

1. APPLICATION FOR:  
(Check and/or complete as appropriate)

APPLICATION FOR BYPRODUCT MATERIAL LICENSE  
INDUSTRIAL

a. NEW LICENSE

b. AMENDMENT TO:  
LICENSE NUMBER

c. RENEWAL OF:  
LICENSE NUMBER

X 23-16788-01

See attached instructions for details.

Completed applications are filed in duplicate with the Division of Fuel Cycle and Material Safety, Office of Nuclear Material Safety, and Safeguards, U.S. Nuclear Regulatory Commission, Washington, DC 20555 or applications may be filed in person at the Commission's office at 1717 H Street, NW, Washington, D. C. or 7915 Eastern Avenue, Silver Spring, Maryland.

2. APPLICANT'S NAME (Institution, firm, person, etc.)

U.S. Geological Survey, WRD

Gulf Coast Hydrosience Center

TELEPHONE NUMBER: AREA CODE - NUMBER EXTENSION

(601) 688-3350 1530

3. NAME AND TITLE OF PERSON TO BE CONTACTED  
REGARDING THIS APPLICATION

Ronald E. Rathbun

TELEPHONE NUMBER: AREA CODE - NUMBER EXTENSION

(601) 688-3350 1530

4. APPLICANT'S MAILING ADDRESS (Include Zip Code)

(Address to which NRC correspondence, notices, bulletins, etc., should be sent.)

NASA-NSTL, Bldg. 2101

NSTL Station, MS 39529

5. STREET ADDRESS WHERE LICENSED MATERIAL WILL BE USED  
(Include Zip Code)

NASA-NSTL, Bldg. 2101

NSTL Station, MS 39529

(IF MORE SPACE IS NEEDED FOR ANY ITEM, USE ADDITIONAL PROPERLY KEYED PAGES.)

6. INDIVIDUAL(S) WHO WILL USE OR DIRECTLY SUPERVISE THE USE OF LICENSED MATERIAL

(See Items 16 and 17 for required training and experience of each individual named below)

FULL NAME

TITLE

a. Ronald E. Rathbun

Project Chief (Hydrologist)

b.

c.

7. RADIATION PROTECTION OFFICER

Ronald E. Rathbun

Attach a resume of person's training and experience as outlined in Items 16 and 17 and describe his responsibilities under Item 15.

8. LICENSED MATERIAL

L I N E N O.	ELEMENT AND MASS NUMBER	CHEMICAL AND/OR PHYSICAL FORM	NAME OF MANUFACTURER AND MODEL NUMBER (If Sealed Source)	MAXIMUM NUMBER OF MILLICURIES AND/OR SEALED SOURCES AND MAXIMUM ACTI- VITY PER SOURCE WHICH WILL BE POSSESSED AT ANY ONE TIME
A	B	C	D	
(1)	Hydrogen (3)	H <sup>3</sup> Absorbed into Scandium	U.S. Radium Part No. LAB-508-2	1,000 mCi
(2)	Carbon-14	Acetone		0.5 mCi
(3)	Carbon-14	Nucleotides (ATP)		0.5 mCi
(4)				

DESCRIBE USE OF LICENSED MATERIAL  
E

(1) See Attachment

(2) Closed Flask Laboratory Studies of Sorption By Sediments

(3) Laboratory Studies of Adenosine Triphosphate Extraction Efficiency.

(4)

## 9. STORAGE OF SEALED SOURCES

LINE NO.	CONTAINER AND/OR DEVICE IN WHICH EACH SEALED SOURCE WILL BE STORED OR USED. A.	NAME OF MANUFACTURER B.	MODEL NUMBER C.
(1)	Gas Chromatograph	Varian	2700
(2)			
(3)			
(4)			

## 10. RADIATION DETECTION INSTRUMENTS

LINE NO.	TYPE OF INSTRUMENT A.	MANUFACTURER'S NAME B.	MODEL NUMBER C.	NUMBER AVAILABLE D.	RADIATION DETECTED (alpha, beta, gamma, neutron) E.	SENSITIVITY RANGE (milliroentgens/hour or counts/minute) F.
(1)	GM Meter	Eberline	E-120E	1	Gamma, Beta	0-50,000 CPM
(2)						
(3)						
(4)						

## 11. CALIBRATION OF INSTRUMENTS LISTED IN ITEM 10

☐ a. CALIBRATED BY SERVICE COMPANY

NAME, ADDRESS, AND FREQUENCY    Annually  
 Todd Research Labs  
 Galveston, Texas

☐ b. CALIBRATED BY APPLICANT

Attach a separate sheet describing method, frequency and standards used for calibrating instruments.

