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Challenges in Implementing the Current International Standards Relating to Food and Drinking Water Applicable in Existing Exposure Situations

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International Workshop on Post-Accident Food Safety Science
Session 3

Outline

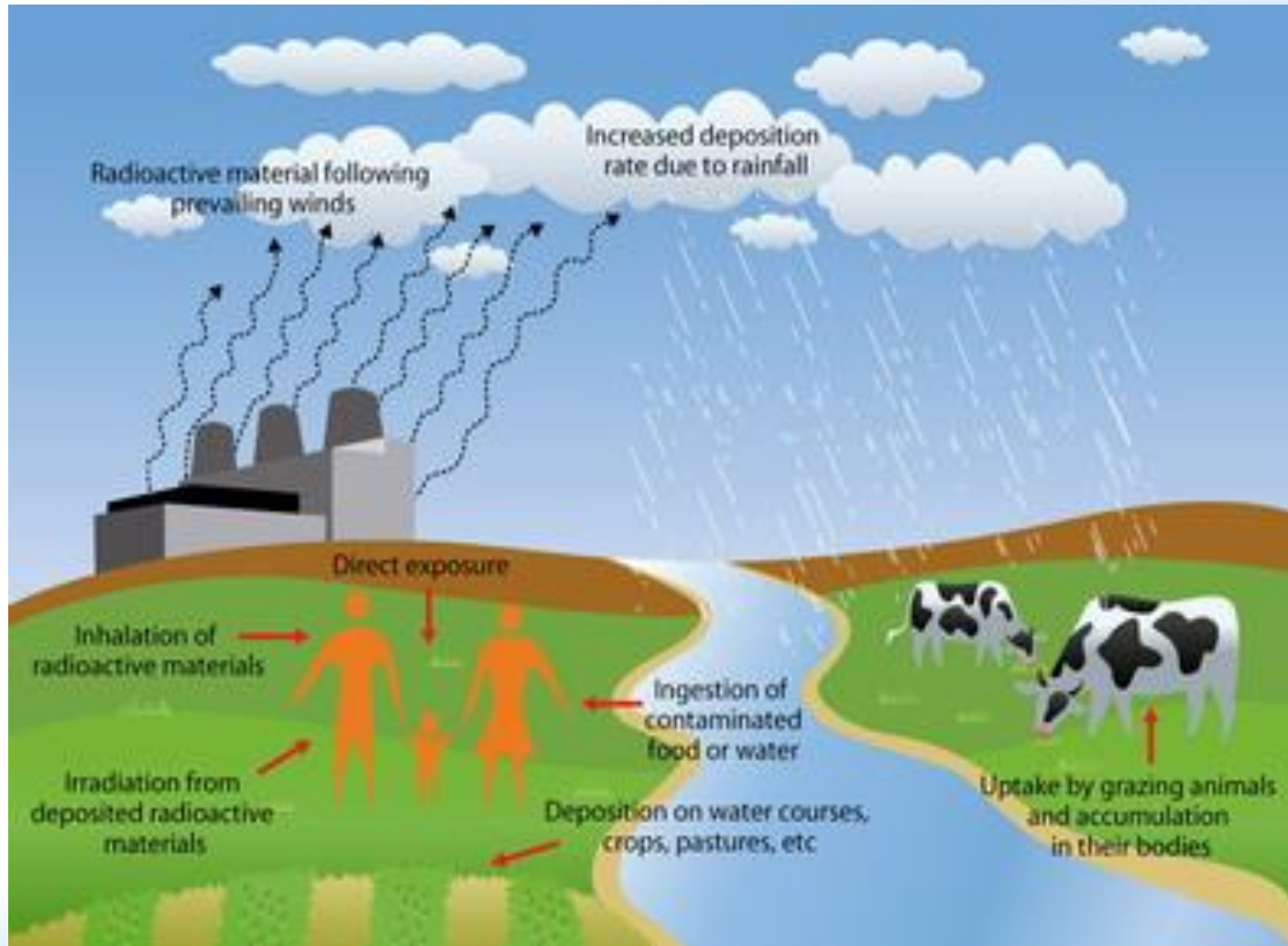
- Sources of Radionuclides in the Environment and Transfer to the Food
- Exposure situations
- International Standards
- IAEA TECDOC 1788

