

APPLICATION FOR BYPRODUCT MATERIAL LICENSE
INDUSTRIAL

a. NEW LICENSE

b. AMENDMENT TO:
LICENSE NUMBER

c. RENEWAL OF:
LICENSE NUMBER

45-03499-07

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.)

COLLEGE OF WILLIAM AND MARY

TELEPHONE NUMBER: AREA CODE - NUMBER EXTENSION
804-253-4000

3. NAME OF PERSON TO BE CONTACTED REGARDING THIS APPLICATION

Henry Aceto, Jr.

TELEPHONE NUMBER: AREA CODE - NUMBER EXTENSION
804-253-4240

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

Williamsburg, Virginia 23185

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

College of William and Mary
Millington Hall
Radiation Laboratory - Room 4

(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.	Martin C. Mathes, Ph.D.	Professor of Biology
	Bradner W. Coursen, Ph.D.	Professor of Biology
	Bruce S. Grant, Ph.D.	Associate Professor of Biology
b.	Robert E.L. Black, Ph.D.	Professor of Biology
	Carl W. Vermeulen, Ph.D.	Associate Professor of Biology
c.	Stanton F. Hoegerman, Ph.D.	Associate Professor of Biology

7. RADIATION PROTECTION OFFICER

Carl W. Vermeulen, Ph.D.

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 NO.	ELEMENT AND MASS NUMBER A	CHEMICAL AND/OR PHYSICAL FORM B	NAME OF MANUFACTURER AND MODEL NUMBER (If Sealed Source) C	MAXIMUM NUMBER OF MILLICURIES AND/OR SEALED SOURCES AND MAXIMUM ACTI- VITY PER SOURCE WHICH WILL BE POSSESSED AT ANY ONE TIME D
(1)	Cesium - 137	sealed source	Isomedix Inc. (Ramco-50-ORNL)	429 curies
(2)				
(3)				
(4)				

DESCRIBE USE OF LICENSED MATERIAL
E

- (1) The licensed material, in the form of a sealed source, will be contained in a completely shielded gamma irradiator for use in educational demonstrations, and laboratory experiments in biology and general science.

(4) 3002011041

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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)	Gamma Irradiator (will be located as described under Item 13)	Radiation Machinery Corp.	Gammator Model 50B-34
(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)	Survey meter	Victoreen Co.	Model Thyac III	1	beta-gamma	.01-20 mr/hr.
(2)	Survey meter	Lionel Corp.	Model 6B	1	beta-gamma	.05-50 mr/hr.
(3)						
(4)						

11. CALIBRATION OF INSTRUMENTS LISTED IN ITEM 10

☒ a. CALIBRATED BY SERVICE COMPANY

NAME, ADDRESS, AND FREQUENCY

RAD Services, Inc.
3527 Whiskey Bottom Rd.
Laurel, Maryland 20810

☐ b. CALIBRATED BY APPLICANT

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

(Annual calibration. Routinely tested with check source).

12. PERSONNEL MONITORING DEVICES

TYPE (Check and/or complete as appropriate.) A.	SUPPLIER (Service Company) B.	EXCHANGE FREQUENCY C.
<input type="checkbox"/> (1) FILM BADGE Not applicable to low radiation field of gammator.		<input type="checkbox"/> MONTHLY
<input type="checkbox"/> (2) THERMOLUMINESCENCE DOSIMETER (TLD)		<input type="checkbox"/> QUARTERLY
<input type="checkbox"/> (3) OTHER (Specify): _____		<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.
- ☐ b. STORAGE FACILITIES, CONTAINERS, SPECIAL SHIELDING (fixed and/or temporary), ETC.
- ☐ c. REMOTE HANDLING TOOLS OR EQUIPMENT, ETC. see attached sheet
- ☐ d. RESPIRATORY PROTECTIVE EQUIPMENT, ETC.

14. WASTE DISPOSAL

a. NAME OF COMMERCIAL WASTE DISPOSAL SERVICE EMPLOYED

RAD Services, Inc. 3527 Whiskey Bottom Road, Laurel, Maryland 20810

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.

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.

