NDSAY RARE EARTH CHEMICALS

American Potash & Chemical Corporation

[illegible] MAIN STREET • WEST CHICAGO, ILLINOIS

August 1, 1962

Director, Division of Licensing and Regulation
U.S. Atomic Energy Commission
Washington 25, D.C.

Dear Sir:

In order to conform with 10CFR20.405 we hereby report that two of our operators were over-exposed (max. 1280 mrem) to whole body radiation during our second quarter in 1962, April 16 to July 15.

During the final month of the period both men received 360 mrem. It is believed that steps which have been taken, including job rotation, will insure that these men will not be over-exposed in the future.

Names and exposures are attached. Reports are being furnished to those over-exposed as per 10CFR20.405.

Very truly yours,

AMERICAN POTASH & CHEMICAL CORPORATION
West Chicago Plant

R. M. Healy

R. M. Healy
Radiation Safety Officer

RMH:er
attach

CC: Manager
Atomic Energy Operations Office
9800 S. Cass Avenue
Argonne, Illinois

COPY

EXHIBIT E
PAGE 2

Name	Social Security No.	Period	Whole Body Radiation (mrem)
		4/16/62-7/15/62	1280 (2 cobtamin badges)
		4/16/62-7/15/62	1260

Sanitized

COPY

EXHIBIT E
[illegible] 2

CONDENSATION OF FILM BADGE RESULTS
(1/15/61 THROUGH 3/15/62)

BEGINNING DATE OF BADGE	NUMBER OF BADGES SHOWING EXPOSURES (MREM)				
	LESS THAN 100	100 TO 200	200 TO 300	GREATER THAN 300	MAXIMUM (MR. WHOLE BODY
1/15/61	85	21	12	5	420
2/15/61	109	10	10	3	320
3/15/61	100	15	6	6	420
	MAXIMUM QUARTERLY - *		-1020;	-1040	
4/15/61	85	6	2	2	350
5/15/61	80	6	3	1	310
6/15/61	76	3	1	2	710
	MAXIMUM QUARTERLY -		-1060		
7/15/61	79	3	4	1	370
8/15/61	90	4	5	0	290
9/15/61	85	7	2	0	270
	MAXIMUM QUARTERLY -		-690;	-710	
10/15/61	85	6	3	2	720
11/15/61	4	80	4	4	380
12/15/61	101	13	1	0	260
	MAXIMUM QUARTERLY -		900		
1/15/62	89	49	15	12	590
2/15/62	99	41	15	12	530
3/15/62	100	33	14	12	860
	MAXIMUM QUARTERLY -		1460		

* Stated that exposure is not valid. Jacket with badge attached was left on thorium nitrate container. Film exposure is not indicative of personnel exposure.

EXHIBIT E, ATTACHMENT 3

RECORDS OF DIRECT READING SURVEYS

5/22/61 : Direct gamma readings at exterior of thorium nitrate drums:
Maximum 18 - 20 mr/hr at side of drum; 3.5 to 4 mr/hr at 3 feet from side; 8.5 to 9 mr/hr at 1 foot from side.

5/22/61 : Warehouse at "twelve acres:" - 5 mr/hr at surface; 0.7 to .75 mr/hr at 10 feet.

3/2/60 : Fiber drum of thorium oxide:
15.5 mr/hr at 6 inches from the drum; 1.9 mr/hr at 36 inches from the drum - with the top open - 13.5 mr/hr at 6 inches from the top of the oxide; 1.5 to 1.55 mr/hr at 36 inches from the top of the oxide.

2/15/60 : Railroad car with thorium hydroxide in 50 gallon drums:
Top of car - maximum 7.5 mr/hr; at one meter from top - 4.5 mr/hr.
End of car - 4.7 mr/hr at 1 meter; 2.7 mr/hr at 2 meters; 1.5 mr/hr at 3 meters; 1.2 mr/hr at 4 meters.
Bottom of car - maximum 50 mr/hr.
West side - maximum 12 mr/hr; 7 mr/hr at 1 meter.
East side - maximum 11 mr/hr; 6 mr/hr at 1 meter.

5/3/60 : Between tanks and wall area in Building 5 at northwest end of ion exchange and dissolving tank: - maximum - 1.2 mr/hr.

2/19/60 : Railroad car loaded with 50 gallon drums of pink salts:
Inside of car - top of drums - 0.25 - .30 mr/hr. 1 meter above drums - 0.20 mr/hr.
Outside of car at approximately 50 feet - 0.25 to .35 mr/hr.

About
3/25/62 : Solid thorium waste storage at "twelve acres"
Radiation level determined at 50 foot intervals along the fence bordered the "twelve acres" warehouse and storage areas in close proximity to the thorium "mud" waste pile. At the fence location closest to this pile (approximately 10 feet distance) a maximum reading of 1.95 mr/hr is recorded. (See Exhibit C, Attachment 2).

EXHIBIT F

DETERMINATION OF OVEREXPOSURE TO AIRBORNE RADIOACTIVITY

If an area is determined by an air sample to be more than 3×10^{-11} uc/ml of thorium activity, additional samples are taken to verify this. If the additional samples do verify the activity levels in excess of the permitted value and the time of the workers assigned to the area is not documented, then a 40-hour exposure time is assumed and the exposure of the workers is calculated based on a 40-hour exposure in 7 consecutive days. On this basis, the workers would be reported as overexposed.

If the workers' time within the area has been documented at something other than 40 hours of exposure in 7 consecutive days then calculations are made based on the documented exposure time and the 3×10^{-11} uc/ml limit increased or decreased depending on this exposure time. Based on these calculations, it would be determined whether an overexposure had occurred.

