

US Radium Corp

License No. 37-00030-08

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Title: Exhibits to Inspection Report for Period 11/13 thru 11/16/1962

Report is ML032651016

U. S. R. C.

Radioisotope Inventory as of 10/31/62
(Summary of Data Furnished Inspector on 11/15/62)

<u>Radioisotope</u>	<u>Licensed Amount</u>	<u>Amount On Hand</u>	<u>Reference Licenses</u>
Americium-241	28 c	3,169 mc	30-2
Carbon-14	.5 c	38 mc	30-2
Cesium-137	250 c	5,200 mc	30-2
Cobalt-60	50 c	8,592 mc	30-2
Krypton-85	1,000 c	140,000 mc	30-2 & GL-117
Nickel-63	.2 c	241 mc	30-2
Promethium-147	100 c	32,585 mc	30-2
Ruthenium-106	.2 c	0 (4)	30-2
Strontium-90	100 c	9,763 mc	30-2
Thallium-204	25 c	806.7 mc	30-2
Hydrogen-3 gas (1)	15,000 c	2,234.7 c	30-2 & GL-112&-12
Hydrogen-3 foil (RRC) (1)	15,000 c	79 sq. in. (2)	30-2 & GL-112
Hydrogen-3 foil (USRC) (1)	1,500 c	1,054 sq. in. (2)	30-2 & GL-112
Tritiated Organic (3)	5,000 c	300 c	30-6
Polonium-210	15 c	1,000 mc	30-2

NOTES: (1) Total of H-3 as gas and as tritiated
foil not to exceed 15,000 c

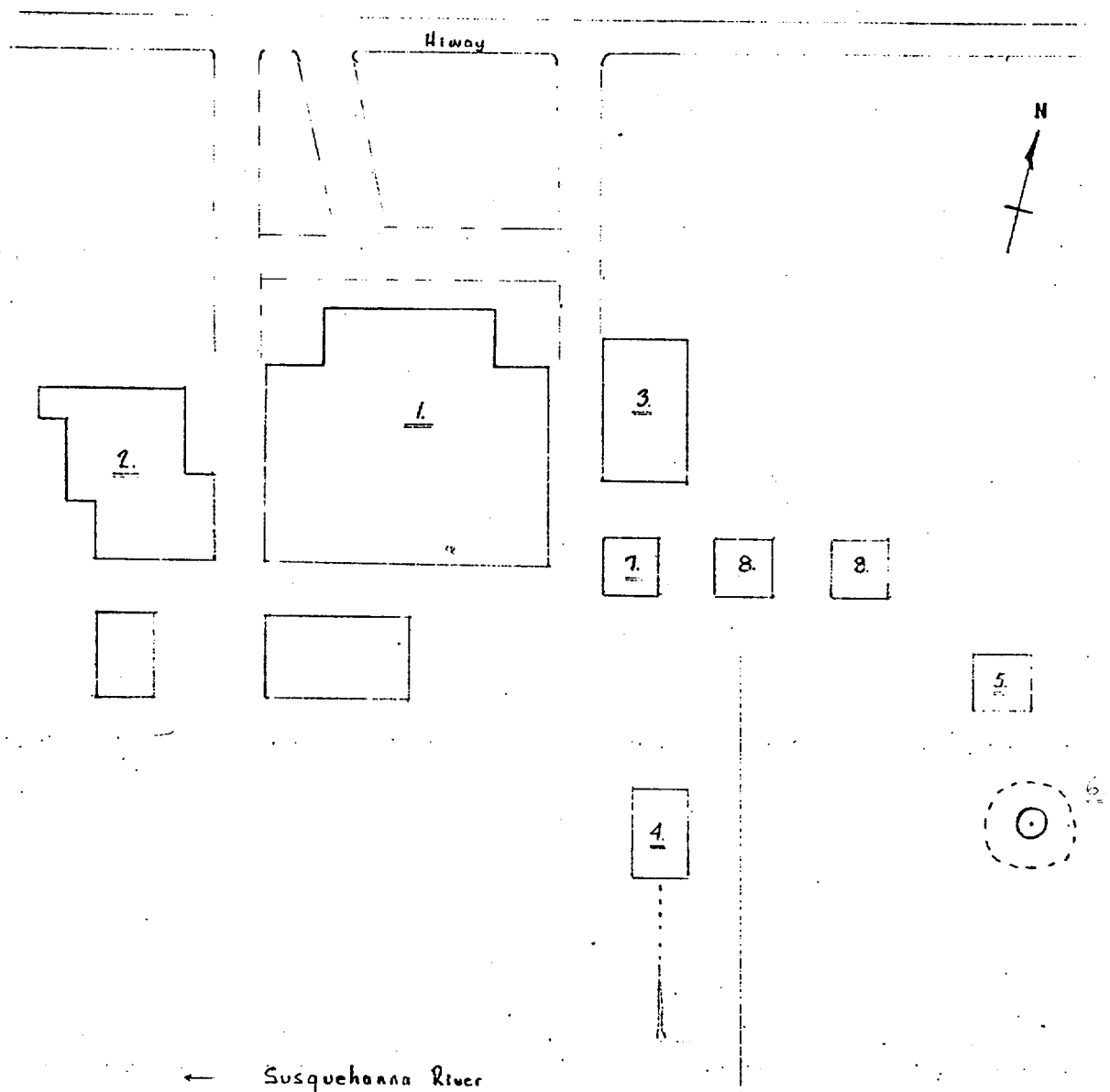
(2) Assay about 1 c per 1 sq. in.

