The role of the International Atomic Energy Agency in developing the System of Radiation Protection

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Seminar

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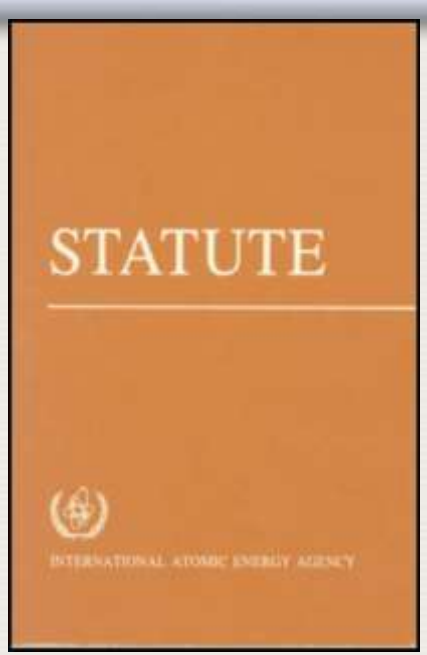
International Atomic Energy Agency

Some details about the IAEA

The International Atomic Energy Agency

Founded in 1957

- Part of the United Nations family
- A science and technology-based organization



1957

Verification of the Non-Proliferation Treaty and agreements

- International treaty
  - to prevent the spread of nuclear weapons and weapons technology
  - to promote cooperation in the peaceful uses of nuclear energy,
  - to work for achieving nuclear disarmament and general and complete disarmament.
- IAEA to perform regular inspections of nuclear facilities in Member States
- Check compliance with the commitment to use nuclear material and facilities only for peaceful purposes

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The International Atomic Energy Agency II

- **Assistance of Member States**
  - Using nuclear techniques in research and industry
  - Generation of electricity
  - Transfer of technology and knowledge to developing Member States

Safety of nuclear techniques

- **Develops nuclear safety standards**
  - To ensure safety for nuclear application
  - Protection of human health and the environment against ionizing radiation

Safety of transport

Safety of nuclear facilities

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Development of International Standards

UNSCEAR

United Nations Scientific Committee on the Effects of Atomic Radiation:

Scientific Reports: Radiation effects

ICRP

International Commission on Radiological Protection

What are appropriate dose limits?
For people
For workers

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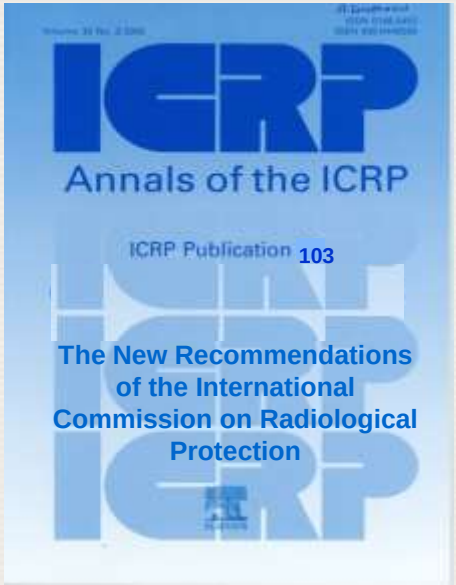
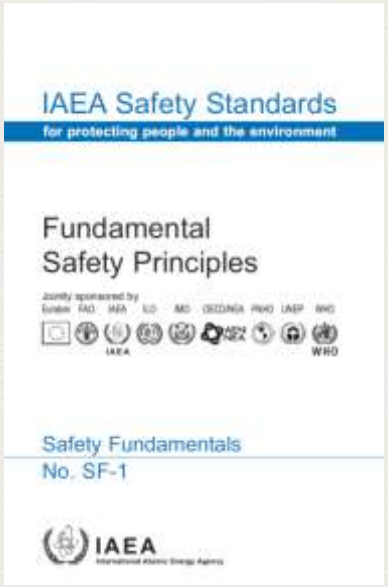
International Atomic Energy Agency

Safety Standards

Nuclear Safety
Management of radioactive waste
Discharge of radionuclides to the environment





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UNSCEAR: United Nations Scientific Committee on the Effects of Atomic Radiation