By use of this method, the licensee determined three employees to have been exposed to concentrations in excess of permitted limits. The licensee reported these overexposures by letter of January 29, 1962. A copy of this letter is attached.

EXHIBIT G

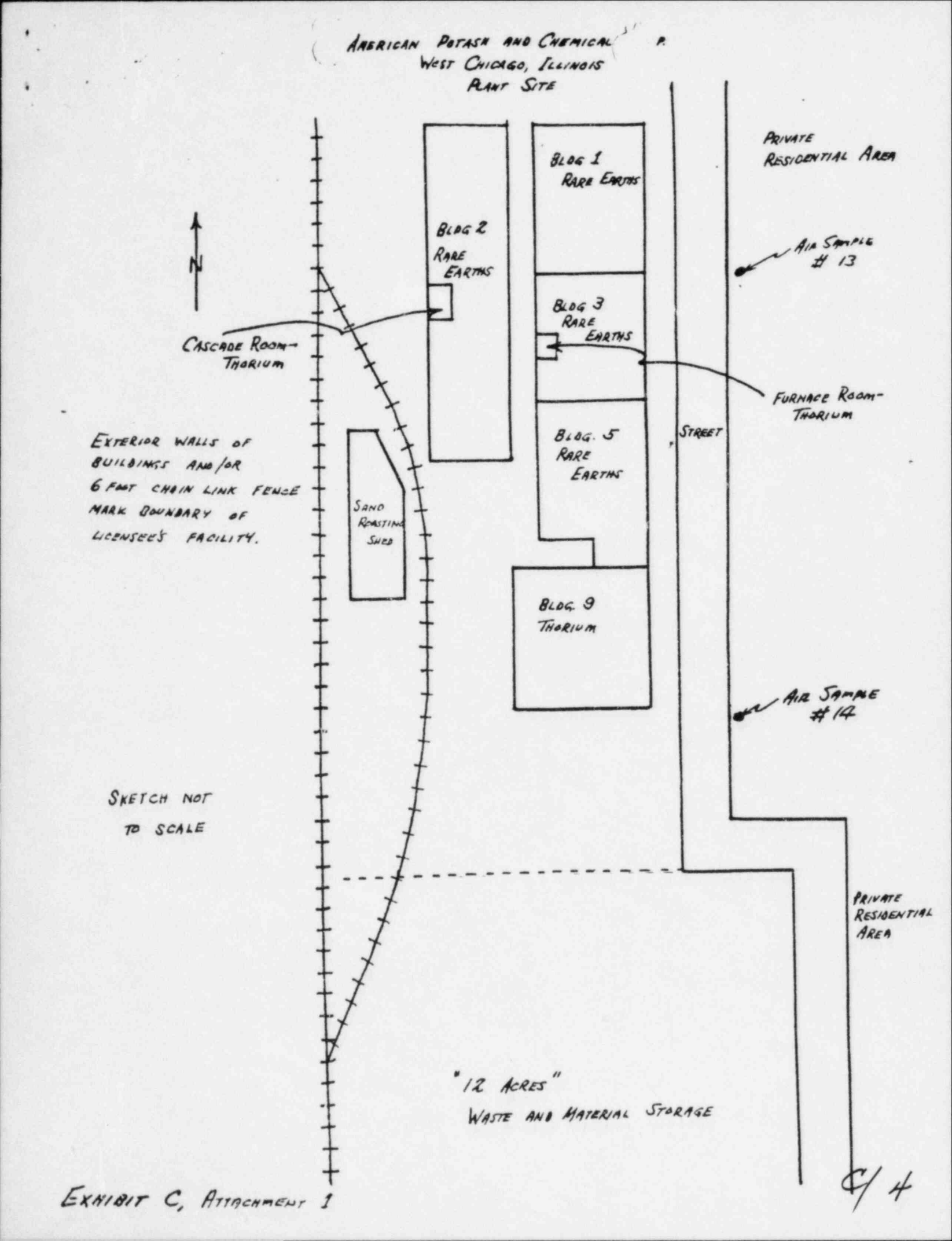
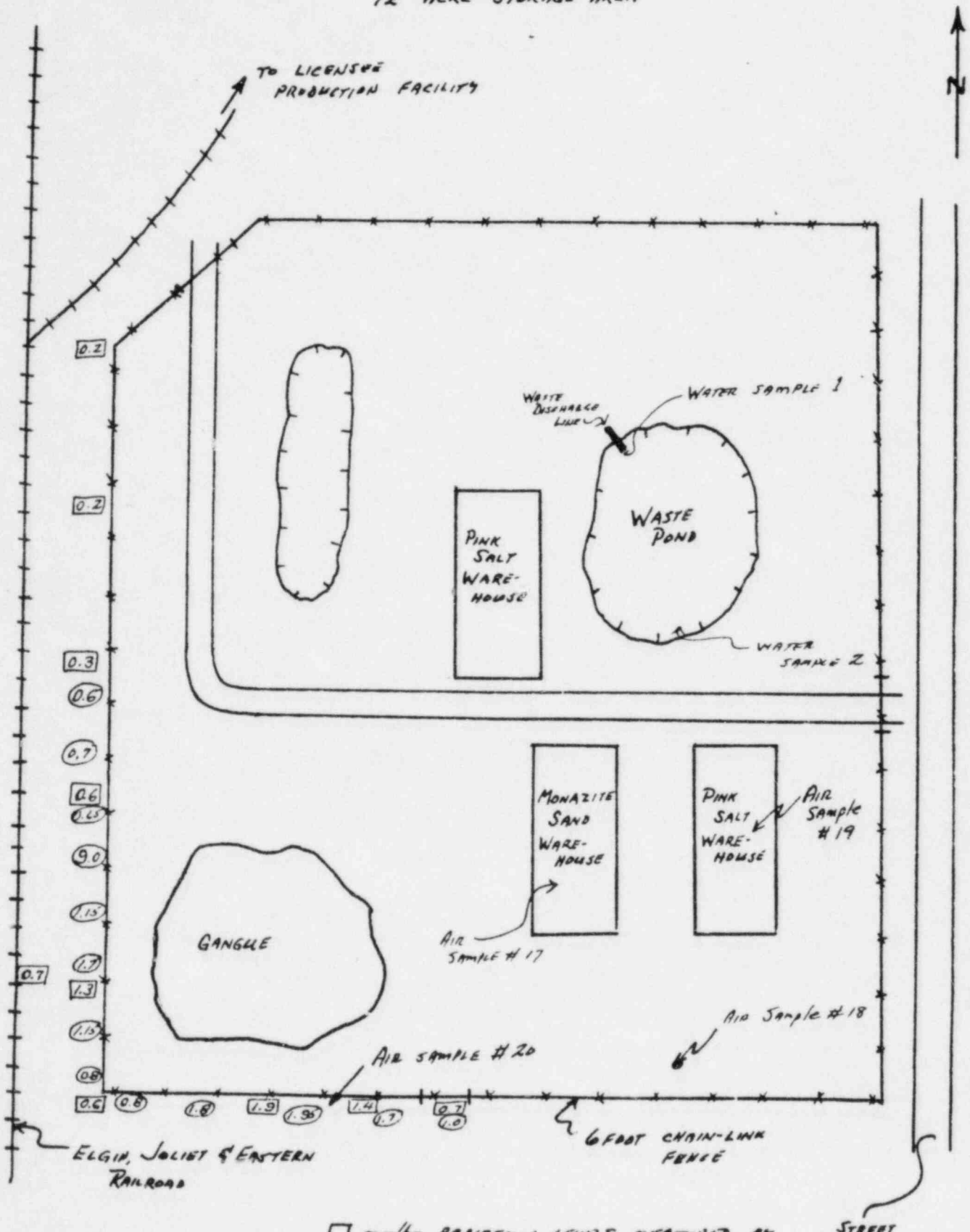


