

SLR:EGP

JUL 29 1966

Nuclear Consultants
Division of Mallinckrodt
Chemical Works
Box 6172
Lambert Field
St. Louis, Missouri 63145

Attention: Mr. Donald W. Solder, Manager
Health Physics Department

Gentlemen:

This will acknowledge receipt of your letter of July 25, 1966 reporting the exposure of several employees to airborne concentrations of iodine 131. We will appreciate your forwarding exposure data for the periods in question for Chemists Nos. 2 and 3 and Technicians Nos. 1 through 5. The only exposure data enclosed with your letter is for Chemist No. 1.

Very truly yours,

bcc: Compliance Div., HQ)
Compliance Div., III)
Public Document Room) w/cpy ltr 7-25-66
Isotopes Branch, DML)
Incident File)

"Signed" Eber R. Price

Eber R. Price, Director
Division of State and
Licensee Relations

c/s

OFFICE ▶	SLR:EB RCR:egp,drm	SLR ER:Price			
SURNAME ▶	<i>[Signature]</i>	<i>[Signature]</i>			
DATE ▶	7-29-66				

Information in this record was deleted
in accordance with the Freedom of Information
Act, exemptions 6
FOIA- 96-343

U. S. GOVERNMENT PRINTING OFFICE 16-62761-3

9701270115 970123
PDR FOIA
FLOYD96-343 PDR

July 25, 1966

Director
Isotopes Branch
Division of Materials Licensing
U. S. Atomic Energy Commission
1717 "H" Street
Washington 25, D. C.

1046

Gentlemen:

A report was made to you indicating the personnel that at one time or another during the first quarter of 1966 had burdens in excess of 0.14 uc of I-131 in their thyroid glands. This information was not submitted in strict accordance with the provisions of Paragraph 20.405. Therefore, this information is being resubmitted at this time. For ease in computational purposes, unity (1.00) indicates a thyroid burden of 0.14 uc.

The exposures listed were not attributable to ingestion or to adsorption on the skin and subsequent absorption into the body. It is assumed that these exposures were due to airborne concentrations of I-131 and therefore are reportable in accordance with the provisions of 10 CFR 20.

The air sampling program indicated several areas in which high air concentrations of I-131 existed. These areas were the I-131 tagging room, the diagnostic capsule matching room, the drug and waste storage room, and the sterile room. No one single cause was found for the high air concentrations in these areas; rather, several corrective steps had to be taken in each area to reduce air concentrations to permissible levels.

When a corrective step was taken, a time lag was involved in order to determine the effectiveness of the corrective measure. Several false steps were taken before the actual cause or causes were determined. These corrective measures were instituted over a six month period culminating during the third week of May.

One of the major causes for high air concentrations in the I-131 tagging room was a change in production procedures.

The stabilizer used in the production of I-131 diagnostic capsules was changed in the early part of the year from cysteine to ascorbic acid. This change was brought to the attention of the health physics department through interrogation of the individuals involved with capsule production. Further investigation indicated a correlation between increased thyroid burdens and this change in production procedures. The production procedure was then altered to resume the use of cysteine as the stabilizer of choice. This change affected a marked decrease in air concentrations in the iodine tagging room.

Other changes which also resulted in reduced air concentrations were as follows:

The open hoods were converted to quasi-glove boxes by the addition of lucite windows to which were affixed glove box gloves. The diagnostic capsules which previously were stored behind a concrete block wall in the tagging room were transferred to a shielded base cabinet under the I-131 production hood. This

base cabinet was put under negative pressure by connecting it to the hood exhaust system. A greater negative pressure differential was created between the tagging room and the main laboratory by closing the auxiliary air supply to the tagging room.

Reduced air concentrations of I-131 were also observed in the diagnostic capsule matching room as a result of the reversion to cysteine. The shielded base cabinet for the matching machine in which the activity is stored was also connected to the I-131 exhaust system resulting in further reduced air concentrations.

