

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 College of Forestry	3. License number 11-100-1
2. Address	Forest Management Research Dept. Moscow, Idaho	4. Expiration date March 31, 1958
	Attn: William K. Ferrell and Frederic D. Johnson	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
Calcium 45 Phosphorus 32	Any Any	50 millicuries 100 millicuries
9. Authorized use  Field and laboratory plant studies.		

## CONDITIONS

10. Unless otherwise specified, the authorized place of use is the licensee's address stated in Item 2 above; and the materials are to be used by, or under the supervision of, the individuals named above.

11. Except as hereinafter provided the licensee shall comply with provisions of the Atomic Energy Commission's proposed standards for protection against radiation as published in the Federal Register, July 16, 1955 (10-CFR-20), until such time as said proposed regulations or revisions thereof become effective regulations of the Commission. Notwithstanding, Section 20.24(f) of said standards, labeling shall not be required for laboratory containers such as beakers, flasks and test tubes, used transiently in laboratory procedures during presence of the user.

For the U. S. Atomic Energy Commission

ORIGINAL SIGNED BY  
LESTER R. ROGERSDate March 21, 1956

by \_\_\_\_\_

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

B.P./ HC/MS CRB

A/1

85750

## RADIOISOTOPE SHIPPING DOCUMENT

## OAK RIDGE NATIONAL LABORATORY

OPERATED FOR U. S. ATOMIC ENERGY COMMISSION  
BY CARBIDE AND CARBON CHEMICALS COMPANYA DIVISION OF  
UNION CARBIDE AND CARBON CORPORATION

OAK RIDGE, TENNESSEE

RADIOISOTOPE ORDER NO.

RAIL EXPRESS

7-19-56

1007-86

CUSTOMER'S ORDER NO.

8298

RADIOISOTOPE ORDER NO.

1007-86

APPROVAL NO.

11-100-1

SCHEDULED DATE

7-19-56

SHIP TO

UNIVERSITY OF IDAHO  
SPECIAL RESEARCH PROJECT NO. 11-B  
COLLEGE OF FORESTRY  
ROOM 112  
MOSCOW, IDAHO

BILL TO (IF DIFFERENT FROM SHIP TO)

UNIVERSITY OF IDAHO  
SPECIAL RESEARCH PROJECT NO. 11-B  
COLLEGE OF FORESTRY  
MOSCOW, IDAHO

ROUTE AND SHIPPING INSTRUCTIONS

RAIL EXPRESS

CONTAINER NO.

NR

BILLING INSTRUCTIONS

DESCRIPTION OF MATERIAL ORDERED

SPECIFIC ACTIVITY REQUESTED

DATE SHIPPED

7-19-56  
BOX WEIGHT

ORDERED	SHIPPED	DESCRIPTION	UNIT PRICE	EXTENSIONS	HANDLING CHARGE	CONTAINER CHARGE	TOTAL VALUATION
15 MCS	15 mc.	CA 45 (P-1)	2.00	30.00	10.00		40.00
CHEMICAL FORM		BATCH NO.	CONCENTRATION		VOLUME		SPECIFIC ACTIVITY
CaCl <sub>2</sub> in HCl Solution		104	0.837 ± 10% mc/ml		18.0 ml		9.09 mc/g
ANALYSIS			CUSTOMER CODE 3010 8298			SALE CODE 1 1	
Assayed at 8:00 A. M. 7-19-56			CUSTOMER TYPE 7			MATERIAL TYPE 3661-61-2	

I 133 \_\_\_\_\_ %

Heavy Metals \_\_\_\_\_ p.p.m.

Total Solids \_\_\_\_\_ mg/ml

Non Volatile Materials \_\_\_\_\_ mg/ml

Alpha \_\_\_\_\_ c/min/mt

Radiochemical Purity \_\_\_\_\_ %

Acidity 1.32 N. Acid

Ca 92.0 mg/ml

APPROVED FOR SHIPMENT

SIGNED

RADIOISOTOPE SALES DEPARTMENT

SHIPPED BY RADIOISOTOPE SHIPPING DEPARTMENT

4

IN REPLY REFER TO:  
IEB:NB

Oak Ridge, Tennessee  
April 4, 1956

Mr. Frederic D. Johnson  
School of Forestry  
University of Idaho  
Moscow, Idaho

11-100-1

Subject: DISTRIBUTION OF FORM AEC-391

Dear Mr. Johnson:

Reference is made to your letter of March 27. The purchase orders which you enclosed have been forwarded to Oak Ridge National Laboratory.