(3) Received from Radium chemie

(4) 60 mc turned over to the
production dept. during
Sept. 1962

Layout Of Buildings At Plant #1, Bloomsburg, Pennsylvania.

(not to scale)

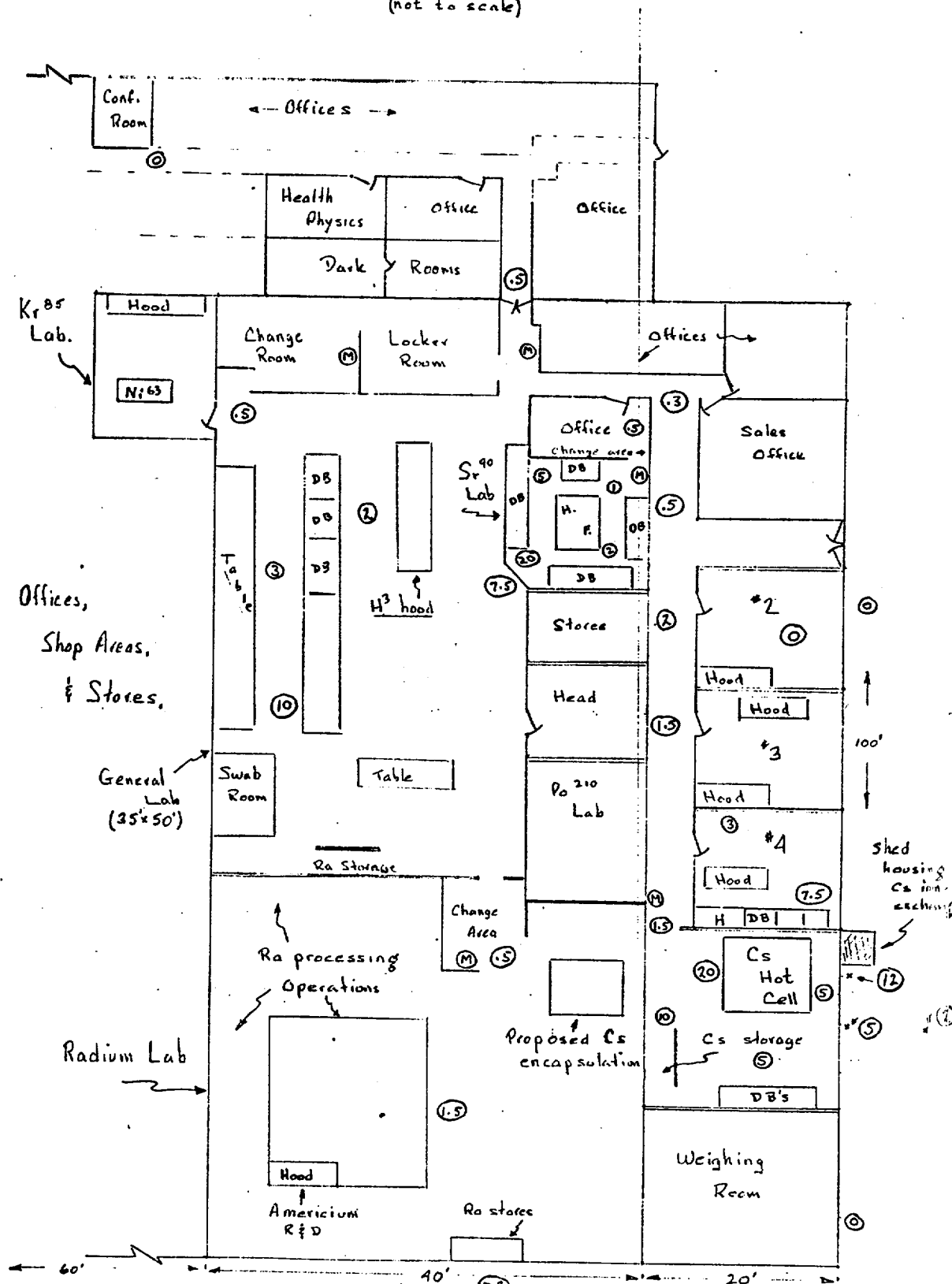


- Code for buildings:
1. Main building - houses Ra lab, general lab, Kr , H^3 , Cs & Sr labs.
 2. Old Etching Bldg - houses Ra dial & H^3 $\text{R}\&\text{D}$ lab, waste storage.
 3. Tritium Bldg - H^3 foil preparation, $\text{R}\&\text{D}$ lab.
 4. Liquid Waste Bldg - storage tanks, evaporators.
 5. Hot Waste facility - Packaging of solid wastes.
 6. Silo - Storage of solid waste before packaging.
 7. Ra supply - storage of Ra supplies.
 8. Byproduct Bldg - storage of liquid materials.