The highest airborne concentrations of I-131 were found in the drug and waste storage room. This room had no air inlet nor outlet. Therefore, small amounts of volatile I-131 could give rise to high airborne concentrations. A new blower was installed on the roof to exhaust air from the drug and waste storage room. A small opening through the ceiling of this room was provided for inlet air. The diameter of the inlet opening was made smaller than the diameter of the exhaust opening such that this room was made to go negative with respect to the adjacent dispensing laboratory. This change not only resulted in reduced air concentration in the drug and waste storage room but also resulted in reduced air concentrations in the dispensing laboratory and in the production laboratory. High level radioactive waste was packaged in air tight two gallon steel containers prior to transfer to the storage tubes. The lids on fiber drums

used to store low level radioactive waste were sealed with tape after filling.

Another new blower was provided on the roof to exhaust air from the sterile room. Two glove boxes were installed in the sterile room and connected to the exhaust blower. Air concentrations in this area were greatly reduced by these measures.

The combined effect of all of the above measures resulted in air concentrations well within permissible levels after the third week in May throughout the entire laboratory. Increased thyroid burdens subsequent to then have been due to specific situations rather than relating to any general problems.

During the week of June 27th the contents of the I-131 production hood, consisting of contaminated equipment, shielding, and glassware, were indiscriminately removed from the hood for decontamination. Air samples assayed later that morning indicated high airborne radioactivity concentrations of I-131 in the tagging room. All personnel were immediately restricted from the I-131 tagging room. A thyroid burden determination was made on all laboratory personnel. The following individuals, all of whom had worked in the tagging room, were found to have thyroid burdens in excess of the permissible limit.

Chemist No. 1
Chemist No. 2
Chemist No. 3
Technician No. 2

(Future decontamination efforts shall be judiciously controlled by the Health Physics department.)

The thyroid burdens listed for Chemist No. 1 and Chemist No. 2 during the week starting 7/4 were as a result of the uptake on 6/27. Since the specific cause for the initial uptake was known, none of these individuals were restricted from performing their normal work functions.

During the week starting 7/4, Technician No. 4 exceeded the permissible limit. It is fairly certain as demonstrated by air samples that this uptake was due to the production of T and O A capsules. T and O A capsule production is being transferred to a glove box which will be connected to the I-131 exhaust system.

Chemist No. 2 exceeded the permissible thyroid burden during the week of 7/18. The cause for this uptake is as yet undetermined.

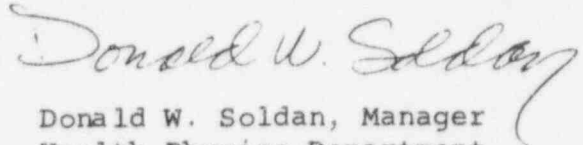
We have experienced recurrent problems with Technician No. 3. The work functions of this individual have been changed repeatedly in an attempt to maintain this individual's thyroid burden within permissible limits. None of these changes resulted in any appreciable decrease in the thyroid burden. It has only recently been brought to our attention that this individual has been under a doctor's care for an abnormal thyroid condition.

We have contacted the attending physician, and he has indicated that the thyroid burdens were most likely attributable to the abnormality.

You will note that none of the individuals has exceeded the permissible thyroid burden on a quarterly average basis.

Sincerely yours,

NUCLEAR CONSULTANTS DIVISION
MALLINCKRODT CHEMICAL WORKS


Donald W. Soldan, Manager
Health Physics Department

DWS/lc

Enclosures

Copy to Manager, Region III
Division of Compliance, USAEC

NUCLEAR CONSULTANTS

1966 FRACTIONAL PERMISSIBLE IODINE-131 THYROID BURDEN*

Chemist No. 1

Name

Social Security No.

Identification No.