EXHIBIT C, ATTACHMENT 1

AMERICAN POTASH AND CHEMICAL CORP.
WEST CHICAGO, ILLINOIS
"12" ACRE STORAGE AREA



□ mr/hr RADIATION LEVELS MEASURED BY AEC REPRESENTATIVES.

○ mr/hr RADIATION LEVELS SHOWN ON LICENSEE'S SURVEY RECORDS.

EXHIBIT C, ATTACHMENT 2

WATER SAMPLE RESULTS

For location of samples, see Exhibit C, Attachment 2.

Sample 1:

2×10^{-6} uc/ml soluble

6×10^{-6} uc/ml insoluble

Sample 2:

1×10^{-6} uc/ml soluble

"Trace" insoluble

EXHIBIT C, ATTACHMENT 3

ID-130
(8-59)

U. S. ATOMIC ENERGY COMMISSION
IDAHO OPERATIONS OFFICE
HEALTH AND SAFETY DIVISION
SAMPLE RECORD

Serial No. 25[illegible]

Sample from: American Potash & Chemical Corp. (Lindsay Chemical Company)
Address: West Chicago, Illinois
Collected by: John G. Davis, William E. Twaler
Date:
Analyzed by: C.O. Willis
Date: 5-17-6[illegible]

Exhibit C. Attachment 4

Sample No.	Hour	Sample Description	Sampling Rate L/M	Sampling Time Min.	Sampling Total Liters	Anal. No.	Quantity Used, ml.	Fluor. Read., sc. div.	Thorium present Total ~~Net~~ μc curies	Thorium present μc/ml x 10⁻¹⁰
17.	5-2 1:30	General air sample - Monazite Warehouse - "12 Acres"	560	5	2800		50λ	19.3	0.1	<0.05
18.	5-2 1:00	General air sample - 150 yards S.E. of Gangue Pile - Wind Variable from N.W. to N.	560	5	2800		50λ	19.2	0.0	<0.05
19.	5-2 2:00	General air sample - Pink Salt Warehouse - "12 Acres"	560	5	2800		50λ	19.2	0.0	<0.05
20.	5-2 3:00	Fence line directly south of Gangue Pile - "12 Acres"	560	15	8400		102λ	19.2	0.0	<0.08
E-83	5-1 11:30	General air sample - ground - 3 feet from Monazite sand Hopper - Pot Baking Area	24	95	2280	1	502λ	22.4	3.2	1.0
E-84	5-2 9:45	General air sample - top of D7-3 tank - Building No. 9 - 3rd Floor Area	24	30	720	2	200λ	64.3	45.1	10.9

Standard 98.9 sc. div. per 5 μg. Blank 19.2 sc. div. Sensitivity 0.0627 microgram/sc. div.

