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BOX No. 5(24-1)NN3-77-85-1

FOLDER NOVEMBER 1944

November 15, 1944

Col. S.L. Warren
P.O. Box B
Oak Ridge, Tenn.

Dear Col. Warren:

CLASSIFICATION CANCELLED
DATE <u>8/1/62 T</u>
For The Atomic Energy Commission
<u>Edgar J. Thurin</u> for the
Chief, Declassification Branch

Lieutenant Wolf and I discussed recently the matter of exposure of personnel to radiation in cases of emergency. My recommendations are as follows:

1. Exposure of the Whole Body to Gamma Rays.

A "single" exposure shall not exceed 100 roentgens in the course of a few hours. Subsequently the individual shall never be exposed to radiation at a rate greater than 0.1 r per day and, preferably, he should not be exposed to radiation even at this low dosage rate for any extended period of time.

Following the exposure to 100 r, the individual shall be kept under medical supervision and at rest for a period of at least one month. In case of wounds incurred at the time of the emergency or within a period of a few months, the use of sulfa drugs, shall be avoided if at all possible. The same applies to the treatment of any disease acquired by the individual in this period of time, which would normally be treated by sulfa drugs.

It must be realized at the outset that a body dose of 100 r is a large dose, being approximately one fifth of the estimated lethal dose. Therefore, physiological disturbances must be expected. It is hoped that these disturbances would be of a transitory character. On the other hand, permanent tissue changes must also be expected even when they are not detectable or functionally evident. For this reason there should be no further exposure to radiation.

The influence of the time during which the body dose of 100 r is delivered, is difficult to appraise.

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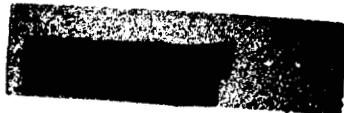
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It is safe to assume that this dose (100 r) delivered over a period of one week is less injurious than when delivered in "the course of a few hours", as stated above. However, if we start to take into account recovery rates, we get farther from experience (which at best is extremely limited) and we are apt to run into serious trouble. Inasmuch as we are considering exposure of personnel in case of an emergency, a maximum period of one week for one individual should be sufficient. I would say then that the same maximum body dose of 100 r should apply to an exposure time of a few hours to one week. When the time during which a person is exposed to radiation is not longer than one week, we may still call it a "single" exposure although the actual exposure may occur at intervals during the week.

If the exposure time is of the order of minutes or seconds, we are again far from experience and we must proceed with more caution. In this case, therefore, it is desirable to reduce the body dose to perhaps 50 r. However, a practical consideration comes in here. I believe it is advantageous to have only one value for the maximum permissible body dose in case of emergency. Accordingly, I am willing to set the limit at 100 r received within any period not exceeding one week. (Extending the period to one week introduces the complication that the individual may be subjected to strenuous physical labor, while being exposed to radiation and while the early radiation changes are developing; whereas in the case of a short exposure he would be resting for one month. However, the same dose spread over one week should be less harmful and the two effects should tend to compensate).

For the same reason of practical expediency we may disregard the influence of the quality of radiation. The 100 r limit shall apply, therefore, to gamma radiation of any quality measured at the surface of the body on the side of incidence.

I consider 100 r the maximum permissible "single" body dose of gamma rays, but only in case of emergency. I have suggested above that the individual be at rest and under medical supervision for at least a month following the exposure. This should apply also to individuals receiving any "single" dose between 50 and 100 r. I would say that for doses between 10 and 50 r some rest and medical supervision are also indicated.



2. Exposure of Hands to Gamma Rays.

A "single" exposure of the hands shall not exceed 500 r measured at the surface of the skin on the incidence side. "Single" should be interpreted here, as in the case of body exposure, to include continuous or interrupted exposure over a period of one week.

While the influence of quality of radiation on skin damage is marked, I think we can neglect it for the purpose at hand, that is, exposure in case of emergency. With very soft gamma rays the skin damage would be greater than with hard radiation, but it would be limited to the superficial layers.

I am opposed to the general idea of making some allowance for "recovery" from radiation injury. Accordingly, I would say that exposure of the hands to a second large dose of radiation should not be allowed at any subsequent time. Exposure of the hands to 0.1 r per day may be permitted at any time.

During the first month following exposure of the hands to 500 r, and preferably for a longer period, the individual should exercise great care in avoiding trauma; whether it be mechanical, chemical, or electromagnetic. In this last category I have in mind particularly heating by "short waves" or infra-red. In fact heat of any kind should be avoided. Exposure to ultraviolet, including sunlight, should be avoided, also.

Here again the post-exposure measures should not be limited to those whose hands receive the maximum dose of 500 r. They should be instituted in cases of exposure of the hands to 100 to 500 r, in varying degree commensurate with the magnitude of the dose.

Yours sincerely,

GF:KR

G. Failla



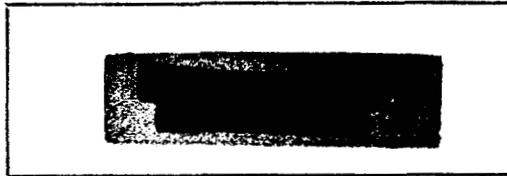
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Col. S.L. Warren

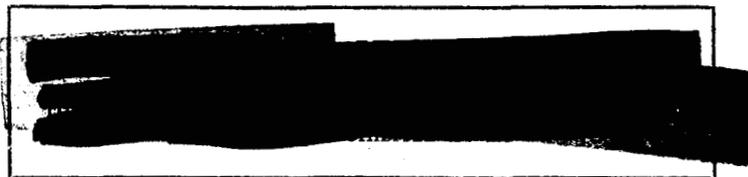
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FOLDER November 1944

W-7405-Eng.-50



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