PERIOD OF EXPOSURE	1/3/66-4/3/66	4/4/66-7/3/66	7/4/66-10/2/66	10/3/66-1/1/67
	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter
WEEK STARTING	W.S.	W.S.	W.S.	W.S.
1/3	2.24 ***R	4/4 .49	7/4 1.46***	10/3
1/10	1.74 ***	4/11 .32	7/11 Terminated	10/10
1/17	1.37 ***	4/18 .59	7/18 7/8/66	10/17
1/24	.94	4/25 .65	7/25	10/24
1/31	.68 U	5/2 .89	8/1	10/31
2/7	.54	5/9 .64	8/8	11/7
2/14	.45	5/16 .51	8/15	11/14
2/21	1.50 ***R	5/23 .59	8/22	11/21
2/28	.99	5/30 .91	8/29	11/28
3/7	.90 U	6/6 .51	9/5	12/5
3/14	.66	6/13 .44	9/12	12/12
3/21	.35	6/20 .81	9/19	12/19
3/28	.10	6/27 1.82 ***	9/26	12/26
QUARTERLY AVERAGE	.96	.71	.24**	

*Fractional Permissible Thyroid Burden based on a permissible quarterly average thyroid burden of 0.14 microcuries of Iodine-131.

**Calculated from extrapolated values.

***Reportable on air concentration basis.

/js R Restricted from work in the tagging room.

1/6/66 U Unrestricted.

NUCLEAR CONSULTANTS

LOGG FRACTIONAL PERMISSIBLE IODINE-131 THYROID BURDEN*

Chemist No. 1

Name

Social Security No.

Identification No.

PERIOD OF EXPOSURE	1/3/66-4/3/66	4/4/66-7/3/66	7/4/66-10/2/66	10/3/66-1/1/67
	<u>1st Quarter</u>	<u>2nd Quarter</u>	<u>3rd Quarter</u>	<u>4th Quarter</u>
<u>WEEK STARTING</u>		<u>W.S.</u>	<u>W.S.</u>	<u>W.S.</u>
1/3	2.24 ***R	4/4 .49	7/4 1.46***	10/3
1/10	1.74 ***	4/11 .32	7/11 Terminated	10/10
1/17	1.37 ***	4/18 .59	7/18 7/8/66	10/17
1/24	.94	4/25 .65	7/25	10/24
1/31	.68 U	5/2 .89	8/1	10/31
2/7	.54	5/9 .64	8/8	11/7
2/14	.45	5/16 .51	8/15	11/14
2/21	1.50 ***R	5/23 .59	8/22	11/21
2/28	.99	5/30 .91	8/29	11/28
3/7	.90 U	6/6 .51	9/5	12/5
3/14	.66	6/13 .44	9/12	12/12
3/21	.35	6/20 .81	9/19	12/19
3/28	.10	6/27 1.82 ***	9/26	12/26
<u>QUARTERLY AVERAGE</u>	.96	.71	.24**	

*Fractional Permissible Thyroid Burden based on a permissible quarterly average thyroid burden of 0.14 microcuries of Iodine-131.

**Calculated from extrapolated values.

***Reportable on air concentration basis.

/js R Restricted from work in the tagging room.

1/6/66 U Unrestricted.

NUCLEAR CONSULTANTS

1966 FRACTIONAL PERMISSIBLE IODINE-131 THYROID BURDEN*

Chemist No. 1

Name

Social Security No.

Identification No.

PERIOD OF EXPOSURE	1/3/66-4/3/66		4/4/66-7/3/66		7/4/66-10/2/66		10/3/66-1/1/67
	1st Quarter		2nd Quarter		3rd Quarter		4th Quarter
WEEK STARTING		W.S.		W.S.		W.S.	
1/3	2.24 ***R	4/4	.49	7/4	1.46***	10/3	
1/10	1.74 ***	4/11	.32	7/11	Terminated	10/10	
1/17	1.37 ***	4/18	.59	7/18	7/8/66	10/17	
1/24	.94	4/25	.65	7/25		10/24	
1/31	.68 U	5/2	.89	8/1		10/31	
2/7	.54	5/9	.64	8/8		11/7	
2/14	.45	5/16	.51	8/15		11/14	
2/21	1.50 ***R	5/23	.59	8/22		11/21	
2/28	.93	5/30	.91	8/29		11/28	
3/7	.90 U	6/6	.51	9/5		12/5	
3/14	.66	6/13	.44	9/12		12/12	
3/21	.35	6/20	.81	9/19		12/19	
3/28	.10	6/27	1.82 ***	9/26		12/26	
QUARTERLY AVERAGE							
	.96		.71		.24**		