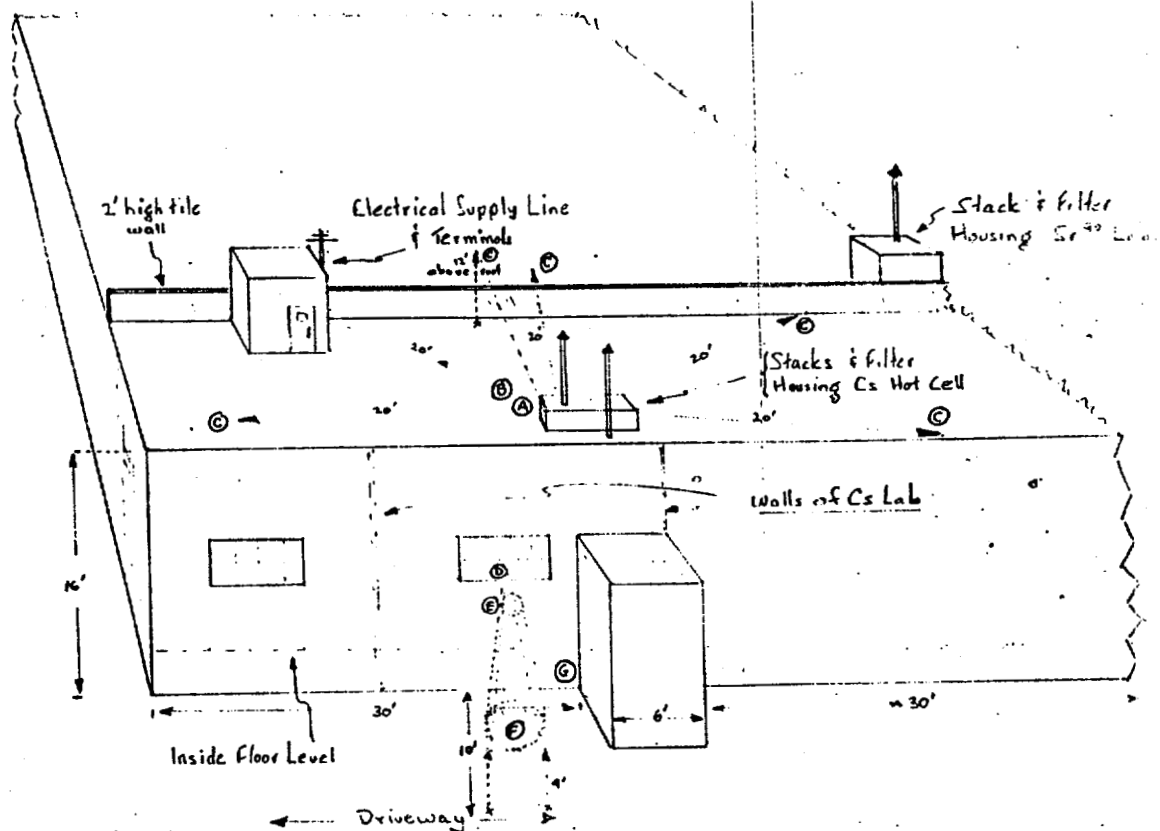
Notes: Buildings
1-6 only were
visited during
11/12-11/16/68.

A private home
is located about
100' east of
building # 5.

Main Building - Layout Of Radiosotope Handling Laboratories - First Floor
(not to scale)



Sketch Of Roof Main Building - Plant #1 - Showing Results
Of Radiation Instrument Survey Above Cs Lab.
(not to scale)



Note: (1) The filter housing & stacks on the roof over the Cs Lab are exactly above the Cs¹³⁷ hot cell. Roof levels (A, B, C) noted on 11/16/62 were a result of the 10c Cs¹³⁷ located in the cell and not from the filters located in the housing.

(2) Radiation levels D, E, F, are apparently the result of direct radiation from a hot filter located in the Cs¹³⁷ lab.

(3) Radiation level noted at G emanating from a hot drain under floor of the hot cell. Drain comes from ion-exchange column in shed.

Code: (A) - 200 mr/hr out 1' from far corner of housing & 21' above roof.

(B) - 130 mr/hr out 3' from far corner of housing & 23' above roof.

(C) - 5 mr/hr detected 20' away from housing in all directions from a height of 23' above the roof to a height of 12' - the maximum height obtainable for a reading.

