

APPLICATION FOR BYPRODUCT MATERIAL LICENSE

INSTRUCTIONS.—Complete Items 1 through 16 if this is an initial application. If application is for renewal of a license, complete only Items 1 through 7 and indicate new information or changes in the program as requested in Items 8 through 15. Use supplemental sheets where necessary. Item 16 must be completed on all applications. Mail three copies to: U. S. Atomic Energy Commission, Washington 25, D. C. Attention: Isotopes Branch, Division of Licensing and Regulation. 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.) Harshaw Chemical Co. 1945 East 97th Street Cleveland 6, Ohio		(b) STREET ADDRESS(ES) AT WHICH BYPRODUCT MATERIAL WILL BE USED. (If different from 1 (a).) Harshaw Chemical Co. 1945 East 97th Street Cleveland 6, Ohio	
2. DEPARTMENT TO USE BYPRODUCT MATERIAL Crystal Department		3. PREVIOUS LICENSE NUMBER(S). (If this is an application for renewal of a license, please indicate and give number.) None	
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.) C. T. Schmidt - Research Physicist R. W. Carlson - Research Physicist W. W. Managan - Research Physicist		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.) C. T. Schmidt	
6. (a) BYPRODUCT MATERIAL. (Elements and mass number of each.) Yttrium 88 Cadmium 109 Manganese 54 NOTE: ABOVE SOURCES ARE CYCLOTRON PRODUCED Sodium 22 Cobalt 60 Cesium 137 (See attached sheet)		(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.) YCl₃ in HCl, 0.1 mc, Nuclear Science & Engineering Co. 1 sealed source in standard lucite mount CdCl₂ in HCl, 0.1 mc, Nuclear Science & Engineering Co. 1 sealed source in standard lucite mount MnCl₂, 0.05 mc, Nuclear Science & Engineering Co. 1 sealed source in standard lucite mount Salt, 0.02 mc, 1 Tracerlab sealed source E-7B Salt, 0.02 mc, " " " " " Salt, 0.02 mc, " " " " "	
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.) These sources are to be used for performance testing of scintillation phosphors produced by Harshaw. They will also be used in research and development of existing and new scintillation materials.			

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27277

(Continued on reverse side)

TRAINING AND EXPERIENCE OF EACH INDIVIDUAL NAMED IN ITEM 4 (Use supplemental sheets if necessary)

B. TYPE OF TRAINING	WHERE TRAINED	DURATION OF TRAINING	ON THE JOB (Circle answer)	FORMAL COURSE (Circle answer)
(C. T. Schmidt)				
a. Principles and practices of radiation protection	Case Institute of Technology	9/57-6/59	(Yes) No	Yes (No)
b. Radioactivity measurement standardization and monitoring techniques and instruments	"	"	(Yes) No	Yes (No)
c. Mathematics and calculations basic to the use and measurement of radioactivity	"	"	(Yes) No	Yes (No)
d. Biological effects of radiation	"	"	(Yes) No	Yes (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
²²⁸ Th (Ra 228)	50 mc	Case Institute of Technology Cleveland, Ohio	9/57 - 6/59	In conjunction with M.S. thesis in physics

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)	USE (Monitoring, surveying, measuring)
Victoreen Model 740B "Cutie Pie"	1	a, b, gamma	1 - 2500	4	Monitor, Survey
Beckman Model MX-5	1	b, gamma	0.1 - 20	30	Monitor, Survey
NaI crystal, Harshaw 888/2	1	gamma	0.01 - 1	220	Survey, Measuring

11. METHOD, FREQUENCY, AND STANDARDS USED IN CALIBRATING INSTRUMENTS LISTED ABOVE.

The Victoreen and Beckman instruments will be calibrated twice a year with a 5 mg radium source. The crystal will be used for pulse height analysis.

12. FILM BADGES, DOSIMETERS, AND BIO-ASSAY PROCEDURES USED. (For film badges, specify method of calibrating and processing, or name of supplier.)