## 12. PERSONNEL MONITORING DEVICES

TYPE (Check and/or complete as appropriate.) A.	SUPPLIER (Service Company) B.	EXCHANGE FREQUENCY C.
<input checked="" type="checkbox"/> (1) FILM BADGE  <input type="checkbox"/> (2) THERMOLUMINESCENCE DOSIMETER (TLD)  <input type="checkbox"/> (3) OTHER (Specify): _____ _____ _____	ICN Nuclear Division 25201 Miles Road Cleveland, Ohio 44128	<input type="checkbox"/> MONTHLY  <input checked="" type="checkbox"/> QUARTERLY  <input type="checkbox"/> OTHER (Specify): _____ _____ _____

## 13. FACILITIES AND EQUIPMENT (Check where appropriate and attach annotated sketch(es) and description(s).)

- ☒ a. LABORATORY FACILITIES, PLANT FACILITIES, FUME HOODS (Include filtration, if any), ETC. See Attachment  
☐ b. STORAGE FACILITIES, CONTAINERS, SPECIAL SHIELDING (fixed and/or temporary), ETC.  
☐ c. REMOTE HANDLING TOOLS OR EQUIPMENT, ETC.  
☐ d. RESPIRATORY PROTECTIVE EQUIPMENT, ETC.

## 14. WASTE DISPOSAL

a. NAME OF COMMERCIAL WASTE DISPOSAL SERVICE EMPLOYED

Todd Research, Galveston, Texas (Licensed Materials (2) and (3))

b. IF COMMERCIAL WASTE DISPOSAL SERVICE IS NOT EMPLOYED, SUBMIT A DETAILED DESCRIPTION OF METHODS WHICH WILL BE USED FOR DISPOSING OF RADIOACTIVE WASTES AND ESTIMATES OF THE TYPE AND AMOUNT OF ACTIVITY INVOLVED. IF THE APPLICATION IS FOR SEALED SOURCES AND DEVICES AND THEY WILL BE RETURNED TO THE MANUFACTURER, SO STATE

Licensed Material (1) - No waste is anticipated. Detector will be returned to Varian for all maintenance. Detector will be returned to Varian for disposal when it is replaced.

# INFORMATION REQUIRED FOR ITEMS 15, 16 AND 17

Describe in detail the information required for Items 15, 16 and 17. Begin each item on a separate page and key to the application as follows:

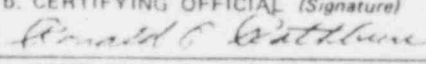
15. **RADIATION PROTECTION PROGRAM.** Describe the radiation protection program as appropriate for the material to be used including the duties and responsibilities of the Radiation Protection Officer, control measures, bioassay procedures *(if needed)*, day-to-day general safety instruction to be followed, etc. If the application is for sealed source's also submit leak testing procedures, or if leak testing will be performed using a leak test kit, specify manufacturer and model number of the leak test kit.
16. **FORMAL TRAINING IN RADIATION SAFETY.** Attach a resume for each individual named in items 6 and 7. Describe individual's formal training in the following areas where applicable. Include the name of person or institution providing the training, duration of training, when training was received, etc.
  - a. Principles and practices of radiation protection.
  - b. Radioactivity measurement standardization and monitoring techniques and instruments.
  - c. Mathematics and calculations basic to the use and measurement of radioactivity.
  - d. Biological effects of radiation.
17. **EXPERIENCE.** Attach a resume for each individual named in Items 6 and 7. Describe individual's work experience with radiation, including where experience was obtained. Work experience or on-the-job training should be commensurate with the proposed use. Include list of radioisotopes and maximum activity of each used.

## 18. CERTIFICATE

*(This item must be completed by applicant)*

*The applicant and any official executing this certificate on behalf of the applicant named in Item 2, 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.*

**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.

<b>a. LICENSE FEE REQUIRED</b> <i>(See Section 170.31, 10 CFR 170)</i>	<b>b. CERTIFYING OFFICIAL (Signature)</b> 
<b>(1) LICENSE FEE CATEGORY</b>	<b>c. NAME (Type or print)</b> Ronald E. Rathbun
<b>(2) LICENSE FEE ENCLOSED: \$</b>	<b>d. TITLE</b> Project Chief <b>e. DATE</b> November 4, 1980

