

5-1399-3

Form AEC-813
(4-55)

ATOMIC ENERGY COMMISSION
APPLICATION FOR BYPRODUCT MATERIAL LICENSE

Form approved
Budget Bureau No. 24-R0273

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.)

U S Geological Survey, Quality of
Water Branch, Denver Federal Center,
Denver, Colorado

(b) ADDRESS ES AT WHICH BYPRODUCT MATERIAL WILL BE USED
(Institution, firm, hospital, person, etc.)

Same

2. DEPARTMENT TO USE BYPRODUCT MATERIAL

Quality of Water Branch, Radiochemistry Section

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

Franklin B Barker, Chemist

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

Same

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 such use, so state)

BYPRODUCT MATERIAL OR IRRADIATION SERVICE DESIRED

6. BYPRODUCT MATERIAL (Element and isotope)

See attachment

7. CHEMICAL AND OR PHYSICAL FORM (If including solvent)

See attachment

8. MAXIMUM AMOUNT OF RADIOACTIVITY IN MILLICURIES THAT YOU WILL POSSESS AT ANY ONE TIME

0.1 millicurie

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

Neutron activation analysis of thorium and/or other trace elements in natural waters or in residues or carrier precipitates obtained from natural waters.

STATEMENT OF USE

10. (a) DESCRIBE PURPOSE FOR WHICH BYPRODUCT MATERIAL WILL BE USED. (If material is for "atomic 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.)

Isotopes are to be used as tracers in the development of methods of analysis and in the study of adsorption, ion exchange and chromatographic phenomena of various solutions in contact with rock and clay minerals with special emphasis on interaction of fission wastes with environments of natural waters.

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

Laboratory smocks, plastic aprons, and surgical gloves available as protective clothing. Two-foot tongs for remote handling, syringes and "Pipettors" for dispensing liquids, and other items as needed are or will be available. Dosimeters will be available when activity out of storage exceeds 50 μ c. Isotopes will be stored in lead pigs in monitored area. Packaged wastes will be disposed of through services of Dow Chemical Co. Equipment and apparatus used in tracer work will not be returned to general stock.

CERTIFICATE

11. The applicant and a person signing this certificate on behalf of the applicant named in Item 1, certify that this application is prepared in accordance 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

Colorado

County of

Adams

Subscribed

day of

August 1956

Notary Public

Richard C. Brown

U.S. Geological Survey, QW Branch

applicant named in Item 1

By

John D. Hem Staff Chemist

Title of Certifying Official

Aug. 20, 1956

Date

WARNING

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

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APPLICATION FOR BYPRODUCT MATERIAL LICENSE

INSTRUCTIONS: Complete Items 12 through 15 of this application. This information may be omitted from subsequent applications provided there is no change in information previously submitted, and reference is made in Item 5 to the atomic energy laws, regulations, orders, and decrees.

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

12. TYPE OF TRAINING	WHERE TRAINED	DURATION OF TRAINING	ON THE JOB	FORMAL COURSE
1. Los Alamos Sci. Labs.	Los Alamos Sci. Labs.	1946-50; 1951	☒	☒
2. Los Alamos Sci. Labs; U of N Mex	Los Alamos Sci. Labs; U of N Mex	1946-50; 1951; 1950-54	☒	☒
3. Los Alamos Sci. Labs; U of N Mex	Los Alamos Sci. Labs; U of N Mex	1946-50; 1951	☒	☒
4. Los Alamos Sci. Labs.	Los Alamos Sci. Labs.	1946-50; 1951	☒	☒
5. Los Alamos Sci. Labs; U of N Mex; 1951-54; US Geol Survey	Los Alamos Sci. Labs; U of N Mex; 1951-54; US Geol Survey	1946-50; 1951; 1954--	☒	☒

13. ISOTOPE HANDLING EXPERIENCE	ISOTOPE	MAXIMUM AMOUNT	WHERE EXPERIENCE WAS GAINED	DURATION OF EXPERIENCE	TYPE OF USE
Ba ¹⁴⁰ -La ¹⁴⁰	Ba ¹⁴⁰ -La ¹⁴⁰	>1000 curies	Los Alamos Sci. Labs.	1946-50; 1951	Tracers and sources
Sb ¹²⁴	Sb ¹²⁴	10 μ c	U of N Mex	1950-54	Tracers
Ra ²²⁶	Ra ²²⁶	0.1 μ c	U S Geol Survey	1954-1956	Tracers and standards
Tl ²⁰⁴	Tl ²⁰⁴	2 μ c	Denver, Colo		

PHYSICAL FACILITIES, EQUIPMENT, AND RADIATION INSTRUMENTATION

14. RADIATION DETECTION INSTRUMENTS

TYPE OF INSTRUMENTS	NUMBER AVAILABLE	RADIATION DETECTED	SENSITIVITY RANGE	WINDOW THICKNESS	USE
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SEE ATTACHED SHEET

15. FILM BADGES, DOSIMETERS, AND OTHER PERSONNEL MONITORING DEVICES INCLUDING BIO-ASSAY PROCEDURES Atomic Inst. Co. model 409 monitor will be used to monitor personnel and clothing at least twice daily; noon and quitting time. When conditions warrant, this will be done more often. Victoreen pocket dosimeters are available when needed.

