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UCC

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December 6, 1955

Dr. C. L. Dunham
Director, Division of Biology and Medicine
Atomic Energy Commission
Washington, D. C.

Dear Dr. Dunham:

Dr. Morgan and I have discussed your letter of November 30, and we shall attempt to clarify the position of the Air Force in the matter of the Japanese dosimetry.

This Division has a fairly long history of association with the U. S. Air Force, School of Aviation Medicine, and in particular with the Radiobiological Laboratory in Austin, Texas, headed by Col. Pickering. Perhaps you will recall that several years ago members of the Air Force, the Health Physics Division at ORNL, and the ANP representatives from ORNL set up a series of experiments in which an effort was made to obtain radiobiological data on primates. The program was set up to follow as closely as possible the exposure rates, total dose level, and interval between doses to be received by the pilots of nuclear aircraft. In the first experiment we cooperated with the Air Force in exposing monkeys to the bulk shielding reactor in Oak Ridge.

These experiments were followed by a second series that were executed at the Austin Radiobiological Laboratory with chemical sources consisting of Po-Be for neutrons and Co^{60} for gamma rays. We have worked with Col. Pickering's group on many problems of radiation dosimetry. An outstanding example of this cooperation was during the T-Pot Operation. At the time we were brought into the program, it was planned to measure neutron dose with the fission foil method which we developed and to measure the gamma-ray dose with the Bureau of Standards film packet. In experiments at the Tower Shielding Facility and with Lady Godiva at Los Alamos, it was indicated that the Bureau of Standards film had relatively large (10 to 20%) response to fast neutrons. Because of realization of this we arranged to have Lt. Sanford C. Sigoloff from Col. Pickering's group at Austin join us so that we could use chemical dosimetry to better estimate the gamma-ray dose in the presence of

neutrons. The chemical system which proved to have very fine characteristics for this work turned out to be the anhydrous chloroform dosimeter (often called the half phase system.) In this dosimeter the energy deposited per gram of tissue per rad of neutrons as compared with the energy deposited per roentgen of gamma rays can be shown to be on the order of 10%. Furthermore, since in similar chemical systems, the G value for heavy ionizing particles (produced by neutrons in this case) is on the order of 1/10 that of the G value for electrons (produced from gamma rays), it was expected that the response of the half phase system to fast neutrons would be on the order of 1%. Experiments in the T-Pot Operation have essentially confirmed our prediction of the superiority of the half phase system chemical dosimeter over the Bureau of Standards film packet, and we feel that this chemical dosimeter is at the present the most hopeful approach to measure gamma rays in the presence of fast neutrons.

As you can see from the background above, we have had two very strong reasons for cooperating with the Air Force. In summary, (1) they meed the help of our group in obtaining radiobiological data for the ANP program, and (2) they do have the unique system for measuring gamma rays. Because of these reasons we very often think of Col. Pickering and his group when we are considering new experiments involving dosimetry or radiobiology. Accordingly, when we were approached by Dr. W. T. Ham to consider the Japanese dosimetry, Dr. Morgan contacted Col. Pickering by telephone and he was so interested in this problem that he decided to join us personally the next day in Oak Ridge for further discussion. We also contacted Dr. Wright Langham at Los Alamos and he was equally interested but because of travel difficulties, he did not join our discussion personally at that time. He and Payne Harris did meet with us for discussions at a later date, and we all agree that Payne's approach as presented to you in Washington should be extended.

To make a long story short, I feel that because of mutual interest and abilities which complement each other, the three groups (ORNL, LASL, and USAF) should cooperate with the other groups (ABCC and Cataract Committee) in studying the correlation of dose with human data from Japan.

We were very pleased to see your keen interest displayed in your letter and in accordance with the suggestion you made sometime earlier during a telephone conversation with Dr. Morgan, I believe the next step would be to meet with the group that will be returning from Japan. Perhaps you could let us know when this group expects to return, what type of information they are likely to have, and when we could meet with them and other people that you might suggest in Washington.

Very truly yours,

G. S. Hurst

G. S. Hurst
Health Physics Division

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