CHAPTER 25

Development of Guidelines for Safety Evaluation of Food and Water After Nuclear Accidents: Procedures in North America

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Introduction

This chapter describes the United States approaches on emergency reference levels for foodstuff. It covers the guidance developed in the 1960s in response to atmospheric fallout, the recommendations for state/local planning for nuclear power plants, and the policy for imported food developed following the Chernobyl accident.

Despite the assigned title, the procedures in Canada and Mexico are not covered; only those in the United States. Somers, Cooper, and Meyerhof will briefly describe Canada’s approach in Chapter 32. Mexico has not developed specific guidance. Rather, Mexico has addressed concerns over levels of radioactive materials in food on a case-by-case basis. The basic approach taken by Mexico has been to assure that levels are as low as practicable.

Atmospheric Fallout Guidance of 1964 to 1965

Guidance on intervention in the event of radiological contamination of food was first given by the Federal Radiation Council (FRC), an interdepartmental group, in the 1960s during the period of atmospheric fallout from nuclear weapons tests. This guidance for federal agencies was defined as Protective Action Guides (PAGs) and was based on the concept of avoiding projected dose (1). The PAG was defined as the projected dose to individuals in the general population that warrants protective action following a contaminating event. Protective action would be warranted if the expected individual dose reduction was not offset by adverse social, economic, or health effects from the action. The PAG applied to the projected or future dose that would be received without any action, and it was expected that the protective action would prevent most of this dose. The PAGs were considered applicable to these types of actions:

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1. Altering production, processing, or distribution practices affecting the movement of radioactive contamination through the food chain and into the human body. This action included 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.

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

The FRC recommendations addressed \textsuperscript{131}I in the initial report. In the second PAG report \textsuperscript{89}Sr and \textsuperscript{90}Sr and \textsuperscript{137}Cs were identified as the radionuclides of particular importance. The PAG recommended doses for \textsuperscript{131}I were 300 mSv (30 rem) to the individual and 100 mSv (10 rem) to “the average of a suitable sample of the exposed population group” (1). The concept of “the average of a suitable sample of the exposed population” was developed because it generally is not practical to measure individual doses. As an operational technique, it was considered that conformance to the PAG for the average of the suitable sample would ensure that the individual PAG was met.

The background material to these recommendations further provided data to indicate that if the maximum level in milk was about 2,200 to 2,600 Bq/L (60,000 to 70,000 pCi/L), the infant thyroid dose would be about 100 mSv. It should be noted that this is not a derived intervention level (DIL) as currently used, but an action level for the milk concentration that was equivalent to the PAG. The DIL is the derived concentration in food that would achieve the dose protection level adopted for intervention. As currently used, the DIL is the concentration in food that would be allowed to enter the market. In contrast, the PAG is an action level for taking a specific action. It was expected that if this maximum level was reached, protective action would be taken to avoid most of the projected dose. Thus, the radioactive contamination of food entering the market and actually consumed would be appreciably lower. The specific protective actions considered in selecting these PAGs were (a) change the cattle’s diet from pasture to stored feed, and (b) divert contaminated milk to processed dairy products to allow decay of \textsuperscript{131}I.

The FRC in a later report (2) provided PAG guidance for \textsuperscript{89}Sr and \textsuperscript{90}Sr and \textsuperscript{137}Cs by three categories covering different time periods and pathways as follows:

- **Category I:** pasture–cow–milk–man pathway during the first 100 days;
- **Category II:** other pathways during the first year; and
- **Category III:** long-term pathway (root uptake from the soil).

The PAGs recommended for the active bone marrow or the whole body decreased from 100 mSv (individual) and 33 mSv (average) for Category I, to 50 mSv (individual) and 20 mSv (average) for Category II, and to 5 mSv (individual) and 2 mSv (average) for Category III. No specific guidance was given for concentrations in food considered equivalent to the PAGs.