

UNITED STATES ATOMIC ENERGY COMMISSION  
APPLICATION FOR BYPRODUCT MATERIAL LICENSE

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.)
Monsanto Company 800 N. Lindbergh Boulevard St. Louis, Mo. 63166  Attn: Research Center Safety Dept.		Same as 1(a)
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.)
Central Research Department		-
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.)
R. E. Moser J. L. Sprung (see attached information)		L. C. Weger (see items 8 and 9)
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.)	
Carbon-14	500 millicuries mostly in the form of KC <sup>14</sup> N, C <sup>14</sup> H <sub>4</sub> and C <sup>14</sup> - labelled α-amino acids	
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.)		
Unsealed chemical sources of Carbon-14 will be used in experiments aimed at elucidating mechanisms of organic reactions.		

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ITEM 4 INDIVIDUAL USERS

Dr. R. E. Moser

Has four months of on-the-job experience working with Carbon-14 (maximum 500  $\mu$ c) in the Central Research Department of Monsanto Company, St. Louis, Missouri. He has attended graduate school lectures on the use of isotopes at Yale University (1961-1965) and will be taking the short course on Radiochemistry to be given at the 154th American Chemical Society Meeting in Chicago in September, 1967.

Dr. Jeremy L. Sprung

Has had five years of experience handling radioisotopes (particularly Carbon-14) in the research group of W. F. Libby at UCLA where he obtained his doctorate in 1966. He will be attending the research course (September 11 - October 6, 1967) of the Oak Ridge Institute of Nuclear Studies.

TRAINING AND EXPERIENCE OF EACH INDIVIDUAL NAMED IN ITEM 1					Page <span style="float: right;">2</span>	
(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		Oak Ridge			<input checked="" type="radio"/> Yes <input type="radio"/> No	<input checked="" type="radio"/> Yes <input type="radio"/> No
b. Radioactivity measurement, standardization and monitoring techniques and instruments		II II			<input checked="" type="radio"/> Yes <input type="radio"/> No	<input checked="" type="radio"/> Yes <input type="radio"/> No
c. Mathematics and calculations basic to the use and measurement of radioactivity		II II			<input checked="" type="radio"/> Yes <input type="radio"/> No	<input checked="" type="radio"/> Yes <input type="radio"/> No
d. Biological effects of radiation		II II			<input checked="" type="radio"/> Yes <input type="radio"/> No	<input checked="" type="radio"/> Yes <input type="radio"/> 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	
Many isotopes ?		Oak Ridge National Laboratories		Two Years	Production of isotopes	
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 <sup>2</sup> )	USE (Monitoring, surveying, measuring)
Autoradiography using x-ray film for detection of radioactivity in reaction products of experiments.						
Tracerlab Laboratory Monitor, Model SU-30, for laboratory monitoring.						
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)						
<b>INFORMATION TO BE SUBMITTED ON ADDITIONAL SHEETS IN DUPLICATE</b>						
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						
See attached sheet						
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 sheet						
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 attached sheet						
<b>CERTIFICATE (This item must be completed by applicant)</b>						
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 <u>9/5/67</u>						
		MONSANTO COMPANY Applicant named in item 1 <u>L. B. Weger</u> SAFETY MANAGER Title of certifying official				
<b>WARNING.</b> —18 U. S. C., Section 1001, Act of June 25, 1948, 60 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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ITEM 13 FACILITIES AND EQUIPMENT

Completely equipped chemical laboratories are used for all work involving Carbon-14. Hoods are available for volatile components. Radioactive materials are routinely stored in a locked cabinet or a refrigerator reserved for project use.

Autoradiography is carried out in a fully-equipped x-ray dark room.

ITEM 14 RADIATION PROTECTION PROGRAM

The location of radioactive materials and designated work areas are checked at regular intervals to control contamination and assure radiation dosages are no greater than AEC recommended limits. A laboratory monitor (Tracerlab Model SU-30) is used for C<sup>14</sup> detection.

ITEM 15 WASTE DISPOSAL

Water-soluble materials are disposed of in the normal sewage flow system within AEC recommended limits. Solids and water-insoluble materials are kept in Fiber Lever Packs with plastic liners kept in the laboratory. The bags are collected in 30 gallon ICC approved waste disposal barrels and sent to Tracerlabs, Waltham, Mass., for proper burial.