APPROVED

Chief, Analysis Branch

~~D-130~~
(8-59)

U. S. ATOMIC ENERGY COMMISSION
IDAHO OPERATIONS OFFICE
HEALTH AND SAFETY DIVISION
SAMPLE RECORD

Serial No. 25[illegible]

Sample from: American Potash & Chemical Corp. (Lindsay Chemical Company)

Address: West Chicago, Illinois

Collected by: John G. Davis, William E. Twaler

Date:

Analyzed by: C B Willis

Date: 5-17-6

Sample No.	Hour	Sample Description	Sampling: Rate L/M	Sampling: Time Min.	Sampling: Total Liters	Anal. No.	Quantity Used λ	Fluor. Read., sc. div.	Thorium present: Total μc curies	Thorium present: μc/ml x 10
1.	5-3 9:55	Entrance to plant on floor under time clock	560	15	8400		10λ	19.2	0.0	<0.08
2.	5-3 12:30	Breathing zone sample - thorium nitrate loading	560	6	3360		25λ	19.5	0.3	0.1
3.	5-3 1:15	Breathing zone sample - scale - Building 2 - Balcony	560	4	2240		50λ	69.8	50.6	15.1
4.	5-3 1:45	Breathing zone sample - Rare earth Hydrate - Worker Shoveling Hydrate	560	5	2800		50λ	19.8	0.6	0.2
5.	5-3 1:05	Building No. 5 - BHI-2 tank - Ion Chamber Section	560	5	2800		50λ	19.3	0.1	<0.05
6.	5-1 10:00	Breathing zone sample - taken at roaster while cutting bags	560	5	2800		50λ	22.2	3.0	0.7
7.	5-1 11:00	Loading Hopper - Building No. 1 - Railroad Dock - Breathing zone sample	560	5	2800		50λ	20.1	0.9	0.2
8.	5-1 1:30	General breathing zone sample - Monazite Sand Hopper - Pot baking area - 3 ft. from Hopper	560	5	2800		50λ	21.2	2.0	0.5
9.	5-1 2:00	General area sample - Building No. 9 - 3rd Floor	560	5	2800		50λ	20.2	1.0	0.2
10.	5-2 10:30	General breathing zone sample - thorium nitrate Evaporation - Building No. 9 - 2nd Floor	560	5	2800		50λ	19.2	0.0	<0.05
11.	5-1 10:15	Sand Roasting Shed - tote filler - Height of 3 feet	560	5	2800		50λ	27.8	8.6	2.
12.	5-2 11:30	Building No. 9 - 2nd Floor - Centrifuges Breathing zone sample	560	5	2800		50λ	20.2	1.0	0.2
13.	5-2 4:15	200 feet from N.E. corner of plant - Wind blowing from N.W.	560	20	11200		10λ	19.8	0.6	0.2
14.	5-2 3:45	S.E. corner of Building No. 9	560	25	14000		10λ	19.3	0.1	<0.05
15.	5-2 9:45	Edge of roof directly opposite of Dust Collector	560	5	2800		50λ	19.2	0.0	<0.05
16.	5-2 11:00	Center of 4 Pot Baking Platforms - North end of Pot Baking area - Building No. 9 - 4th Floor	560	5	2800		50λ	20.0	0.8	0.2

Standard 98.9 sc. div. per 5 μg. Blank 19.2 div. Sensitivity 0.0627 microgram/sc. div

C B Willis
APPROVED

Chief, Analysis Branch

EXHIBIT C, ATTACHMENT 4

ID-1,30
18 - 59

U. S. ATOMIC ENERGY COMMISSION
IDAHO OPERATIONS OFFICE
HEALTH AND SAFETY DIVISION
SAMPLE RECORD

Serial No. 25938

EXHIBIT C, ATTACHMENT 4

Sample from: American Potash & Chemical Corp. (Lindsay Chemical Company)

Address: West Chicago, Illinois

Collected by: John G. Davis, William E. Twaler

Date:

Analyzed by: C.B. Willis

Date: 5-17-6.

Sample No.	Hour	Sample Description	Sampling: Rate L/M	Sampling: Time Min.	Sampling: Total Liters	Anal. No.	Quantity Used, ml	Fluor. Read., sc div.	Thorium present: Total μc curies (net)	Thorium present: μc/ml x 10
E-85	5-2 9:43	Twelve 1/2-hour samples - taken with sequencial	5.5	30	165	3	5001	21.2	2.0	0.8
E-86	5-2 10:13	Located 3 feet from tote filler in Sand Roasting	5.5	30	165	4	0.823	25.1	5.9	2.5
E-87	5-2 10:43	Shed - Stationed about 4 feet above ground	5.5	30	165	5		22.3	3.1	1.3
E-88	5-2 11:13		5.5	30	165	6		25.2	6.0	2.5
E-89	5-2 11:43		5.5	30	165	7		24.8	5.6	2.3
E-90	5-2 12:13		5.5	30	165	8		22.2	3.1	1.3
E-91	5-2 12:43		5.5	30	165	9		20.2	1.0	0.4
E-92	5-2 1:13		5.5	30	165	10		24.0	4.8	2.0
E-93	5-2 1:43		5.5	30	165	11		21.6	2.4	1.0
E-94	5-2 2;13		5.5	30	165	12		31.0	11.8	5.0
E-95	5-2 2:43		5.5	30	165	13		22.0	2.8	1.2
E-96	5-2 3:13		5.5	30	165	14		25.2	6.0	2.5

Standard 98.9 sc div per 5 μg Blank 19.2 sc div Sensitivity 0.0627 microgram/sc div

C.W. Sill
APPROVED

Chief, Analysis Branch

ID-1130
(8-59)

