



DEPARTMENT OF DEFENSE  
MILITARY LIAISON COMMITTEE

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**MEMORANDUM FOR THE CHAIRMAN, JOINT CHIEFS OF STAFF  
THE ASSISTANT SECRETARY OF DEFENSE (RESEARCH AND ENGINEERING)  
THE ASSISTANT SECRETARY OF DEFENSE (HEALTH AND MEDICAL)  
THE ASSISTANT SECRETARY OF DEFENSE (MANPOWER, PERSONNEL AND RESERVE)  
THE ASSISTANT SECRETARY OF DEFENSE (PUBLIC AFFAIRS)**

**SUBJECT: New Permissible Levels of Radiation Exposure**

**REFERENCE: Letter to the Chairman, Military Liaison Committee from the  
Chairman, Atomic Energy Commission, dated 5 December 1957,  
concerning the above subject.**

**A copy of the above reference, less the Atomic Energy Commission  
Manual Chapter 0524, is forwarded for your information.**

(Signed) Herbert B. Loper  
**Herbert B. Loper  
Chairman**

**1 Inclosure  
As Indicated**

SECRETARY OF DEFENSE  
OFFICE OF THE

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UNITED STATES  
ATOMIC ENERGY COMMISSION  
Washington 25, D. C.

December 5, 1957

Dear Mr. Loper:

The Commission has adopted new, lower levels of permissible exposures to ionizing radiation in its operations and for the operations of its contractors.

This action is based on recommendations of the National Committee on Radiation Protection and Measurement (NCRP) set forth in the Committee's preliminary Statement dated January 8, 1957, "Maximum Permissible Radiation Exposure to Man" (copy enclosed), with some modifications recently formulated by the NCRP Executive Committee and circulated to the members of the Main Committee for approval. Although the recommendations of the Committee are not binding on either Government or private operations, the AEC, through its Division of Biology and Medicine, has traditionally followed the recommendations of the Committee in limiting exposures to radiation of AEC and contractor personnel.

The new NCRP recommendations represent the first major change since 1948 in the basic guides limiting exposure of atomic energy workers and the population to ionizing radiation. They are intended to reflect consideration of the genetic and possible life-shortening effects of radiation. In its preliminary statement, however, the Committee points out that "changes in the accumulated maximum permissible dose are not the result of positive evidence of damage due to the use of earlier permissible dose levels, but rather are based on the desire to bring the MPD into accord with the trends of scientific opinion." With the probability of a large future increase in radiation uses, the NCRP suggests that these recommendations be put into effect as soon as practicable, but in any case within five years.

The NCRP recommendations under consideration here are limited to statements of standards. In applying these standards to situations of interest to the Atomic Energy Commission, it is necessary to specify in more detail how they shall be applied. For AEC installations these details are stated in the proposed AEC Manual Chapter (copy enclosed), which is expected to be made effective about February 1, 1958. It is believed that this Chapter is in complete accord with the current thinking of the NCRP.

Honorable Herbert B. Loper - 2 -

Since the Committee's recommendations permit radiation exposure limits as high as 15 rems per year under certain circumstances, there is no sharp break with previous permissible dose rates. Inasmuch as essentially all AEC contractors have been operating routinely well below the previous permissible levels, it is anticipated that adoption of the new levels will not result in any material change in present operating procedure.

Sincerely yours,

/s/ Lewis L. Strauss  
Chairman

Enclosures:

1. NCRP Statement
2. AEC Manual Chapter 0524

Honorable Herbert B. Loper  
Chairman, Military Liaison Committee  
to the U. S. A. E. C.

A  
APPENDIX "C"

MAXIMUM PERMISSIBLE RADIATION EXPOSURES TO MAN

A Preliminary Statement of the  
National Committee on Radiation Protection  
and Measurement

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January 8, 1957

THIS MATERIAL IS TO BE PUBLISHED ONLY  
IN ITS ENTIRETY, AND ONLY BY PERMISSION  
OF THE NATIONAL COMMITTEE ON RADIATION  
PROTECTION AND MEASUREMENT.

January 8, 1957

MAXIMUM PERMISSIBLE RADIATION EXPOSURES TO MAN

A Preliminary Statement of the  
National Committee on Radiation Protection  
and Measurement

INTRODUCTION

Since the publication of NBS Handbook 59 on Permissible Dose from External Sources of Ionizing Radiation, the National Committee on Radiation Protection and Measurement (NCRP) has continued the study and review of its recommendations, particularly with respect to genetic effects and the possible shortening of average life expectancy due to radiation exposure of a larger fraction of the population. The NCRP proposals resulting from these studies had an important influence on the decisions reached by the International Commission on Radiological Protection (ICRP) in Geneva in April 1956, which resulted in a general lowering of the maximum permissible accumulated dose (MPD) for occupational radiation exposures, as well as for exposures of the population as a whole. These changes are in accord with the informal agreements reached by the ICRP in Stockholm in 1952.

The NCRP has now agreed upon the formulation of revised recommendations on maximum permissible doses which integrate the national and international views for practical application. The Committee is pleased to note that the findings of the ICRP are reinforced by the important information and data provided in the subsequent reports of the National Academy of Sciences and the British Medical Research Council.