The Form AEC-391 should be submitted in duplicate to the Commission facility from whom you desire to procure byproduct material. The address on both the Form AEC-391 and on the purchase order should be:

Oak Ridge National Laboratory  
Radioisotope Sales Department  
P.O. Box P  
Oak Ridge, Tennessee  
Attn: Mr. John H. Gillette

In order to facilitate your purchase of byproduct material, we suggest that you send both Form AEC-391 and your purchase order directly to the Oak Ridge National Laboratory. We shall be pleased to forward these forms for you when you submit them with an application. However, it will facilitate your purchase if you send the forms directly to the Oak Ridge National Laboratory on all subsequent orders. We hope this satisfactorily answers your questions.

Very truly yours,

Nathan Bassin, Technical Reviewer  
Byproduct Licensing Branch  
Isotopes Extension

OFFICE ▶	Isotopes			Division of Civilian	Application	
SURNAME ▶	Bassin:bp					
DATE ▶	4-4-56					

UNIVERSITY OF IDAHO  
SCHOOL OF FORESTRY  
MOSCOW, IDAHO

March 27, 1956

NrB  
2692  
LR

Mr. Lester R. Rogers, Chief  
Byproducts Licensing Branch  
Isotopes Extension  
Division of Civilian Application  
U. S. Atomic Energy Commission  
Oak Ridge, Tennessee

RE: IEB:NB  
(Lic 11-100-1)

Dear Mr. Rogers:

Thank you for your letter of March 21. We were pleased to know that we could submit forms AEC 313 and AEC 391 along with our purchase order and thus expedite the ordering of radioisotopes.

Regarding form 391 we have three questions:

1. How many copies of form 391 do you require? — *One copy*
2. In Item #1 -- what address do you require for ordering by-products from Oak Ridge? — *Remember*
3. Whom shall we make the purchase order to?

We are enclosing three copies of form 391 and our purchase order. If it is misaddressed will you please forward it to the proper agency?

Thank you for your cooperation.

Sincerely,

*Frederic D. Johnson*  
Frederic D. Johnson  
Radioisotopes Technologist

FJ:ab  
Enc.

*AKM*

IN REPLY REFER TO:  
IEB:NB (LIC 11-100-1)

Oak Ridge, Tennessee  
March 21, 1956

Mr. Frederic D. Johnson  
School of Forestry  
University of Idaho  
Moscow, Idaho

Subject: LICENSE NO. 11-100-1

Dear Mr. Johnson:

Enclosed is License No. 11-100-1 issued against your recent request for Calcium 45 and Phosphorus 32.

Although it is not customary procedure, we would be willing to accept your purchase order and Form AEC-391 for subsequent transfer to Oak Ridge National Laboratory for the procurement of byproduct material. You may follow this procedure with any future applications which you may submit. We will fill in the license number on the forms prior to submission to Oak Ridge National Laboratory.

A new catalog was issued by Oak Ridge National Laboratory in January 1956. There have been some changes made in this catalog, and you may obtain a copy of this new catalog, without charge, by requesting it from Mr. John H. Gillette, Radioisotope Sales Department, Oak Ridge National Laboratory, P.O. Box P, Oak Ridge, Tennessee.

Please be assured of our desire to be of assistance in byproduct licensing.

Very truly yours,

for: Lester R. Rogers  
Acting Chief, Byproduct Licensing Branch  
Isotopes Extension  
Division of Civilian Application

✓ NFF  
Encls.:

1. Form AEC-374
2. Application forms w/instructions & regulations

OFFICE ▶	Isotopes	Isotopes				
SURNAME ▶	Bassin:bp	CRB				
DATE ▶	3-21-56	3-21-56				

## 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. . . . .	O.R.I.N.S.	1 MONTH OAK RIDGE PLUS 6 YEARS ON THE JOB	(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
CA-45	50 MILLICURIES	O.R.I.N.S. AND OWN LABORATORY	6 YEARS	LAB. AND FIELD
P-32	100 "	" " " "	"	" " "

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." <sup>Supple-</sup> 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 <sup>2</sup> )	USE (Monitoring, surveying, measuring)
SCALER-RCL, MARKB MODEL 1 + GEIGER TUBE	1	ALPHA, BETA	1-20000 CPM	1.5MG/CM <sup>2</sup>	MEASURING
SCALER-NIC, MODEL 172	1	GAMMA	"	"	"
COUNT-RATE METER-NIC, MODEL 16LS	1	"	1-50000 CPM	1.2	MONITORING AND SURVEYING
SCALER-TRACERLAB MODEL 64	1	"	1-20000 CPM	2.0	MEASURING
PORT.COUNTER-NIC MODEL 2611	1	"	0-20MR/HR	1.5	SURVEYING

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

FILM BADGES USED DURING ALL WORK

DOSIMETER-VICTOREEN- RANGE 0-0.2 R FOR GAMMA RAYS

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

ASSAY INSTRUMENTS - CALIBRATED DAILY WITH C-14

MONITORING INSTRUMENTS - CALIBRATED WEEKLY WITH RADIUM SOURCE

FILM BADGES- TRACERLAB

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

LEAD BRICKS AVAILABLE FOR HIGH SOURCES; TRACERLAB REMOTE PIPETTING DEVICE AVAILABLE; SAME USED FOR STORAGE OF CONCENTRATED SOURCES; PLASTIC AND GLASS SHIELDING FOR BETA SOURCES; TWO KEENEWEE HOODS IN USE.