U. S. ATOMIC ENERGY COMMISSION
IDAHO OPERATIONS OFFICE
HEALTH AND SAFETY DIVISION
SAMPLE RECORD

Serial No. 25639

Sample from: American Potash & Chemical Corp. (Lindsay Chemical Company)

Address: West Chicago, Illinois

Collected by: John G. Davis, William E. Twaler

Date:

Analyzed by: C. D. Willis

Date: 5-17-62

Sample No.	Hour	Sample Description	Sampling: Rate L/M	Sampling: Time Min.	Sampling: Total Liters	Anal. No.	Quantity Used, ml.	Fluor. Read., sc. div.	Uranium present: Total micrograms	Uranium present: μc/ml x 10
E-97	5-3 10:23	Seven 1/2-hour samples - taken with sequencial -	5.5	30	165	15	1002	65.9	net 46.8	98.5
E-98	5-3 10:53	Located between the two Monazite Sand Roaster	5.5	30	165	16	500 D.F. 2	38.5	19.3	8.1
E-99	5-3 11:23	Hoppers - 1 1/2 feet above ground	5.5	30	165	17		28.9	9.7	4.1
E-100	5-3 11:53		5.5	30	165	18		23.0	3.8	1.6
E-101	5-3 12:23		5.5	30	165	19		23.2	4.0	1.7
E-102	5-3 12:53		5.5	30	165	20		25.8	6.6	2.8
E-103	5-3 1:23		5.5	30	165	21		33.2	14.0	5.9

Standard 98.9 sc. div. per 5 μg. Blank 19.2 sc. div. Sensitivity 0.0827 microgram/sc. div.

APPROVED C. W. Sill

Chief, Analysis Branch

Exhibit C, Attachment 4

RESULTS OF SWEAR TESTS
(COUNTED ON MAY 8, 1962)

Alpha Background - 2 cpm
Yield - 0.16

Beta and Gamma Background - 22 cpm
Yield - 0.042

SWEAR NO.	LOCATION	ALPHA - DPM/100 CM^2	BETA - GAMMA DPM/100 CM^2
1	Floor, 2nd floor, Bldg. #9*	844	520
2	Floor, 2nd floor, Bldg. #9*	1110	590
3	Ra. Source, R & D Building	60	105
4	Interior of Monazite Bag*	586	500
5	Funnel #2, Bldg. 9, 3rd Floor*	5440	1120
6	Floor, 3rd floor, South Bldg. #9*	3440	910
7	Funnel #1, Bldg. 9, 3rd floor*	6140	1545
8	Floor at Sand Hopper, 4th floor, Bldg. #9*	865	1080
9	Floor, 4th floor, Bldg. #9*	493	500
10	Floor, 3rd floor, Bldg. #9*	950	7460
11	Floor, 3rd floor, Bldg. #9*	4140	1600
12	Lunch Room Table, 3rd floor, Bldg. #9*	81	154
13	Lunch Room Floor, 3rd floor, Bldg. #9*	220	192
14	Sidewalk outside bldg. Main Entrance	58	107
15	Floor - at door between entrance anteroom and process area	140	172
16	Floor - at Time Clock	53	90
17	Standard Storage Box - R & D Bldg.	20	33
18	Fe 55 container - R & D Bldg.	31	77
18-A		44	69
19	Floor - Cascade Room*	116	115
20	Elevator entrance - 2nd floor, Bldg. #9	870	600

* Location shown on sketch.