Sources of Radionuclides in the Environment

- **Radionuclides of natural origin**, particularly radionuclides in the uranium and thorium decay series and ^{40}K , all of which are present throughout the environment;
- **Authorized discharges from nuclear facilities and other licensed facilities**: these are primarily of artificial origin, but may also be of natural origin;
- **Fallout from the testing of nuclear weapons**, which occurred primarily in the 1950s and 1960s — the main radionuclides of interest are ^{90}Sr and ^{137}Cs ;
- **Accidental releases of radionuclides**
 - Windscale nuclear reactor fire (1957)
 - Chernobyl nuclear power plant accident (1986)
 - Fukushima Daiichi (2011)



Radionuclide Transfer to Food



Exposure Situations

1

Planned exposure situation - a situation of exposure that arises from the planned operation of a source or from a planned activity that results in an exposure from a source
» full control exists before the exposures occur

2

Existing exposure situation - a situation of exposure that already exists when a decision on the need for control needs to be taken
» includes natural background radiation and exposures from past practices that were never regulated

3

Emergency exposure situation - a situation of exposure that arises as a result of an accident, a malicious act, or any other unexpected event, and requires prompt action in order to avoid or reduce adverse consequences.

International Basic Safety Standards

Requirement 51: Exposure due to radionuclides in commodities

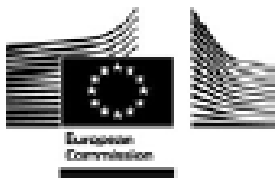
The regulatory body or other relevant authority shall establish reference levels for radionuclides in commodities.

