

Mailinckrodt, Inc.

BOX 10172 LAMBERT FIELD * ST LOUIS MISSOURI 63145 * PHONE 314-291-0540

August 13, 1974

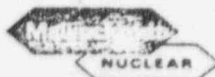
John G. Davis, Deputy Director
For Field Operations
Directorate of Regulatory Operations
U.S. Atomic Energy Commission
Washington, D.C. 20545

The purpose of this letter is to report an incident which resulted in elevated concentrations of Iodine-131 in our main production laboratory and which threatened to cause excessive exposures to the thyroid glands of eight individuals working in the general area.

The windows of our hotcells are filled with zinc bromide solution. On the morning of July 14, 1974 a fracture in the exterior glass plate of the Iodine hotcell window was found which permitted a slow leak of zinc bromide to occur.

Under the supervision of members of the health physics department, a transfer of the Iodine-131 and related equipment was made to the adjacent hotcell used for Mercury-203 processing so that the window could be repaired. This transfer was accomplished with no appreciable increase in air concentrations or exposures to individuals.

At the end of the working day on July 17, 1974, two production technicians removed the Iodine-131 related equipment from the Mercury hotcell in order to prepare the cell for Mercury-203 processing the following morning. This removal was accomplished via an access plug atop the hotcell without the knowledge or supervision of health physics personnel. The equipment was placed in unsealed polyethylene bags and left on top of the hotcell overnight.



At 0830 hours on July 18, 1974 Individual No. 5, who was working in the Iodine-131 diagnostic capsule room since 0700 hours, reported for a thyroid burden measurement. His Iodine-131 thyroid burden was 63% of permissible, which was considerably elevated from the 7% average recorded for the previous day. Individual No. 3 who worked in the same room was called down and also had an elevated burden of 30% of permissible.

Other individuals who had reported earlier for thyroid burden measurements when the working day began at 0700 were called down for an additional measurement to determine the extent of the problem. An overall elevation in burdens was noted at which time production laboratory personnel were evacuated.

Health physics personnel wearing appropriate protective clothing and respiratory protection located the source of the airborne contamination on top of the hotcell at 1030 hours and transferred the items to ventilated enclosures. Air samples collected as a matter of routine earlier in the morning confirmed the extent and degree of the airborne contamination.

Considering the rapid elevation in thyroid burdens and the high airborne concentrations measured, we consulted our medical advisor who recommended a thyroid block for all personnel involved to prevent an excessive exposure to their thyroid glands. Accordingly, eight individuals were selected and sent to our medical advisor for administration of SSKI. A complete report of the medical examinations, procedure and evaluations are on file for your inspection.

Decontamination of the top of the hotcell was affected under health physics supervision and a series of short term, high volume air samples were begun to determine when reentry was permissible.

Table 1, Column 1, shows the rapid initial uptakes which after 24 hours would have resulted in excessive burdens if corrective measures had not been taken. Column 3 shows that the highest average weekly burden was $0.48 \times 0.14\text{uc}$ which equals 0.067uc for Individual No. 1.

Figure 1 shows the fixed air sampling station locations in the main production laboratory broadly outlined in red. The primary air flow pattern in Production I is toward the Iodine diagnostic capsule room (P1) and the open faced hood on the west wall (P2). The secondary air flow pattern is toward the open faced hood on the south wall (P8) and through the doorway (P15) to the open faced hood in Production II (P16). The entire Production laboratory is negative with respect to adjacent rooms and hallways.

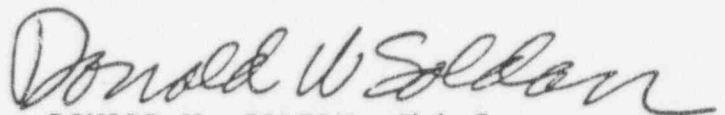
Table 2 shows the measured air concentrations at the various stations for different time periods.

Table 3 shows the series of high volume air samples taken in front of the Iodine hotcell to determine when reentry was permitted.

This incident was reported in detail at a special meeting of our Radiation Safety Committee. As a result, all responsible individuals were reprimanded for their actions and in particular for failure to involve health physics personnel in the operation.

Sincerely yours,

MALLINCKRODT, INC.