(D) - 12 mr/hr at window surface - 6' above ground

(E) - 5 mr/hr about 2' from window within approximate cone drawn

(F) - 2 mr/hr 10' from building at face of cone sketched - face started 4' above drive & went to height of 12' at 6'

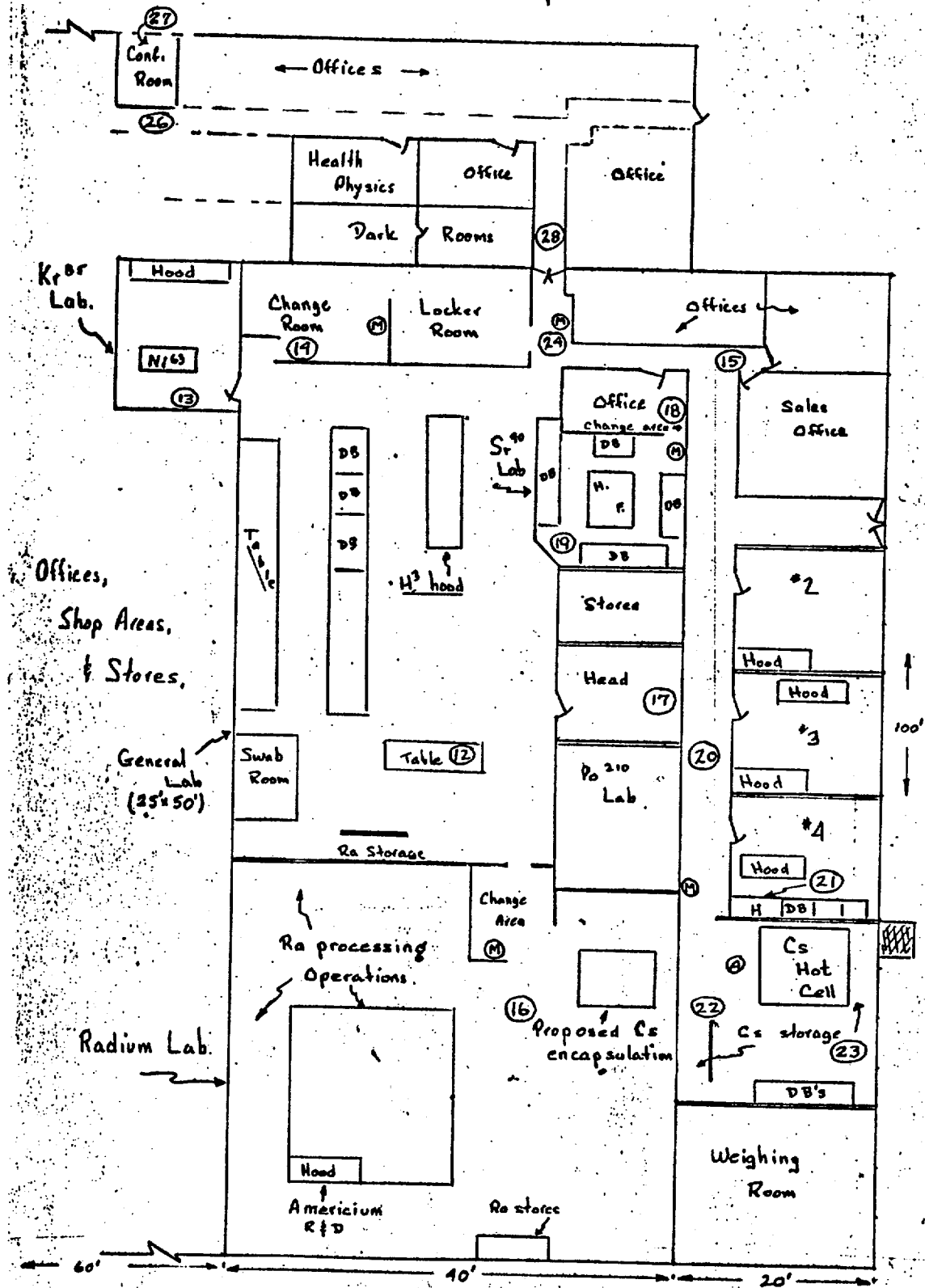
(G) - 12 mr/hr at distance of 2' above ground 1' away from corner.

EXHIBIT #I

Main Building - Layout Of Radioisotope Handling Laboratories - First Floor

(not to scale)