*Fractional Permissible Thyroid Burden based on a permissible quarterly average thyroid burden of 0.14 microcuries of Iodine-131.

**Calculated from extrapolated values.

***Reportable on air concentration basis.

/js R Restricted from work in the tagging room.

1/6/66 U Unrestricted.

NUCLEAR CONSULTANTS

1966 FRACTIONAL PERMISSIBLE IODINE-131 THYROID BURDEN*

Chemist No. 1

Name

Social Security No.

Identification No.

<u>PERIOD OF EXPOSURE</u>	<u>1/3/66-4/3/66</u>	<u>4/4/66-7/3/66</u>	<u>7/4/66-10/2/66</u>	<u>10/3/66-1/1/67</u>
	<u>1st Quarter</u>	<u>2nd Quarter</u>	<u>3rd Quarter</u>	<u>4th Quarter</u>
<u>WEEK STARTING</u>		<u>W.S.</u>	<u>W.S.</u>	<u>W.S.</u>
1/3	2.24 ***R	4/4 .49	7/4 1.46***	10/3
1/10	1.74 ***	4/11 .32	7/11 Terminated	10/10
1/17	1.37 ***	4/18 .59	7/18 7/8/66	10/17
1/24	.94	4/25 .65	7/25	10/24
1/31	.68 U	5/2 .89	8/1	10/31
2/7	.54	5/9 .64	8/8	11/7
2/14	.45	5/16 .51	8/15	11/14
2/21	1.50 ***R	5/23 .59	8/22	11/21
2/28	.99	*5/30 .91	8/29	11/28
3/7	.90 U	6/6 .51	9/5	12/5
3/14	.66	6/13 .44	9/12	12/12
3/21	.35	6/20 .81	9/19	12/19
3/28	.10	6/27 1.82 ***	9/26	12/26
<u>QUARTERLY AVERAGE</u>	.96	.71	.24**	

*Fractional Permissible Thyroid Burden based on a permissible quarterly average thyroid burden of 0.14 microcuries of Iodine-131.

**Calculated from extrapolated values.

***Reportable on air concentration basis.

/js R Restricted from work in the tagging room.

1/6/66 U Unrestricted.

NUCLEAR CONSULTANTS

1966 FRACTIONAL PERMISSIBLE IODINE-131 THYROID BURDEN*

Chemist No. 1

Name

Social Security No.

Identification No.

PERIOD OF EXPOSURE	1/3/66-4/3/66	4/4/66-7/3/66	7/4/66-10/2/66	10/3/66-1/1/67
	<u>1st Quarter</u>	<u>2nd Quarter</u>	<u>3rd Quarter</u>	<u>4th Quarter</u>
<u>WEEK STARTING</u>		<u>W.S.</u>	<u>W.S.</u>	<u>W.S.</u>
1/3	2.24 ***R	4/4 .49	7/4 1.46***	10/3
1/10	1.74 ***	4/11 .32	7/11 Terminated	10/10
1/17	1.37 ***	4/18 .59	7/18 7/8/66	10/17
1/24	.94	4/25 .65	7/25	10/24
1/31	.68 U	5/2 .89	8/1	10/31
2/7	.54	5/9 .64	8/8	11/7
2/14	.45	5/16 .51	8/15	11/14
2/21	1.50 ***R	5/23 .59	8/22	11/21
2/28	.99	5/30 .91	8/29	11/28
3/7	.90 U	6/6 .51	9/5	12/5
3/14	.66	6/13 .44	9/12	12/12
3/21	.35	6/20 .81	9/19	12/19
3/28	.10	6/27 1.82 ***	9/26	12/26
<u>QUARTERLY AVERAGE</u>				
	.96	.71	.24**	

*Fractional Permissible Thyroid Burden based on a permissible quarterly average thyroid burden of 0.14 microcuries of Iodine-131.

