing of the sealed source, please submit the following information:

A. The name of the person in your organization who will perform the test,

B. His training and experience in leak testing techniques,

C. The leak testing procedure which will be followed, and

D. The make and model number of the instrumentation that is available.

Sincerely yours,

John E. Bowyer
Senior Licensing Reviewer
Isotopes Branch
Division of Licensing and
Regulation

OFFICE ▶	I&R:IB					
SURNAME ▶	Bowyer:bar					
DATE ▶	1/4/61					

Form AEC-318 (Rev. 9-53)

U. S. GOVERNMENT PRINTING OFFICE 16—62761-3

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.

Amd # 2

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

University of Idaho
Moscow, Idaho

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

2. DEPARTMENT TO USE BYPRODUCT MATERIAL

Department of Physical Sciences

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

None

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.)*

E. K. Raunio, Director of the Radioisotopes Laboratory
P. K. Freeman, Assistant Professor of Chemistry

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.)*

D. J. LeTourneau

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

Co^{60}

P^{32}

C^{14}

(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.)*

Western Radiation Laboratory CCT-1, 1 millicurie Co^{60} capsule

H_3PO_4, 1 millicurie

$BaCO_3$, 0.5 millicurie

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.)*

The Co^{60} source will be stored in Western Radiation Laboratory S-200 lead container for 1 mc. Co^{60} source. The Co^{60} source will be used for experiments in gamma ray absorption and scattering, radiation chemistry and in calibration of survey meters.

The P^{32} will be used for experiments in β -ray absorption, radioactive decay and radiochemical separation methods.

The C^{14} will be used for experiments in tracer techniques in organic chemistry.

DUPLICATED FOR DIV. OF COMPLIANCE

(Continued on reverse side)

31315

Form AEC-313 (5-58) Page Two

TRAINING AND EXPERIENCE OF EACH INDIVIDUAL NAMED IN ITEM 4 *(Use supplemental sheets if necessary)*

8. TYPE OF TRAINING — E. K. Raunio	WHERE TRAINED	DURATION OF TRAINING	ON THE JOB (Circle answer)	FORMAL COURSE (Circle answer)
a. Principles and practices of radiation protection	Oak Ridge Institute of Nuclear Studies		Yes No	Yes No
b. Radioactivity measurement standardization and monitoring techniques and instruments	" " "	6 weeks	Yes No	Yes No
c. Mathematics and calculations basic to the use and measurement of radioactivity	" " "	total	Yes No	Yes No
d. Biological effects of radiation	" " "		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
All of Dr. Raunio's experience was obtained in the course at ORINS.				

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)*
See attachment					

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

See attachment

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

Ten Atomic Accessories Model L-50-57 Landsverk Dosimeters will be used, range 0 - 200 mr.

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) Radioisotopes Laboratory description attached.

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 copy of Regulation Governing Safe Handling of Radioactive Isotopes.

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 attachment.

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.

The Regents of the University of Idaho

Date DEC 22 1960

x P. K. Freeman

Applicant named in item 1

Kenneth A. Dick, Comptroller

University of Idaho

Title of certifying official

RECEIVED DEC 27 1960 U.S.A.E.C. Isotopes Branch Div. of L & R

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.

GPO - 87 407 3

P. K. Freeman

8. Type of Training	Where Trained	Duration of training	On the Job	Formal Course
A.	Univ. of California, Institute in Basic Nuclear Science and Radiation and Radio-isotope Technology	7 weeks	No	Yes
B.	" "	7 weeks	No	Yes
C.	" "	7 weeks	No	Yes
	Univ. of Colorado	1 semester	No	Yes
D.	Univ. of California	7 weeks	No	Yes

9. Experience with Radiation

Dr. Freeman's formal experience with radiation was gained at Institute in Basic Nuclear Science and Radiation and Radioisotope Technology at the University of California, July 11 to August 26, 1960.

