

OAK RIDGE NATIONAL LABORATORY

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January 9, 1963

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Dr. S. Allan Lough
 Assistant Director for
 Radiological Physics
 Division of Biology and Medicine
 U. S. Atomic Energy Commission
 Washington 25, D. C.

A-00534

Human Studies Project

Dear Allan:

This is a belated reply to your letter of November 21, 1962. I sincerely appreciate your interest in our work on I^{131} . Unfortunately, we have not yet found time to document our study. As you may recall from the Health Physics Division Information Meeting, I went to considerable length to emphasize that we do not have an established research program and that everything done on I^{131} uptake from milk was accomplished by volunteers on our own time. This being the case, we could not compete with vacations, viruses and unabated volumes of work during December. With the aid of S. R. Bernard (Internal Dose Section), I am now trying to bring our I^{131} data together. I will be happy to send you a completed copy as soon as it is finished. Meanwhile, I am sending you an assortment of graphs and tables which illustrate most of our results.

Briefly, our study was as follows:

1. Milk was provided by the UT-AEC Agricultural Research Farm.

- (a) First batch - I^{131} (2 mc as NaI) administered intravenously.
- (b) Second and third batches - I^{131} (2 mc each as NaI) administered by gavage.
- (c) All milk recycled over Dowex No. 1 column twice.
- (d) Column effluent milk contained ~ 3.8 % of the original I^{131} concentration in the raw milk. Greater than 97 % of the I^{131} in the treated milk was precipitable (zinc sulfate - sodium hydroxide) compared to ~ 4.7 % precipitated from the raw milk. We have concluded tentatively that the column treated milk contained only organically bound I^{131} .

2. Human subjects, all adult male volunteers.

- (a) [redacted] - a real hero! - on a constant activity intake (1.84 mc/day) once daily for 62 days -- collected and delivered essentially all urine excreted.
- (b) [redacted] - on constant activity intake (1.84 mc/day) for 8 days.
- (c) [redacted] and [redacted] - single oral ingestion of 92 mc I^{131} in 500 ml milk.
- (d) [redacted] - single oral ingestion of 1.84 mc I^{131} in 10 ml milk.

3. Single Intake

- (a) Early times --- [redacted] secreted ~ 1 % per hour in saliva at 3 hours, and ~ 0.5 % per hour in saliva at 6.7 hours -- only trace in 8-hour perspiration (estimate < 0.03 %).

3. Single Intake (cont'd)

(b) One day:

<u>Subject</u>	<u>% of intake in thyroid</u>	<u>% excreted in urine</u>
[REDACTED]	8	71
[REDACTED]	11	69
[REDACTED]	27	61
[REDACTED]	10	-
[REDACTED]	-	75

* Single dose until second dose.

(c) Four days

	<u>% of intake in thyroid</u>	<u>% of intake in whole body</u>	<u>% in urine</u>	<u>% in feces</u>
[REDACTED]	12.5	15.7	80.5	3.8*
[REDACTED]	29.0	31.0	69	1.9

* Estimated

(d) Period from day 1 through day 30 (estimates)

For thyroid	f_1	f_v	f_2	T_B	urine/total excretion
ICRP	1.0	0.3	0.2	138 days	-
[REDACTED]	>0.98	0.29	0.94	138 "	0.96*
[REDACTED]	>0.96	0.14	0.80	38 "	0.96

* Ratio of cumulative excretion. Ratio of rates is 0.93 after day 2.

4. Chronic

(a) Thyroid Burden - Percent of one day's intake

	<u>Days</u>			
	1	8	22	>60
[REDACTED]	8 %	39 %	69 %	75 %
[REDACTED]	x	49	x	x
[REDACTED]	10	x	x	x
[REDACTED]	11	65*	10*	123*
[REDACTED]	27	155*	257*	300*

* Estimated by extrapolating single dose data.

(b) After equilibrium

- (1) 95 % of a day's intake excreted daily in urine.
- (2) 4 % of a day's intake excreted daily in feces.
- (3) f_2 for thyroid may be as low as 0.3 (comparable to ICRP value, 0.2).
- (4) T_B for thyroid may be as low as 25 days.
- (5) 75 % of a day's intake found in thyroid.

