

20-1465-1

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 <i>(Institution, firm, hospital, person, etc.)</i> National Research Corporation Applied Physics Section 70 Memorial Drive Cambridge 42, Massachusetts	(b) ADDRESS(ES) AT WHICH BYPRODUCT MATERIAL WILL BE USED <i>(If different from shipping address)</i>
2. DEPARTMENT TO USE BYPRODUCT MATERIAL Applied Physics Department	
3. INDIVIDUAL USER <i>(Name and title of individual(s) who will use or directly supervise use of byproduct material)</i> Mr. J. R. Roehrig	
4. RADIOLOGICAL SAFETY OFFICER <i>(Name of person qualified in radiological safety, if other than individual user)</i> 	
5. PREVIOUS LICENSE OR AUTHORIZATION NUMBER <i>(If this is an application for renewal of a license for byproduct material obtained under a prior license or authorization for radioisotope procurement)</i> <p style="text-align: center;">Not applicable</p>	

BYPRODUCT MATERIAL OR IRRADIATION SERVICE DESIRED

6. BYPRODUCT MATERIAL <i>(Element and mass number)</i> <p style="text-align: center;">Krypton 85</p>	7. CHEMICAL AND/OR PHYSICAL FORM <i>(Or catalog number)</i> <p style="text-align: center;">Krypton Gas</p>	8. MAXIMUM AMOUNT OF RADIOACTIVITY IN MILLICURIES THAT YOU WILL POSSESS AT ANY ONE TIME <p style="text-align: center;">3000 millicuries</p>
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. <p style="text-align: center;">REPEATABLE SOURCE MATERIAL IS NOT REQUIRED AS THE SOURCE IS A PART OF THE UNIT - SEE DRAWING</p>		

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.)*

The radioisotope will be used as an ionizing agent in gas analysis chambers of Metal construction. Beta emission occurs through a thin wall tube, radiation being directed toward the center of the chamber.

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

Two gas analysis chambers are involved under the application, one of these containing 400 millicuries, the other containing 1000 millicuries of krypton 85. The outer periphery of the chamber is heavily sealed, while the thin wall tube which serves as the emitting face is effectively sealed by crimping and silver soldering.

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 <u>Massachusetts</u> County of <u>Worcester</u> Subscribed and sworn to before me this <u>23rd</u> day of <u>October</u> , 19 <u>56</u> <u>Ruth Harrison LeRoy</u> Notary Public	Applicant named in Item 1 By <u>Robert A. Stauffer</u> <u>Vice President</u> Title of Certifying Official <u>October 23, 1956</u> Date
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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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**ATOMIC ENERGY COMMISSION
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 <i>(Circle answer)</i>		FORMAL COURSE <i>(Circle answer)</i>	
			Yes	No	Yes	No
See separate sheet						
1. Principles and practices of radiological health safety.			<input checked="" type="radio"/> Yes	<input type="radio"/> No	<input type="radio"/> Yes	<input checked="" type="radio"/> No
2. Radioactivity measurement standardization and monitoring techniques and instruments			<input checked="" type="radio"/> Yes	<input type="radio"/> No	<input type="radio"/> Yes	<input checked="" type="radio"/> No
3. Mathematics and calculations basic to the use and measurement of radioactivity.			<input checked="" type="radio"/> Yes	<input type="radio"/> No	<input type="radio"/> Yes	<input checked="" type="radio"/> No
4. Biological effects of radiation.			<input type="radio"/> Yes	<input type="radio"/> No	<input type="radio"/> Yes	<input checked="" type="radio"/> No
5. Actual use of radioisotopes in the types and quantities for which application is being made, or equivalent experience			<input type="radio"/> Yes	<input checked="" type="radio"/> No	<input type="radio"/> Yes	<input checked="" type="radio"/> No

13. ISOTOPE HANDLING EXPERIENCE				
ISOTOPE	MAXIMUM AMOUNT	WHERE EXPERIENCE WAS GAINED	DURATION OF EXPERIENCE	TYPE OF USE
Radium A	400 millicuries	National Research	5 years	Development of ionization type Vacuum gages, gas analyzers, et

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." Supplementary sheet is attached *(Circle answer)*

Yes No

PHYSICAL FACILITIES, EQUIPMENT, AND RADIATION INSTRUMENTATION

15. RADIATION DETECTION INSTRUMENTS <i>(Use separate sheet if necessary)</i>					
TYPE OF INSTRUMENTS <i>(Include make and model number of each)</i>	NUMBER AVAILABLE	RADIATION DETECTED	SENSITIVITY RANGE <i>(mr/hr)</i>	WINDOW THICKNESS <i>(mg/cm²)</i>	USE <i>(Monitoring, surveying, measuring)</i>
Tracerlab Mod. SUB	1	Beta, Gamma	0-1500mr/h	2-3	monitoring, surveying
Technical Associates Mod SRJ-1	1	α, β, Gamma	0-5000mr/h		monitoring, surveying
Espey Mfg. Co. Mod. H-4-602	1	α, β, Gamma	0-5000 mr/h		monitoring, surveying

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

**Victoreen Model 362 pocket dosimeter and Model 267 charge reader
Tracerlab film badge service**

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

yearly return to manufacturer for repair and calibration

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

The only operation on the unshielded source is the assembly of the end caps. This is done in a vacuum dry box made of 1/4" steel with 1/2" thick glass windows and thick rubber gloves sealed to the box.

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

Yes No

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

Each source is surveyed after assembly. Since these are sealed sources waste disposal is no problem. Unusable sources would be returned to U. S. Radium Co.

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ATOMIC ENERGY COMMISSION

Application for Byproduct Material License

Attached sheet

12. National Research Corporation has been manufacturing an ionization type vacuum gauge using Radium as a source for ten years. Mr. Roerhig has been associated with the company for the last six years developing improvements and other applications of the basic principle. In pursuing these developments higher radioactive fluxes have become necessary. Because of the high gamma radiation from the radium sources it has not been practical to increase the radium sources. The krypton source has been suggested by the U. S. Radium company for this use. This application for license is to cover several experimental krypton sources. Although we have had no previous experience with Krypton 85, these sources should be less hazardous than the present radium sources. The construction of the krypton source reduces the handling of unshielded sources and the gamma radiation is considerably lower.