



UNION CARBIDE CORPORATION  
CHEMICALS AND PLASTICS

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

April 2, 1970

Mr. Robert Dube  
U. S. Atomic Energy Commission  
Isotopes Branch  
Division of Material Licensing  
Washington, D. C. 20545

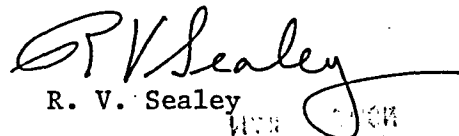
Dear Mr. Dube:

Attached is our application for an AEC License for the use of encapsulated neutron sources. These sources will be used for locating carbon buildup in process vessels. They will be in storage except when in use under the direct supervision of Mr. C. R. Landfried or me. We hope to use these sources in West Virginia, Texas, Louisiana, and Puerto Rico. The source will be licensed in Texas and Louisiana when in use in those states.

I have included a brief description of how these sources will be used and values of exposure levels. In the tests we have run in Louisiana and Texas, we have had no measureable exposure on either pocket dosimeters or film badges.

If there are any questions or if any further information is needed, please contact me.

Sincerely yours,

  
R. V. Sealey

RVS:csg  
Enclosures

P. S. Please call me collect as soon as you can concerning this license.  
THANK YOU. (304) 747-5414

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SENT TO COMPLIANCE

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A-124

## 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.)		(b) STREET ADDRESS(ES) AT WHICH BYPRODUCT MATERIAL WILL BE USED. (If different from 1 (a).)	
Union Carbide Corporation Chemicals and Plastics Operations Div. Technical Center, P. O. Box 8361 South Charleston, West Virginia 25303		Technical Center Laboratories and their plant extensions of above named division of Union Carbide Corp.	
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.)	
Measurement Development and Technology Group of the Engineering Department		47-260-2 and 47-260-6 This is an application for a new license	
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. V. Sealey, Section Leader, training and experience same as on 47-260-2 and 47-260-6 licenses C. R. Landfried, Project Engineer, training and experience same as on 47-260-2 license		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.)	
Polonium 210 Beryllium		Sealed sources, total not to exceed 5 curies ( $12.5 \times 10^6$ n/sec) Monsanto Research Corporation, MRC-N-SS-W-PoBe	
Americium 241 Beryllium		Sealed sources, total not to exceed 5 curies ( $11 \times 10^6$ n/sec) Monsanto Research Corporation, MRC-N-SS-W-AmBe	
Americium 241		Monsanto Model MRC-A-SS-U-1, calibration source 0.1 $\mu$ curie	
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.)			

SEE ATTACHED SHEETS

Item 7 - PURPOSE FOR WHICH BYPRODUCT MATERIAL WILL BE USED

These sources will be used for testing steel vessels for carbon buildup. These vessels are 25 feet high with a diameter of about 10 feet. The source is lowered in a tube through a 6" to 8" steel plate. The nominal shielding is approximately 16" of steel and a distance of 12 feet. The average exposure rate is 8 n/sec/cm<sup>2</sup>. The exposure rate exists for approximately 2 hours for each test. A single individual would not be exposed for more than six hours per month. An area 20 foot square will be roped off and posted with signs stating "Caution - Radioactive Materials" at the top and bottom of the vessel. Only individuals having both film badges and dosimeters will be allowed in these areas during the time tests are being made.

The test is made by removing the source from its storage container and bolting it to the detector probe. The source is handled with 18" tongs.

Total exposure time during this transfer is approximately 30 sec. Trunk exposure rate is about 100 n/cm<sup>2</sup>/sec. during this time, while exposure to the operator's hands is about 400 n/cm<sup>2</sup>/sec. This is an exposure rate of approximately 3.2 and 12.8 millirem/hr. The normal exposure rate during the tests is 8 n/sec/cm<sup>2</sup> or 0.26 millirem/hr. The estimated total neutron exposure is 0.52 millirem. The gamma field associated with a 5 curie Po-Be source is 0.58 mr/hr at one meter and 50.5 mr/hr at one meter for 5 curies of Am-Be. The total neutron and gamma dose would be less than 3 millirem with either a Po-Be or Am-Be for each test. No person would run more than two tests per month.