Smears and Air Sample Locations



Code: DB - dry box

H - hood

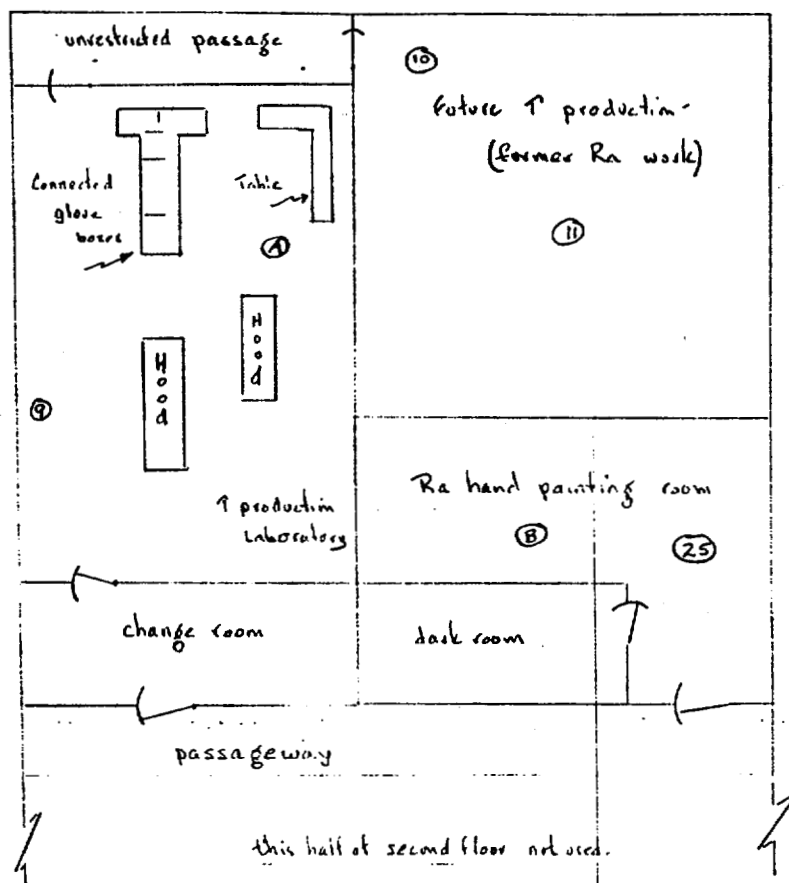
F - Furnace

① - locations where smears were taken 11/14 - 11/15/62; see exhibit #I

② - air sample in Cs lab; refer to exhibit #I, entry 30.

EX-15 - #3

Layout of T & Ra Shops - 2nd Floor - Main Building : Results of
Smear Samples and Meter Surveys
(not to scale)



Code: Ⓢ - circled numbers - areas of smear samples - see exhibit # I for results.

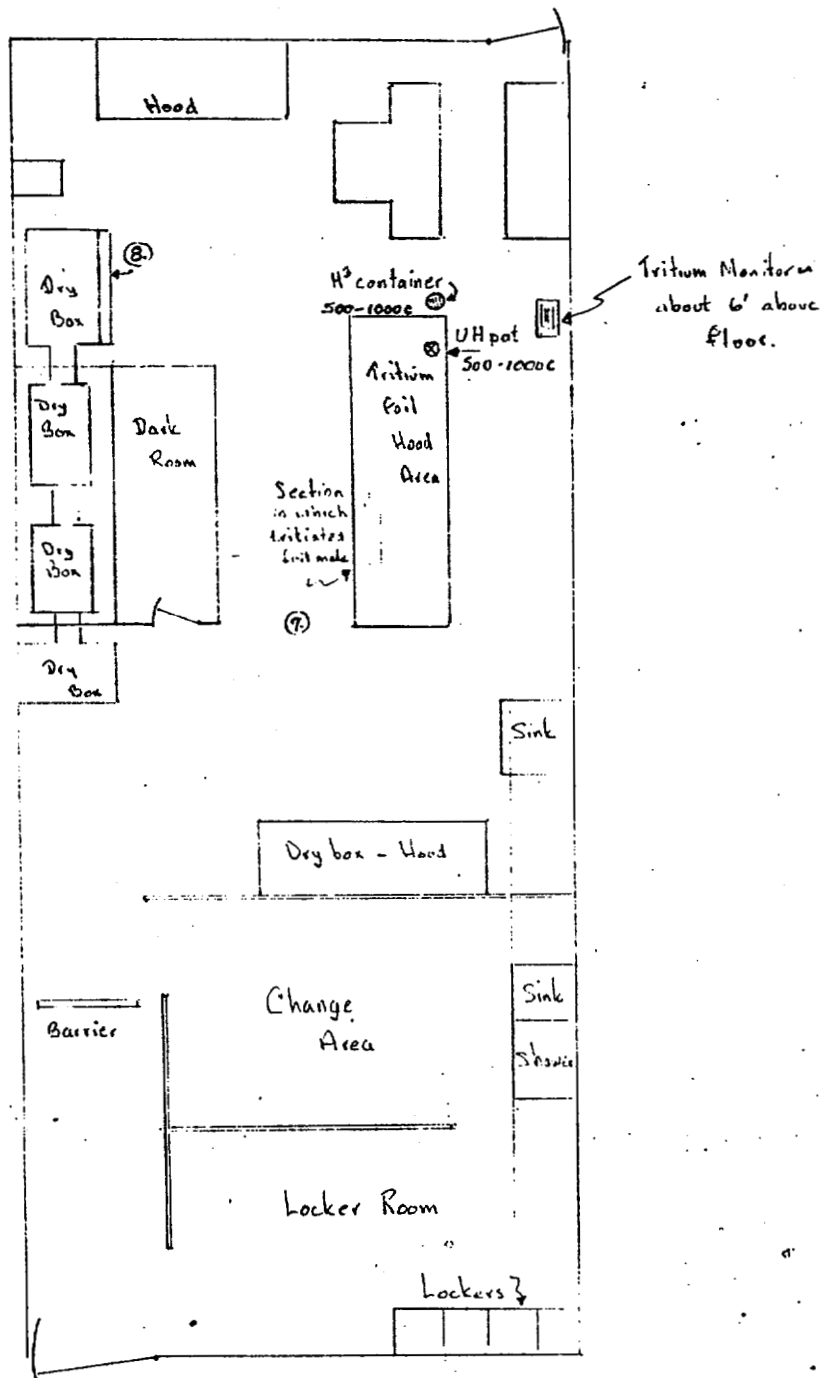
ⓐ - circled letters - instrument surveys

