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ATOMIC ENERGY COMMISSION

RADIATION PROTECTION GUIDANCE AND STATUS REPORT

Note by the Acting Secretary

1. The Director of Regulation has requested that the attached memorandum to the President from the Chairman, Federal Radiation Council, with enclosures, be circulated for the information of the Commission.

2. The Director of Regulation has advised that:

"It is expected that the Memorandum for the President will be published in the FEDERAL REGISTER at which time copies will be made for distribution with Federal Radiation Council Report No. 5. A copy of Federal Radiation Council Report No. 5 is presently on file in the Division of Safety Standards."

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F. T. Hobbs

Acting Secretary

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FEDERAL RADIATION COUNCIL
WASHINGTON, D.C. 20449

16 JUL 1964

MEMORANDUM FOR THE PRESIDENT

SUBJECT: Radiation Protection Guidance and Status Report

The Federal Radiation Council transmits to you: (1) a Memorandum for the President which contains recommendations for protective actions related to contamination of foods by iodine-131, and (2) a status report on the development of additional recommendations for three other fallout radionuclides: strontium-89, strontium-90, and cesium-137.

The Council recommends that you approve the guidance in the Memorandum for the President. With your approval, a copy of the attached Memorandum and status report will be transmitted to the Joint Committee on Atomic Energy for its information on the progress of the Council in developing guidance related to fallout and protective actions.

sgd ---

Anthony J. Celebrezze
Chairman

Attachments 2

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FEDERAL RADIATION COUNCIL
WASHINGTON, D.C. 20449

16 JUL 1964

MEMORANDUM FOR THE PRESIDENT

SUBJECT: Radiation Protection Guidance for Federal Agencies

Pursuant to Executive Order 10831 and Public Law 86-373, the Federal Radiation Council is transmitting recommendations for the approval of the President for guidance of Federal agencies in their radiation protection activities. The present recommendations are directed to guidance for protective actions affecting the normal production, processing, distribution, and use of food products for human consumption. Specific guidance is provided for iodine-131. It is the intention of the Council to release the background material leading to these recommendations as Staff Report No. 5 when the recommendations herein are approved.

Background The first two memorandums which provided guidance for Federal agencies in the conduct of their radiation protection activities were approved by the President on May 13, 1960, and September 20, 1961. These provided a general philosophy of radiation protection and general principles of control based on the annual intake of radionuclides. The recommendations contained therein provided the basis for the control and regulation of normal peacetime operations in which exposure to radiation is a factor. Numerical values were provided for the Radiation Protection Guides designed to limit the exposures of the whole body and of certain organs resulting from normal peacetime operations.

During the period of atmospheric testing of nuclear weapons in 1961 and 1962 the question arose as to the use of these Radiation Protection Guides for determining the conditions under which the production, processing, distribution, and use of food, particularly fresh fluid milk, should be altered to reduce human intake of radionuclides from fallout.

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In September 1962 the Federal Radiation Council stated its position on this subject, and in 1963 the Council reiterated that existing guides were not applicable to a determination of a need for protective actions and noted that it would recommend guidance on the subject to the President.

Concept of Protective Action Guide In previous reports the Federal Radiation Council has recommended a philosophy of radiation protection and discussed alternative approaches to the derivation of basic guidance for radiation protection. It has pointed out that decisions concerned with radiation protection involve a balance between the possible health risks associated with radiation exposure and the reasons for accepting the exposure. The Council adopted the term "Radiation Protection Guide" to express the balance between the benefits from normal peacetime operations and the health risks associated with those exposures. The radionuclide releases causing these exposures are generally controlled at the source.

Radiation protection guidance for protective actions applicable to ingestion of food contaminated with radioactive material requires a different balance. Here, the Council is 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.

For this purpose, the Council has adopted the term "Protective Action Guide" (PAG), defined as the projected absorbed dose to individuals in the general population which warrants protective action following a contaminating event. The projected dose is the dose that would be received in the future by individuals in the population group from the contaminating event if no protective action were taken. If the projected dose exceeds the PAG, protective action is indicated. According to the operational technique adopted in the Memorandum for the President, May 1960, the corresponding average projected dose to a suitable sample of the exposed population would be one-third of the PAG.

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A protective action is 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 features of the protective actions. The PAG represents the Council's judgment as to where this balance should be for the conditions considered most likely to occur. If, in a particular situation, there is available an effective action with low total impact, initiation of such action at a projected dose lower than the PAG may be justifiable. If only very high impact action would be effective, initiation of such action at a projected dose higher than the PAG may be justifiable.

A basic assumption in the development of the guidance in this memorandum is that a condition requiring protective action is unusual and should not be expected to occur frequently. In any event, the numerical values selected for the Protective Action Guides are not intended to authorize deliberate releases expected to result in absorbed doses of these magnitudes.

The types of actions to which application of the Protective Action Guides may be related are:

1. Altering production, processing, or distribution practices affecting the movement of radioactive contamination through the food chain and into the human body. This action includes storage of food supplies and animal feeds to allow for radioactive decay.
2. Diverting affected products to uses other than human consumption.
3. Condemning affected foods.