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 TRAINING AND EXPERIENCE
 

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<u>Type of Training</u>	<u>Where Trained</u>	<u>Duration of Training</u>	
a) Principles and practices of radiation protection	Union Carbide Corporation Oak Ridge Associated Universities	13 months 4 weeks	On the job Formal course
b) Radioactivity measurement, standardization and monitoring techniques and instruments	Union Carbide Corporation Wichita State University Oak Ridge Associated Universities	13 months 1 year 4 weeks	On the job Formal course Formal course
c) Mathematics and calculations basic to the use and measurement of radioactivity	Union Carbide Corporation Wichita State University Oak Ridge Associated Universities	13 months 2 years 4 weeks	On the job Formal course Formal course

## Item 9

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 EXPERIENCE WITH RADIATION
 

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<u>Isotope</u>	<u>Maximum Amount</u>	<u>Where Experience Gained</u>	<u>Duration of Experience</u>	<u>Type of Use</u>
Na <sup>22</sup>	mc	Wichita State University	1 year	R & D
Cs 137	mc	Wichita State University	1 year	R & D
Cl <sup>14</sup>	mc	Wichita State University	1 year	R & D
Sr <sup>90</sup>	mc	Wichita State University	1 year	R & D
Co <sup>60</sup>	mc	Wichita State University	1 year	R & D
Bi <sup>207</sup>	mc	Wichita State University	1 year	R & D
Ra <sup>226</sup> & daughters	mc	Wichita State University	1 year	R & D
Cl <sup>14</sup>	mc	Union Carbide Corporation	5 years	Tracer
Ra <sup>226</sup> & daughters	mc	Union Carbide Corporation	5 years	Density & Level Gauges
Cs <sup>137</sup>	curies	Union Carbide Corporation	5 years	Density & Level Gauges
H <sup>3</sup>	curies	Union Carbide Corporation	13 months	Tracer
Xe 133	mc	Union Carbide Corporation	1 year	R & D
Cs 131	mc	Union Carbide Corporation	1 year	R & D
Rb 86	mc	Union Carbide Corporation	1 year	R & D
Sn-113	mc	Union Carbide Corporation	2 years	R & D
Po-210	5 curies	Union Carbide Corporation	21 days	R & D

### TRAINING AND EXPERIENCE

<u>Type of Training</u>	<u>Where Trained</u>	<u>Duration of Training</u>	
a) Principles and practices of radiation protection	Union Carbide Olefins Division	11 years	On the job
b) Radioactivity measurement standardization and monitoring techniques and instruments	Union Carbide Olefins Division	11 years	On the job
c) Mathematics and calculations basic to the use and measurement of radioactivity	Union Carbide Olefins Division	11 years	On the job
d) Biological effects of radiation	Union Carbide Olefins Division	11 years	On the job

### EXPERIENCE WITH RADIATION

<u>Isotope</u>	<u>Maximum Amount</u>	<u>Where Experience Gained</u>	<u>Duration of Experience</u>	<u>Type of Use</u>
Cs <sup>137</sup>	curies	Union Carbide Corporation	11 years	Density & Level Ga Tracer
Co <sup>60</sup>	curies	Union Carbide Corporation	11 years	Density & Level Ga
Ra <sup>226</sup> & daughters	mc	Union Carbide Corporation	11 years	Density & Level Ga R & D
C <sup>14</sup>	mc	Union Carbide Corporation	7 years	R & D, Tracer
H <sup>3</sup>	mc	Union Carbide Corporation	7 years	Tracer
Cs <sup>131</sup>	mc	Union Carbide Corporation	2 years	Tracer
Xe <sup>133</sup>	mc	Union Carbide Corporation	2 years	Tracer
Pb <sup>210</sup>	mc	Union Carbide Corporation	2 years	Tracer
K <sup>40</sup>	mc	Union Carbide Corporation	2 months	Tracer
Au <sup>198</sup>	mc	Union Carbide Corporation	2 years	Tracer
Sr <sup>90</sup>	mc	Union Carbide Corporation	11 years	R & D
Li <sup>7</sup>	mc	Union Carbide Corporation	2 years	Tracer
Sn <sup>113</sup>	mc	Union Carbide Corporation	2 years	R & D
Po <sup>210</sup>	curies	Union Carbide Corporation	6 days	R & D