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

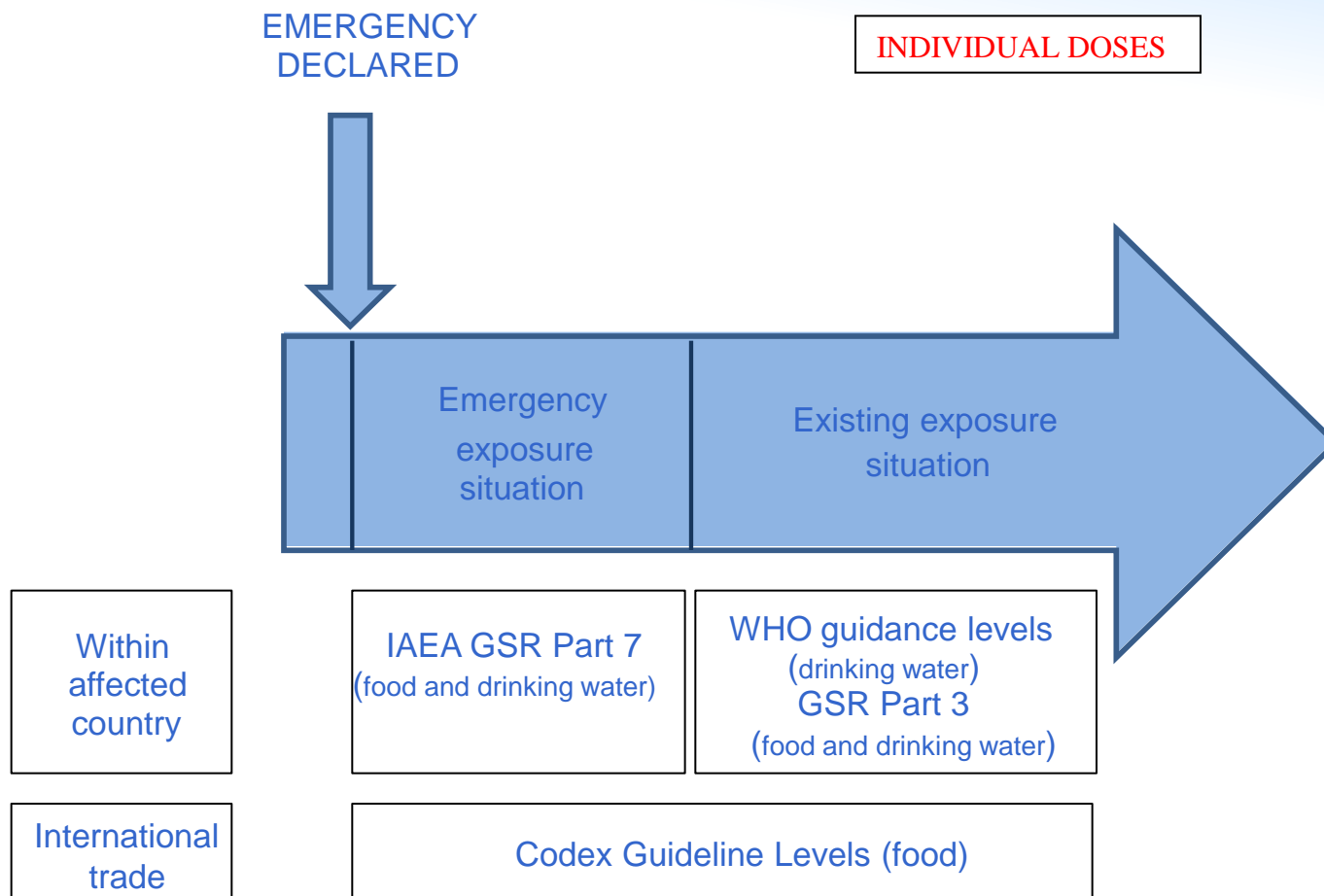


International Basic Safety Standards

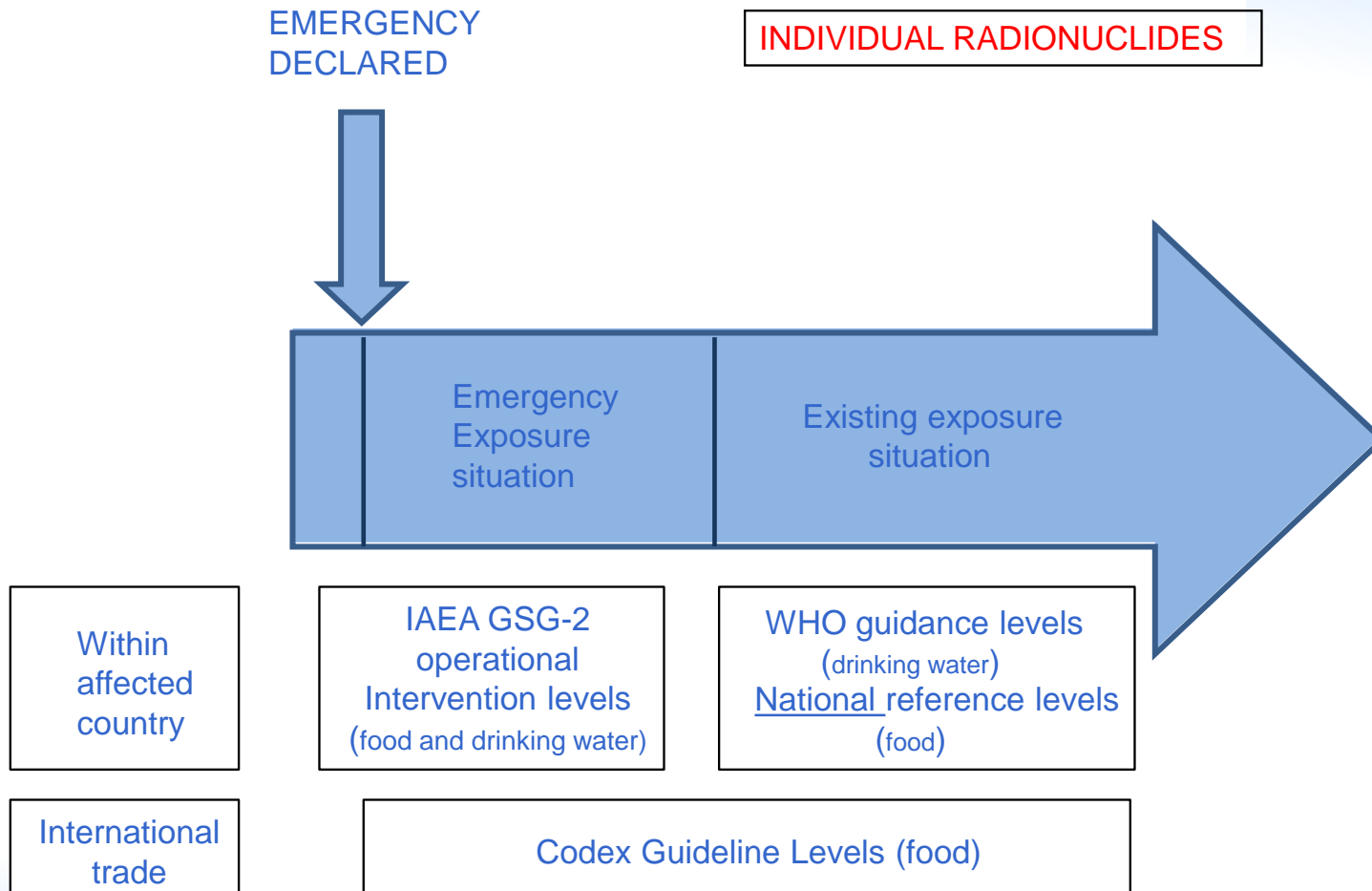
The regulatory body or other relevant authority shall consider the guideline levels for radionuclides contained in food traded internationally that could contain radioactive substances as a result of a nuclear or radiation emergency, as published by the **Joint FAO/WHO Codex Alimentarius Commission**. The regulatory body or other relevant authority shall consider the **guideline levels for radionuclides contained in drinking water that have been published by the WHO**.



Reference Levels - Individual Dose



Reference Levels – Activity Concentrations



Radiation Protection Criteria

Joint FAO/WHO Codex Alimentarius Commission

Codex General Standard for Contaminants and Toxins in Food and Feed (CODEX STAN 193-1995)

- Covers food in international trade after a nuclear accident for as long as levels persist – originally covered only the first year
- Covers radionuclides of importance for the food industry – in practice, only radionuclides of artificial origin
- Based on an individual dose of 1 mSv in a year with values for “infant food” and “non-infant food”
- Based on FAO statistics, assumes that 10% of the diet is imported, and contaminated at the maximum concentrations

Representative radionuclides	Guideline Level (Bq/kg)	
	Infant Foods*	Non-infant Foods
^{238}Pu , ^{239}Pu , ^{240}Pu , ^{241}Am	1	10
^{90}Sr , ^{106}Ru , ^{129}I , ^{131}I , ^{235}U	100	100
$^{35}\text{S}^{**}$, ^{60}Co , ^{89}Sr , ^{103}Ru , ^{134}Cs , ^{137}Cs , ^{144}Ce , ^{192}Ir	1 000	1 000
$^3\text{H}^{***}$, ^{14}C , ^{99}Tc	1 000	10 000

* When intended for use as such.