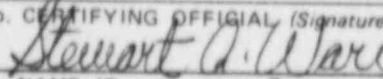
17. **EXPERIENCE.** Attach a resume for each individual named in Items 6 and 7. Describe individual's work experience with radiation, including where experience was obtained. Work experience or on-the-job training should be commensurate with the proposed use. Include list of radioisotopes and maximum 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.

a. LICENSE FEE REQUIRED <i>(See Section 170.31, 10 CFR 170)</i> License Fee not required	b. CERTIFYING OFFICIAL <i>(Signature)</i>  c. NAME <i>(Type or print)</i> Stewart A. Ware Associate Professor of Biology and Chairman
(1) LICENSE FEE CATEGORY:	d. TITLE Associate Professor of Biology and Chairman
(2) LICENSE FEE ENCLOSED: \$	e. DATE December 12, 1979

Item 13 Facilities and Equipment

The irradiator is kept in a locked room to which only faculty and janitorial staff have access. The room, which is labeled with appropriate radiation signs, is described on attached sheet.

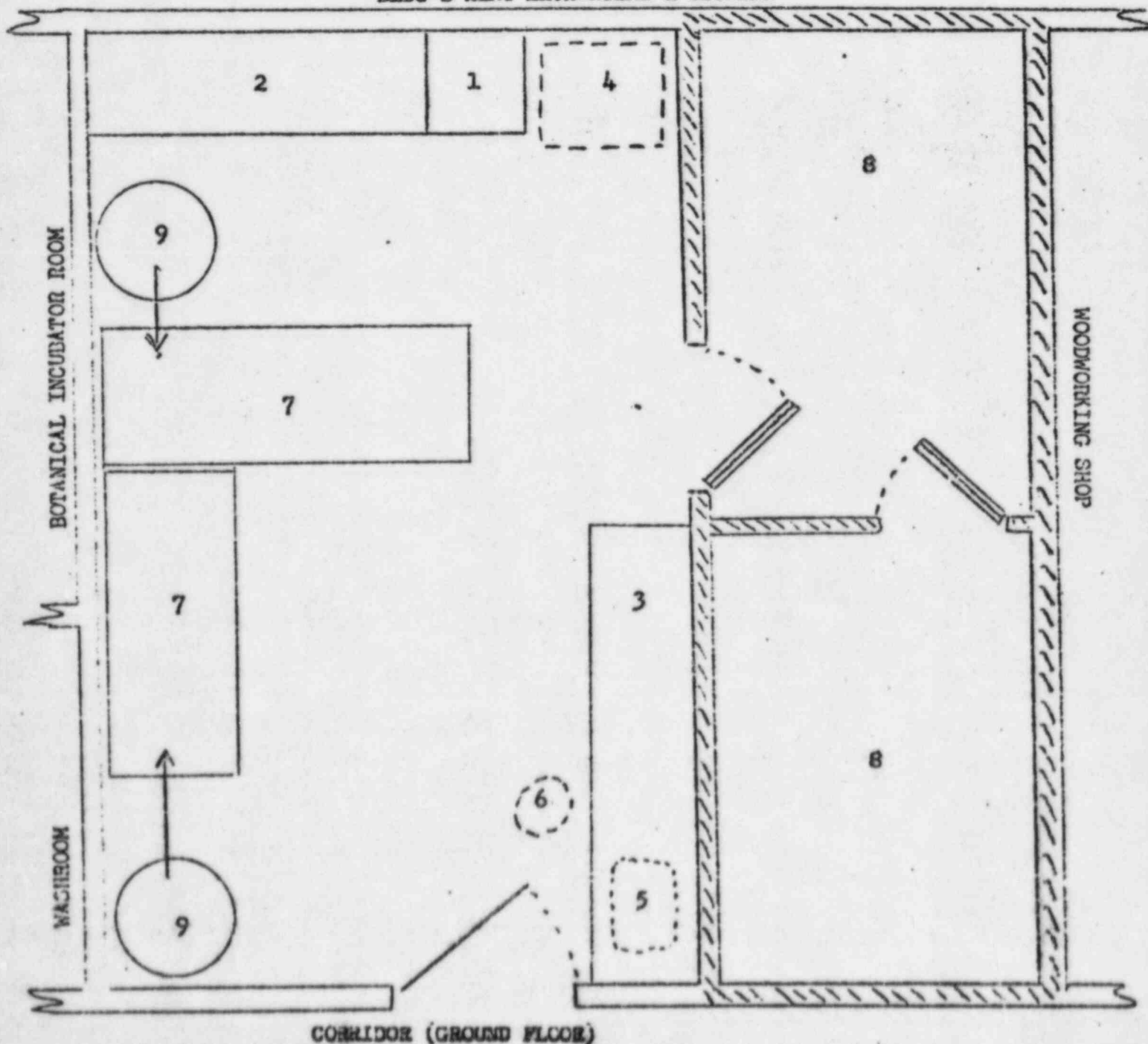
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RADIATION BIOLOGY LABORATORY - MILLINGTON HALL OF LIFE SCIENCES