DONALD W. SOLDAN, Chief
Radiological Protection Officer

DWS:mjw

bcc: All Radiation Safety
Committee Members

cc: Director,
Region III, Directorate of
Regulatory Operations
US Atomic Energy Commission
799 Roosevelt Road
Glen Ellyn, Illinois 60137

TABLE 1

Fractional Permissible Thyroid Burden (FPTB) Iodine-131

COLUMN 1. Hourly values for the day of the incident
 COLUMN 2. Daily values before, during and after the incident
 COLUMN 3. Weekly values before, during and after the incident





	COLUMN 1					COLUMN 2			COLUMN 3		
	Hourly for 7-18					Daily Average			Weekly Average		
Individual	0800	1000	1200	1400	1600	7-17	7-18	7-19	7-8	7-15	7-22
No. 1	-	(1)	.99	-	.79	-	.89	.63	.07	.48	(2)
No. 2	.22	.87	-	-	.59	.26	.56	.52	.09	.37	.30
No. 3	.30	-	.58	.66	.82	.14	.59	.50	.05	.30	.27
No. 4	.17	-	.54	-	.39	.20	.37	.44	.13	.25	.21
No. 5	.63	.66	-	-	.68	.07	.66	.38	.09	.29	.23
No. 6	-	-	.37	-	.57	-	.47	.22	.01	.34	.21
No. 7	.05	.18	.42	.33	.24	.28	.25	.20	.08	.20	.18
No. 8	.04	.87	-	.37	-	.12	.43	.19	.06	.17	.13

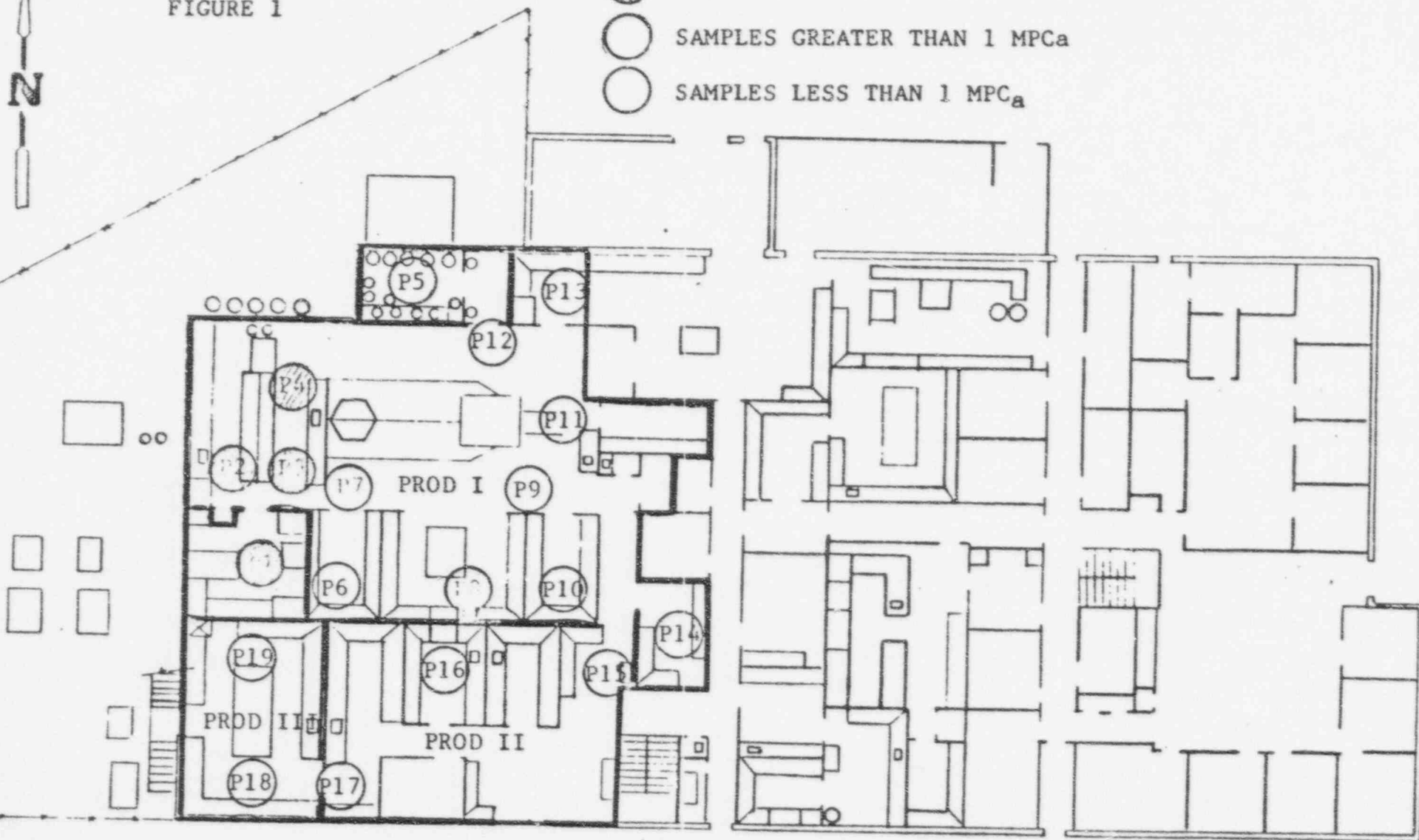
(1) External contamination - showered and changed uniform.