Film badges - Nuclear-Chicago

INFORMATION TO BE SUBMITTED ON ADDITIONAL SHEETS

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)

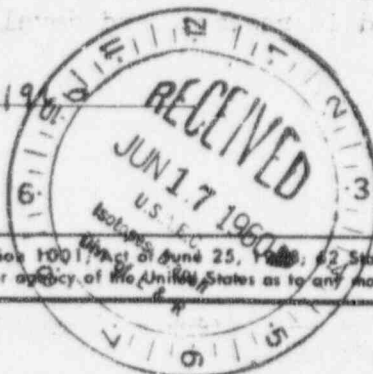
14. RADIATION PROTECTION PROGRAM. Describe the radiation protection program including control measures. If application covers sealed sources, submit leak testing procedures where applicable, name, training, and experience of person to perform leak tests, and arrangements for performing initial radiation survey, servicing, maintenance and repair of the source.

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.

CERTIFICATE (This item must be completed by applicant)

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 June 14, 1960



Harshaw Chemical Co
Applicant named in Item 1

By: *[Signature]*

Security Officer
Title of certifying officer

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.

Supplemental Sheet 1

<u>6(a)</u>	<u>6(b)</u>				
Tin 113	Salt, 0.03 mc, 1	Tracerlab sealed source E-7B			
Cerium 144	Salt, 0.03 mc, 1	"	"	"	"
Mercury 203	Salt, 0.05 mc, 1	"	"	"	"
Selenium 75	Salt, 0.02 mc, 1	"	"	"	"
Iron 55	Salt, 0.02 mc, 1	"	"	"	"

The Tracerlab E-7B mount consists of an aluminum disk 1" diam., 1/4" high, with a 7/8" diam. x 0.010" deep recess. A copper planchet on which the activity is deposited is placed in the recess and covered with a window material and retainer ring which are cemented together to form a sealed source. The window material for the Cerium 144, Selenium 75, Tin 113, Mercury 203, and Iron 55 sources will be 1/4 mil aluminized mylar; for the other Tracerlab supplied sources, an approximately 10 mil aluminum window will be used.

Supplemental Sheet 2

Training of R. W. Carlson

<u>Where Trained</u>		<u>Duration</u>	<u>On the Job</u>	<u>Formal Course</u>
8. a.	Picker X-Ray Co.	2-1/2 yrs.	Yes	No
b.	Case Inst. of Tech.	1/2 yr.	No	Yes
c.	" " " "	2 yrs.	No	Yes
d.	Picker X-Ray Co.	2-1/2 yrs.	Yes	No

9. <u>Isotope</u>	<u>Amount</u>	<u>Where Used</u>	<u>Duration</u>	<u>Type of Use</u>
I ¹³¹	2 mc	Picker X-Ray	2-1/2 yrs.	Testing instruments.
Co ⁶⁰	1000 c	" "	2 yrs.	Monitoring shipping containers.

Training of W. W. Managan

<u>Where Trained</u>		<u>Duration</u>	<u>On the Job</u>	<u>Formal Course</u>
8. a.	Victoreen Inst. Co.	8 yrs.	Yes	Yes
b.	Argonne Natl. Lab.	5 yrs.	Yes	No
c.	Victoreen Inst. Co.	8 yrs.	Yes	No
d.	" " "	8 yrs.	Yes	No

9. <u>Isotope</u>	<u>Amount</u>	<u>Where Used</u>	<u>Duration</u>	<u>Type of Use</u>
I ¹³¹	0.1 mc	Victoreen Inst. Co.	3 yrs.	Instrument calibration.
Co ⁶⁰	30 c	" " "	3 yrs.	" "
C ¹⁴	1 mc	" " "	3 yrs.	" "
Radium	100 mg	" " "	8 yrs.	" "
X-Ray machine	200 kev	" " "	5 yrs.	" "

Supplemental Sheet 3

13. A lead shield will be provided for source storage. This shield will have 4 inches of shielding on the sides and 2 inches, top and bottom. Dose exterior to shield will be far below permissible level since shield will be near test location of sensitive scintillation crystals.
14. All sources covered in this license are to be sealed. Personnel exposure will be checked by film badges. The sources and storage area will be wipe tested semi-annually to insure that no sources are leaking. Since all sources are gamma emitters, the wipes will be counted with a NaI scintillation crystal and multi-channel analyzer to determine the specific defective source, if any. A two-inch thick lead shield of large interior dimension is available for use in the detection of any low-level activity procured with the wipes. These tests will be performed by C. T. Schmidt, who has had one year's experience in the use and calibration of scintillation crystals.
15. It is anticipated that no disposal will be necessary. Should disposal become necessary, however, the job will be contracted to Oak Ridge National Laboratory.

