Ltr/cy 27

614 Rels.

UNION CARBIDE

UNION CARBIDE CORPORATION

CHEMICALS AND PLASTICS

P. O. BOX 8361, SOUTH CHARLESTON, W. VA. 25303

RESEARCH AND DEVELOPMENT DEPARTMENT

August 29, 1967

Mr. Richard E. Cunningham
Chief, Isotopes Branch
U. S. Atomic Energy Commission
Division of Materials Licensing
Washington, D. C. 20545

Dear Mr. Cunningham:

Two copies of the attached application are submitted for the renewal of License Number 47-00260-040 which expires September 30, 1967. In this renewal application, we have removed the name of W. J. Skraba under Item 4 and added the name of Fred Williams under Item 5.

Since we are supplying complete information at this time, we request that this application replace previous letters and communications submitted with earlier applications.

Very truly yours,

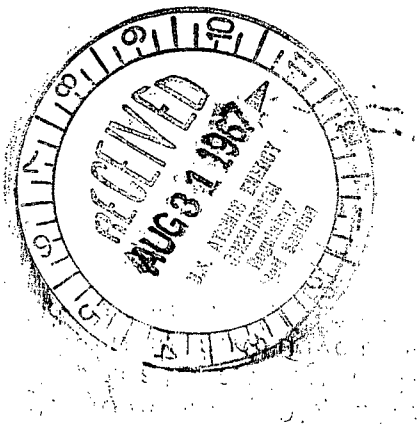
F. Johnston

F. Johnston, Director
Chemicals and Plastics
Research and Development
Department

FJ/dww

Attachments

E-27
96688
T06


RECEIVED
AUG 31 1987

See Attachments

TRAINING AND EXPERIENCE OF EACH INDIVIDUAL NAMED IN ITEM 4 *(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			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

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^2)*	USE *(Monitoring, surveying, measuring)*

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.)*

INFORMATION TO BE SUBMITTED ON ADDITIONAL SHEETS IN DUPLICATE

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 _____

RECEIVED AUG 31 1967

Applicant named in item 1

By: R E Johnston

Director R/D

Title of certifying official

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.

* U.S. GOVERNMENT PRINTING OFFICE : 1964 O—745-381

Form AEC-313 8-64 10 CFR 30	UNITED STATES ATOMIC ENERGY COMMISSION **APPLICATION FOR BYPRODUCT MATERIAL LICENSE**	Form approved. Budget Bureau No. 38-R027

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 Commisson 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.)*
Union Carbide Corporation Chemicals and Plastics Research and Dev. Technical Center South Charleston, West Virginia 25303	Union Carbide Corporation Chemicals and Plastics Research and Development Technical Center South Charleston, West Virginia 25303
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.)*
Research and Development Department	47-260-4 Amendment No. 5
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.)*
F. G. Young, Jr., Ph. D. - Senior Research Scientist	Fred Williams

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.)*	
$Cobalt^{60}$	Sealed Sources (AECL Types KCP - I)	1200 curies
	Sealed Sources (AECL Type C-129) (total - 39 s.s. pencils)	1000 curies

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.)*

To be used in irradiation facility for research and development as described in this application.

56688

(Continued on reverse side)

8. TYPE OF TRAINING - Frank G. Young, Jr.

Where Trained	Duration of Training	On Job	Formal Course
a. Oak Ridge Institute of Nuclear Studies Massachusetts Institute of Technology	1948 1955	yes	yes
b. Same as above and UCC - Technical Center	18 years	yes	yes
c. Same as b	18 years	yes	yes
d. *Oak Ridge Institute of Nuclear Studies UCC - Technical Center	1948 18 years	yes	yes

*Proficient in radiation calculations

Fred Williams

Union Carbide Corporation Nuclear Division Y-12 Plant Oak Ridge, Tennessee	12 years[1]
Union Carbide Corporation Chemicals and Plastics Division Technical Center South Charleston, West Virginia	5 years[2]

[1]On-the-job training at the Y-12 Plant from 1950 - 62 included:

(a) Analysis of uranium, plutonium and thorium 3 years
(b) Non-Destructive testing training program (Cobalt^{60} and X-ray) 6 months
(c) Supervisor of Bio-Analysis Laboratory (PC2 proportional counters, Geiger - Mueller detectors, automatic scintillation counter, vibrating reed electrometer and film badge program) 3 years
(d) Industrial Hygienist

Member of radiation survey team for emergency trailer at Y-12. Attended lectures and courses offered by the Y-12 Plant and Oak Ridge National Laboratory on Radiochemistry and Radiation Safety.