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# TRAINING AND EXPERIENCE

Union Carbide 12 years<sup>(1)</sup>  
Nuclear Division  
Y-12 Plant  
Oak Ridge, Tennessee

Union Carbide 2 years<sup>(2)</sup>  
Olefins Division  
South Charleston, West Virginia

(1) On-the-job training received at the Y-12 Plant from 1950-1962 included:

- (a) Analytical analyses of uranium, plutonium, and thorium 3 years
- (b) Non-destructive testing training program (Cobalt<sup>60</sup> 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 5 years

Member of the survey team that operated the emergency radiation detection 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 and a member of the Area Radioactive Materials Committee for the Union Carbide Chemicals Division. This includes performing the duties of advising users of radioactive materials, making surveys and measurements, maintaining records of personnel exposure, and performing other functions that assure compliance with AEC regulations.

## Item 9

## EXPERIENCE WITH RADIATION

Isotope	Maximum Amount	Where Experience Gained	Duration of Experience	Type of Use
Uranium	Kilograms	Y-12 Plant, Oak Ridge	12 years	Classified
Plutonium	Micrograms	Y-12 Plant, Oak Ridge	3 years	Classified
Tritium (H <sup>3</sup> )	Microcuries	Y-12 Plant, Oak Ridge	3 years	Classified
Cobalt <sup>60</sup>	Curies	Y-12 Plant, Oak Ridge	6 months	Non-destructive test
Thorium <sup>228</sup>	Micrograms	Y-12 Plant, Oak Ridge	3 years	Classified
Iodine <sup>131</sup>	Microcuries	ORNL, Oak Ridge, Tennessee	1 month	Air pollution study
Iodine <sup>131</sup>	MilliCuries	U.C. Olefins Div., So. Charleston, W. Va.	2 weeks	Tracer
Radium <sup>226</sup>	MilliCuries	U.C. Olefins Div., So. Charleston, W. Va.	7 years	Instrumental
Strontium <sup>90</sup>	Curies	U.C. Olefins Div., So. Charleston, W. Va.	7 years	Instrumental

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## EXPERIENCE WITH RADIATION

<u>Isotope</u>	<u>Maximum Amount</u>	<u>Where Experience Gained</u>	<u>Duration of Experience</u>	<u>Type of Use</u>
Cesium <sup>137</sup>	Curies	U.C. Olefins Div., So. Charleston, W.Va.	7 years	Instrumentat
Cobalt <sup>60</sup>	Curies	U.C. Olefins Div., So. Charleston, W.Va.	7 years	R & D
Carbon <sup>14</sup>	Millicuries	U.C. Olefins Div., So. Charleston, W.Va.	7 years	Tracer
Gold <sup>198</sup>	Millicuries	U.C. Olefins Div., So. Charleston, W.Va.	2 weeks	Tracer
Tritium <sup>3</sup>	Curies	U.C. Chemicals Div.	7 years	Instrumentation and Tracer

# Item 10 - RADIATION DETECTION INSTRUMENTS

<u>Make and Model of Instrument</u>	<u>Number Available</u>	<u>Radiation Detected</u>	<u>Range mr/hr</u>	<u>Window</u>	<u>Use</u>
Tracerlab SU-14	4	$\beta\gamma$	0-25		Monitoring Surveying
Tracerlab SU-20	2	$\beta\gamma$	0-80		"
Jordan AGB-10KG-SR	1	$\beta\gamma$	.01-10,000		"
Tracerlab SUIF	1	$\beta\gamma$	0-2,500		"
Victoreen Model 440	1	$\beta\gamma$	0-300		"
Nuclear Chicago 2652	1	$\beta\gamma$	0-100		"
Ludlum Scaler 20-A	1	$\beta\gamma$		1.5-2.0 mg/in. <sup>2</sup>	Counting
Cary Vib. Reed Electrometer, Model 31	2	$\alpha\beta$ (gas)	Variable	275 ml ion chamber	Monitoring
Keithley Model 602 Electrometer	1	$\alpha\beta$		275 ml ion chamber	Monitoring
Nuclear Associates, Inc. Model 32-700 Gas Flow Counter	1 (on order)	$\alpha$	4 $\pi$	gas flow counter	Leak Testing of Neutron Sources
Eberline Instrument Corp. Model PNC-4	1	n			Surveying

NOTE: Miscellaneous combinations of thin end window and normal GM tubes and scintillation detectors used in combination with a single channel analyzer for laboratory counting applications.

