

June 1, 1973

RADIATION PROTECTION GUIDANCE
FOR CONTROL OF EXPOSURES AT ENIWETOK ATOLL

INTRODUCTION

Standards for protecting man from exposures to ionizing radiation have been developed concurrently with development of nuclear technology. Authorities at the national and international level using conservative assumptions have developed approaches for radiation protection and established numerical standards which in their view provide a level of safety at least as stringent as is achieved for other powerful agents.

As activities with nuclear radiation and radioactivity have become more numerous and complex, standards have evolved for broad categories of exposure conditions. These standards are directed toward use by governmental agencies and other responsible bodies in their health protection activities.

A major consideration in development of standards is that they be simple to understand and easy to apply in order to avoid misinterpretation. In considering real situations, use of judgement rather than rigid application, in the extreme, is favored recognizing the benefits as well as risks associated with radiation usages. It has been anticipated that situations will arise for which available standards are not directly applicable. Such cases are to be considered on a case-by-case basis, with judgements made as to exposure levels that are

D/c. Navy. R. medical Survey

04788

2983

justifiable.

AVAILABLE STANDARDS

This section provides a general description of the current radiation protection standards, their sources and application that have ^{relevance} ~~relevance~~ for Eniwetok guidance.

Federal Radiation Council, FRC. The FRC was established in 1959 to advise the President and to provide guidance for U.S. Federal agencies in their radiation protection activities. Basic numerical standards and health protection philosophy are very similar to that of the International Commission on Radiological Protection, ICRP. Numerical criteria and supporting material are provided for, (1) exposure of individuals and of population groups where actions are directed primarily at control of the source of radioactivity, these are the Radiation Protection Guides, RPG's, ^{and} (2) exposure of individuals and population groups to radioactivity from an unplanned release where action is taken in the production and use of foods, these are the Protective Action Guides, ^{of} RPG's PAG's. The term "Radiation Protection Guides" has been adopted for Federal use. This is the dose that should not be exceeded without careful consideration of the reasons for doing so. Every effort should be made to encourage the maintenance of radiation doses as far below this guide as practicable. The RPG's are intended for use with normal peacetime operations. However, there should not be any man-made radiation exposure without expectation of benefits from such exposure.

2984

Considering such benefits, exposure at the level of the RPG is considered as an acceptable risk for a lifetime. The RPG's are expressed in terms of annual exposure. ^{PH} Environmental monitoring is a necessary part of complying with the RPG guidance, the intensity and frequency of measurements being determined by requirements to be able to detect sharply rising trends, and to provide prompt and reliable information on the effectiveness of control actions. Source control actions and monitoring efforts are to increase as predicted exposures move through a range of values and approach the numerical value of the RPG. A sharply rising trend approaching the PRG would suggest strong and prompt action. The magnitude of the action should be related to the degree of likelihood that the RPG would be exceeded.

² The child, infant, and unborn infant are identified as being more sensitive to radiation than the adult. Exposures to be compared with the guidance are to be derived for the most sensitive members in the population. The guide for the individual applies when individual exposures are known, otherwise, the guide for a suitable sample (one-third the guide for the individual) is to be used. This is an operational technique and may be modified to meet special situations.

The FRC primary numerical guides, expressed in rem, are provided in two reports, FRC Nos. 1 and 2, ^{These} and ^{are} summarized in Table I. Through calculational methods using dose models, secondary numerical guides have been developed by FRC and are expressed in terms of daily intake

5895

of specific radionuclides corresponding to the annual RPG's. In practice, consideration is given to all radionuclides through all pathways to derive total annual exposure for comparison with FRC guides. However, for many situations, a relatively few radionuclides yield the major contribution to total exposure and exposures from others are very small by comparison.

PAG's: The term "Protective Action Guide" has been defined as the projected absorbed dose to individuals in the general population which warrants protective action following a contaminating event. In setting these numerical guides, the FRC was concerned with a balance between the risk of radiation exposure and the impact on public well-being associated with alterations of the normal production, processing, distribution and use of food.

A protective action is described as an action or measure taken to avoid most of the exposure to radiation that would occur from future ingestion of foods contaminated with radioactive materials. Such actions are appropriate when the health benefits associated with the reduction in exposure to be achieved are sufficient to offset the undesirable feature of the protective actions. A basic assumption in the development of the guidance is that a condition requiring protective action is unusual and should not be expected to occur frequently.

The numerical guides are related to three types of actions, (1) altering production, processing, or distribution practices, (2) diverting affected products to other than human consumption, and (3) condemning affected foods. There is one additional category involving long-term exposure for which numerical guides are not provided and for which need for action is to be determined on a case-by-case basis.

9886

The FRC identifies the critical segment of the population for which dose projections, for comparison with the guides, are to be made. For instance, for ^{131}I in milk, the critical segment is children, one year of age.

In cases where it is not practical to estimate individual doses, action will be based on average values of radiation exposure. Guides for both individuals and a suitable sample are provided. For ^{131}I in milk, the suitable sample is to consist of children approximately one year of age using milk from a reasonably homogenous supply.

Numerical guidance for PAG's is provided in two reports, FRC Nos. 5 and 7.^{2/} These guides are summarized in Table II.

2987