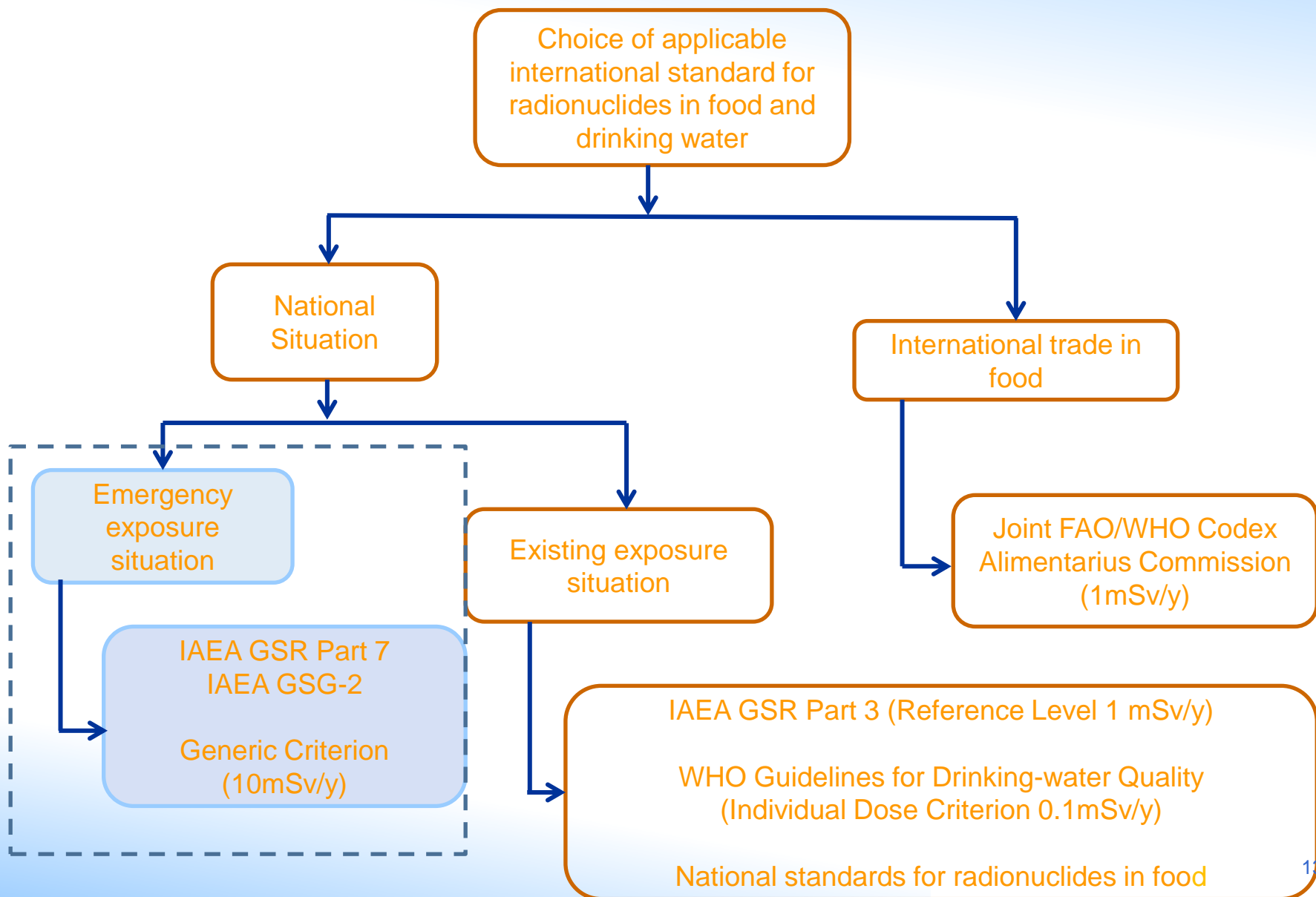
** Represents the value for organically bound sulphur.