16. METHOD, FREQUENCY, AND STANDARDS USED IN CALIBRATING INSTRUMENTS LISTED ABOVE. For film badges, specific calibration and processing, at home. Monitoring instrument standardized weekly with Ra²²⁶ standard; alpha counters standardized daily with 5 to 25 μ c of radium (NBS standard); beta counters standardized daily with Atomic Inst. Co. calibrated β -ray sources and/or NBS Tl²⁰⁴ solutions; gamma counters standardized with NBS Cobalt or NBS Ra²²⁶ and daughters.

17. DESCRIBE BRIEFLY REMOTE HANDLING EQUIPMENT, STORAGE CONTAINERS, SHIELDING, AND LABORATORY FACILITIES. If using units, list model. Isotopes will be stored in 1-inch lead pigs with additional iron brick shielding when needed. Storage area, located in remote corner; will be monitored and radiation level maintained below 10 mr/hr at edge of storage area. Long handled tongs available for handling larger sources. Additional shielding will be built up of iron bricks as needed. ☒ Yes ☐ No

18. SKETCHES OF SUCH FACILITIES ARE ATTACHED (if not, answer) (contd on additional sheet)

19. DESCRIBE BRIEFLY RADIATION SURVEYING PROCEDURES AND METHODS OF DISPOSING OF RADIOACTIVE WASTES. Wastes will be stored in closed containers behind adequate shielding in monitored storage area. Liquid wastes will be reduced to solids by evaporation and/or precipitation. At necessary intervals wastes will be packaged according to ICC regulations and disposed of through services of the Dow Chemical Co AEC installation, Rocky Flats, Colo.

5-1399.3

Additional sheet to Form AEC-313 (P B Barker, Quality of Water
Branch, U S Geological Survey,
Denver Federal Center, Denver, Colo)

Item 6.

Byproduct material

Ba 140 - La 140

Cs 137 - Ba 137

Fission products

Fe 55 - Fe 59

P 32

Rb 86

Ru 106 - Rh 106

Sr 89

Sr 90 - Y 90

Y 91

Co 60

Item 7.

Catalog No

ORNL BaLa-140-P

ORNL CsBa-137-P

ORNL PP-P

ORNL Fe-55-59-P

ORNL P-32-P-1

ORNL Rb-86-P

ORNL RuRh-106-P

ORNL Sr-89-P

ORNL SrY-90-P

ORNL Y-91-P

NBS 4915

Additional sheet to Form AEC-313 (P B Barker, Quality of Water Branch, U S Geological Survey, Denver Federal Center, Denver, Colo)

Item 15.

Type of instrument	Number available	Radiation detected	Sensitivity range	Window thickness	Use
El-Tronics Model 100-P with end window GM tube	1	β - γ	1-10,000 cpm	< 2 mg/cm ²	Measuring <u>2/</u>
El-Tronics Model 100-P with Tracer-lab Model P-12 a detector	1	α	0.01-50,000 cpm	None	Measuring <u>2/</u>
Atomic Inst. Co. Model 101-M scaler with Atomic Model 306 hi-voltage power - supply and end window GM tube	1	β - γ	1-10,000 cpm	< 2 mg/cm ²	Measuring
Atomic Inst. Co. Model 409	1	β - γ	10-20,000 cpm <u>1/</u>	30 mg/cm ²	Surveying and Monitoring <u>3/</u>
Nuclear Mens. Corp Model PCC-11 proportional converter with Atomic Model 204-C amplifier, Atomic Model 162-A scaler and Atomic Model 306 hi-voltage power supply	1	α , β	0.01-50,000 cpm	Window-less	Measuring
Alpha-beta proportional counter to be constructed (components on hand)	1	α , β	0.01-50,000 cpm	Window-less	Measuring <u>2/</u>
Well type gamma scintillation counter - to be ordered - make and model undecided at present	1	γ	-	-	Measuring

1/ Approximately .005-10 mr/hr - will be calibrated accurately against Ra²²⁶ standards.