## Item 11 - INSTRUMENT CALIBRATION

Periodic inspection, calibration, and repair all instruments used for measuring exposure of personnel to beta and gamma radiation. Instruments are calibrated every six months. Standard calibration techniques, using Tracerlab 1 millicurie calibrated Co<sup>60</sup> source. A Monsanto calibrating source Model MRC-A-SS-U-1, Am-241 alpha source will be used for calibrating Gas Flow Counter.

## Item 12 - FILM BADGE SERVICE - SEE APPLICATION



### Item 13 - FACILITIES AND EQUIPMENT

Chemicals and Plastics Research - Washable, seamless walls and desk tops; vinyl tile floors, high capacity hoods in constant use to sweep room air up stack.

Samples stored in hood.

Technical Center - Ventilated hood closed with safety glass windows. Building air conditioned--no recirculation.

Respirators, gas masks, fire blankets, safety water showers.

Asphalt tile floor, alberene bench tops covered with stainless steel trays.

Attached drawing shows new nucleonics laboratory.

Sources will be stored in approved shipping containers in Radioactive Materials Storage area when not in use. (See attached drawings describing the storage facilities at the Technical Center. The storage facilities vary in structure from plant to plant but in all cases the source will be placed in a controlled area (locked cinder block building, or locked wire fenced area, or locked warehouse where only an authorized person, usually the RPO, has a key) which will be marked with "Caution - Radioactive Materials" signs.

Shipping containers will be marked with the appropriate radiation tags as specified by the AEC and Department of Transportation and each container will be surveyed before and after shipment to ascertain compliance with AEC and DOT regulations.

### Item 14 - RADIATION PROTECTION PROGRAM

All personnel using radioisotopes have annual physical examinations by the company physician during which particular emphasis is placed on detecting any effects attributable to radiation. The Radiation Protection Officer and his staff will

