

723929

MAY 4 1961

THE UNIVERSITY OF ROCHESTER
 SCHOOL OF MEDICINE AND DENTISTRY
 POST OFFICE BOX 287, STATION 3
 ROCHESTER 20, NEW YORK

N
of. Inghel
Bernard
Good
Conte
5-4-61
AW

ATOMIC ENERGY PROJECT
 (ADMINISTERED BY THE DEPARTMENT OF
 RADIATION BIOLOGY UNDER CONTRACT WITH
 THE U. S. ATOMIC ENERGY COMMISSION)

May 1, 1961

Dr. Karl Z. Morgan, Director
 Oak Ridge National Laboratory
 Union Carbide Nuclear Company
 Post Office Box P
 Oak Ridge, Tennessee

Dear Karl:

Don Morken and I have conducted an experiment on ingestion of Rn-222 in water with results of some interest. We propose to extend our series beyond one subject but will be unable to do so for three or four weeks due to pressure of other obligations. Accordingly, since we appreciate that the question of an M.P.L. for Rn-222 in water will probably be discussed at the Washington meeting of the Committee, and since I will be unable to attend, I am submitting the results to you with my apologies for their preliminary nature.

The experiment involved the ingestion at time zero of 0.606 μ c Rn in (90%) equilibrium with its daughter products by a 54-year old, 190 lb. male subject.

The total Rn expired during the first hour was collected on a series of charcoal-filled cannisters. Thereafter 15 minute sampling periods were taken up to an elapsed time of five hours. The amount of radon expired during the associated time period was measured by gamma counting the cannister. The curve may be reasonably well represented by the sum of three exponentials. This experiment (predicting 0.44 percent) confirms the Stover-Mays statement that 0.45 percent of the radon decays in the body under these circumstances of exposure. A graph is presented with the radon results.

The fate of Radium C introduced together with the radon could be followed by whole body counting. This was done and a graph of the results is enclosed.

REPOSITORY MMES-ORNL
 COLLECTION 4500S ATTIC
 BOX No. KZ Morgan 68156
 FOLDER E-9

A-00529

Human Studies Project

May 1, 1961

From this preliminary data some tentative working propositions can be stated.

1. Daughter product free radon in water could be tolerated in daily amounts of about $0.2 \mu\text{c}$ in water (occupational) if these data be representative. The stomach is judged to be the limiting vulnerable organ.

2. When radon in equilibrium with its daughters is ingested the limiting exposure is that produced by the daughters. From internal evidence it may be guessed that Radium C is expelled from the stomach at about 23 minutes (see graph) and that the improved geometry (the crystal with respect to the lower belly, versus the less advantageous lower chest position of the stomach) produces an increase in count. This time scale may be typical only of water taken without food and may not be conservative.

3. Using the stomach as the limiting organ a rough calculation suggests that radon in equilibrium with daughters should be limited to about $0.1 \mu\text{c}$ per day, occupational, 168 hour week. Perhaps I should not draw any more inferences lest it appear I am making too much of a little gas on the stomach.

It may be noted that there is insufficient evidence to establish the 200 minute half-time as the longest time constant for the "fat" compartment. The possibility exists that a small fraction is held with a 1000 min time constant (which has been found for inhaled radon). Hardin Jones has postulated bimodality of the human fat compartment based on circulatory differences and Nussbaum and Hursh find half-times of 21 and 138 minutes for fat uptake of radon in rats.

I hope this data will be of help in conjunction with that obtained by other members of the committee. Very best regards.

Sincerely,



John B. Hursh, Professor
Department of Radiation Biology

JBH:aem
Enc. 3.

