Food and drinking water

Improving radiation protection in practice

There are many sources of natural and human-made radionuclides in the environment.

These are present in:

terrestrial ecosystems

aquatic ecosystems

The radionuclides in food may be a result of root uptake from the soil, direct deposition from the atmosphere onto crops or transfer via aquatic pathways (freshwater or saltwater).

In the case of drinking water, radionuclides may be absorbed as water passes over or through rocks and soils.

Most of the radiation dose from ingestion of food and drinking water comes from natural radionuclides, such as polonium-210, lead-210, radium-226 and radium-228. Human-made radionuclides, such as strontium-90, caesium-137 and plutonium, generally make a much smaller contribution.

Sources of radionuclides in the environment

- Primordial radionuclides such as the uranium-238, uranium-235 and thorium-232 decay series
- Authorized discharges from nuclear and other facilities
- Fallout from the testing of nuclear weapons
- Unplanned releases to the environment during the large scale nuclear accidents such as the Kyshtym, Chernobyl and Fukushima Daiichi accidents
- Potassium-40

Did you know?

Potassium, which contains 0.012% of potassium-40, is an essential element that regulates and controls many body functions. Because the body regulates the amount of potassium it needs, the body content of potassium-40 is also regulated. Typically, everyone receives an annual radiation dose of about 165 to 175 μSv from this source.

IAEA
International Atomic Energy Agency

Visit:
www.iaea.org/topics/radiation-protection

Email:
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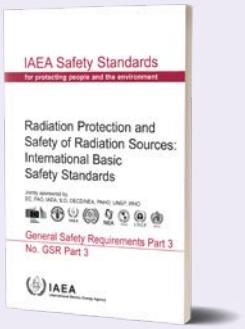
What do the IAEA Safety Standards say?



In 2014, the IAEA has published the *General Safety Requirements Part 3: Radiation Protection and Safety of Radiation Sources: International Basic Safety Standards*. This is often referred to simply as the BSS. The BSS is jointly sponsored by eight international organizations with responsibilities in various areas of radiation protection.

The requirements in the BSS take account of the most recent scientific evidence relating to exposure due to radiation. The BSS is used by many States as the basis for their national regulations dealing with radiation protection and safety.

Until relatively recently, IAEA safety standards addressed criteria for controlling public exposure to radiation from radionuclides in food and drinking water only in the context of nuclear or radiological emergencies. This changed with the publication in 2014 of *IAEA General Safety Requirements Part 3 (GSR Part 3)*, which contains requirements for radionuclides in food and drinking water in existing exposure (non-emergency) situations.

Requirement 51 of the BSS says that: "... the regulatory body or other relevant authority shall establish specific reference levels for exposure due to radionuclides in commodities such as construction materials, food and feed, and in drinking water, each of which shall typically be expressed as, or be based on, an annual effective dose to the representative person that generally does not exceed a value of about 1 mSv."

Criteria for the assessment and management of radionuclides in drinking water in existing exposure situations have been published by the World Health Organization. These criteria cover both natural and human-made radionuclides. The international food standards of the Joint FAO/WHO Codex Alimentarius Commission include guideline levels for 20 radionuclides for food in international trade and which is contaminated as a result of a nuclear or radiological emergency.

In addition to the IAEA, the BSS is jointly sponsored by the European Commission, the Food and Agriculture Organization of the United Nations, the International Labour Organization, the Nuclear Energy Agency of the Organisation for Economic Co-operation and Development, the Pan American Health Organization, the United Nations Environment Programme and the World Health Organization.

Challenges

Challenges in international guidance

Currently there is no international guidance on natural radionuclides in food. The FAO, IAEA and WHO jointly undertook a review of the existing international guidance on radionuclides in food and drinking water and identified some gaps and inconsistencies in relation to non-emergency situations. The three international organizations are working together to develop such guidance.

Assessing the radiation dose from a person's diet needs to take account of the contribution from several radionuclides, some of which are not easy to measure.

Additionally, the various assessment strategies based on sampling the total diet have limitations in terms of representativeness of the results. Implementing future guidance may therefore be challenging for many national authorities in terms of analytical capability.

Challenges in using reference levels

The BSS requires national authorities to establish reference levels for radionuclides in food and drinking water in non-emergency situations. Reference levels are not limits, but experience has shown that they are often used as such.

Terms such as ‘guidance level’ (used by WHO) or ‘guideline level’ (used by the Joint FAO/WHO Codex Alimentarius Commission) may be more appropriate, particularly in relation to natural radionuclides in food. If the approach, including language, can be harmonized, this will benefit understanding and implementation of the guidance.

How does the IAEA support Member States?

The IAEA supports its Member States in implementation of all aspects of the Safety Standards including graded approach through national, regional workshops and trainings including online webinars.

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