Attachment

Describe Use Of Licensed Material

E

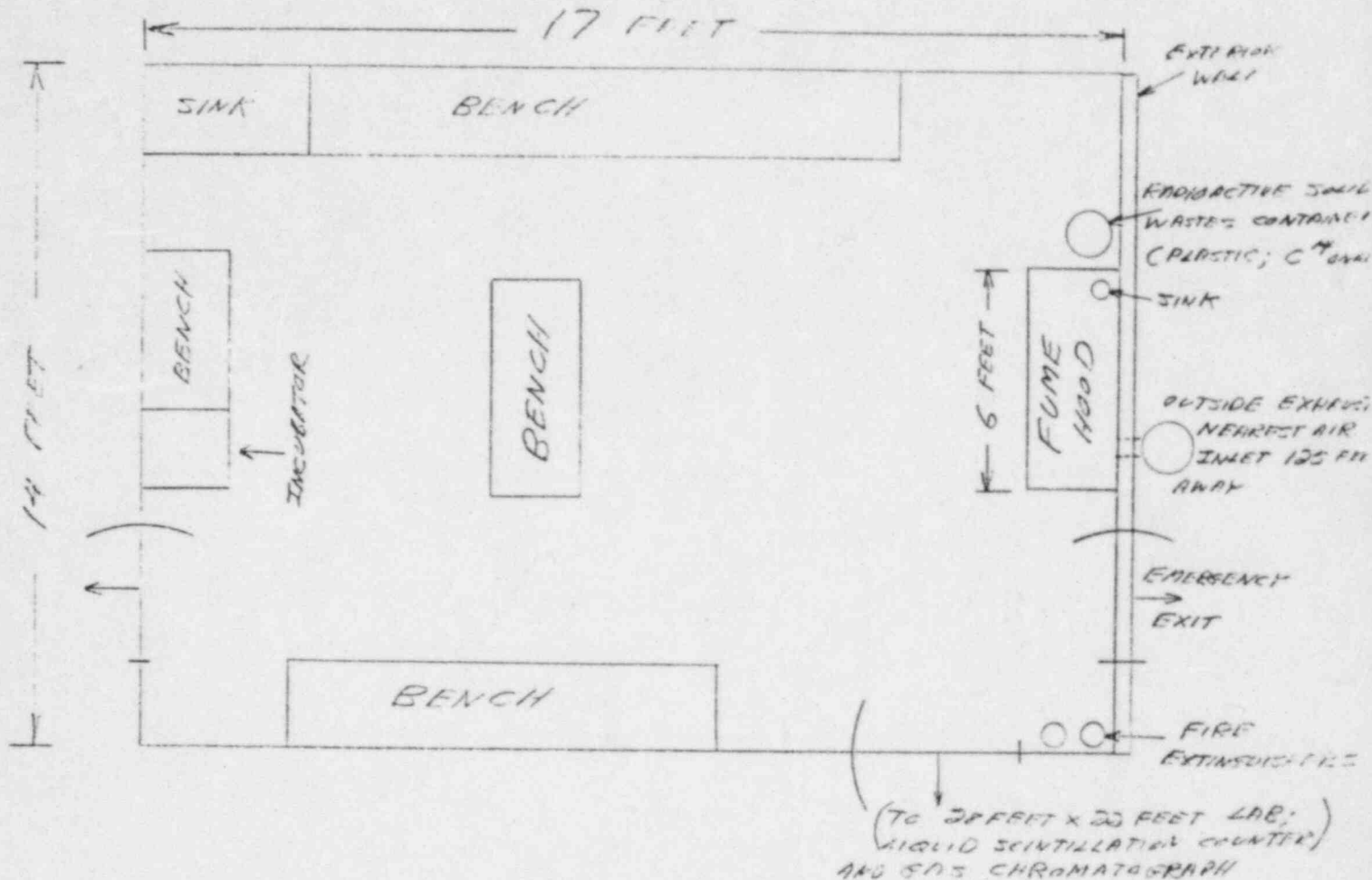
- (1) Hydrogen (3) is absorbed into Scandium which is plated onto SS foil, 1/2 inch X 1/2 inch X 0.006 inches thick. This foil is incorporated in the Scandium Tritide Detector, Part Number 96-000095-00, manufactured by Varian Instrument Division, Aerograph Operations. It will be used in a gas chromatograph Model 2700 equipped with a Fenwall Detector, activated, factory set, temperature control device which will be operated properly and according to the instructions in the instrument manual.

Item 13. Licensed Material (1)

Instrument is protected to prevent foil temperature from rising above 325°C for Scandium Tritide detector. The instrument manual will be used as a guide for handling the material to prevent contamination of the laboratory. The instrument will be used in a laboratory equipped with a fume hood which continuously exhausts outside the building. When detector is not being used, it will be kept in a locked storage area labeled "Caution-Radioactive Material". The instrument will be equipped with the same label.

