

BOX 10172 LAMBERT FIELD • ST. LOUIS, MISSOURI 63145 • 314 AX 1-0540

February 23, 1972

Lawrence D. Low, Director  
Division of Compliance  
U. S. Atomic Energy Commission  
Washington, D. C. 20545

Dear Mr. Low:

During the period January 27 - February 3, concentrations of airborne radioactive materials were measured in the therapy laboratory of our Dispensing Department, which averaged above the limits specified in Appendix B, Table I, considering occupancy time.

The levels of concentrations of radioactive materials involved were as follows:

Radionuclide	I-131	I-125	Other	Total
$10^{-9}$ $\mu$ c/ml	13.6	0.93	0	14.5
FMPCa	1.51	0.19	0	1.70

The maximum estimated occupancy time for an individual working in the therapy laboratory gave a result in excess of unity in the following calculations.

$$\text{FMPCa} = (\text{C1}/\text{MPC}_1) + (\text{C2}/\text{MPC}_2) = 1.70$$

$$(6 \text{ hrs/day}) (5 \text{ day./week}) (1 \text{ week}/40 \text{ hours}) = 0.75$$

$$(1.70) (0.75) = 1.28 \text{ FMPCa}$$

This data indicates that an individual could have been present in an airborne concentration of iodine-131 and iodine-125 which was 1.28 times the specified limits considering occupancy time.

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Thyroid burden measurements taken during the period of high air concentrations, when compared to previous periods, indicate that no significant uptake of either iodine-131 or iodine-125 occurred as a result of this incident. We conclude from the attached thyroid information that no significant exposure to the individuals occurred.

A thorough review of the Dispensing procedures in the therapy laboratory was made by Radiological Protection Department personnel. Several operations were noted, any one or all of which may have caused or contributed to the problem. Specific corrective measures were recommended to the Dispensing Department supervisor. All actions taken regarding this incident will be reported to the Radiological Protection Committee for consideration by its members as required by Committee procedure.

We would appreciate clarification on a point raised in a letter from Mr. Boyce H. Grier, dated December 23, 1971, as it related to this particular letter.

In his letter to us, Mr. Grier stated in part that:

"An individual was exposed to airborne concentrations of iodine-131 in excess of the limits during the seven consecutive days July 2-8, 1971, as evidenced by your measurement of more than an average of 0.14 microcurie of iodine-131 in the employee's thyroid during that period."

If an appreciable thyroid burden is evidence of an exposure to airborne concentrations of iodine-131 (or iodine-125), is then a low thyroid burden evidence of no appreciable exposure to airborne concentrations of iodine-131 (or iodine-125)?

We relate the direct measurement of thyroid burdens to the direct measurement of external exposure by use of film badges.

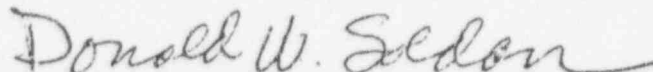
<u>Type of Exposure</u>	<u>Indirect Measurement</u>	<u>Direct Measurement</u>
Whole body	dose rate X time	film badges
Thyroid	Air concentration X Occupancy factor	thyroid burden measurement

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We feel that a direct measurement is more indicative of the actual exposure to an individual and when available should be used in preference to an indirect measurement. Do you concur? If so, may we use thyroid burden information as evidence that an exposure of an individual to airborne concentrations of iodine-131 or iodine-125 did not occur? Would this mean that future reports of this type would not be necessary?

Sincerely yours,

MALLINCKRODT CHEMICAL WORKS  
MALLINCKRODT NUCLEAR

A handwritten signature in cursive script, reading "Donald W. Seldan". The signature is written in dark ink and is positioned above the typed name and title.

Donald W. Seldan  
Chief, Radiological  
Protection Officer

DWS:cm

cc: Mr. Boyce H. Grier  
Regional Director

# FRACTIONAL PERMISSIBLE THYROID BURDENS (FPTB)

Iodine-131 (1FPTB = 0.14 microcuries)

Individual	-	(*)	1-27	1-28	1-31	2-1	2-2	2-3	-	(*)
1	0.01	(1-25)				0.00			0.00	(2-21)
2	0.02	(1-24)	0.15					0.00	0.02	(2-8)
3	0.14	(1-24)			0.06			0.03	0.06	(2-4)
4	0.05	(1-25)		0.06		0.01		0.05	0.07	(2-4)
5	0.09	(1-24)	0.12		0.00			0.16	0.19	(2-4)
6	0.00	(1-21)		0.13	0.08			0.10	0.07	(2-9)
7	0.06	(1-24)						0.08	0.12	(2-9)
8	0.00	(1-18)	0.00		0.00				0.05	(2-9)
9	0.00	(1-24)	0.05		0.00				0.04	(2-8)
10	0.00	(1-24)			0.00				0.05	(2-8)

Iodine-125 (1FPTB = 0.50 microcuries)

1	0.00	(1-25)				0.00			0.00	(2-21)
2	0.00	(1-24)	0.00					0.00	0.00	(2-8)
3	0.00	(1-24)			0.01			0.01	0.04	(2-4)
4	0.00	(1-25)		0.01		0.02		0.00	0.00	(2-4)
5	0.03	(1-24)	0.02		0.00			0.00	0.04	(2-4)
6	0.01	(1-21)		0.02	0.00			0.00	0.00	(2-8)
7	0.00	(1-24)						0.00	0.00	(2-9)
8	0.00	(1-18)	0.00		0.01				0.01	(2-9)
9	0.00	(1-24)	0.00		0.00				0.00	(2-8)
10	0.00	(1-24)			0.00				0.00	(2-8)

(\*) The date in parenthesis is when the closest measurement was taken just before and after the period of high air concentrations.

The individuals referred to in this report are:

<u>Number</u>	<u>Name</u>	<u>Social Security Number</u>	<u>Date of Birth</u>
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			

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