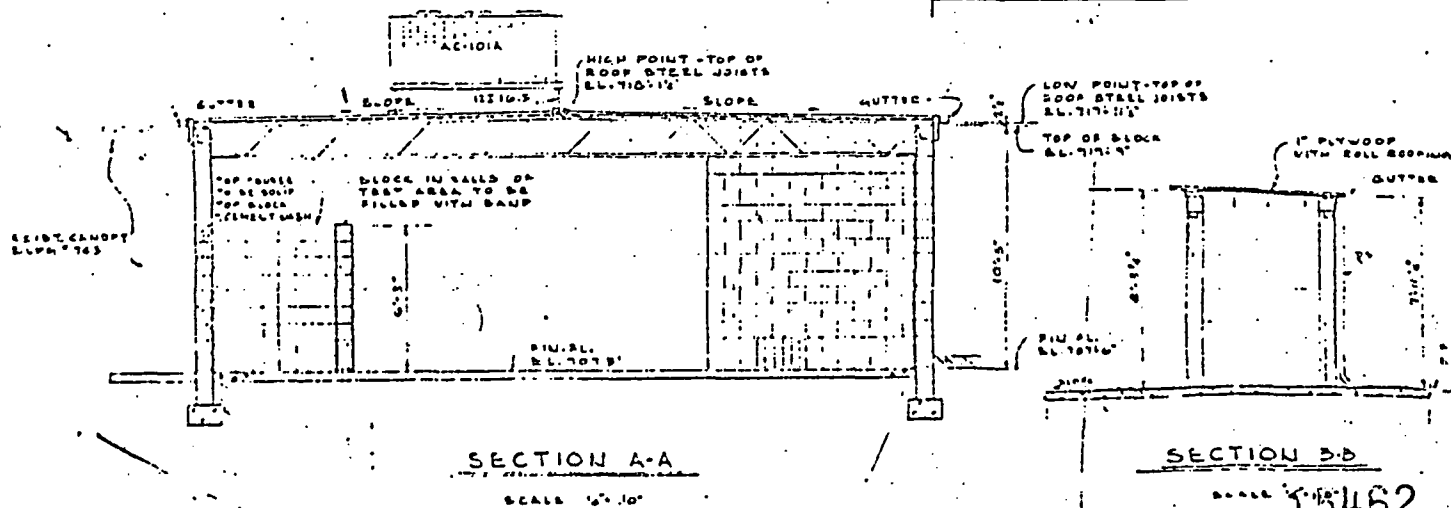
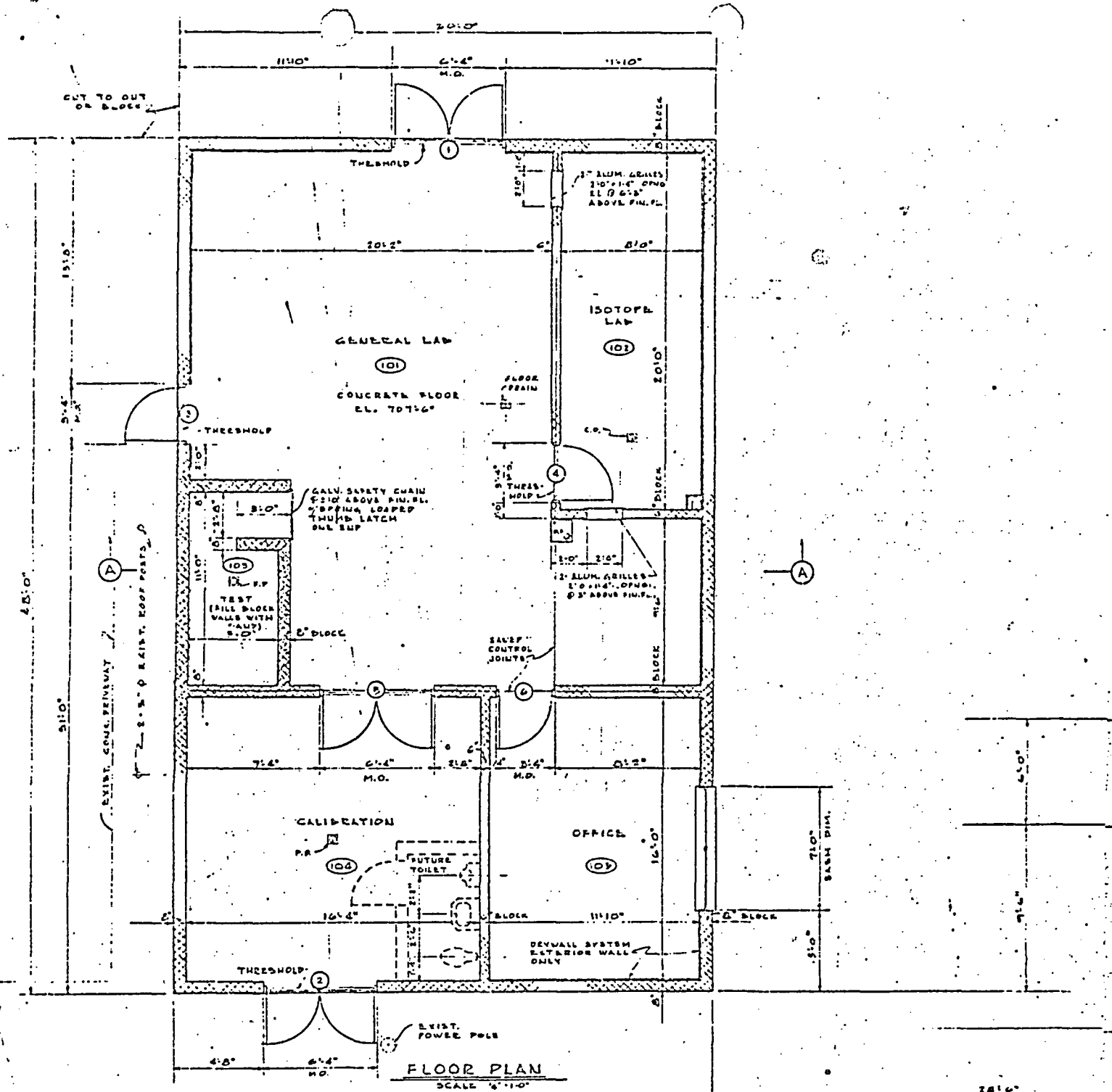
(1) keep a monthly exposure record of each individual's Nuclear Chicago film badge record plus a quarterly record of total dosage received, (2) survey all radiation equipment and facilities on a periodic basis (normally 1/2 yr or 1 yr) to guarantee no hazardous situation exists (this includes the storage areas set aside for radioisotopes which are not in present use), and (3) make certain that any violations detected will receive immediate attention and all unauthorized personnel will be restricted from the area until the necessary corrections have been made and the area is safe.