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In addition to photographs and figures pertaining to the I^{131} work, I am enclosing a copy of our Aerosol Project research summary which was prepared for the Science Information Exchange. Since Jim Turner left your office, I have never been quite sure of the appropriate person to contact regarding our aerosol work.

I will be in the Washington area near the end of this month or early in February and would be very happy to discuss our program, informally, with anyone you suggest.

Yours very truly,

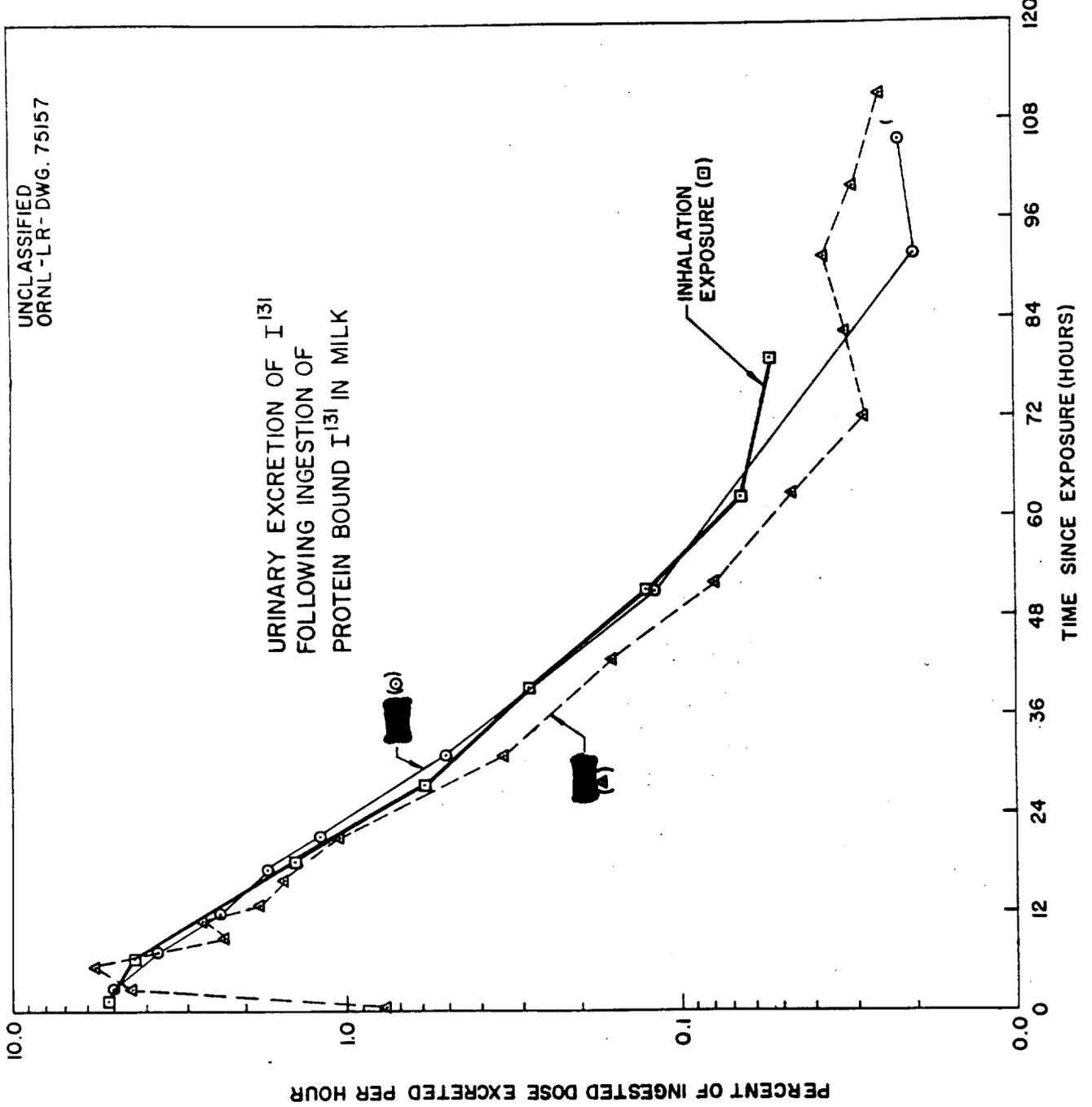
Original Signed By

Birney R. Fish
Health Physics Technology Section
Health Physics Division

BRE/or

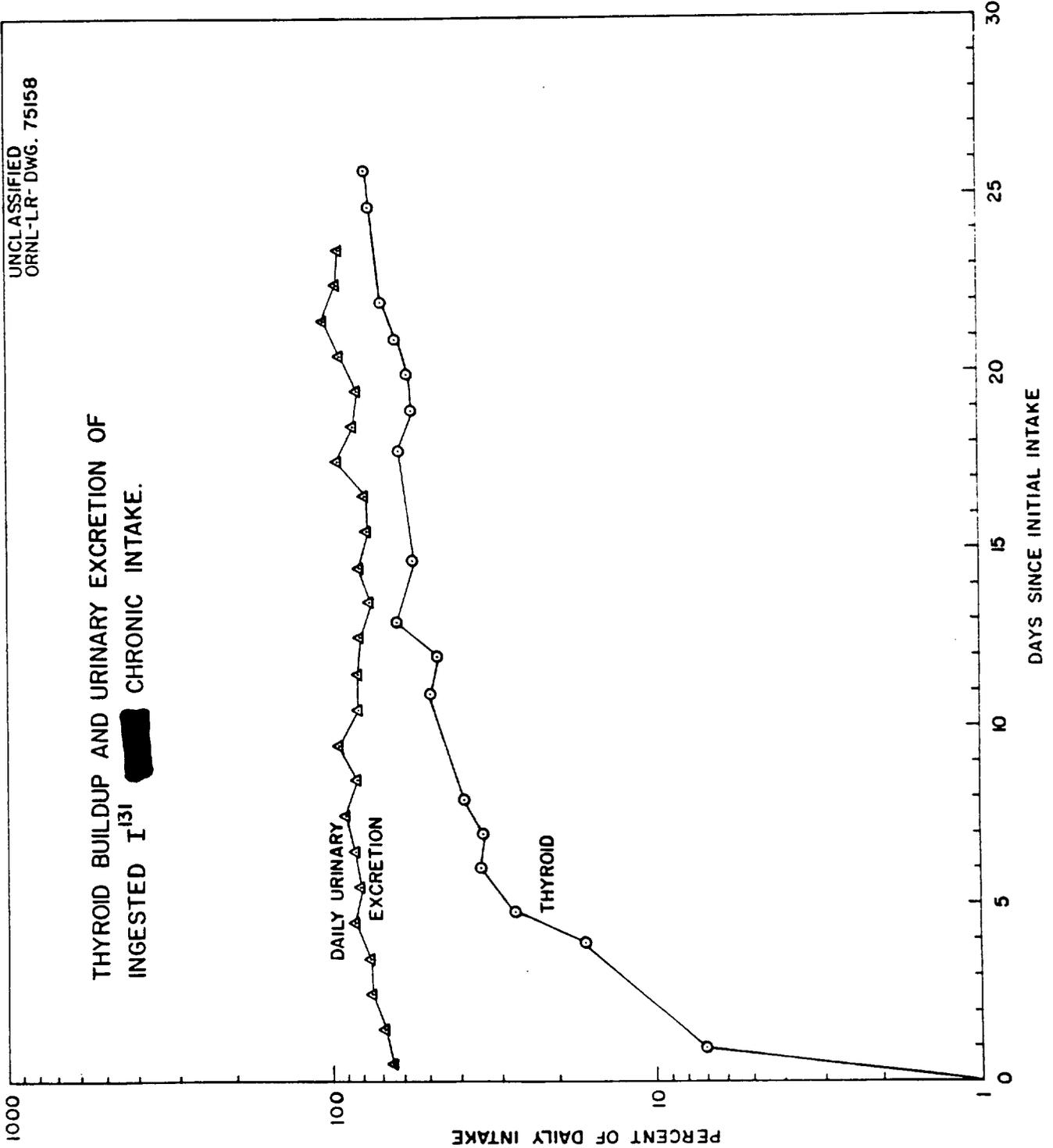
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cc: K. Z. Morgan 



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THYROID BUILDUP AND URINARY EXCRETION OF
INGESTED I¹³¹ [REDACTED] CHRONIC INTAKE.