The changes in the accumulated MPD are not the results of positive evidence of damage due to use of the earlier permissible dose levels, but rather are based on the desire to bring the MPD into accord with the trends of scientific opinion; it is recognized that there are still many uncertainties in the available data and information. Consideration has also been given to the probability of a large future increase in radiation uses. In spite of the trends, it is believed that the risk involved in delaying the activation of these recommendations is very small if not negligible. Conditions in existing installations should be modified to meet the new recommendations as soon as practicable, and the new MPD limits should be used in the design and planning of future apparatus and installations. Because of the impact of these changes and the time required to modify existing equipment and installations, it is recommended on the basis of present knowledge that a conversion period of not more than five years be adopted within which time all necessary modifications should be completed.

#### DEFINITIONS

For the purposes of this preliminary statement, the following tentative definitions are given:

Controlled Area: A defined area in which the occupational exposure of personnel to radiation or to radioactive material is under the supervision of a radiation safety officer. (This implies that a controlled area is one that requires control of access, occupancy, and working conditions for radiation protection purposes.)

Workload. The output of a radiation machine or a radioactive source integrated over a suitable time and expressed in appropriate units.

Occupancy Factor. The factor by which the workload should be multiplied to correct for the degree or type of occupancy of the area in question.

RBE Dose. RBE stands for relative biological effectiveness. An RBE dose is the dose measured in rems. (This is discussed in the forthcoming report of the International Commission on Radiological Units and Measurement.)

MPD RECOMMENDATIONS FOR OCCUPATIONAL  
CONDITIONS (CONTROLLED AREAS)

1. ACCUMULATED DOSE. The maximum permissible accumulated dose, in rems, at any age, is equal to 5 times the number of years beyond age 18, provided no annual increment exceeds 15 rems. Thus the accumulated MPD = 5 (N-18) rems where N is the age and greater than 18. This applies to all critical organs except the skin, for which the value is double.

2. WEEKLY DOSE. The previous permissible weekly whole-body dose of 0.3 rem, and the 13-week dose of 3 rems when the weekly limit is exceeded are still considered to be the weekly MPD with the above restriction for accumulated dose.

3. EMERGENCY DOSE. An accidental or emergency dose of 25 rems to the whole body, occurring only once in the lifetime of the person, shall be assumed to have no effect on the radiation tolerance status of that person. (See National Bureau of Standards Handbook 59.)

4. MEDICAL DOSE. Radiation exposures resulting from necessary medical and dental procedures shall be assumed to have no effect on the radiation tolerance status of the person concerned.

## MPD RECOMMENDATIONS FOR THE WHOLE POPULATION

5. The maximum permissible dose to the gonads for the population of the United States as a whole from all sources of radiation, including medical and other man-made sources, and background, shall not exceed 14 million rems per million of population over the period from conception up to age 30, and one-third that amount in each decade thereafter. Averaging should be done for the population group in which cross-breeding may be expected.

## RECOMMENDATIONS FOR INTERNAL EMITTERS

6. In controlled areas, the permissible radiation levels for internal emitters will conform to the general principles outlined above. Where the critical organ is the gonad or the whole body, the maximum permissible concentrations of radionuclides in air and water will be one-third the values heretofore specified for radiation workers. Where single organs other than the gonads are regarded as the critical organ, the present maximum permissible concentrations will continue. For individuals outside of controlled areas, the maximum permissible concentrations should be one-tenth of those for occupational exposures. (Other changes in the maximum permissible concentrations for radionuclides may be introduced because of additional information developed since the publication of National Bureau of Standards Handbook 52.)

## DISCUSSION OF REVISED RECOMMENDATIONS

7. The MPD for occupational exposure is based on the absence of detectable injury to the individual. It remains at its present level of 0.3 rem/week for the whole body. Where the dose in any week exceeds this

value, a dose of 3 rems in 13 weeks may be accepted. The 13-week period may start at the beginning of the calendar quarter or the beginning of the week during which the permissible weekly dose was exceeded.

8. The rules given in Handbook 59 will be continued for operational and administrative purposes, but some of the rules will be modified by provisions related to an average yearly limitation of occupational exposure to external sources of ionizing radiation of 5 rems to the blood-forming organs, gonads, and lens of the eyes, and of 10 rems to the skin. The use of "5 rems" in the statement of the revised rules is for the purpose of design and administration. The critical limitation will be that defined for the total accumulated dose in paragraph 1 above.

9. If a person's occupational exposure is documented or otherwise known with reasonable certainty, he may be permitted to use his reserve exposure in accordance with paragraphs 1 and 2 above. In all other cases, he shall be assumed to have received his maximum accumulated dose as indicated in paragraph 1 above.

10. It is considered that with the current and proposed low levels of occupational exposure, it is presently not necessary to make special allowance for medical exposure in conjunction with occupational exposure. This consideration may later become important. The effects of medical exposures have long been considered by this Committee to be the responsibility of the attending physician; it is his responsibility to evaluate medical radiation exposure in relation to the health of the individual. (See National Bureau of Standards Handbook 59.)

11. In the determination of the population dose in the vicinity of radiation sources, proper consideration should be given to occupancy factor and to workload. The exposure of individuals outside of controlled areas may be integrated over periods up to one year.

12. While at the moment it is not feasible to determine the average exposure for the population with any reasonable accuracy, the adoption of some figure is necessary for planning purposes. For the immediate future, it may be assumed that the total integrated RBE dose received by all radiation workers will small in comparison with the integrated RBE dose of the whole population. Furthermore, persons outside of controlled areas, but exposed to radiation from a controlled area, constitute only a small portion of the whole population. Therefore, if this small portion is assumed to receive yearly an average per capita dose of 0.5 rem, the total dose to the whole population from man-made radiations is not likely to exceed 10 million rems per million of population up to age 30. (This assumes a dose of 4 million rems per million of population over this age period from background radiation.)

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