EXHIBIT C, ATTACHMENT 5

EXHIBIT C
ATTACHMENT 6

EXHIBIT C
ATTACHMENT 6

EXHIBIT C

ATTACHMENT 7

EXHIBIT C - ATTACHMENT 8

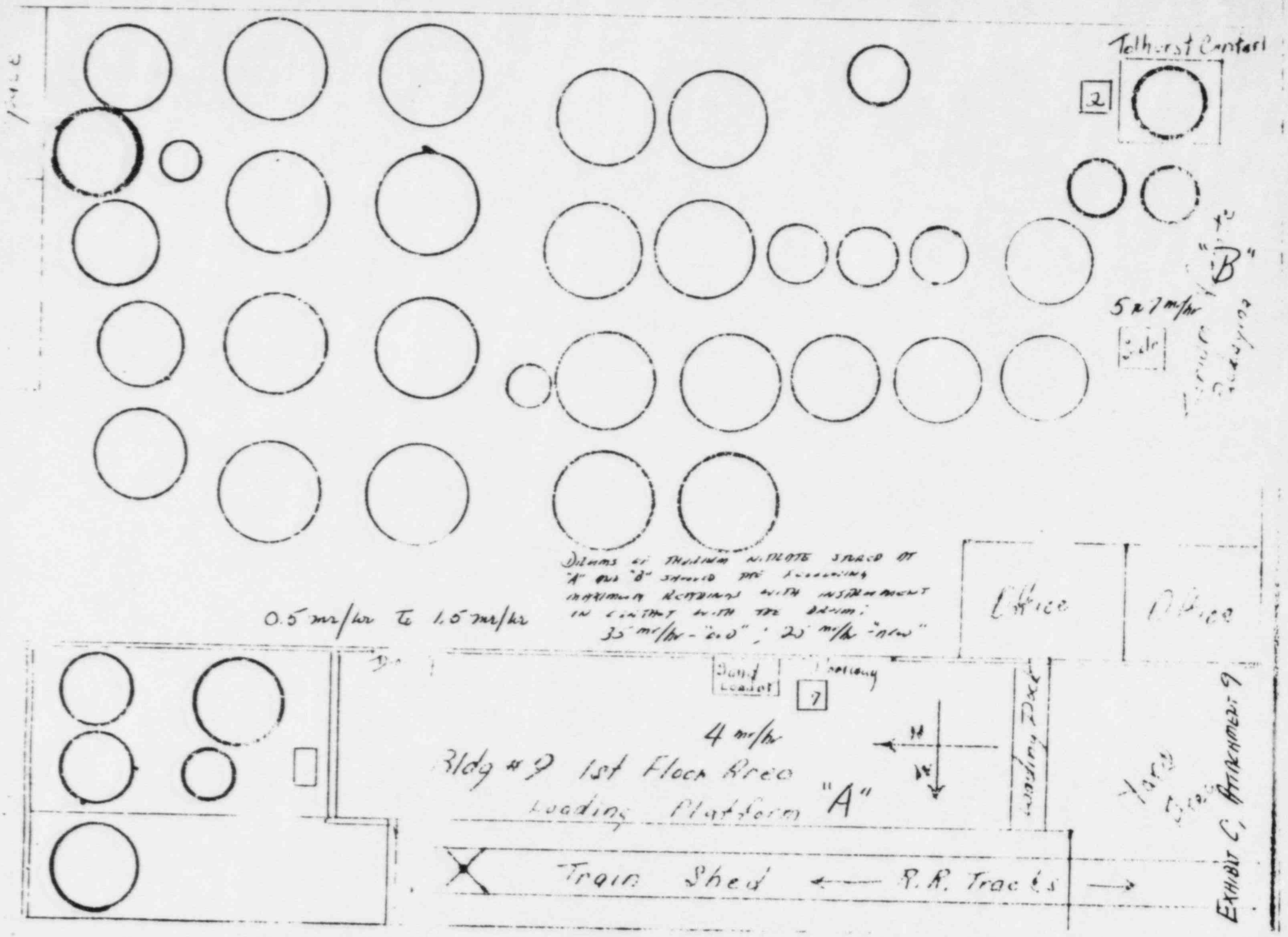
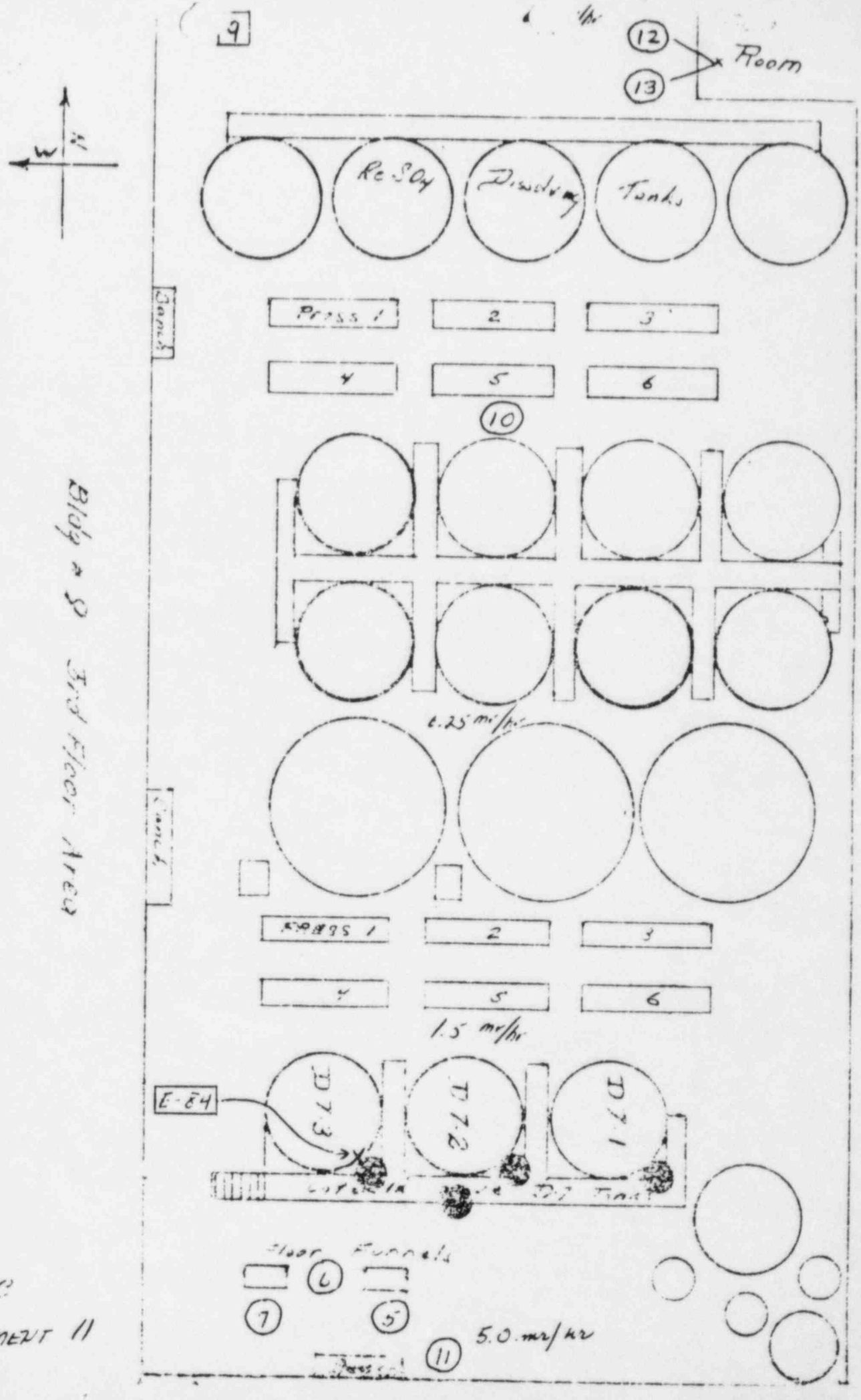