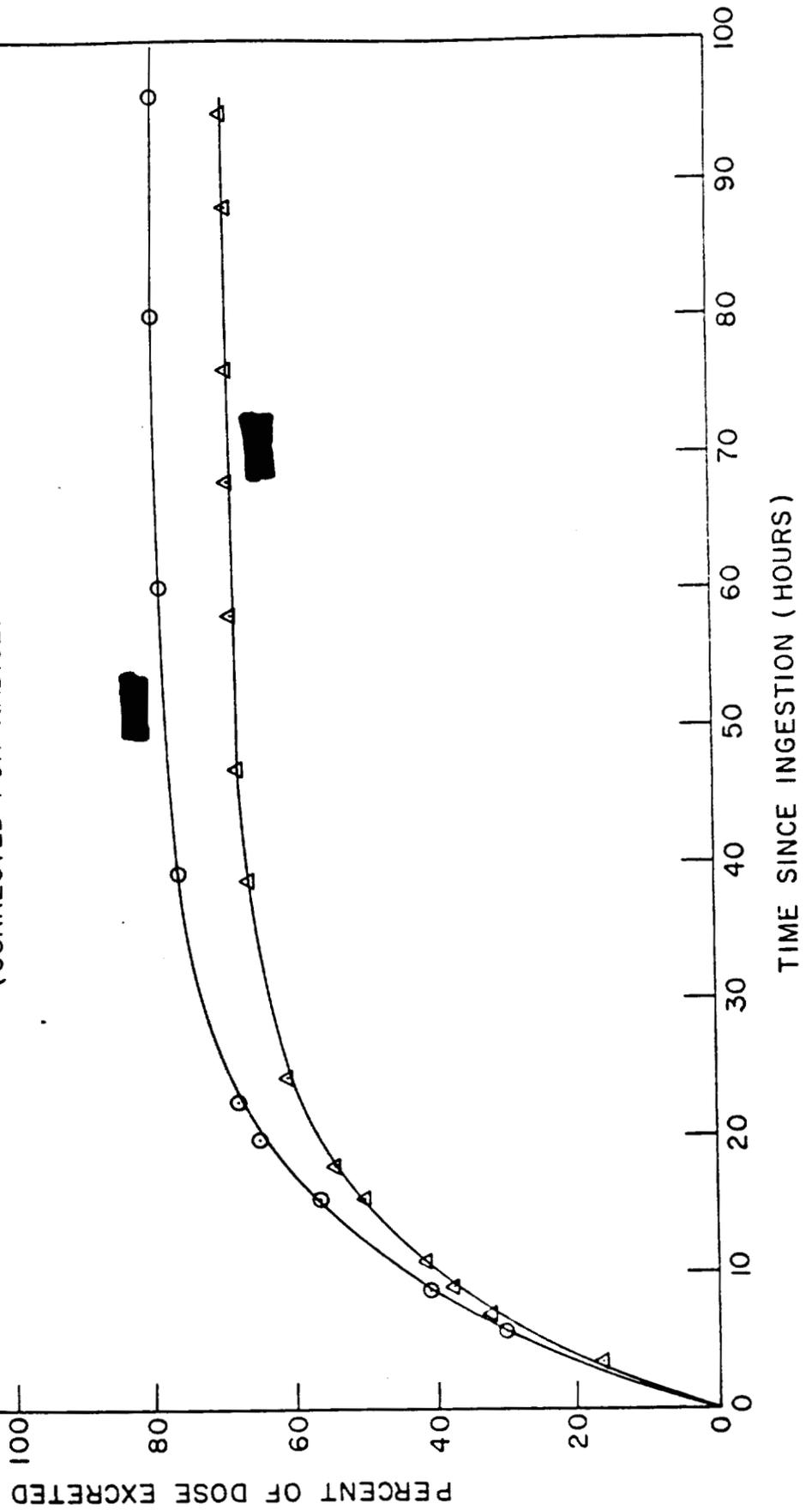


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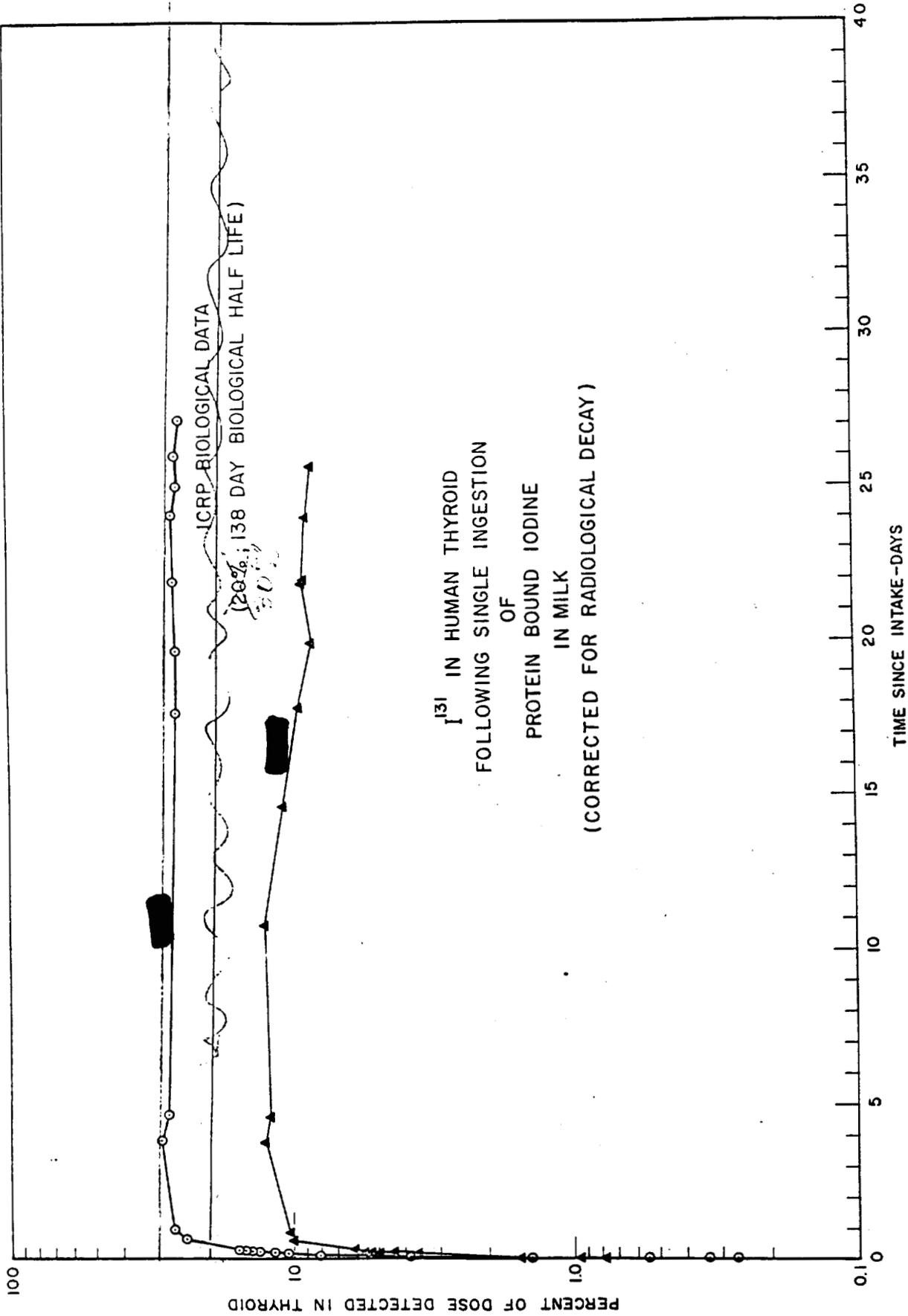
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CUMULATIVE EXCRETION OF I¹³¹
IN URINE FOLLOWING SINGLE INGESTION
OF PROTEIN BOUND I¹³¹ IN MILK
(CORRECTED FOR RADIOLOGICAL DECAY)



