

47-260-4³

CARBIDE AND CARBON CHEMICALS COMPANY

A DIVISION OF
UNION CARBIDE AND CARBON CORPORATION



SOUTH CHARLESTON 3, W. VA.

September 17, 1956

United States Atomic Energy Commission
Isotopes Division
Post Office Box E
Oak Ridge, Tennessee

Subject: Cobalt-60

Gentlemen:

Please find attached two (2) copies of our "Application for Byproduct Material License", Form AEC-313, and one (1) copy of Form AECL-247, which is an "Application for Radioactive Isotopes", for use outside of Canada. According to procedure A-4 (R), these forms are to be sent to you and in turn you will issue Form AEC-374 entitled "By-Product Material Licence". The firm from which we are purchasing this material is the Atomic Energy of Canada, Ltd., Commercial Products Div., P. O. Box 93, Ottawa, Canada.

Our Purchase Order No. 514-19227-R is being issued today, therefore, your prompt processing of our application will be appreciated.

Very truly yours,

Works Purchasing Department

G.S. Givens/gh
Encl. *AKW*

47-260-4

Form AEC-318
(9-55)

ATOMIC ENERGY COMMISSION
APPLICATION FOR BYPRODUCT MATERIAL LICENSE

Form approved.
Budget Bureau No. 38-R027.3.

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 Applications. 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
(Institution, firm, hospital, person, etc.)
Carbide and Carbon Chemicals Co.
Research Center
South Charleston 3, West Virginia

(b) ADDRESS(ES) AT WHICH BYPRODUCT MATERIAL WILL BE USED
(If different from shipping address)

2. DEPARTMENT TO USE BYPRODUCT MATERIAL
Research

3. INDIVIDUAL USER (Name and title of individual(s) who will use or directly supervise use of byproduct material)
Dr. Frank G. Young, Group Leader

4. RADIOLOGICAL SAFETY OFFICER (Name of person qualified in radiological safety, if other than individual user)
Mr. Walter J. Skraba

5. PREVIOUS LICENSE OR AUTHORIZATION NUMBER (If this is an application for renewal of a license for byproduct material obtained under a prior license or authorization for radioisotope procurement)
Not Applicable

BYPRODUCT MATERIAL OR IRRADIATION SERVICE DESIRED

6. BYPRODUCT MATERIAL (Element and mass number) Cobalt-60	7. CHEMICAL AND/OR PHYSICAL FORM (Or catalog number) Metal Slugs	8. MAXIMUM AMOUNT OF RADIOACTIVITY IN MILLICURIES THAT YOU WILL POSSESS AT ANY ONE TIME 1,200,000
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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

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.)
Radiation Chemistry Studies

(b) DESCRIBE PROCEDURES WHICH WILL BE OBSERVED TO MINIMIZE HAZARD FROM HANDLING, STORAGE, AND DISPOSAL OF THE BYPRODUCT MATERIAL.
Attached: (1) Description of facility
(2) Drawing of facility
(3) Dose rates expected in and near facility.

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 West Virginia
County of Kanawha

Carbide and Carbon Chemicals Co.
Applicant named in Item 1

Subscribed and sworn to before me this 31st day of August 1956

By Frank G. Young
Group Leader; Radiation Chemistry
Title of Certifying Official

Robert W. Sanford
Notary Public

August 31, 1956
Date

ROBERT W. SANFORD, NOTARY PUBLIC

WARNING

18 U. S. C., Section 1001, July 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.
My Commission Expires Oct. 28, 1962

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 (Circle answer)	FORMAL COURSE (Circle answer)
1. Principles and practices of radiological health safety.	ORINS - Carbide and Carbon	Orins - 4 wks. C&C - 7 yrs.	<input checked="" type="radio"/> Yes <input type="radio"/> No	<input checked="" type="radio"/> Yes <input type="radio"/> No
2. Radioactivity measurement standardization and monitoring techniques and instruments	Same	Same	<input checked="" type="radio"/> Yes <input type="radio"/> No	<input checked="" type="radio"/> Yes <input type="radio"/> No
3. Mathematics and calculations basic to the use and measurement of radioactivity.	Same	Same	<input checked="" type="radio"/> Yes <input type="radio"/> No	<input checked="" type="radio"/> Yes <input type="radio"/> No
4. Biological effects of radiation. . .	Same	Same	Yes <input checked="" type="radio"/> No	<input checked="" type="radio"/> Yes <input type="radio"/> No
5. Actual use of radioisotopes in the types and quantities for which application is being made, or equivalent experience	Same	Same	<input checked="" type="radio"/> Yes <input type="radio"/> No	Yes <input checked="" type="radio"/> No

13. ISOTOPE HANDLING EXPERIENCE				
ISOTOPE	MAXIMUM AMOUNT	WHERE EXPERIENCE WAS GAINED	DURATION OF EXPERIENCE	TYPE OF USE
Co-60	1000 c	ORNL	2 years	Rad. Chem.
C-14	10 mc	Carbide and Carbon Chemicals Co.	7 years	Tracer