Tolhurst Contact
2
"B"
5 to 7 mr/hr
Office
Office
Band Leader
7
Gallery
4 mr/hr
Bldg #9 1st Floor Area
Loading Platform "A"
Factory Door
Train Shed
R.R. Tracks
0.5 mr/hr to 1.0 mr/hr
EXHIBIT C, ATTACHMENT 9

Exhibit C

Attachment to



Bldg. 50 First Floor Area

EXHIBIT C
ATTACHMENT 11

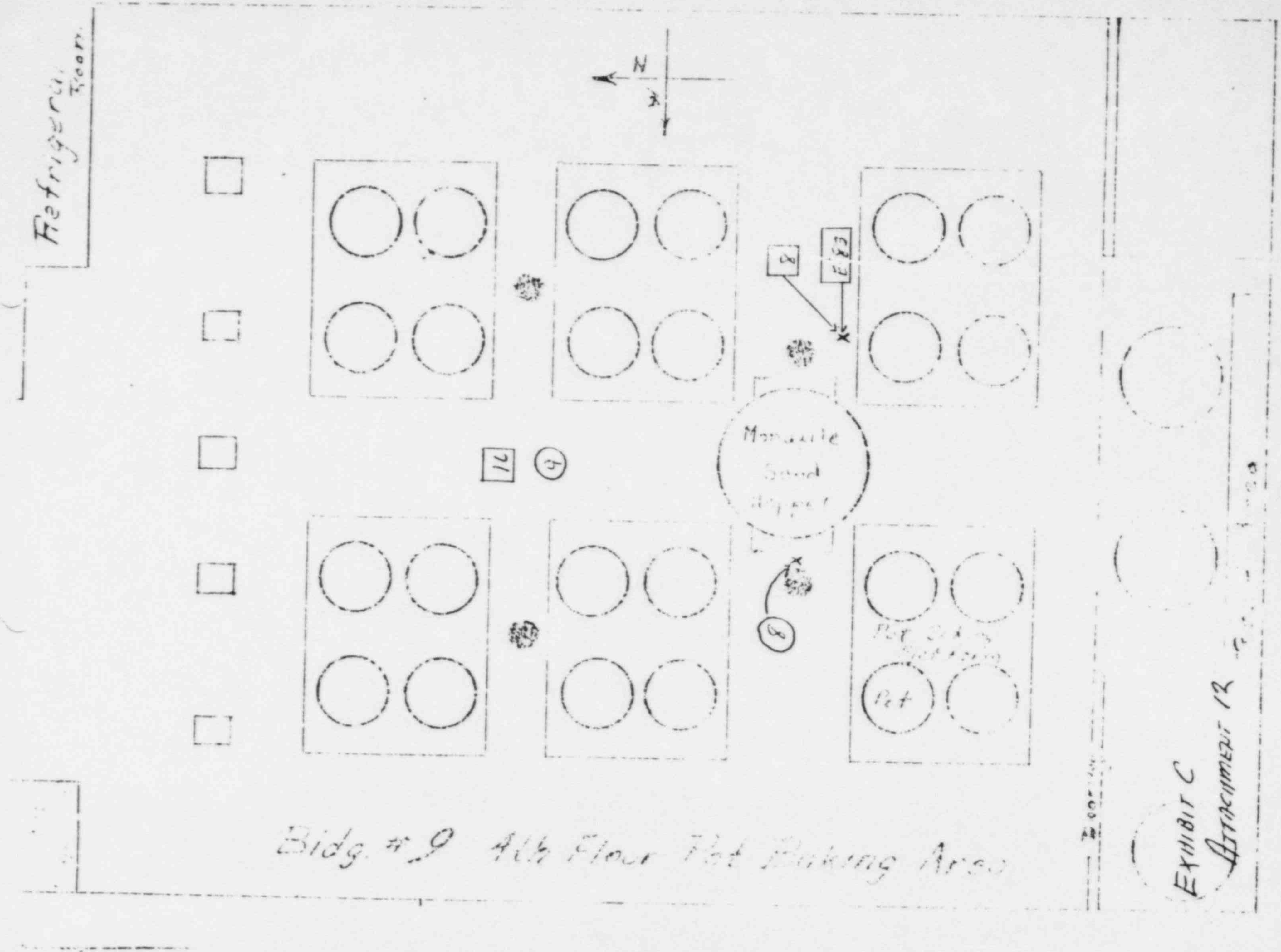


Exhibit C
Attachment 12
Refrigera. Room
N
Manasite Sand Hopper
E-83
8
8
9
17
Pot
Bldg. #9 4th Floor Pot Baking Area

EXHIBIT C, ATTACHMENT 13

FILM BADGES

All Lindsay employees working in this area must wear film badges as part of our radiation monitoring program.

RULES

1. When you report for work, take your badge from the file badge rack. When you leave for home, put your badge in the box at the time clock.

2. Make sure you have your own badge - your name is on it.

3. Under no circumstances are film badges to be taken home, or tampered with, or mutilated in any manner.

4. Wear the badge on your shirt collar. Don't put it in your locker or leave it anywhere.

5. You will not be told of the results of the badge readings unless they show excessive exposure to radiation.

Please cooperate.