**Calculated from extrapolated values.

***Reportable on air concentration basis.

/js R Restricted from work in the tagging room.

1/6/66 U Unrestricted.

NUCLEAR CONSULTANTS

1966 FRACTIONAL PERMISSIBLE IODINE-131 THYROID BURDEN*

9401

Chemist No. 1

Name

Social Security No.

Identification No.

PERIOD OF EXPOSURE	1/3/66-4/3/66	4/4/66-7/3/66	7/4/66-10/2/66	10/3/66-1/1/67
	<u>1st Quarter</u>	<u>2nd Quarter</u>	<u>3rd Quarter</u>	<u>4th Quarter</u>
<u>WEEK STARTING</u>		<u>W.S.</u>	<u>W.S.</u>	<u>W.S.</u>
1/3	2.24 ***R	4/4 .49	7/4 1.46***	10/3
1/10	1.74 ***	4/11 .32	7/11 Terminated	10/10
1/17	1.37 ***	4/18 .59	7/18 7/8/66	10/17
1/24	.94	4/25 .65	7/25	10/24
1/31	.68 U	5/2 .89	8/1	10/31
2/7	.54	5/9 .64	8/8	11/7
2/14	.45	5/16 .51	8/15	11/14
2/21	1.50 ***R	5/23 .59	8/22	11/21
2/28	.99	5/30 .91	8/29	11/28
3/7	.90 U	6/6 .51	9/5	12/5
3/14	.66	6/13 .44	9/12	12/12
3/21	.35	6/20 .81	9/19	12/19
3/28	.10	6/27 1.82 ***	9/26	12/26
<u>QUARTERLY AVERAGE</u>	.96	.71	.24**	

*Fractional Permissible Thyroid Burden based on a permissible quarterly average thyroid burden of 0.14 m microcuries of Iodine-131.

**Calculated from extrapolated values.

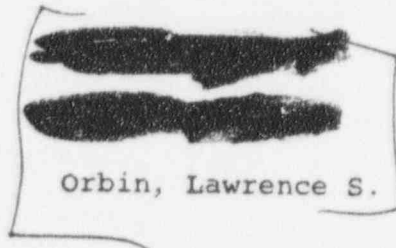
***Reportable on air concentration basis.

/js R Restricted from work in the tagging room.

1/6/66 U Unrestricted.

NUCLEAR CONSULTANTS

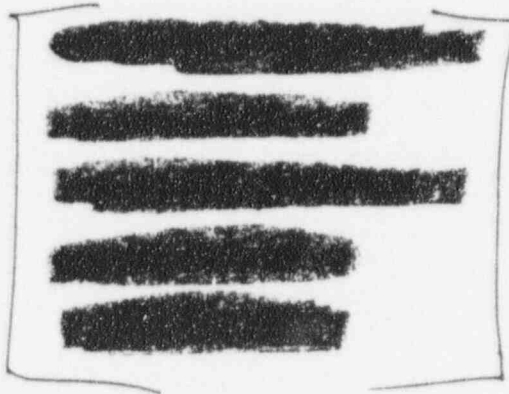
DIVISION MALLINCKRODT CHEMICAL WORKS



Chemist No. 1

Chemist No. 2

Chemist No. 3



Technician No. 1

Technician No. 2

Technician No. 3

Technician No. 4

Technician No. 5

Ex 6

Above is a list of individuals reported on our overexposure report dated July 25, 1966.