D. J. Le Tourneau

8. Type of Training	Where Trained	Duration of training	On the Job	Formal Course
A.	Oak Ridge Institute of Nuclear Studies	4 weeks	No	Yes
B.	" " "	4 weeks	No	Yes
C.	" " "	4 weeks	No	Yes
D.	" " "	4 weeks	No	Yes

9. Experience with Radiation

Experience with radiation gained at the Oak Ridge Institute of Nuclear Studies. Dr. LeTourneau holds AEC License No. 11-197-3 (F-61) Amendment No. 2 permitting him to work with Ca^{45}, Na^{24}, S^{35}, Ce^{36}, P^{32}, Cs^{137}, and Sr^{90}.

DUPLICATED
FOR DIV. OF COMPLIANCE

Radiation Detection Instruments

Type of Instruments	Number	Radiation Detected	Sensitivity mr/hr	Window Thickness	Use
Survey meters-El-Tronics, sm-3	1	alpha, beta gamma	0-0.2 0-2.0 0-20	less than 2 mg/cm^2	monitoring, surveying
Tracerlab, Su-14	2	"	0-0.25 0-2.5 0-25	less than 2 mg/cm^2	"
Atomic Accessories, Model SM-131	2	"	0-5 0-50 0-500	less than 2 mg/cm^2	"
Baird-Atomic Model 414, Logarithmic	1	beta, gamma	3-3000	0.9 mg/cm^2	"
Auto Scaler, Tracerlab SC-1B	1				measurement
RCL Scaler, Radiation Counter Laboratories, Mark 13, Model 1	1				"
Baird-Atomic Model 123 G-M Scaler	5				"
Baird-Atomic Model 2010 Scaler	1				measurement
Windowless flow counter, Radiation Counter Labs	1	alpha, beta, gamma			"
Scintillation detector, Nuclear Chicago	1	beta gamma			"
Baird-Atomic Model, 810A well type scintillation detector	1	"			"
Pulse Height Analyzer, Tracerlab, RL1-6SR					"

Radiation Detection Instruments

Type of instruments	Number	Radiation Detected	Sensitivity mr/hr	Window Thickness	Use
Baird-Atomic Model, A-2-17B single channel scintillation spectrometer	1				measurement
Rate meter, Tracerlab, Sc34Bd	1				measurement
Carbon counter, Tracerlab, SC 55	1	alpha beta gamma			measurement
Windowless flow counter, Tracerlab Sc 166	1	alpha beta gamma			measurement
Baird-Atomic Model 822B stand and end window GM tubes	5	"		less than 2 mg/cm^2	"
Baird-Atomic Model 821B micro-thin end window flow counter	1	"			"
Baird-Atomic Model 410 count rate meter	1				"
Atomic Accessories Model RSC-5A chromatogram scanner with recorder	1				"
Atomic Accessories Model ND-191-BF^3 neutron counter	2	neutrons			"

3-13-60

11. Flow counters, carbon counter and GM tubes will be calibrated once a day, when in use, against standards in New England Nuclear Model 1225 Beta Reference Source Sets. Scintillation detectors will be calibrated, once a day when in use, against standards in a New England Nuclear Model 1230 Gamma Reference Source Set. Calibration of Atomic Accessories Model SM-131 survey meter will be calibrated, once a day when in use, against standard source supplied with the instrument. The Baird-Atomic Model 414 Logarithmic Survey Meter is factory calibrated and will be calibrated, once a day when in use, by following secondary calibration procedure recommended in the manufacturer's instruction manual.

In addition, the survey meters will be calibrated once a semester against the 1 mc. Co^{60} sealed source.