[2]Technical Center Industrial Hygienist - 5 years; Radiation Protection Officer; Air and Water Pollution Control and a member of the Area Radioactive Material Committee for license 47-260-6.

9. EXPERIENCE WITH RADIATION - Frank G. Young, Jr.

Isotope	Max. Amt.	Where	Duration	Type of Use
$Carbon^{14}$	Millicuries	UCC-Tech Center	18 years	Synthesis
$Phospherus^{32}$	Millicuries	UCC-Tech Center	1 year	Synthesis
$Sulfur^{35}$	Millicuries	UCC-Tech Center	18 months	Synthesis
$Calcium^{45}$	Millicuries	UCC-Tech Center	6 months	Synthesis
$Cobalt^{60}$	Curies	UCC-Tech Center	9 years	Irradiation Studies

Fred Williams

Isotope	Max. Amt.	Where	Duration	Type of Use
Uranium	Kilograms	Y-12 Plant, Oak Ridge, Tenn.	12 years	Classified
Plutonium	Micrograms	Y-12 Plant, Oak Ridge, Tenn.	3 years	Classified
Tritium	Microcuries	Y-12 Plant, Oak Ridge, Tenn.	3 years	Classified
$Cobalt^{60}$	Curies	Y-12 Plant, Oak Ridge, Tenn.	6 months	Non-destructive testin
$Thorium^{228}$	Micrograms	Y-12 Plant, Oak Ridge, Tenn.	3 years	Classified
$Iodine^{131}$	Microcuries	ORNL, Oak Ridge, Tenn.	1 month	Air Pollution Studies
$Iodine^{131}$	Millicuries	UCC, South Charleston, W. Va.	2 years	Instrumentation
$Radium^{226}$	Millicuries	UCC, South Charleston, W. Va.	5 years	Instrumentation
$Strontium^{90}$	Curies	UCC, South Charleston, W. Va.	5 years	Instrumentation
$Cesium^{137}$	Curies	UCC, South Charleston, W. Va.	5 years	Instrumentation
$Cobalt^{60}$	Curies	UCC, South Charleston, W. Va.	5 years	R & D
$Carbon^{14}$	Millicuries	UCC, South Charleston, W. Va.	5 years	Tracer
$Gold^{198}$	Millicuries	UCC, South Charleston, W. Va.	2 weeks	Tracer
$Cesium^{131}$	Millicuries	UCC, South Charleston, W. Va.	2 months	Tracer
$Krypton^{79}$	Millicuries	UCC, South Charleston, W. Va.	1 month	Tracer
$Xenon^{133}$	Millicuries	UCC, South Charleston, W. Va.	1 month	Tracer
Tritium (H^3)	Curies	UCC, South Charleston, W. Va.	5 years	Instrumentation and Tracer

10. RADIATION DETECTION INSTRUMENTS

Type of Instrument	Number Available	Radiation Detected	Sensitivity Range mr/hr	Window Thickness	Use
Universal Atomics, Model 700	1	Beta, Gamma	0-50	_____	Monitoring
Tracerlab, Model SU-14	1	Alpha, Beta, Gamma	0-25	_____	Monitoring and Surveying
Jordan RAMS II Remote Area Monitoring System (4 stations)	1	Beta, Gamma	0 mr. - 100,000R	_____	Monitoring
Dumont Type VM-8 Monitor	1	_____	_____	_____	Visual Observation
RCL Mark 13, Model 1 Scaler (unit) Model 10104 halogen - quench end window; 30100 vertical iron shield and mount	1	Beta, Gamma	_____	_____	Measuring

II. Methods, Frequency, and Standards used in Calibrating Instruments Listed On 10

The survey meters are calibrated with a 1.11 Millicuries Cobalt^{60} point source that was obtained from Tracerlab, Inc. The instrument to be calibrated is fastened to a movable carriage. The distance from the source to the instrument is accurately measured. The decay correction is applied for the source and calculations are made by substituting the figures in the following equation:

$$\text{Milliroentgens per hour} = \frac{S' \times 13{,}500}{D^2}$$

Where S' = Millicuries of Co^{60} in the decay corrected source and D = the distance from the source in centimeters.

Survey meters must be calibrated at least once per year; however, more frequent calibrations are made to assure that the instruments are dependable.