Date Received JUN 17 1960	Expiration Date June 30, 1962	Issue Date	Technical Reviewer JML
Control No. 27277	Reference No.	License No. 34-6558-1 F62	Amendment No.

Isotope	Form	Possession Limit
A. Co-60	A. } B. } C. } D. } E. } F. } G. } H. } <div style="margin-left: 20px;"> Sealed sources Prepared by (Tracer Lab, Inc.) Lab. 27277 </div>	A. 20 microcuries
B. Cs-137		B. 20 "
C. Sn-113		C. 30 "
D. Ce-144		D. 30 "
E. Hg-203		E. 50 "
F. Se-75		F. 20 "
G. Fe-55		G. 20 "
H.	H.	H.

Authorized Use

A. Through G: To be used for ~~the~~ testing and study of scintillation materials.

see 4d
3D3

SCHA Review: ☐ Yes ☒ No

Type User (Circle One) 1 2 3 4 5 6 7 Other

REMARKS, letters, phone calls, visits, exemptions, etc.

(Use reverse side if necessary) *At 6-29-60 re wa - byproduct mat. dms*

- | Conditions |
|------------------|
| 1. A B C |
| 2. A B C |
| 3. A B C D |
| 4. A B |
| 5. <i>16.00</i> |
| 6. <i>17.00</i> |
| 7. <i>18.00</i> |
| 8. <i>19.00</i> |
| 9. <i>20.00</i> |
| 10. <i>21.00</i> |
| 11. <i>22.00</i> |
- (Use reverse side if Necessary)

B32

☒ Approve ☐ Void

Technical Reviewer *JML* Date *6-28-60*

Chief *R50* Date *6-29-60*

Mail to: *ayhira* Date Mailed JUN 29 1960

8A - by the owner.

9D — byproduct material —

F. — by the owner, as
described in 313 dated 6-14-60, or
by other —————

16 313 dated 6-14-60

WAB:IB-JAB (10-4422-1)

June 18, 1960

The Federal Bureau of Investigation
The American Chemical Company
1915 West 87th Street
Cleveland 4, Ohio

Dear Mr. J. J. ...
...
Your application indicating that Section 22, Section 22 and Section 22 will be submitted for review. Section 22 is also currently produced through the use of a particle accelerator. We do not believe our accelerator produced radiolabeled since they do not contain any material as defined by Section 22.4(b) of the Federal Atomic Energy Act of 1954. Section 22 and Section 22 are not subject to the licensing requirements of 22 CFR 22.

Very truly yours,

Robert E. ...
Director Licensing Section
Division of Licensing and Regulation

- Enclosures:
1. Section 22, 22-4422-1
2. 22 CFR 22 and 22
3. Form 22-22 of Instructions

OFFICE

LAR:IB
Boiler

LAR:IB
Brinkman

SIGNATURE

DATE

6/29/60

6/29/60

U. S. ATOMIC ENERGY COMMISSION
BYPRODUCT MATERIAL LICENSE

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Pursuant to the Atomic Energy Act of 1954 and Title 10, Code of Federal Regulations, Chapter 1, Part 3 Licensing of Byproduct Material, and in reliance on statements and representations heretofore made by the licensee a license is hereby issued authorizing the licensee to receive, acquire, own, possess, transfer and import byproduct material listed below; and to use such byproduct material for the purpose(s) and at the place(s) designated below. This license shall be deemed to contain the conditions specified in Section 183 of the Atomic Energy Act of 1954 and is subject to all applicable rules, regulations, and orders of the Atomic Energy Commission now or hereafter in effect and to any conditions specified below.