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 (Use separate sheet if necessary)					
TYPE OF INSTRUMENTS (Include make and model number of each)	NUMBER AVAILABLE	RADIATION DETECTED	SENSITIVITY RANGE (mr/hr)	WINDOW THICKNESS (mg/cm ²)	USE (Monitoring, surveying, measuring)
Cutie Pie-Tracerlab SUIF	1	gamma	0-2500	2-3	Surveying
Samson-Nuclear 2582	1	"	0-12.5		Monitoring
Area Monitor Jordan RAMS-1	3	"			Monitoring

16. FILM BADGES, DOSIMETERS, AND OTHER PERSONNEL MONITORING DEVICES INCLUDING BIO-ASSAY PROCEDURES
 Minometer - Victoreen V1; 8-Pocket chamber V2
 Dosemeter - Landsverk L24K; 4-Pocket electrometer L28
 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)
 Bench standardization - against Co-60 standard. Quarterly
 film badge Nuclear - Chicago

18. (a) DESCRIBE BRIEFLY REMOTE HANDLING EQUIPMENT, STORAGE CONTAINERS, SHIELDING, AND LABORATORY FACILITIES (Working areas, fumé hoods, etc.)
 Attached - See Item 10(b) 1 Description of Facility

(b) SKETCHES OF SUCH FACILITIES ARE ATTACHED (Circle answer) Yes No

19. DESCRIBE BRIEFLY RADIATION SURVEYING PROCEDURES AND METHODS OF DISPOSING OF RADIOACTIVE WASTES
 Attached - See Item 10(b) 1

Item 10(b)

(1) Description of Facility

The housing for the cobalt-60 will consist of a chamber surrounded on all sides by 4 feet of concrete of density 2.37, or its equivalent in shielding value for cobalt-60 gamma rays. The source will be stored at the bottom of a water-filled pool 12 feet deep in the floor of this chamber. The source will be assembled by lowering the shipping container into the filled pool, removing the cover under water, and then removing the source proper, under water at all times, to a platform whose position is controlled by an elevator operated remotely. This assembly will be done by means of a gripping tong at least 12 feet long. The water provides more than adequate shielding for the operation.

Entry to the radiation chamber is by a labyrinthine passage terminated by a steel gate which will be locked when the source is raised. Mirrors will permit observation of experiments under way in the chamber when the source is raised to its operating position. The barrier-gate lock and source-raising mechanism will be electrically interlocked so that the source cannot be raised except when the gate is locked nor can the gate be opened until the source is lowered into the water pool. The gate will also be interlocked with the water-level in the pool so that, if it is inadvertently drained, the cell cannot be entered. When the source is elevated, a flashing red light visible in the control room and an audible alarm in the cell will be activated. The barrier-gate will open easily from the inside at all times. A telephone inside the gate connected to the main laboratory switchboard will also be provided.

In the event of mechanical failure of the source elevator, means will be provided for transferring the source to a shielded storage box at the bottom of the pool. This will be covered with a lead plug and the water drained to permit safe access to the elevator mechanism.

DUPLICATED
FOR DIV. OFFICE

Item 10(b)

Continuous check on the exposure of staff to radiation and a permanent record of exposure will be provided by a conventional film badge service. For immediate checking of exposure, pocket dosimeters will be worn by all personnel while in the radiation laboratory. Visitors will be provided with pocket ionization chambers. Persons entering the radiation cell will be required to carry a hand monitor which gives a continuous and sensitive indication of dose rate. Further protection will be provided by a continuous area monitoring system. This will provide permanent record of the radiation intensity in the control room area, and in the cell when the gate is raised. The latter ionization chamber will provide warning if the radiation level in the cell is above 20 mr./hr. It will be provided primarily to cover the unlikely contingency of the source pencils becoming detached from their holders and being left behind when the source is lowered. Fusible links will provide for automatic lowering of the source and operation of a fire-extinguishing system in the cell, which may also be operated manually from outside the shield.

(3) The calculated gamma ray dose in areas designated by numbered points in shield drawing, accessible only to radiation workers.

<u>Number</u>	<u>Location</u>	<u>Dosage, mr/hr</u>
1	Directly against outer shield wall in control room and outside building to East	0.65
2	At laboratory bench in control room	less than 0.1
3	At office desk	less than 0.08
4	At gate to labyrinthine entrance	less than 0.08
5	Area adjacent to SW side of radiation shield	0.65
6	Area adjacent to S side of radiation shield	0.36

continued next page

<u>Number</u>	<u>Location</u>	<u>Dosage, mr/hr</u>
7	At surface of water above source in lowered position	0.001
8	At bottom of pool, source in emergency storage	less than 0.6
9	"	less than 0.9
10	"	less than 0.8

A plot plan of the proposed site for the radiation laboratory to house the cobalt-60 source is shown on Figure No. 2, attached. The area, inhabited on a 40 hour per week schedule, nearest to the radiation laboratory is the NE corner of the building marked High Pressure Laboratory. The calculated gamma ray dose rates here and in other areas accessible to other than radiation workers at points indicated on the plot plan are:

<u>Number</u>	<u>Location</u>	<u>Dosage, mr/hr</u>
11	NE corner High Pressure Laboratory	0.00006
12	Incinerator (manned approx. 2 hrs/week)	0.0003
13	Cooling tower (unmanned)	0.00038
14	Outside fence enclosing Rad. Lab.	0.0014

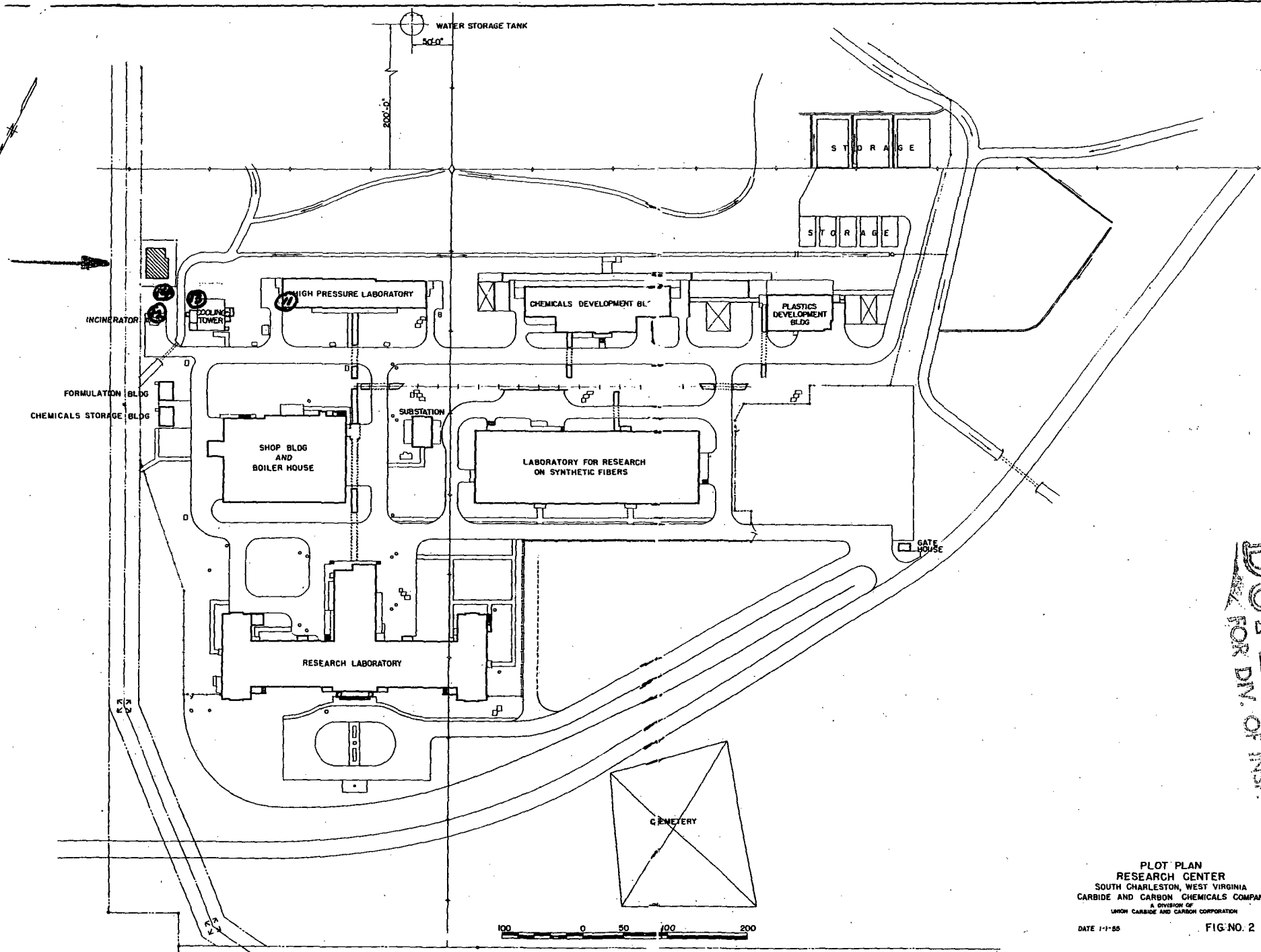
The area to the South and East of the proposed site is private property belonging to Carbide and Carbon Chemicals Company.

DUPLICATE
FOR ENCL. OF RPT.

Item 14

"Training and Experience with Radioactivity
of Radiological Safety Officers"

<u>Type of Training</u>	<u>Where Trained</u>	<u>Duration</u>	<u>On the Job</u>	<u>Formal Course</u>
1	ORNL	2 yrs.	yes	yes
2	ORNL- C & CCC	13 "	yes	yes
3	ORNL	6 mos.	no	yes
4	ORNL	6 "	no	yes
5	ORNL	2 yrs.	yes	no



DUPLICATION
 FOR DIV. OF INSP.

PLOT PLAN
 RESEARCH CENTER
 SOUTH CHARLESTON, WEST VIRGINIA
 CARBIDE AND CARBON CHEMICALS COMPANY
 A DIVISION OF
 UNION CARBIDE AND CARBON CORPORATION
 DATE 1-1-55 FIG. NO. 2