A - within T production lab - background ≈ 2 m/hr.

B - within Ra hand painting room,

area of Ra work - 1.0 m/hr, background ≈ 2 m/hr.

Layout of the Tritium Building
(not to scale)

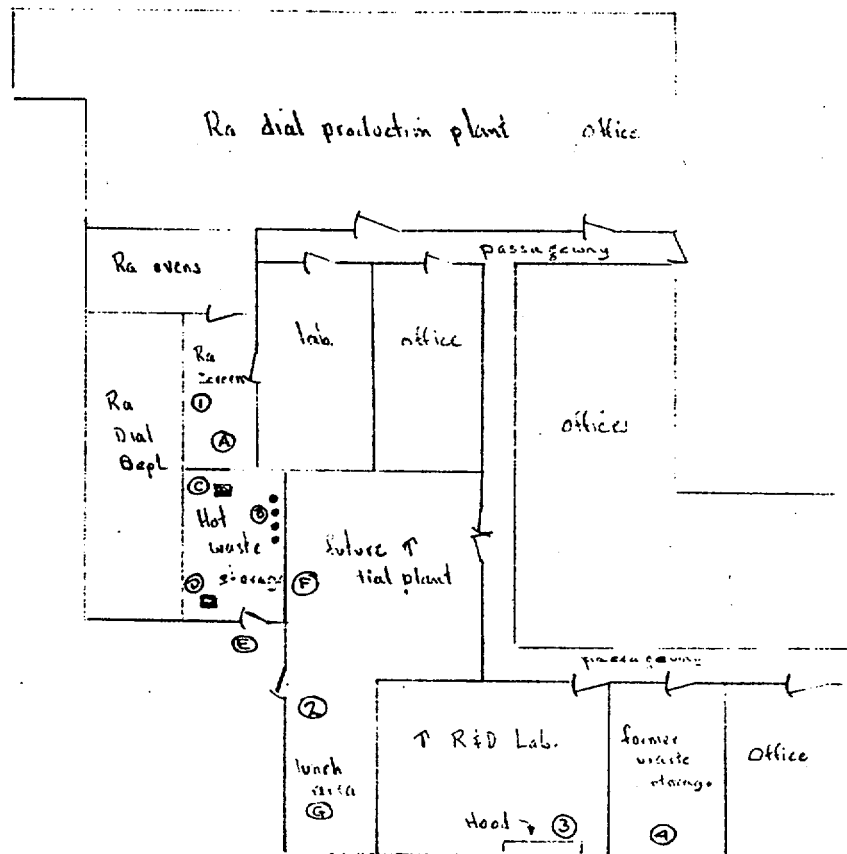


Codes ⑧ - location of smears: refer to exhibit "I" for results.

Note: no instrument survey was made.

Layout of the Old Etching Plant (not to scale)

Shows are survey results & locations of smears taken in the radium facilities, tritium lab, and waste storage room - 11/14/62



Five rooms were visited on 11/14/62 - Ra screening, current storage for packaged wastes, future H^3 dialplant, H^3 R&D lab, and former waste storage.

Code: ⊙ - circled numbers - site of smear sample - refer to exhibit # I for results of smears.

⊙ - circled letters - air sample and instrument surveys

- A - air sample taken in Ra screening room - see exhibit # I, entry 29.
- B - 2nd barrel containing 4.75 mc Sr^{90} waste - surface level 30 mc/hr
- C - box containing 221.5 mc Cs^{137} waste - surface level 50 mc/hr
- D - box " 17.5 mc Co^{60} " - " " 50 mc/hr.
- E - 12" from door to waste storage room - < 2 mc/hr
- F - 18" from wall between storage & new T plant - < 2 mc/hr
- G - at lunch table - < 1 mc/hr