(2) On Vacation - Following weekly average 0.14 FPTB.

* Multiply the tabulated FPTB's by 0.14 to obtain microcuries.

FIGURE 1

-  AIRBORNE CONTAMINATION SOURCE
-  SAMPLES GREATER THAN 10 MPCa
-  SAMPLES GREATER THAN 1 MPCa
-  SAMPLES LESS THAN 1 MPCa



BLDG. 100

1ST. FLOOR PLAN

TABLE 2

Fractional Maximum Permissible Air Concentrations (FMPC_a) Iodine-131

COLUMN 1. Average values preceding the incident
 COLUMN 2. Values including the morning of the incident
 COLUMN 3. Values including the afternoon of the incident
 COLUMN 4. Values excluding the effect of the incident

Station No.	Station Description	COLUMN 1	COLUMN 2	COLUMN 3	COLUMN 4
		Average 5-21 - On	Period 7-11 - 7-18	Period 7-18 - 7-22	Period 7-22 - 8-7
Production I					
P1	Capsule Room	.15	11.1	8.7	0.28
P2	Production Hood	.18	20.1	7.4	0.34
P3	Glovebox Area	.13	13.0	9.0	0.03
P4	Glovebox Area	.12	18.0	11.8	0.23
P5	Hot Waste Room	.26	0.16	0.09	0.42
P6	P-32 Glovebox	(1)	(1)	(1)	(1)
P7	Iodine Hotcell	.09	4.15	3.07	0.09
P8	Second Bay Hood	.09	0.98	0.59	0.10
P9	General Area	.09	0.68	0.73	0.05
P10	First Bay Area	.08	0.51	0.27	0.06
P11	Hotcell Transfer Door	.08	0.34	0.18	0.05
P12	Waste Room Doorway	.07	0.46	0.24	0.06
P13	UTK Assembly Room	.05	0.27	0.18	0.06
Production II					
P14	Sterile Room	.04	0.07	0.08	0.03
P15	Prod I - Prod II Doorway	.08	0.47	0.37	0.04
P16	Production II Hood	.08	0.44	0.19	0.04
P17	Prod II - Prod III Doorway	.07	0.29	0.12	0.04
Production III					
P18	Production III Area	.06	0.26	0.13	0.06
P19	Production III Area	.07	0.16	0.17	0.04

(1) Membrane filter only on this station for P-32 sampling

* Multiply the tabulated FMPC_a's by 9×10^{-9} to obtain microcuries per milliliter

TABLE 3

Fractional Maximum Permissible Air Concentrations (FMPC_a) Iodine-131

High volume air samples taken at waist level at station P7 using 47mm type AC-1 charcoal filters

TIME ON	VOLUME (10 ⁶ ml)	FMPC _a
7/18/74		
1100	0.10	1.58
1130	0.10	3.17
1145	0.10	2.13
1210	0.10	4.23
1230	0.50 (1)	1.66
1315	0.50	1.48
1405	0.70	1.10
1445	0.70	1.00
1520	0.70	0.73 (2)
1545	0.70	0.74
1630	0.70	0.64
7/19/74		
0715	0.70	0.33

(1) Increased sample volume to improve statistical accuracy

(2) Permitted reentry after value dropped below unity

* Multiply the tabulated FMPC_a's by 9×10^{-9} to obtain microcuries per milliliters

The referenced individuals in this report are:

<u>No.</u>	<u>NAME</u>	<u>SOCIAL SECURITY NO.</u>	<u>DATE OF BIRTH</u>
1	[REDACTED]	[REDACTED]	[REDACTED]
2	[REDACTED]	[REDACTED]	[REDACTED]
3	[REDACTED]	[REDACTED]	[REDACTED]
4	[REDACTED]	[REDACTED]	[REDACTED]
5	[REDACTED]	[REDACTED]	[REDACTED]
6	[REDACTED]	[REDACTED]	[REDACTED]
7	[REDACTED]	[REDACTED]	[REDACTED]
8	[REDACTED]	[REDACTED]	[REDACTED]

Ex 6