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UNCLASSIFIED
ORNL-LR-DWG 75155



^{131}I IN HUMAN THYROID
FOLLOWING SINGLE INGESTION
OF
PROTEIN BOUND IODINE
IN MILK
(CORRECTED FOR RADIOLOGICAL DECAY)

ICRP BIOLOGICAL DATA
(20% ; 138 DAY BIOLOGICAL HALF LIFE)

NOTICE OF RESEARCH PROJECT
SCIENCE INFORMATION EXCHANGE

SMITHSONIAN INSTITUTION

ACCESSION NO. (Do not use this space)

ZP

NOT FOR PUBLICATION OR
PUBLICATION REFERENCE

SUPPORTING AGENCY: United States Atomic Energy Commission

NAME AND ADDRESS OF INSTITUTION: Oak Ridge National Laboratory

TITLE OF RESEARCH PROJECT: Radiological and Health Physics, and Instrumentation
Aerosol Studies

Give names, departments, and official titles of PRINCIPAL INVESTIGATORS and ALL OTHER PROFESSIONAL PERSONNEL (including graduate students) engaged on the project; and fraction of man-year devoted to the project by each person.

1.60 D. M. Trayer, Health Physicist
R. L. Walker, USAEC Graduate Fellow

Number of supporting personnel: Total supporting man-years:

SUMMARY OF PROPOSED WORK - (Approximately 200 words. Omit confidential data.) In the Science Information Exchange summaries of work in progress are exchanged with government and private agencies supporting research, and are forwarded to investigators who request such information. Your summary is to be used for these purposes. Please make your summary SUBSTANTIVE in nature, rather than generally descriptive.

Dispersion of particles and vapors in semi-isolated environments is being studied, particularly, regarding deposition and retention on environmental surfaces. Present, major emphasis on: (1) developing standardized methods for measuring particulate contamination on surfaces; (2) delimiting the normal range of environmental conditions affecting deposition and redispersion; and (3) applying new measurement techniques and the results of redispersion tests to the establishment of contamination control criteria.

Laboratory-scale studies have been made on the redispersion of 1 μ and of 5 μ ThO₂ particles from various surfaces -----stainless steel, plexiglas (roughnesses from 8 to 1000 μ inches RMS), porous concrete, greased concrete, and 22 others. Measurements are made of the relative redispersion effectiveness of abrasion, adhesion, air impingement and centrifugal forces. Large scale pilot studies have been run in two demountable rooms 8x12x8 feet high to simulate dust redispersion resulting from normal working activities in contaminated areas. Ancillary work has included the production of 0.1 gram quantities of spherical particles (< 0.1 μ diameter); by electrically exploding wires of 18 different elements in dry air, in nitrogen, in argon and in helium. These particles are being used in several studies: eg. condensation of I¹³¹ and of H₂O vapors on nuclei produced by exploding wires.

The continuing program will include particles of different physical and chemical characteristics and will be repeated under various environmental conditions (temperature, humidity, dustiness, air flow rates, etc.). Although primary attention will be given to scaling-up the laboratory work, some studies will be done to clarify basic questions concerning the probability of a particle depositing on a given surface and of its subsequent redispersion.

	Program Category Number
Primary	05 - 06
Secondary	06 - 06 - 01
Tertiary	06 - 06 - 01 - 02

*If applicable

SIGNATURE OF Original Signed By
PRINCIPAL B. R. FISH
INVESTIGATOR

DATE 11/1/63

INVESTIGATOR — DO NOT USE THIS SPACE

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