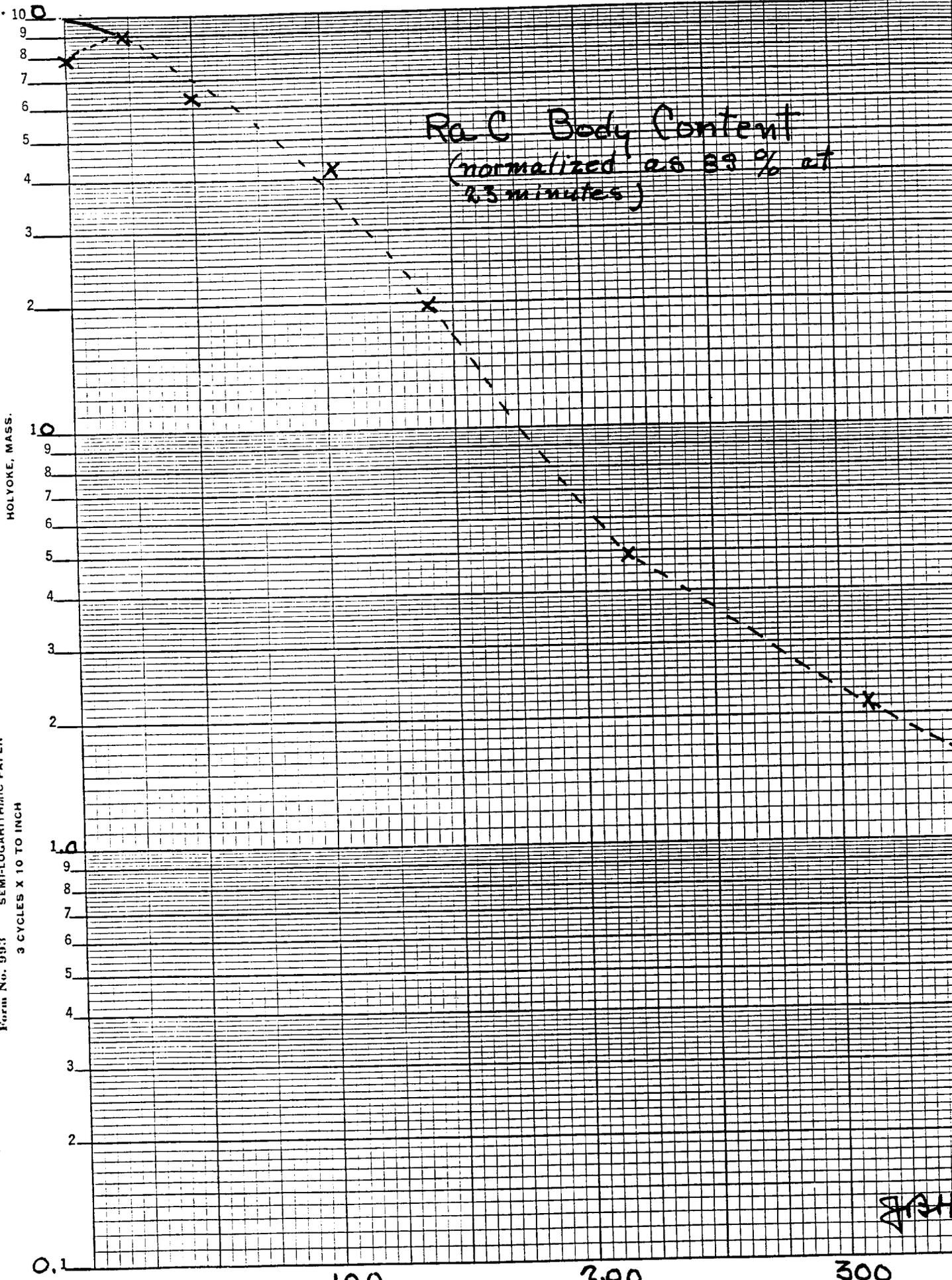
	Rn		Rn + Ds
	Occup. μc/day	Exposure	Occup. μc/day
Stomach	0.2	$(\frac{.047 \text{ rems}}{\text{day}})$	0.1
Yellow Marrow	1.4	$\leftarrow (\frac{.015 \text{ rem}}{\text{day}}) \rightarrow$	1.4

AMERICAN PAD & PAPER CO.
HOLYOKE, MASS.