13. Facilities and Equipment - Radioisotopes Laboratory Building

1. Radiochemical Laboratory

Two hoods, benches, distilled water, waste disposal cans for "hot" and normal waste, chemical glassware, chemicals and general laboratory supplies, gas, H and C water, balances, remote pipettor, two Atomic Accessories Model RHT-60-3 remote handling tools, 25 Atomic Accessories Model LB-24 lead bricks and:

3	Atomic Accessories Model	AB-23 absorber sets
1	" " "	L-75 Isotope Analysis Kit (electroscope)
10	" " "	IF-1 indium foils
2	" " "	PC-14 planchet storage cabinets
1000	" " "	NP-11 nickel plated cupped planchets
1000	" " "	LT-16 lusteroid well counter tubes
5	" " "	PF-44 plancet forceps
5	" " "	RD-43 Ring and disc sets
1	" " "	SPP-69 sample spinner
20	" " "	TMP-74 micropipette transfer (2 ea. 1λ, 2λ, 5λ, 10λ, 25λ, 50λ, 100λ, 250λ, 500λ, and 1 ml.)
1	" " "	RP-65 remote pipetter
~~2~~	~~" " "~~	~~370/371 BF_3 neutron counters~~
1	Western Radiation Lab	S-200 lead container for 1 mc Co^{60} - to be supplied with Co^{60}
1	Atomic Accessories Model	LS-62 lead shield and collimator
10	" " "	BSS-35 shielded syringe (0.10 cc)
1	" " "	SL-71 education source kit
2	" " "	RHT-60-3 Remote handling tools
1	Curtiss-Wright Neutron Howitzer	

2. Preparation Laboratory

Carver Press, balance, Wiley Mills, large waste cans

3. Counting Room

1	Baird-Atomic Model	255 non-overloading proportional amplifiers
5	" "	960 dual purpose precision timers
5	" "	800D low background iron shields
1	Atomic Accessories Model	RRMA-X-X51 single channel recorder
1	Baird-Atomic Model	812 scintillation probe
1	Atomic Accessories Model	L-24K-58 landsverk charger
2	" " "	AGR-28 pressure regulators

4. Storage Rooms - 2

steel safe for isotopes storage, air conditioner

5. Dark Room

enlarger, mechanical developer, printer, safe lights, refrigerator, developing pans, racks

6. Office

desk, chairs, filing cabinet, shelving, table

7. Lavatory and wash-up facilities

8. Waste storage pit - concrete lined 5' x 5' x 5', underground, at rear of building

15. Waste Disposal

Disposal of waste will be carried out according to the attached "Regulations Governing the Safe Handling of Radioactive Isotopes at the University of Idaho." More specifically, in relation to this application, P^{32} will be stored in a radiochemical hood for decay. With 1 mc. of activity, after a period of 10 months, it will be possible to make a disposal meeting the requirements of the Federal Register, Jan. 29, 1957, Title 10, Part 20, Section 20.303.

Disposal of the C^{14} waste will be made in the University of Idaho's burial ground according to the requirements of the Federal Register, Jan. 29, 1957, Title 10, Part 20, Section 20.304.

The waste storage pit mentioned in item 13 does not now contain any activity and will not be used for further storage of radioisotopes.

Ame.

Form AEC-313 (5-58)

ATOMIC ENERGY COMMISSION

APPLICATION FOR BYPRODUCT MATERIAL LICENSE

11-19.

Form approved. Budget Bureau No. 38-R.

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.)*

University of Idaho
Dept. of Physical Sciences
Moscow, Idaho

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

2. DEPARTMENT TO USE BYPRODUCT MATERIAL

Dept. of Physical Sciences

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

Renewal 11-197-2

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.)*

Edgar H. Grahn
Associate Professor of Chemistry

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. James V. Jordan - appointed by University of Idaho in accordance with A.E.C. regulations.

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

Carbon 14

(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.)*

Solid oxalic acid 0.5 millicuries

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[illegible] OF INSP.

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.)*

Chemical exchange studies using microcurie amounts of Carbon 14

18178

(Continued on reverse side)

(5-58)

TRAINING AND EXPERIENCE OF EACH INDIVIDUAL NAMED IN ITEM 4 *(Use supplemental sheets if necessary)*

4G	WHERE TRAINED	DURATION OF TRAINING	ON THE JOB (Circle answer)	FORMAL COURSE (Circle answer)
and practices of radiation protection			Yes No	Yes No
b. Radioactivity measurement standardization and monitoring techniques and instruments			Yes No	Yes No
c. Mathematics and calculations basic to the use and measurement of radioactivity			Yes No	Yes No
d. Biological effects of radiation			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

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)*

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

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

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

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.

