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COLLECTION H-4 Radiobiology Group
BOX No A-92-095, Box 1
FOLDER #1

Dr. Wright H. Langham
Los Alamos Scientific Laboratory
H-4 Division
P. O. Box 1663
Los Alamos, New Mexico

Dear Wright:

During recent telephone conversations regarding the extent of the exposure dose received by one of the Los Alamos employees, you asked me to send some notes on the estimates we made of the dose. The only estimate which we have made to date is based on (1) the 0.008 $\mu\text{c}/\text{mg}$ of sodium which was determined at your Laboratory, and (2) the relationship between blood sodium activity and neutron dose was assumed to be the same as that for the Y-12 case, reported in Y-1234. The burro exposed to a dose of 48 rads gave 2.9×10^{-4} μc of Na^{24} per cc of blood. Under the above two conditions, the neutron part of the dose would be $0.008 \times 3.1^* \times 48 + 2.9 \times 10^{-4} = 4000$ rads. Again, if we use the same gamma-neutron ratio found in the Y-12 case, i.e. $D_\gamma/D_n = 3.0$, the gamma dose would be 12,000 rads, making a total dose of 16,000 rads.

It should be emphasized that this is a very crude preliminary estimate which at this time may be inaccurate due to the following factors:

- (1) The relationship between neutron dose and blood sodium depends to some extent on the neutron spectrum, and it was assumed that the spectrum for the recent Los Alamos case was the same as in the Y-12 case.
- (2) In the Y-12 case it was shown that the contribution to sodium activation due to thermal neutrons was negligible. Depending on the exact exposure geometry of the person involved, this may not hold for the Los Alamos case.
- (3) Even though the gamma-neutron ratio is affected by the geometry of the critical assembly, no corrections have as yet been attempted.

It should be possible through experimentation and calculations of the type done for the Y-12 case to check on the above uncertainties and eventually arrive at a fairly accurate estimate of the dose received by this person.

If we can be of any assistance whatever, please call on us.

Sincerely,

G. S. Hurst
Health Physics Division

GSH:nb
cc: K. Z. Morgan

* Assuming blood has 3.1 mg of Na per cc of blood

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