Form No. 993 SEMI-LOGARITHMIC PAPER
3 CYCLES X 10 TO INCH

6510911

%



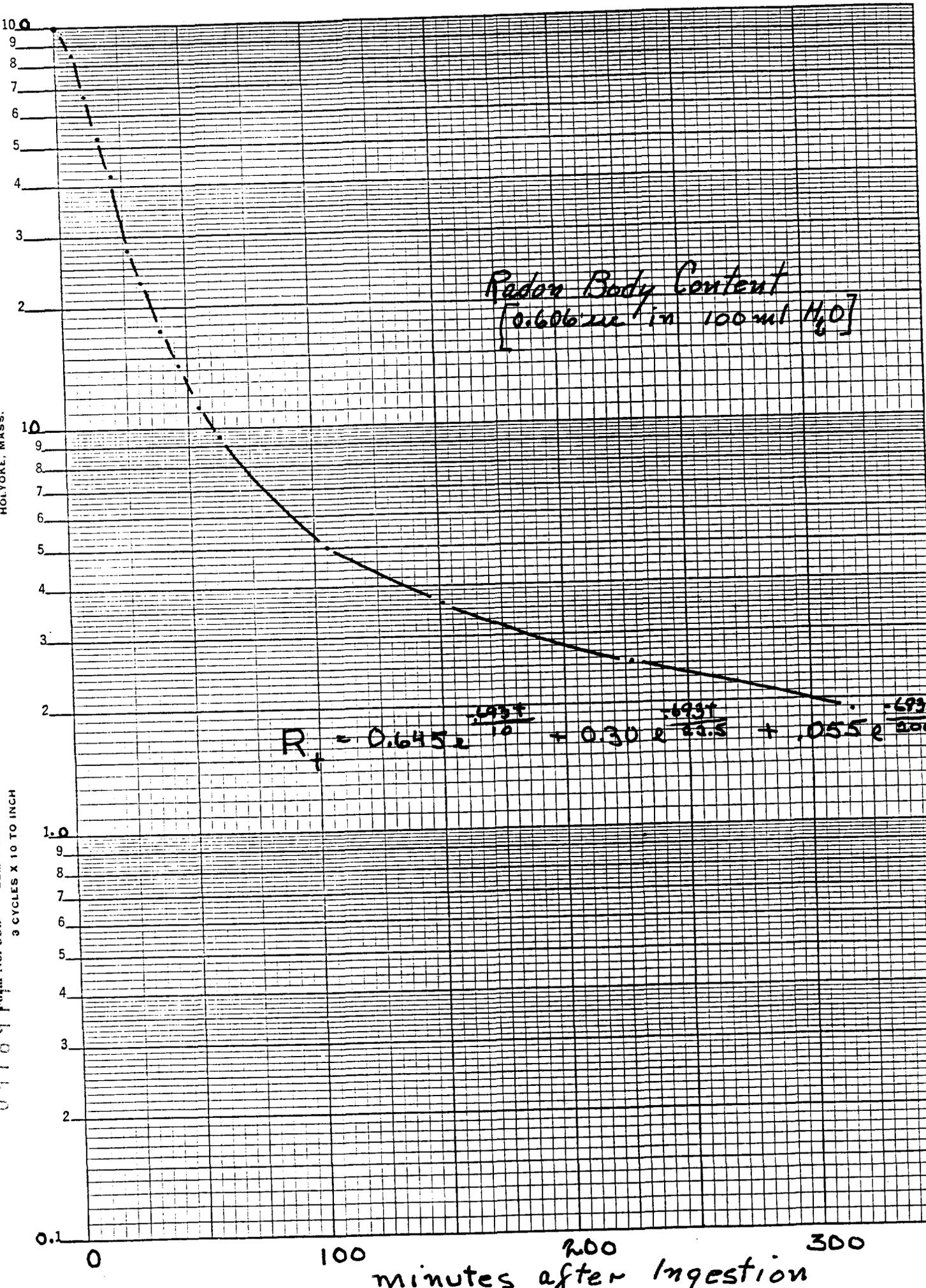
HEB

100 200 300
minutes after ingestion

AMERICAN PAD & PAPER CO.
HOLYOKE, MASS.

09189 Kodak No. 903 SEMI-LOGARITHMIC PAPER
3 CYCLES X 10 TO INCH

%



minutes after ingestion