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To: J. E. Wirth

From: S. G. English

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RE: QUESTIONS ON THE TOXICITY AND BEHAVIOR OF

PRODUCT IN THE BODY

At your and Dr. Stone's request I have attempted to outline below some of the questions which many of us working in the field of product chemistry feel should be answered. Our principal concern is that of protection of personnel who regularly handle in the laboratory large amounts of this material.

We feel, in general, that at present fairly sensitive methods are available for the detection of product - i.e. methods for the measurement of air and surface contamination (both in working areas and on the person). Similarly, methods of urine analysis for product in the body are being developed. The difficult task even when these methods are completely worked out will be the proper interpretation of the results of these measurements, what they mean: (1) in terms of product which has been accumulated in the body, and (2) what damage is likely to be incurred as a result. The importance of this latter point, which involves the setting of tolerance figures for product in the body, is of extreme importance to those working in this field. The early tolerance figures were, I believe, derived by calculation, assuming a strict analogy to radium, and no chemical toxicity. Roughly, this figure amounts to about fifty times (by weight) of the allowable amount of radium. We understand that there are now some reasons for believing that the tolerance amounts may be considerably lower, possibly as low as 0.1 microgram total. If this proves to be the case, then the picture presented by urine analyses (and the present interpretation of them) is extremely alarming. The difficulties of making accurate urine analyses are certainly great, where contamination can easily obscure results, and with present sample sizes being collected it would be very difficult to detect with any accuracy the lower tolerance level mentioned above. In any event a definite tolerance limit for product in the body should be established as rapidly as is possible

This is attempting to compare toxicity and radiation damage which we induce at level of 0.1 ppm stated in document with these

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In setting down the following points in outline form, I realize that some of the questions raised may already have partial answers, and that many of the problems posed are, and will be, extremely difficult to solve.

I. Methods of Analysis for Product in the Body

- (a) Blood examination. Correlation of any standard indices with fixed product, if any such relationships can be found to exist.
- (b) Interpretation of routine personnel urine analyses for product. This undoubtedly is largely a function of studies of elimination rates under various conditions of intake of plutonium; however, times of collection of specimens (morning, night, after week-end, etc.) should be correlated with interpretation to be applied. Rigorous controls are probably indicated.

II. Elimination from, and Distribution of, Product in the Body
Emphasis on Studies at Low Rates of Intake

- (a) Rate of excretion of product as a function of rate of intake by various sources (inhalation, ingestion, etc.). Since most personnel exposure to product is more likely to be at low intake levels, due to daily contact over a considerable period of time, it is necessary to know if the magnitude and rate of elimination varies under such circumstances, as compared with intake of relatively large amounts, in order to better interpret the results of urine analyses, and estimate tolerance intakes.
- (b) Distribution of product in the body, as a function of rate of intake, particularly at low intake rates.

It is felt that considerable emphasis should be given to the study of elimination after ingestion since it is our belief that this source of intake is probably the most likely one. (Inhalation of relatively small amounts is also a continuous source of intake and the possibility of relatively large amounts being taken in by accidental spills on skin abrasions always exists.)

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CLASSIFICATION CANCELLED

DATE

1-30-56

For The Atomic Energy Commission

H. F. Canale

Chief, Declassification Branch *KW*

[REDACTED]

in the body. Effect of diet on elimination rates and body dis-

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