2/ Will normally be reserved for low level (background) determinations of activity in natural waters, but available for use in tracer work in an emergency.

3/ Other β - γ monitoring instruments are available on loan from other branches in case of

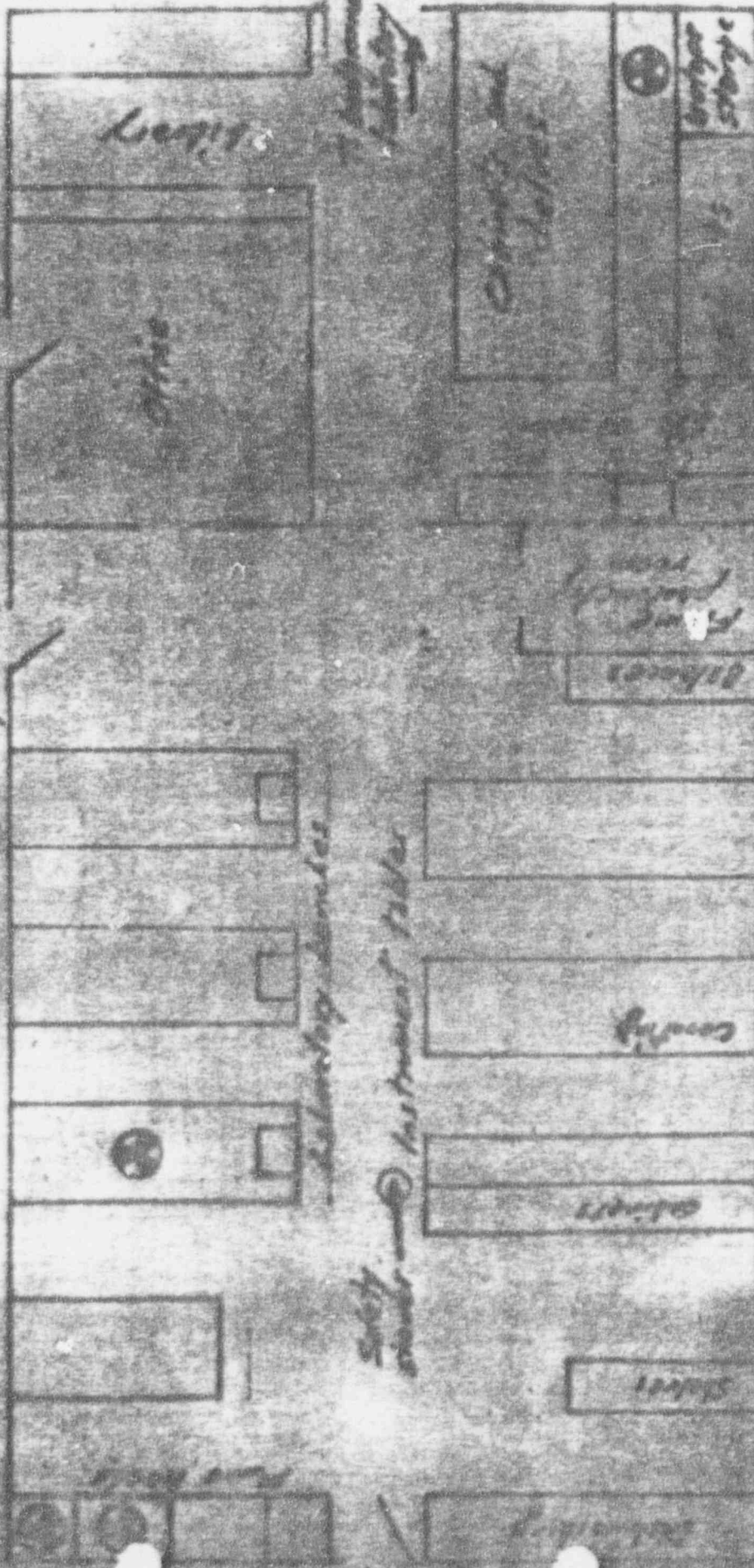
Additional sheet Form AEC-313 (F B Barker, Quality of Water Branch,
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Item 18. (contd)

Tracer work will be done in one section of an analytical laboratory.
Isotopes will be restricted to one workbench with soapstone top
and to two fume hoods except for counting. Only qualified radiochem-
ists and personnel under direct supervision of a radiochemist will
work at these places.

All walls are glass and placed concrete floor.
 Location of radioisotope tracer operation

Passway



Laboratory layout showing location of isotope tracer work

1992

100

laboratory layout showing location
of isotope tracer work