BUILDING 3101

LICENSING MATERIAL (C) AND (D)



1. All isotope handling is done in fume hood. Hood is commercial safety-flow design with an external exhaust blower and source blower producing a face velocity of 125 feet/min. and an exhaust capacity of 2041 cubic ft/min. (Air volume within room is 1950 ft<sup>3</sup>.) All blower motors are explosion proof. The unfiltered exhaust vents to the exterior of the building at roof level (15 ft). The hood has a clear pull-down plastic shield, electrical outlets, plumbing, and gas outlet. Working surfaces in hood and bench tops are synthetic slate.
2. Stoppered flasks containing sediments and isotope are incubated in a commercial unit within the isotope lab.
3. Transfers of volatile compounds are done with syringe pipettes and septum bottles.
4. Counting is done in an adjacent lab.



Item 15. Radiation Protection Program:

The Safety Officer will inspect and monitor both the isotope handling area and counting area of the lab on a quarterly basis. All records of surveys will be maintained by the officer. Appropriate warning signs will be placed near the working areas and on all doors leading into the laboratory. All glassware and utensils used with radioactive materials will be segregated and appropriately labeled. Cleansing operations will involve an acid bath cleaner located in the fume hood. At the completion of each operational day, the fume hood will be monitored with a beta meter to determine possible contamination. If any spills or contamination occur, they will be reported to the Safety Officer and decontaminated immediately. Appropriate guidelines for personnel using the isotopes have been drafted (copy enclosed) and will be posted in the lab. All personnel handling radioactive material will wear a lab coat and film badge. Film badges will be commercially processed on a quarterly basis. Records of the film badges will be entered in the personnel exposure files kept by the Safety Officer.

All radioactive aqueous liquid wastes will be placed in a labeled carboy for pickup by Todd Waste Services. Liquid scintillation wastes will be kept in the vials for disposal by Todd. Radioactive solid wastes will be retained in appropriate labeled containers for pickup by Todd. Waste storage areas will be monitored weekly using a beta meter. During the initial handling of volatile radioactive compounds and at quarterly intervals, an air sample will be collected in the fume hood during any transfer operations. A measured quantity of air will be drawn through an impinger tube containing an appropriate solvent and an aliquot of that solvent then counted using liquid scintillation. If levels of radiation are determined to be above  $4 \times 10^{-6} \mu\text{Ci/ml}$ , operations will cease until the source of contamination is located and the problem corrected.

1. Eating, drinking, smoking, and the use of cosmetics in the laboratory are not permitted.
2. All transfers or handling of radioactive material will be done in the designated fume hood with the blower on, and plastic shield lowered half-way.
3. Diluent flammable liquids will not be stored in fume hood. In case of hood fire, keep blower on and extinguish with CO<sub>2</sub> extinguisher. Report incident to the Safety Officer.
4. Pipetting or the performance of any similar operation will be done with a pipette bulb.
5. Before a worker leaves the laboratories, the hands will be washed first, then checked with a beta-gamma survey meter. Contamination remaining after thorough washing will be reported.
6. If personal contamination is suspected, a survey with a suitable instrument will be made immediately. This will be followed by the required cleansing and a further survey. Routine precautionary surveys will be made at weekly intervals.
7. No person will work with active materials if he has any breaks in the skin on the hands unless he wears rubber gloves. Contaminated gloves will be placed in the appropriate solid waste container.
8. No person will work in the laboratories without wearing a film badge.
9. Active liquid wastes will be poured into the labeled containers provided. They will never be poured into a standard drain.
10. Active solid wastes and contaminated materials will be placed in trash cans labeled "contaminated" or in designated containers.
11. Good housekeeping is encouraged at all times. Spillage should be prevented, but in the event of such an accident the following procedure will be followed:
  - a. The liquid should be blotted up. (Wear rubber gloves.)
  - b. All disposable materials contaminated by the spill and the cleaning process should be placed in a "contaminated" trash can.
  - c. The area of the spill should be clearly marked and reported to the Safety Officer.
12. No apparatus will be washed in the public water-sewage system if it contains any activity appreciably above background when measured with a counter type survey meter.
13. In general, active materials and contaminated materials are to be retained within the radioisotope laboratory and at specific points within the laboratory.
14. All wounds, spills, and other emergencies will be reported to the Safety Officer immediately.
15. Before leaving the laboratory, all written records will be completed.
16. All contaminated glassware will be cleaned up by 24-hour immersion in an acid bath within the hood, followed by a hot detergent wash and checking for residual contamination with the survey meter.



Item 16. Formal Training

Ronald E. Rathbun:

Formal training at the University of Washington consisted of 3 quarter hours in principles of radiation protection, 2 quarter hours in monitoring and standardization, and 3 quarter hours in calculations applicable to use of radioactivity. Ph.D. in chemical engineering, University of Washington.

Item 17. Experience

Ronald E. Rathbun:

Two years experience with carbon-14 (0.5mCi) at the University of Washington, 1 year at Colorado State University with gold-198 (750 $\mu$ Ci) and with scandium-46 (94 $\mu$ Ci).