1. Stainless steel table
2. Stainless steel hood
3. Metal Storage Cabinets
4. Isotope Storage Pit
5. Stainless steel sink
6. Shower
7. Movable cabinet
8. Shielded rooms: walls are 10" concrete; doors are 2 cm lead
9. Present locations of Gammator (along this indicated wall)

This entire complex is normally locked with access available only to faculty members.

BLDG'S HEAT EXCHANGERS & BLOWERS



Item 15.

Control measures include tests for leakage and/or contamination of sealed source at 6-month intervals performed by Biology Department and Isomedix Inc., 25 Eastmans Rd., Parsippany, New Jersey.

Leak testing procedure will use Isomedix Model L-3 Leak Test Kit. Test to be performed according to instructions in the Owner's Manual and attached instruction sheet.

Wipe samples to be collected by Radiation Protection Officer and submitted to Isomedix Inc. for analysis.

In addition the following procedures are carried out by the Radiation Protection Officer on a monthly basis:

- (1) Inspect and clean radiation chamber of gammator
- (2) Check for free rotation of rotor
- (3) Check for proper turntable operation
- (4) Check for obvious previous abuse of gammator

ISOMEDIX

INSTRUCTIONS FOR USING ISOMEDIX MODEL L-3 LEAK TEST KIT

Materials Included

- 2 Sterile Swabs in Tubes
- 1 Vial of Detergent
- 1 Identification Sheet
- 1 Return Mailing Label

1. Add water to the vial of detergent.
2. Dip each swab into the detergent solution.
3. Wipe the following areas of the gammator, using one wet swab for each area:
 - A. Inside of the sample chamber.
 - B. In and around the drain holes on the bottom of the GAMMATOR shell. Note that for the Model M Gammators, the base cabinet door must be opened to gain access to the bottom of the shell.
4. Replace the swabs in the tubes.
5. Pack the tubes and the completed identification sheet in the mailing carton.
6. Survey the carton with a Gamma Radiation-Sensitive Survey Meter. If the reading is less than 0.5 mr/hr, attach the mailing label to the carton and send to Isomedix, Inc.

If the reading is greater than 0.5 mr/hr, contact Isomedix, Inc. for further instructions.
7. Please enclose check for \$25.00 to cover payment in full for Leak Test Service.

Item 16 - 17 Experience and Training of Personnel

EXPERIENCE AND TRAINING OF PERSONNEL

1. Martin C. Mathes, Ph.D.

Two years research training as a graduate student at Univ. of Maryland using up to 0.05 mC P-32 and C-14. Seven years experience with device for which this license application is submitted.

2. Bradner W. Coursen, Ph.D.

Two years research training as graduate student.

Nine years of research at Lawrence University with millicurie amounts of C-14 and up to 0.05 mC of P-32, Na-22 and K-40.

3. Bruce S. Grant, Ph.D.

Six-weeks summer course in Radiation Biology at Bloomsburg State College, 1963

4. Robert E. L. Black, Ph.D.

One-semester course at William and Mary in Radiation Biology.

Ten years of research experience with up to 0.05 mC C-14, and 0.02 mC P-32, and 1 mC H-3 at William and Mary.

5. Carl W. Vermeulen, Ph.D.

Five years graduate research experience at University of Illinois using up to 10 mC P-32, 0.2 mC C-14, and 5 mC H-3.

One year at Johns Hopkins Univ. using up to 5 mC P-32 and 0.05 mC H-3

6. Stanton F. Hoegerman, Ph.D.

Four years on staff of Argonne National Laboratory. Experience using 600 C. Cesium-137 gamma source.