(b) SKETCHES OF SUCH FACILITIES ARE ATTACHED (Circle answer)

Yes (No)

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

ALL POSSIBLE SOURCES OF HIGH LEVEL CONTAMINATION MONITORED AFTER ALL OPERATIONS. OTHER SOURCES OF CONTAMINATION MONITORED AT LEAST DAILY. ALL WASTE MATERIALS STORED IN LOCKED CONCRETE POT OR IN STAINLESS STEEL TRAYS FOR AT LEAST TEN HALF LIVES.

MIC ENERGY COMMISSION  
APPLICATION FOR BYPRODUCT MATERIAL LICENSEForm approved.  
Budget Bureau No. 38-R027.3.

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.

1. (a) NAME AND SHIPPING ADDRESS OF APPLICANT (Institution, firm, hospital, person, etc.) COLLEGE OF FORESTRY, 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 FOREST MANAGEMENT RESEARCH	
3. INDIVIDUAL USER (Name and title of individual(s) who will use or directly supervise use of byproduct material) WILLIAM K. FERRELL, ASSISTANT PROFESSOR AND FREDERIC D. JOHNSON, RADIOISOTOPES TECHNOLOGIST	
4. RADIOLOGICAL SAFETY OFFICER (Name of person qualified in radiological safety, if other than individual user) SAME AS ITEM 3	
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) NONE	

## BYPRODUCT MATERIAL OR IRRADIATION SERVICE DESIRED

6. BYPRODUCT MATERIAL (Element and mass number) CA-45 P-32	7. CHEMICAL AND/OR PHYSICAL FORM (Or catalog number) CA-45-P-1 P-32-P-1	8. MAXIMUM AMOUNT OF RADIOACTIVITY IN MILLICURIES THAT YOU WILL POSSESS AT ANY ONE TIME 50 MILLICURIES 100 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 NONE		

## 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.)
- CA-45....GREENHOUSE STUDY OF CALCIUM METABOLISM OF SMALL PINE TREES AND IN FIELD STUDIES USING TREES ON UNIVERSITY PROPERTY WHICH ARE UNDER CONTROLLED ACCESS.
- P-32....STUDY OF THE RELATIVE EFFICIENCY OF PHOSPHORUS UPTAKE IN DISEASED AND HEALTHY MYCORRHIZAL PINE ROOTS. FIELD STUDIES OF A SIMILAR NATURE ON TREES UNDER CONTROLLED ACCESS.
- (b) DESCRIBE PROCEDURES WHICH WILL BE OBSERVED TO MINIMIZE HAZARD FROM HANDLING, STORAGE, AND DISPOSAL OF THE BYPRODUCT MATERIAL
- MATERIALS IN THE LABORATORY ARE HANDLED IN STAINLESS STEEL TRAYS WITH RUBBER GLOVES IN INITIAL DILUTIONS. FIELD USE AND STORAGE INVOLVES CAREFUL POSTING AND MONITORING OF ALL POSSIBLE HAZARD AREAS. DISPOSAL OF MATERIALS IS ACCOMPLISHED BY STORAGE FOR AT LEAST 10 HALF LIVES AND MONITORING FOLLOWED BY DISPOSAL INTO CITY SEWERS IF ACTIVITY IS VERY LOW. CONCENTRATED SOURCES ARE STORED IN A SAFE WHEN NOT IN USE.

## 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 Idaho Applicant named in Item 1 College of Forestry University of Idaho  
County of Latah  
Subscribed and sworn to before me this 12th day of March 1956 By Wm. H. Slade  
H. E. SLADE, Notary Public Title of Certifying Official  
Latah County, Moscow, Idaho  
My Commission Expires 9-20-56 Date March 12 1956

## WARNING

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

(Continued on reverse side)

UNIVERSITY OF IDAHO  
SCHOOL OF FORESTRY  
MOSCOW, IDAHO

March 9, 1956

77. B

2319  
EP

Mr. Lester R. Rogers, Chief  
Allocations Branch  
Isotopes Extension  
Division of Civilian Application  
U.S.A.E.C.  
Oak Ridge, Tennessee

Dear Mr. Rogers:

We received your letter of February 21, advising of the new application procedure for radioisotopes.

We would like to know if it would be possible to submit the application form (AEC-313, revised) the order form (AEC-391) and our purchase order at the same time. This would save several weeks in the procurement of isotopes.

Do all of the former catalog numbers, prices, etc., remain unchanged?

Sincerely,

  
Frederic D. Johnson

FJ:ab