Refer to Item 7 for additional details concerning the tests.

### Item 15 - WASTE DISPOSAL

A licensed commercial company will be contracted e.g., Bio-Nuclear of Houston, Texas or Radiological Service Company, Inc. of Long Island, New York.

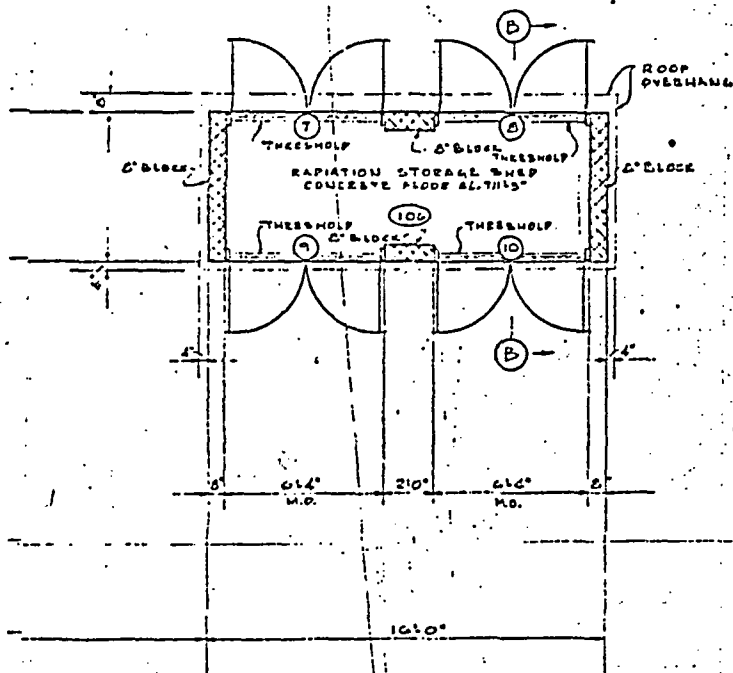
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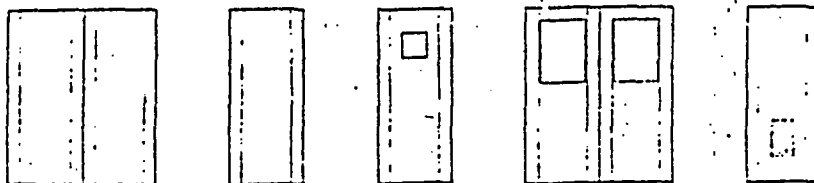
ROOM FINISH SCHEDULE						
SPACE	FLOOR	BASE	WALLS	CEILING	CLIM	FIN SH
101 CONC. SLAB	VINYL	BLOCK & DRYWALL	EXPOSED BAR JOISTS	PAINT WALLS & EXPOSED ROOF STL. & PECK		
102 CONC. SLAB	VINYL	BLOCK & DRYWALL	EXPOSED BAR JOISTS	PAINT WALLS & EXPOSED ROOF STL. & PECK		
103 CONC. SLAB	VINYL	BLOCK & DRYWALL	EXPOSED BAR JOISTS	PAINT WALLS & EXPOSED ROOF STL. & PECK		
104 CONC. SLAB	NONE	BLOCK	EXPOSED BAR JOISTS	PAINT WALLS & EXPOSED ROOF STL. & PECK		
105 VINYL ASBESTOS	VINYL	BLOCK & DRYWALL	EXPOSED BAR JOISTS	PAINT WALLS & EXPOSED ROOF STL. & PECK		
106 CONC. SLAB	NONE	BLOCK	PLYWOOD	PAINT WALLS & CEILING		