Summary of Smear and Air Samples Taken by CO-1 on11/14 - 15/62

<u>Sample No.</u>	<u>Location</u>	<u>Reference Exhibit</u>	<u>Results*</u>		
			<u>Net dpm</u>	<u>Net dpm</u>	<u>Y</u>
1	Radium Shop - Screening table	H.	1,200	2,700	1,100
2	Lunch Table in Etching Shop	H.	1.3	200	0
3	Top of Hood - H-3 R&D Lab.	H.	.75	3,000	9.8
4	Window Sill - Former Waste Storage Room	H.	.37	210	0
5	Work Table - Evaporator Building	None	1.9	230	65
6	Hot Spot on Floor of Waste Processing Plant	None	55	20,000	18,000
7	Tritium Building - Floor	G.	2.1	19	12
8	Tritium Building - Bench Top and Glove Box	G.	.37	69	15
9	Second Floor H-3 Production Area - Window Sills	G.	1.1	26	0
10	Second Floor H-3 Production Area - Floor	G.	150	1,200	75
11	Main Building - Second Floor - Proposed H-3 Shop	G.	62	510	67
12	General Lab - Desk	E	16	340	18
13	Krypton Lab	E.	19	360	78
14	Floor of Change Room	E.	52	340	53
15	Corridor Floor	E	9	45	26
16	Radium Lab - Main Building - Floor	E.	580	2,700	320
17	General Lab - Window Ledge - Head	E	42	240	23
18	Sr-90 Lab - Floor Change Room	E.	36	300	48
19	Sr-90 Lab - Floor	E	37	3,000 ⁺	820
20	Corridor Opposite Lab-3	E.	35	220	0
21	Lab No. 4 - Top of Hood	E.	37	740	90
22	Cesium Lab - Floor Opposite Storage Area	E.	11	1,000	300

U. S. R. C.

Summary of Smear and Air Samples Taken by CO:I on

11/14 - 15/62 (Continued)

<u>Sample No.</u>	<u>Location</u>	<u>Reference Exhibit</u>	<u>Results</u>		
			<u>Net dpm</u>		
			<u>α</u>	<u>β</u>	<u>γ</u>
23	Cesium Lab - Glove Box	E.	13	800	310
24	Monitoring Station - Floor	E.	18	110	29
25	Second Floor Radium Shop - Floor	F.	42	340	26
26 and 28	Floor - Conference Room and Passageway	E.	5	30	6
27	Conference Room - Window Ledge - Door top	E.	27	170	22
29	Radium Screening Room 40 min. air sampling 34 l/m	H.	1.5 (.7 x 10 ⁻¹⁰ uc/ml)	250	1.1
30	Cesium Lab 45 min. air sampling - 34 l/m	E.	.19 (1 x 10 ⁻¹⁰ uc/ml)	330	6.5

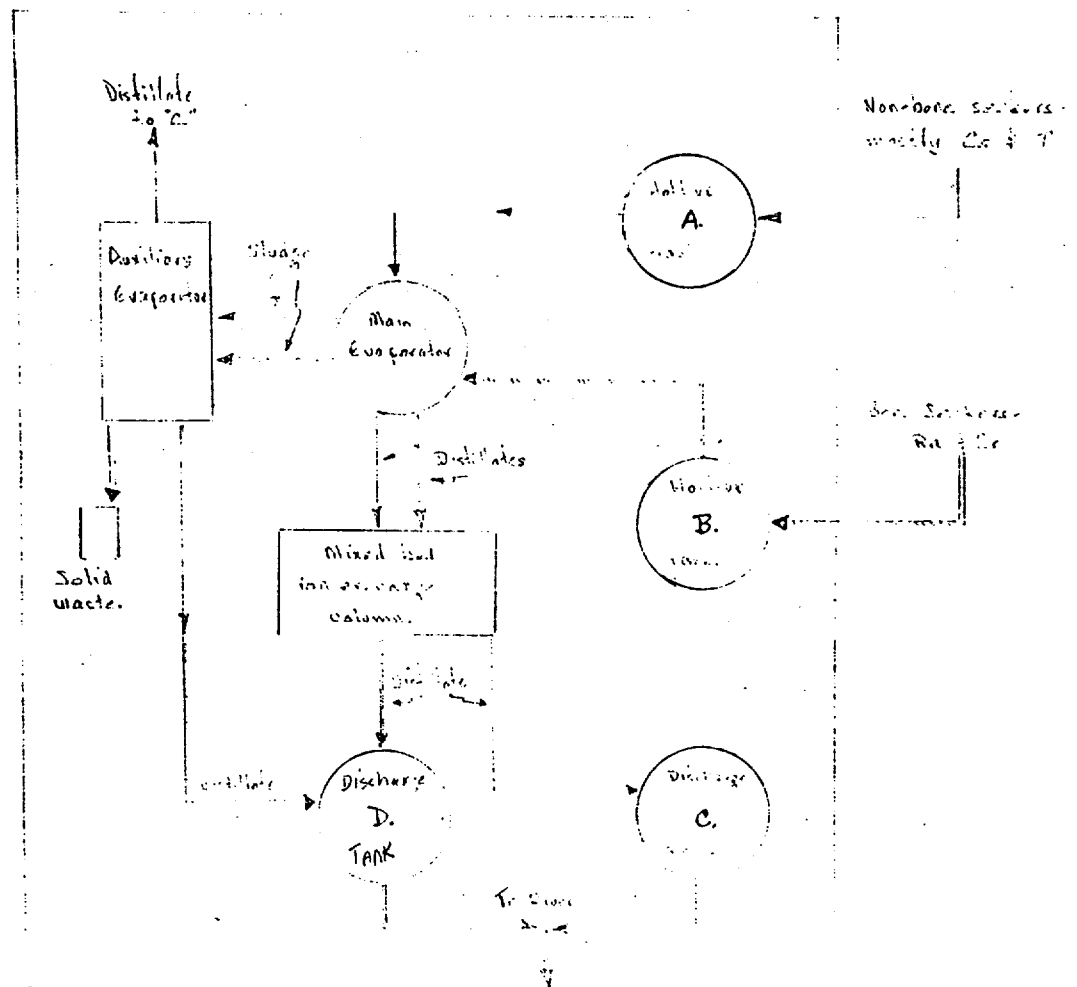
* Smears analyzed by HASL-NYOO. Method of Determination: alpha and beta-phosphor count, and gamma^{gamma} well count