*** Represents the value for organically bound tritium.

Terminology

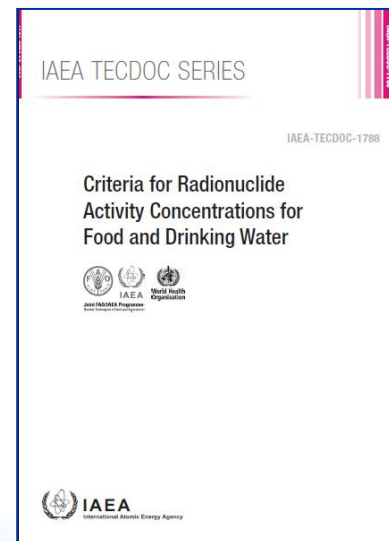
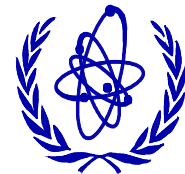
Drinking water	Individual dose in a Year	Activity concentrations (Bq/L)	Responsible international organization
Reference level	1 mSv	NO	IAEA
Indicative dose criterion	0.1 mSv	YES — guidance levels	WHO
Guidance level	-	Developed primarily for radionuclides of natural origin	WHO
Food	Individual dose in a year	Activity concentrations (Bq/kg)	Responsible international organization
Reference level	1 mSv	NO	IAEA
Intervention exemption level	1 mSv	YES — guideline levels	Joint FAO/WHO Codex Alimentarius Commission
Guideline levels	-	Separate values apply for infants and non-infants	Joint FAO/WHO Codex Alimentarius Commission

International Standards - Summary



Technical Document: Criteria for Radionuclide Activity Concentrations in Food and Drinking Water

- Jointly developed by FAO, IAEA and WHO
- Summarizes current international standards
- Discusses the circumstances in which each is to be used



IAEA TECDOC 1788: Overview (1/2)

- The new publication reviews the current international standards developed by the Food and Agriculture Organization of the United Nations (FAO), the IAEA and the World Health Organization (WHO), including the various acceptability criteria for radionuclides concentration for food and drinking water.
- The publication also discusses the management of situations where certain foods, such as wild mushrooms and game meat, may contain elevated levels of radionuclides over an extended period.

IAEA TECDOC 1788: Overview (2/2)

The purpose of this publication is to systematize current international standards on radiation safety of food and drinking water under existing exposure situations. This publication can be used to initiate the harmonization of standards in collaboration with IAEA Member States and relevant International Organizations.

IAEA TECDOC 1788: Conclusions (1/3)

- Food and drinking water may contain radionuclides of natural origin or residual amounts of radionuclides of artificial origin after an emergency has been declared ended. The requirements for existing exposure situations in GSR Part 3 apply when the exposures from these radionuclides are considered amenable to control.
- For the purpose of decision-making, GSR Part 3 requires that reference levels, typically based on as an annual effective dose to a representative person, be in the range 1–20 mSv. Specifically for commodities, which include food and drinking water, reference levels are based on a value of 1 mSv.

IAEA TECDOC 1788: Conclusions (2/3)

- The Joint FAO/WHO Codex Alimentarius Commission has established activity concentrations for radionuclides contained in foods destined for human consumption and traded internationally, following a nuclear or radiological emergency.
- They are based on a dose criterion of 1 mSv in a year and use cautious assumptions particularly regarding the percentage of food with contamination that is consumed.
- They were developed with the first year following an emergency in mind but are also applicable on a permanent basis. In subsequent years, the assumptions underpinning the guideline levels would become even more cautious.

IAEA TECDOC 1788: Conclusions (3/3)

- In exceptional circumstances, national authorities may wish to accept higher activity concentrations than those given in the WHO or Codex guidelines. Formulas for deriving higher levels, on the basis of the approaches used in the relevant guidelines, are provided in the TECDOC.
- In developing appropriate and reference levels of activity concentration for radionuclides in food and drinking water, interested parties could be consulted and their views taken into account as part of the decision making process.

Thank you for your attention