RECEIVED APR 21 1959 U.S.A.E.C. Isotopes Branch Div. of L & R

Date April 15, 1959

University of Idaho
Applicant named in item 1

By: Kenneth A. Dunk

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 : 1959 O—491408

Amend #1
11-19-72

Item 15. WASTE DISPOSAL.

No more than 20 to 30 microcuries Carbon 14 waste will be buried at one time. It will be placed in a Stainless Steel beaker and buried at a depth of approximately 12 feet in heavy clay in the official burial ground at the University of Idaho.

DUPLICATED
FOR DIV. OF INSP.

11-197-2.

Form AEC-313 (9-55)

ATOMIC ENERGY COMMISSION

APPLICATION FOR BYPRODUCT MATERIAL LICENSE

Form approved. Budget Bureau No. 38-R027.

INSTRUCTIONS: Complete Items 1 through 19 if this is a new application. If renewal is requested 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.

DUPLICATE FOR DIV. OF INSP.

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

University of Idaho
Moscow, Idaho

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

2. DEPARTMENT TO USE BYPRODUCT MATERIAL

Department of Physical Sciences

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

Edgar H. Grahn

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

Edgar H. Grahn

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*)

Authorization No. 23418

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
Carbon 14	Solid oxalic acid	0.5 millicuries

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

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.*)

Exchange studies between tris(oxalato) gallate (III) and radio active oxalate ions. May include studies with other metal oxalato complexes.

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

Remote handling tongs, remote pipet, lead bricks, steel safe-

appropriately marked disposal cans in concrete lined waste pit.

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 .....
County of .....
Subscribed and sworn to before me this .....
day of .....

Notary Public

Edgar H. Grahn
Applicant named in Item 1

By .....
Title of Certifying Official

May 7, 1957
Date

SUGGESTED

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.

(*Continued on reverse side*)

16—57264-5

5643

Form AEC-313

ATOMIC ENERGY COMMISSION

APPLICATION FOR BYPRODUCT MATERIAL LICENSE

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	WHERE TRAINED	DURATION OF TRAINING	ON THE JOB (Circle answer)		FORMAL COURSE (Circle answer)	
1. Principles and practices of radiological health safety.	Univ. of Illinois	8 week summer course	Yes	No	(Yes)	No
2. Radioactivity measurement standardization and monitoring techniques and instruments	Univ. of Illinois	8 week summer course	Yes	No	(Yes)	No
3. Mathematics and calculations basic to the use and measurement of radioactivity.	University of Illin.	8 weeks summer course	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	Univ. of Illinois	8 weeks summer course	Yes	No	(Yes)	No

13. ISOTOPE HANDLING EXPERIENCE

ISOTOPE	MAXIMUM AMOUNT	WHERE EXPERIENCE WAS GAINED	DURATION OF EXPERIENCE	TYPE OF USE
C - 14	0.5 mc.	University of Idaho	6 months	tracer exchange studies

14. If Radiological Safety Officer named in Item 4 is different from individual user named in Item 3, 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/cm^2)	USE (*Monitoring, surveying, measuring*)
Use same physical facilities, equipment and radiation instrumentation as described in University of Idaho licence No. 11-197-1 previously issued.					

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

as above

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

as above

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

as above

(*b*) SKETCHES OF SUCH FACILITIES ARE ATTACHED (*Circle answer*) previously sent Yes (No)

19. DESCRIBE BRIEFLY RADIATION SURVEYING PROCEDURES AND METHODS OF DISPOSING OF RADIOACTIVE WASTES

as above

U. S. GOVERNMENT PRINTING OFFICE 16—57264-5