NOTE: Items 2, 26, 27 and 28 were taken in unrestricted areas

The results of smears analyzed for H-3 are qualitative only inasmuch as smears contained an unknown quantity of H-3 and the counting efficiency for H-3 (between 2% and 5%) was not taken into account.

Exhibit I (continued)

Schematic - Liquid Waste Disposal System.

Summary of Operations of the Disposal System:

- (1) Liquid wastes from the Cs, Ni, T, Kr labs drain into the holdup tank designated "A". (Liquid waste from the Cs lab (hot cell) is the effluent from the ion exchange column located outside the Cs lab.)
- (2) Wastes from the Sr and Ra labs drain into holdup tank "B".
- (3) The level of the liquid in "A" and "B" is kept low by frequent processing of the waste. Each tank is processed separately through the system with the distillate of "A" stored in discharge tank "C", and the distillate of "B" stored in tank "D". Separate handling is also made of the sludge from the main evaporator.
- (4) "C" and "D" when full, are sampled to determine the activity and, hence the amount of dilution required for discharge to the Susquehanna River. Each tank is discharged separately.
- (5) If the activity of "A" or "B" is found to be low, the contents of these tanks may be discharged directly to the river.

Liquid Waste Disposal to Susquehanna River

(Extracts Taken from 1962 Disposal Records)

<u>Entry</u>	<u>Tank Discharge</u>	<u>Date of Discharge</u>	<u>Isotope</u>	<u>Concentration uc/ml</u>	<u>Total uc Discharge</u>	<u>Total Volume(ml) Discharge, W+D*</u>
1.	A	1/6	Radium	8.35×10^{-6}	812.7	9.7×10^7
			Cesium	2.01×10^{-4}	19.5	
			Tritium	4.27×10^{-4}	41,536	
2.	C	1/17	Tritium	7.26×10^{-4}	2,362	3.18×10^7
			Cesium	2.76×10^{-7}	8.8	
			Radium	2.84×10^{-8}	.875	
3.	D	2/2	Tritium	3.01×10^{-4}	10,220	3.39×10^7
			Strontium	3.17×10^{-7}	10.74	
			Radium	1.66×10^{-8}	.54	
4.	D	2/14	Tritium	7.9×10^{-4}	23,967.9	3.04×10^7
			Strontium	1.3×10^{-6}	39.46	
			Radium	5.55×10^{-8}	1.687	
5.	B	2/15	Tritium	1.53×10^{-4}	55,900	3.65×10^8
		- 2/21	Strontium	1.45×10^{-5}	5,300	
			Radium	5.73×10^{-7}	209	
6.	C	2/21	Tritium	7.7×10^{-4}	31,280	4.06×10^7
			Cesium	3.74×10^{-7}	15.19	
			Radium	1.41×10^{-7}	5.7	
7.	B	2/21	Tritium	1.25×10^{-4}	5,260	4.21×10^7
			Strontium	1.19×10^{-5}	502	
			Radium	4.72×10^{-7}	19.85	
8.	C	10/29	Tritium	1.59×10^{-3}	13,477	5.12×10^7
			Cesium	7.48×10^{-8}	3.83	
			Radium	3.18×10^{-10}	.016	

NOTE: 12 Additional Discharges During 1962

NOTE: Total Waste Discharge by Isotope to 11/1/62

Tritium 700,000 uc

Strontium 6,100 uc (Specific nuclide Sr-90)

Radium 1,000 uc (Specific nuclide Ra-226)

Lead 7.08 uc (4/27) (Specific nuclide Pb-210)

Cesium 35 uc (Specific nuclide Cs-137)

*W+D = Waste plus Dilution