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To: Recipients of Subject Report

Report No.: NUREG/CR-3572, ORNL/TM-8939 Classification: Unclassified

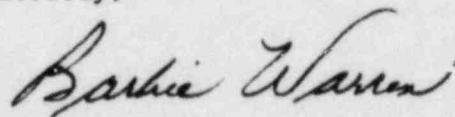
Authors: K. F. Eckerman, R. W. Leggett, R. Meyer, G. D. O'Kelley

Subject: Determination of Metabolic Data Appropriate for HLW Dosimetry (ICRP-30), I.

During the makeup process for publication, Figure 3.1 (page 44a) was inadvertently omitted. There is also an error on page 33. Please insert the attached pages in your copy(ies) of the report.

I apologize for your inconvenience.

Sincerely,



Barbie P. Warren, Secretary
Metabolism and Dosimetry Research Group
Health and Safety Research Division

:bpw

Attachments (2)

cc: Master File ORNL/TM-8939-RC

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colloids of Am and Cm are generally much more easily dissolved than those of Pu. This could lead to greater and more rapid transportability of Am and Cm than Pu into blood from the respiratory and gastrointestinal tracts, for example.

Neptunium

Compared with Pu, Am, and Cm, there is relatively little information on the biophysical and biochemical properties of Np. The following information is gleaned from Refs. 24 and 25 and an unpublished summary by D. M. Taylor.

In aqueous solutions, Np can exist in oxidation states 3⁺, 4⁺, 5⁺, 6⁺, and 7⁺, with the oxidation states 4⁺, 5⁺, and 6⁺ being the most stable and the ones most frequently used in experiments. In solutions of neptunium free from complexing anions the Np(V) oxidation state appears to predominate at pH values up to about 7. The oxidation state of neptunium under physiological conditions is not known, but Np(V) probably predominates. The tendency of Np ions toward reactions of complex formation decreases in the sequence $\text{Np}^{4+} > \text{Np}^{3+} > \text{NpO}_2^{2+} > \text{NpO}_2^+$, that is, in accordance with decreasing ionization potentials. The more stable the complex compound, the more hydrolysis of Np ions is suppressed. It is known that NpO_2^+ shows virtually no tendency to hydrolyze below about pH 7. Thus it might be expected that NpO_2^+ , and perhaps other forms of Np, would tend toward polymerization inside the body less than most compounds of Pu, Am, and Cm.

Strontium

Strontium is chemically similar to calcium and appears to behave similarly to calcium in the body, although there is some discrimination against Sr at membranes.²⁶⁻²⁸ Thus it is expected that Sr, like calcium, will be carried in body fluids both in ionic and complexed form. In normal human plasma, about half of the calcium exists as free ions, while most of the rest is bound to protein (mainly albumin).²⁹ The remainder is carried as CaHPO_4 and calcium citrate, and as unidentified complexes.²⁹ The extent of complexing of Sr is probably similar. Strontium chloride, for example, is probably very soluble in the lungs or

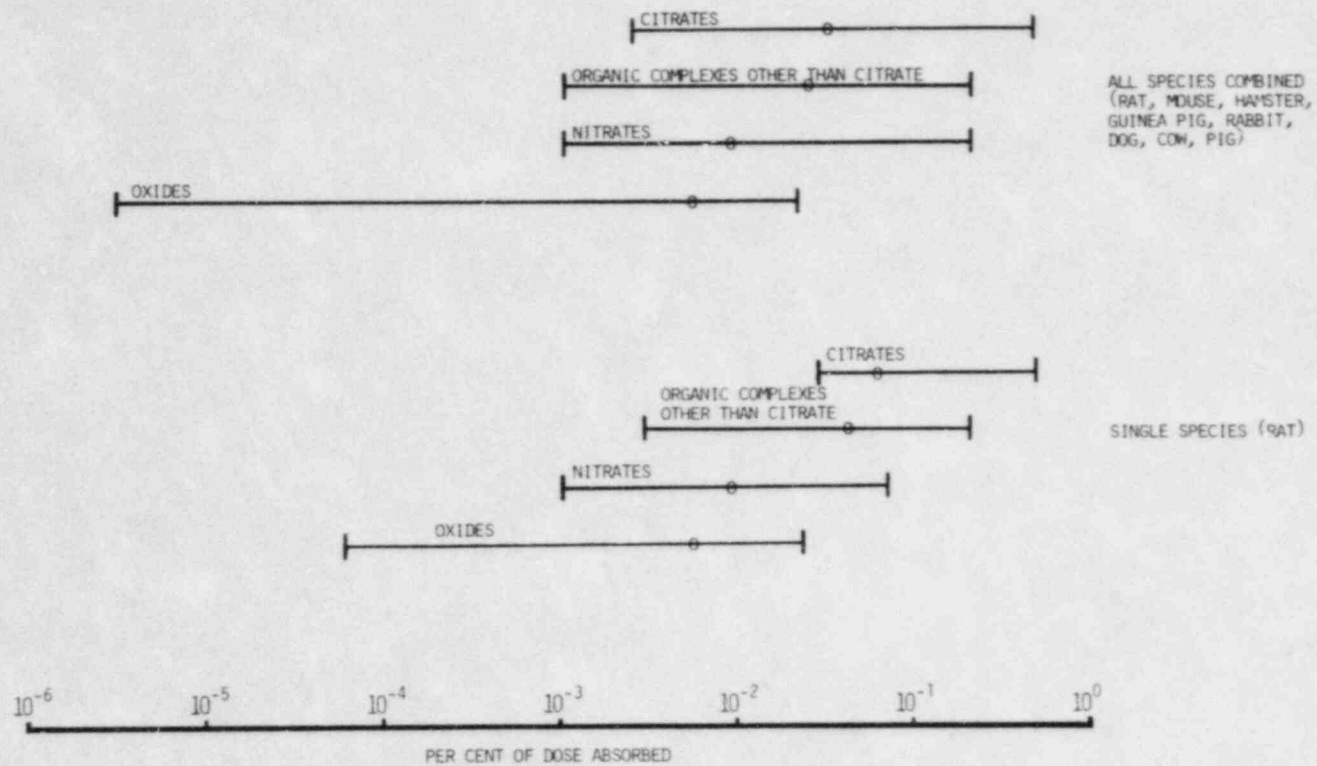


Fig. 3.1. Ranges and median values (circles) of gastrointestinal absorption fractions for various forms of Pu administered to laboratory animals.