The Jordan RAMS II Remote Area Monitoring System is set to activate at the 25.0 milliroentgen per hour level by using a 0.06 millicurie radium^{226} source with the radiation emission previously measured at a given distance.

The counter is calibrated with a known source each day the equipment is in operation.

12. FILM BADGES, DOSIMETERS, AND BIO-ASSAY PROCEDURES USED

Personnel who are assigned to work routinely in the Research and Development Department's Radiation Facility are issued film badges supplied by Nuclear - Chicago Corporation. These badges are returned monthly for evaluation and a report is received from Nuclear - Chicago showing the results for each badge and the accumulative exposure.

Keleket Dosimeters are worn by assigned personnel and visitors in the facility. These are read on a Model K - 430A Charge - Reader and the results are recorded in a log book with date and name of wearer.

There are no routine bio - assay procedures in use but facilities are available should such services be required.

13. FACILITIES AND EQUIPMENT

2 drgs. see dwg. envelope

See attached print of building.
"Fail-safe" interlocking electrical system.
Panic button and crash bar on door from radiation area.
Stainless steel pencils stored under water (recirculated, filtered, with automatic water level gauge).
Storage vault in corner below bottom of pool, covered with large lead plug.

Pictures show:

1. Jordan RAMS II Area Monitoring System
2. Pool, water and monitoring devices.
3. Panic button and monitoring device near door into maze.

14. RADIATION PROTECTION PROGRAM

Only trained personnel approved by Dr. F. G. Young, Jr. shall operate the Research and Development Department's Radiation Facility.

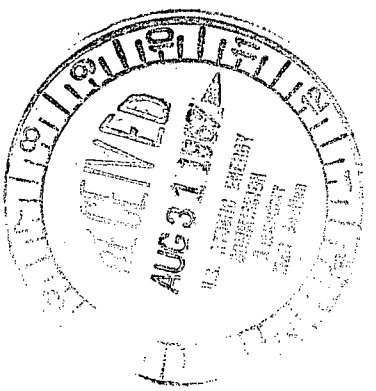
A "fail safe" system that utilizes an interlocking electrical system which includes the position of the elevator platform (raised or lowered), dual control entry button and switch, and the Jordon RAMS II Area Monitoring System.

The door is locked when no personnel are working in the building.

The building is surveyed each year by the Radiation Protection Officer for radiation leakage via cracks in the concrete structure.

A leak test is made by or under the direction of the Radiation Protection Officer every 6 months or prior to draining the water from the pool. (The stainless steel pencils are placed in a storage well in the corner of the pool and covered with a large lead plug before draining.) A sample of 500 milliliters of the water is collected, evaporated to dryness on a stainless steel planchet and counted in the measuring system that is capable of detecting <0.005 microcuries of radiation.

The following emergency procedure is used:



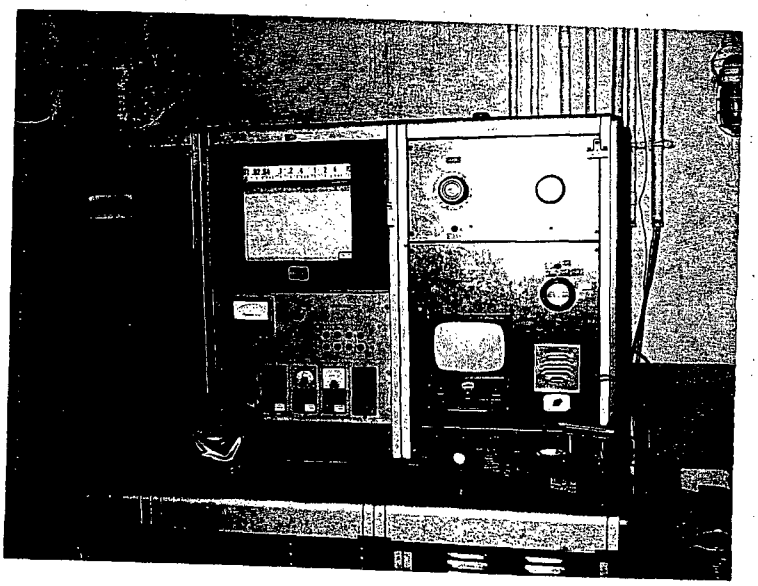
RESEARCH AND DEVELOPMENT DEPARTMENT'S RADIATION FACILITY EMERGENCY PROCEDURES

IN CASE OF:

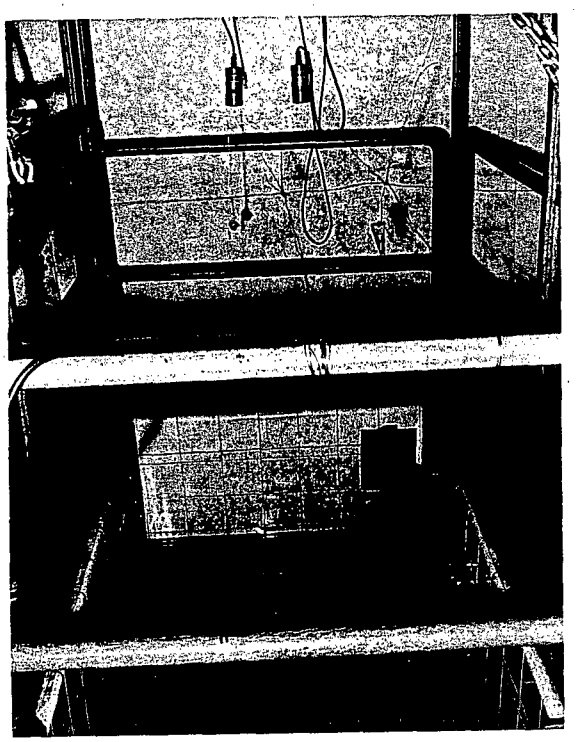
POWER FAILURE (source raised)	Lower source elevator into water manually by turning motor shaft in control pit.
JAMMED ELEVATOR (source lowered)	Remove submerged source from elevator platform with tongs. Withdraw elevator from water well for repairs.
(source raised)	Remove elevator platform coupling - pin from outside of shield, dropping elevator and source into well. Proceed as above.
FIRE NEAR SOURCE (source raised, failure of thermal release on elevator)	Lower source elevator as under Power Failure or Jammed Elevator as necessary.
LOSS OF WATER LEVEL IN WELL (source lowered)	Open valve to fill and maintain water level in well. If necessary, use auxiliary fire hose to maintain level. Remove source to emergency storage for repair of well as necessary.
PENCIL LOST FROM SOURCE RACK (Inside well)	Lower source into well. Pick up pencil in tongs and replace in rack.
(outside well)	Radiation - level alarm will be activated with source lowered. Entrance gate will be locked. This emergency will require "fishing" for pencil through access port in roof. Consult group leader and Radiation Protection Officer.

In this last rare emergency the plan of action calls for closing all openings to the cell by temporary bulkheads, flooding the cell with 6 feet of water, removal of the concrete access plug in roof by means of a mobile crane and "fishing", from behind temporary shielding, with a magnet attached to a pole and line to maneuver pencil into water well. Continuous monitoring will be employed during this operation. When pencil is safely submerged, procedure will be as for pencil lost inside well.

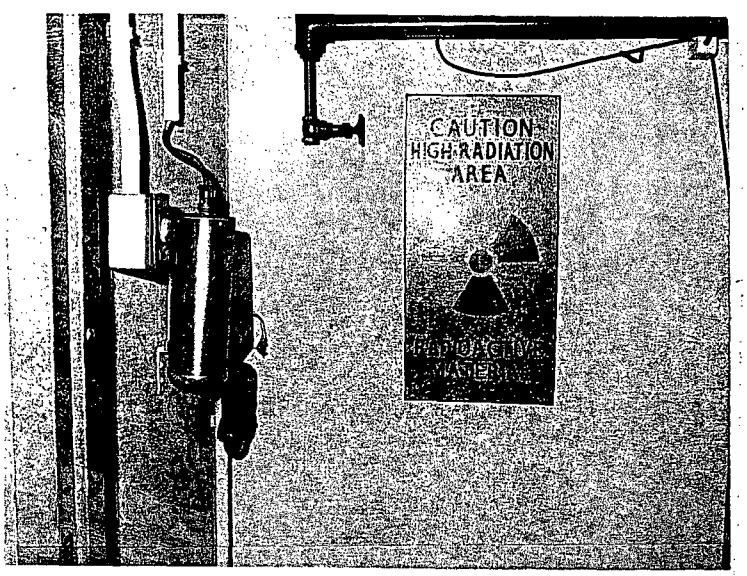
1. AREA MONITORING SYSTEM



2. POOL AND DETECTOR



3. PANIC BUTTON AND DETECTOR



15. WASTE DISPOSAL

If waste disposal is required, an AEC approved service will be contracted.