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Measures that require an alteration of the normal diet are generally less desirable than those listed and should not be undertaken except on the advice of competent medical authorities.

Radionuclides Considered Four radionuclides are of particular importance in considering radioactive contamination of food. These are iodine-131, strontium-89, strontium-90, and cesium-137. This memorandum will deal only with iodine-131.

In contrast to the other fission nuclides, the relatively high yield of iodine-131 and the short radioactive half-life (8 days) of iodine-131 make it the radionuclide most likely to reach concentrations justifying protective actions. This is especially true if the deposition occurs within a few days after the fission event. Protective action against iodine-131 must be taken promptly in order to be effective.

Physical and biological factors related to iodine-131 have been considered in FRC Reports No. 1 and No. 2. As in FRC Report No. 2, it is assumed that children one year of age, with a thyroid weight of 2 grams and 30 percent uptake of iodine-131, are the critical segment of the population.

Protective Actions Against Iodine-131 The Council has evaluated the kinds of protective actions available for use against iodine-131, the health benefit that **may result** by averting a radiation dose larger than the Protective Action Guide, and the probable impact of taking the actions. Of various actions that might be effective in averting the major part of the potential exposure, two appear to provide the most acceptable combinations of maximum effectiveness and minimum undesirable consequences. One of these is the diversion of fresh milk to provide unaffected milk in the contaminated area and to use the affected milk in the production of dairy products that may be conveniently stored until the iodine-131 has effectively decayed, a matter of a few weeks. The other is the substitution of stored feed for pasturage, until most of the iodine-131 has decayed.

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Recommendations In view of the considerations summarized, the following recommendations are made.

It is recommended that:

1. The term "Protective Action Guide" (PAG) be adopted for Federal use.

The Protective Action Guide is defined as the projected absorbed dose to individuals in the general population which warrants protective action following a contaminating event. The projected dose is the dose that would be received in the future by individuals in the population group from the contaminating event if no protective action is taken.

It is recommended that:

2. The Protective Action Guide for iodine-131 be 30 rads to the thyroid.

If the projected dose exceeds the Protective Action Guide, protective action is indicated.

According to the operational technique adopted in the Memorandum for the President, May 1960, the corresponding average projected dose to the thyroids of a suitable sample of the exposed population group would be 10 rads.

It is recommended that:

3. The guidance contained herein be approved for the use of Federal agencies in the conduct of those radiation protection activities affecting the normal production, processing, distribution, and use of food and agricultural products.

sgd ---

Anthony J. Celebrezze
Chairman

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The recommendations numbered "1" through "3" contained in the above memorandum are approved for the guidance of Federal agencies, and the memorandum shall be published in the Federal Register.

Date: 31 JUL 1964

sgd ---
Lyndon B. Johnson

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FEDERAL RADIATION COUNCIL

STATUS OF RECOMMENDATIONS FOR PROTECTIVE ACTION
GUIDES APPLICABLE TO STRONTIUM-89, STRONTIUM-90,
AND CESIUM- 137

The Federal Radiation Council has agreed to formulate recommendations indicating the conditions under which the normal production, processing, distribution and use of food products should be altered as the result of radioactive fallout. Studies during the past year have led to the conclusion that such recommendations will most likely be needed for four radio-nuclides --- iodine-131, strontium-89, strontium-90, and cesium-137.

The Council has reached agreement on:

1. The kinds of situations most likely to lead to a requirement for protective action. (Inadvertent deposition following a major release of fission products.)
2. The criteria on which the guidance should be based. (The projected absorbed dose for a single episode.)
3. The kinds of protective action to which the guidance may be applied. (Actions that change the normal production, processing, distribution and use of food products for human consumption.)
4. The definition of a "Protective Action Guide" by which these criteria can be reduced to numerical values for determining

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when protective actions are indicated. (The Protective Action Guide is the projected absorbed dose to individuals in the general population which warrants protective action following a contaminating event.)

5. Numerical Protective Action Guides applicable to contamination of the environment by iodine-131. (Thirty rads to the thyroid of individuals in the population or 10 rads to the average of a suitable sample of the population.)

The Council's recommendations covering these points have been submitted for your approval.

The development of guides applicable to strontium-89 and, especially, to strontium-90 and cesium-137 requires the evaluation of considerations not relevant to iodine-131. These questions arise from the chemical properties of strontium and cesium and from the relatively long half-lives of the radionuclides concerned. Especially difficult are considerations of the time span over which individuals may be exposed to strontium-90 or cesium-137 and of practical ways by which this exposure may be avoided.

The technical staff is evaluating the alternatives using a value of 15 rads for exposure of individuals in the population and 5 rads as the corresponding average of a suitable sample of the population as tentative figures for the Protective Action Guides for these nuclides. The values apply to exposure of the whole body, blood-forming organs and reproductive tissue. We expect our recommendations for these nuclides to be ready in the next three to six months.

July 1964

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