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SPECIAL REVIEW
FINAL DETERMINATION
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By Ted Davis
Date 3-6-86

2000947

MJC RSS 425

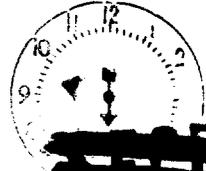
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10:45 AM

March 15, 1945

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U. S. ENGINEER OFFICE
MANHATTAN DISTRICT



File
4/26/45

Col. Stafford L. Warren
Box E
Oak Ridge, Tennessee

27871

Dear Colonel Warren:

On September 1, 1944 you wrote a memorandum to Col. K.D. Nichols on the subject of Radiation Hazards connected with Product. On September 21st, I wrote to you stating that I disagreed with certain parts of that memorandum. Later in the year this same memorandum was discussed at H.E.W. in connection with tolerances to be used there. I again disagreed with parts of your memorandum and feel that you should know of the stand I have taken. At H.E.W. the matter was discussed with Mr. Parker who reaffirmed his previous calculations and attitude.

In Paragraph 2, you stated that 5 mgms of product is considered as a tolerance dose for the amount that might be deposited in the body, and then stated that Mr. Parker had calculated it to be 0.6 mgms, but that by certain computations this could be changed to 6 mgms. Mr. Parker's figure of 0.6 gms of product referred only to the amount deposited in the lungs and retained there. The calculation used to reach it was based on an assumed tolerance dose of 0.01 rep (roentgen equivalent physical) per 24 hour day. It is not possible to modify this to 0.1 r, "the standard tolerance dose", as you did because irradiation by alpha particles is certainly more damaging per equal ionization than gamma irradiation, to which the 0.1r value applies. The factor of 10 cannot be numerically substantiated, but it is a reasonable extrapolation from the accepted factor of 4, between gamma irradiation and proton irradiation due to neutron bombardment.

The calculation by which Mr. Parker arrived at the tolerance concentration of product in air of 5×10^{-10} mgms/cc was a conservative one and will be affected by revised figures on retention of product in the lung. He assumed a 50% removal of product from the air, and a permanent retention of this 50% on the lung surfaces. It now seems that somewhere in the neighborhood of a 10% retention of the product in the lungs will be more likely, and therefore his figure is probably conservative by a factor of five.

The value of 5 mgms as a tolerable amount in the body is based on the amount deposited in the skeleton and is derived, as you state, from the generally accepted proposition that gram for gram product should be only 1/50 as toxic as radium, and the tolerance level for radium deposited in the body largely in the bones, is 0.1 mgm. It should be pointed out that the tolerable amounts in the skeleton and in the lung will be entirely separate quantities. In those cases where the absorption in the lung is so high that significant amounts can enter the skeleton before direct lung damage is produced, the amount in the skeleton will be of importance, but when the amount retained in the lungs far exceeds that which passes through into the skeleton, then the amount in the lung becomes the most important.

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Central Files
MD 729.3 Radiation Book 2
Thru 12/31/45

Special Rereview
Final Determination
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By: J. R. Patton
Date: 1980
P. F. Brown

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MD-729.3 Radiation Book 2

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Robley Evans has stated that in some cases the retention of 1 to 2 μ gms of radium in the body is a lethal dose, and in some instances I might add, the retention of 1 μ gm of radium in the body while not lethal has caused severe crippling bone injuries. Hence the figure which you took of 10 - 100 μ gms of radium as a lethal dose is somewhat arbitrary and does not in my opinion justify the statement that several thousand micrograms stored in the body of the individual is the range of lethal effects for Product.

In spite of these disagreements on detail, Mr. Parker and I felt that your statement that "superpoisonous" as applied to product is unduly alarming, was a most timely statement. He and I both believe that as far as the processes at the Hanford Engineer Works are concerned, it will not be too difficult to regulate exposures so as to be within the present stringent limits. I might add that the experience at Clinton justifies this belief.

Yours sincerely,



Robert S. Stone, M.D.

- cc SLW
- KDN
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Special Rereview
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