DOOR SCHEDULE										
MARK	TYPE	SIZE	SWING	MATERIAL	GLAZING	FRAME	REMARKS	LOUVER	WINDSET	REMARKS
1	A	PR. 3'0" x 7'0"	DOUBLE DOORS	HOLLOW METAL	NONE	4" COMPRESSED METAL	1 2 3	NONE	1	LRHD ACTIVE
2	A	PR. 3'0" x 7'0"	DOUBLE DOORS	HOLLOW METAL	NONE	4" COMPRESSED METAL	1 2 3	NONE	1	LRHD ACTIVE
3	D	3'0" x 7'0"	RHRB	HOLLOW METAL	NONE	4" COMPRESSED METAL	1 2 3	NONE	2	
4	C	3'0" x 7'0"	2H	HOLLOW METAL	CLEAR WRE	4" COMPRESSED METAL	1 2 3	NONE	4	
5	D	PR. 3'0" x 7'0"	DOUBLE DOORS	HOLLOW METAL	CLEAR WRE	4" COMPRESSED METAL	1 2 3	NONE	2	
6	E	3'0" x 7'0"	2H	HOLLOW METAL	NONE	4" COMPRESSED METAL	1 2 3	NONE	5	
7	A	PR. 3'0" x 7'0"	DOUBLE DOORS	INDUSTRIAL STEEL	NONE	4" COMPRESSED STEEL	4 5 6	NONE	6	LRHD ACTIVE
8	A	PR. 3'0" x 7'0"	DOUBLE DOORS	INDUSTRIAL STEEL	NONE	4" COMPRESSED STEEL	4 5 6	NONE	6	LRHD ACTIVE
9	A	PR. 3'0" x 7'0"	DOUBLE DOORS	INDUSTRIAL STEEL	NONE	4" COMPRESSED STEEL	7 5 6	NONE	6	LRHD ACTIVE
10	A	PR. 3'0" x 7'0"	DOUBLE DOORS	INDUSTRIAL STEEL	NONE	4" COMPRESSED STEEL	7 5 6	NONE	6	LRHD ACTIVE

SEE CONSTRUCTION SPECIFICATIONS FOR WINDSET.



REFERENCE DRAWINGS  
 PLUMBING & PIPING 65003-34  
 HEATING & VENTILATION 65003-35  
 ELECT. LIGHTING PLAN 65003-36  
 CONSTRUCTION SPECIFICATIONS



A B C D E  
 DOOR TYPES

DRAWN BY CHECKED BY DESIGNED BY APPROVED BY DATE 1-11-54 PURCHASE FABRICATION CONSTRUCTION 2-17	PROJECT NO. 65003-34 65003-35 65003-36 65003-37 65003-38 65003-39 65003-40 65003-41 65003-42 65003-43 65003-44 65003-45 65003-46 65003-47 65003-48 65003-49 65003-50 65003-51 65003-52 65003-53 65003-54 65003-55 65003-56 65003-57 65003-58 65003-59 65003-60 65003-61 65003-62 65003-63 65003-64 65003-65 65003-66 65003-67 65003-68 65003-69 65003-70 65003-71 65003-72 65003-73 65003-74 65003-75 65003-76 65003-77 65003-78 65003-79 65003-80 65003-81 65003-82 65003-83 65003-84 65003-85 65003-86 65003-87 65003-88 65003-89 65003-90 65003-91 65003-92 65003-93 65003-94 65003-95 65003-96 65003-97 65003-98 65003-99 65003-100
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ENGINEERING DEPARTMENT  
 UNION CARBIDE CORPORATION  
 ARCHITECTURAL  
 PLAN,  
 ROOM FINISH & DOOR  
 SCHEDULE  
 15462