(Signed) HOWARD KREMERS

EXHIBIT D

Records of exposure to external sources of radiation consist of supplier film badge reports and a card file. The film badge supplier is [illegible] Landauer, Matteson, Illinois. These two records contain the information equivalent to a Form AEC-5. Film badges are worn on the basis of a calendar month and are exchanged the 15th of each month.

The licensee does not maintain a Form AEC-4 for any employee. His exposure limit is 1.25 rem per calendar quarter.

Film badges were reviewed for the period January 15, 1961 through April 15, 1962.

As reported in a letter of May 9, 1962 from the licensee, four overexposures are shown in badge records for the period January 15, 1962 through April 15, 1962. These are:

Name	Whole Body Exposure (mrem)
	1400 (one badge contaminated)
	1390
	1380 (all three badges contaminated)
	1460

In a letter of August 1, 1962, the licensee reported two overexposures as shown by film badge results for the period April 16, 1962 through July 15, 1962. These are:

Name	Whole Body Exposure (mrem)
	1280 (2 contaminated badges)
	1260

Copies of the letters of May 9, 1962 and August 1, 1962 are attached to this Exhibit. It should be noted that film badges have been reported as contaminated. Exhibit C, Attachment 5 shows typical contamination results of the licensee's facilities. Such contamination on a film badge would render invalid the results of the badge interpretation. Licensee operations are such that low-level body and clothing contamination may be expected.

Attached to this exhibit is a compilation of badge results.

EXHIBIT E

LINDSAY RARE EARTH CHEMICALS

American Potash & Chemical Corporation

258 ANN STREET • WEST CHICAGO, ILLINOIS

LICENSE FILE ROUTING

[illegible]	
[illegible]	
[illegible]	
[illegible]	
EJM	
	[illegible]

January 29, 1962

Director, Division of Licensing and Regulation
U.S. Atomic Energy Commission
Washington 25, D.C.

Dear Sir:

In order to conform with 10CFR20.405 we hereby report that measurements indicate three of our employees have been present in excess concentrations of airborne activity.

The operation involved is roasting of monazite ore. Analyses of air samples taken on January 5 and January 9 indicate that the men have been working in an average concentration of approximately 9×10^{-11} μc Th(nat)/ml. Most of the difficulty has been due to abnormal conditions attendant to start-up of equipment which has been idle for a considerable period of time. Besides repair work, several modifications are in process of installation. We believe these changes will result in bringing the thorium concentrations below specified levels.

It was believed that the operation would be carried on without the necessity of authorization for face masks, however, as a safety precaution the men wear masks continuously while engaged in the operation of feeding monazite to the furnace. We hereby request authorization to take into account the filtering action of the masks worn when computing exposures during this operation.

1. Two types of masks are being used, Mine Safety Appliance Comfo Type H - CR76872, and American Optical Red Devil 5090.

To test the efficiency of the cartridge a special sampler head was constructed and air was drawn through the cartridge at 35 l/min before going through the sampler filter. A second sampler was placed next to the one with the cartridge to measure unfiltered air. Duplicate tests were performed on two types of cartridges. A Mine Safety Appliance Type H Ultra Filter was 98.6 ± 0.6% efficient. A Wilson Chemical Cartridge No. 43 was 94 ± 4% efficient.

2. Masks were carefully fitted to the individuals under supervision of the foremen. The face of one man was too small for the MSA mask, so he was fitted with an American Optical mask. The only available cartridge to fit this mask was the Wilson Chemical Cartridge. Other cartridges are now in stock which should be more efficient dust filters. They will be tested, and if superior we hereby request authorization to substitute them for the Wilson Cartridge. The men wear a cartridge until it affects ease of breathing. They then remove canister from mask, wash mask with soap and water, and assemble mask with new cartridge. The men are instructed to wipe any dust from inner surfaces of mask before using. The masks are enclosed in a cabinet or box when not in use. The men are instructed to report any defects in the masks. It is a function of the Safety Committee which inspects housekeeping, safety equipment, etc. once per month to inspect the condition of the masks.

Cont'd.

COPY

JAN 31 1962

EXHIBIT G
FINCH

SD0402 0572 3pp

3. It is the duty of the foreman to see that the men wear masks in good condition, at the proper time, in the correct manner. The men are required to wear the masks all the time that they are feeding the furnaces. This is estimated at six hours per day for the day shift and four hours for the other two shifts. These times may appear to be excessive. However, when the airborne concentration rises, the dust carrying it is quite noticeable. The men understand why they are wearing the masks and have been quite faithful in doing so.

4. The average concentration up to January 9 is estimated at 11 x 10^{-11} μc Th(nat)/ml at the hopper, and 2 x 10^{-11} μc Th(nat)/ml in the accessable remainder of the roasting shed.

Very truly yours,

AMERICAN POTASH & CHEMICAL CORPORATION
West Chicago Plant

R. M. Healy

R. M. Healy
Radiation Safety Officer

RMH:er
attach - 1

CC: Manager
Atomic Energy Operations Office
9800 S. Cass Avenue
Argonne, Illinois

EXHIBIT G
ATTACHMENT 1,

U.S. Atomic Energy Commission - January 29, 1962 Attachment

The following list gives estimated average Th(nat) air concentrations in which the men have been present since January 8, on a 40 hour per week basis:

Name	Soc. Security No.	Av. Th(nat), μc/ml x 10^{11}

These men have not yet been informed of the over-exposure, since if the Commission approves the masks, the men have not actually been over-exposed. We await the Commission's instructions on how to proceed in this matter.

RMH:er

Exhibit 5