Licensee			
1. Name	Harshaw Chemical Company	3. License number	14-6388-1 Q52
2. Address	1945 East 97th Street Cleveland 4, Ohio	4. Expiration date	June 30, 1962
		5. Reference No.	
6. Byproduct material (element and mass number)	7. Chemical and/or physical form	8. Maximum amount of radioactivity which licensee may possess at any one time	
A. Cobalt 60	A. Sealed sources (Prepared by Yenarish, Inc.)	A. 20 microcuries	
B. Cesium 137	B. Sealed sources (Prepared by Yenarish, Inc.)	B. 20 microcuries	
(See Page 2)		(See Page 2)	
9. Authorized use.			
A. through G: To be used for testing and study of contamination materials.			

CONDITIONS

10. Unless otherwise specified, the authorized place of use is the licensee's address stated in item 2 above.
 11. The licensee shall comply with the provisions of Title 10, Part 30, Code of Federal Regulations, Chapter 1, "Standards for Protection Against Radiation."
 12. Byproduct materials shall be used by, or under the direct supervision of, G. T. Schmidt, R. W. Carlson or W. W. Hunsper.
 13. Byproduct material in sealed sources shall not be opened by the licensee.
 14. Each sealed source containing byproduct material shall be tested for leakage and/or contamination in accordance with the following:
 - A. An appropriate test for leakage and/or contamination shall be performed on the sealed source surface, or on the accessible surfaces of the device in which such a sealed source is permanently or temporarily mounted. The test shall be performed upon receipt of a source from another person, unless the licensee receives certification from the person selling the source.
- (See Page 2)

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Supplementary Sheet

M-4536-1

(702)

License Number _____

CONTINUED:

4. Hypocent material (element and mass number)	7. Chemical and/or physical form	8. Maximum amount of radioactivity which licensee may possess at any one time
G. Th-113	G. Sealed sources (Prepared by Tencorish, Inc.)	G. 30 microcuries
H. Curium 144	H. Sealed sources (Prepared by Tencorish, Inc.)	H. 30 microcuries
I. Radium 223	I. Sealed sources (Prepared by Tencorish, Inc.)	I. 30 microcuries
F. Selenium 75	F. Sealed sources (Prepared by Tencorish, Inc.)	F. 30 microcuries
G. Iron 55	G. Sealed sources (Prepared by Tencorish, Inc.)	G. 30 microcuries

CONTINUED**14. A. (continued)**

transfer that the sealed source had been tested within thirty (30) days prior to transfer and found free of any removable radioactive material.

- B. Following completion of the test prescribed in A, each sealed source shall be tested for leakage and/or contamination at intervals not to exceed six (6) months.
- C. The test performed pursuant to A or B shall be sufficiently sensitive to detect 0.05 microcuries of removable beta and/or gamma emitting radioactive material. Records of leak test results shall be maintained by the licensee.
- D. If the test performed pursuant to A or B reveals removable radioactive material, the licensee shall take immediate action to prevent spread of contamination and shall notify the Inspector General, Division of Licensing and Regulation, U. S. Atomic Energy Commission, Washington 25, D. C. within thirty (30) days after completion of the test.
- E. Repair of sources shall be performed by the manufacturer of the source or by persons specifically licensed by the Commission to perform such repairs.
- F. Tests for leakage and/or contamination shall be performed by the licensee, as described in application dated June 14, 1959, or by other persons specifically licensed by the Commission to perform such tests. (See Page 1)

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/PRODUCT MATERIAL LICENSE

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Supplementary Sheet

14-00000-1
(762)

License Number _____

CONTENTS:

CONTENTS

13. Except as provided otherwise by this license, the licensee shall possess and use byproduct material described in Items 6, 7 and 8 of this license in accordance with statements, representations, and procedures contained in his application dated June 14, 1960.

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Date JUN 29 1960

For the U. S. Atomic Energy Commission
Original Signed By
James R. Mason

by Chief, Inspection Branch
Division of Licensing and Regulation
Washington 25, D. C.

1. jk / 203
R & B 6/29/60