- **Evaluation of all sources of exposure to radiation**
  - Natural radiation
    - Cosmic and terrestrial radiation
    - Inhalation of radon and radon daughters
    - Intake of natural radionuclides with food:
      H-3, C-14, K-40, Po-210, Ra-226/228, thorium and uranium isotopes
  - Current levels and trends of exposure
- **Analysis of studies on ionizing radiation**
  - Effects on human health
  - Effects on wildlife
- **UNSCEAR reports directly to the United Nations General Assembly**
  - Represent a consensus of the UN Member States on effects of ionizing radiation

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Global average of doses to the public from natural radiation sources (UNSCEAR, 2008)

Source		Annual effective dose (mSv/a)	
		Average	Range
Ingestion		**0.3**	**0.2 - 1**
	^{40}K	0,17	
	U- and Th-series	0,12	
	Cosmogenic radionuclides	0,01	
Inhalation		**1.26**	**0.2 - 10**
	U- Th– series	0,006	
	Radon ($^{222}Rn/^{220}Rn$ and decay products)	1,25	
External exposure		**0.87**	**0.6 - 2**
	Cosmic radiation (at sea level)	0,39	0,3 - 1
	Natural radionuclides in soil	0,48	0,3 - 1
Total annual average		**2.4**	**1 - 13**

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Lifetime dose from natural sources: about 200 mSv

ICRP: International Commission on Radiological Protection

- **Founded in 1928**
  - Work was initiated because of the effects observed following applications of radiation
    (e.g. x-rays) in medicine

- **Analysing the knowledge on radiation-related health risks**
  - Radiation effects (as provided by UNSCEAR) in dependence of
    - Exposure (total doses and dose rates)
    - Age and gender
    - Pathway (external/internal exposure)
    - Dosimetry
      (e.g. dose per unit intake: Sv per Bq for intake with food,
      Sv per Bq for inhalation

- **Providing recommendations for radiation protection**
  - E.g. dose limits, reference levels
  - Basis for developing radiological protection standards world-wide

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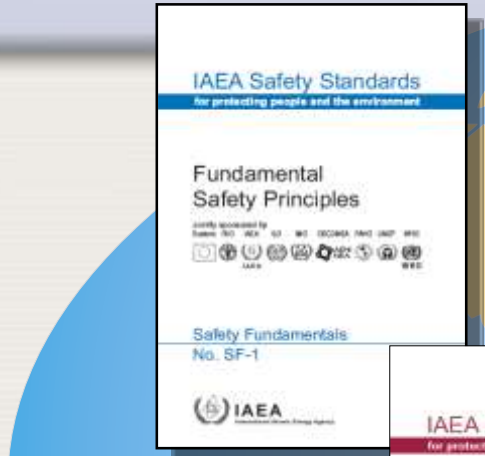
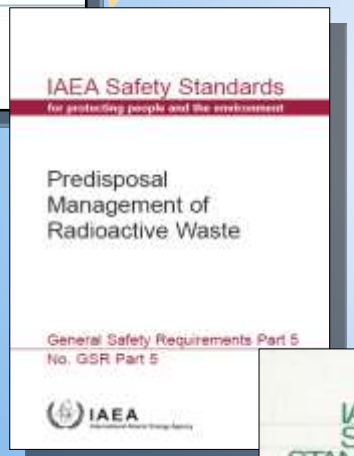
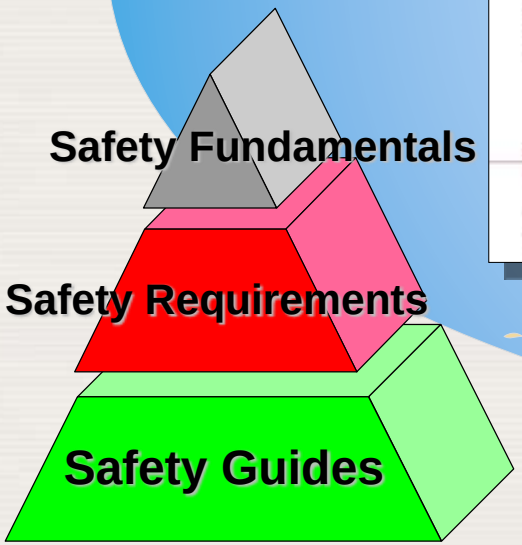
IAEA: System of Safety Standards



Fundamental Safety Principles



Requirements: What to do?



Best Practice to meet Requirements: How to do?

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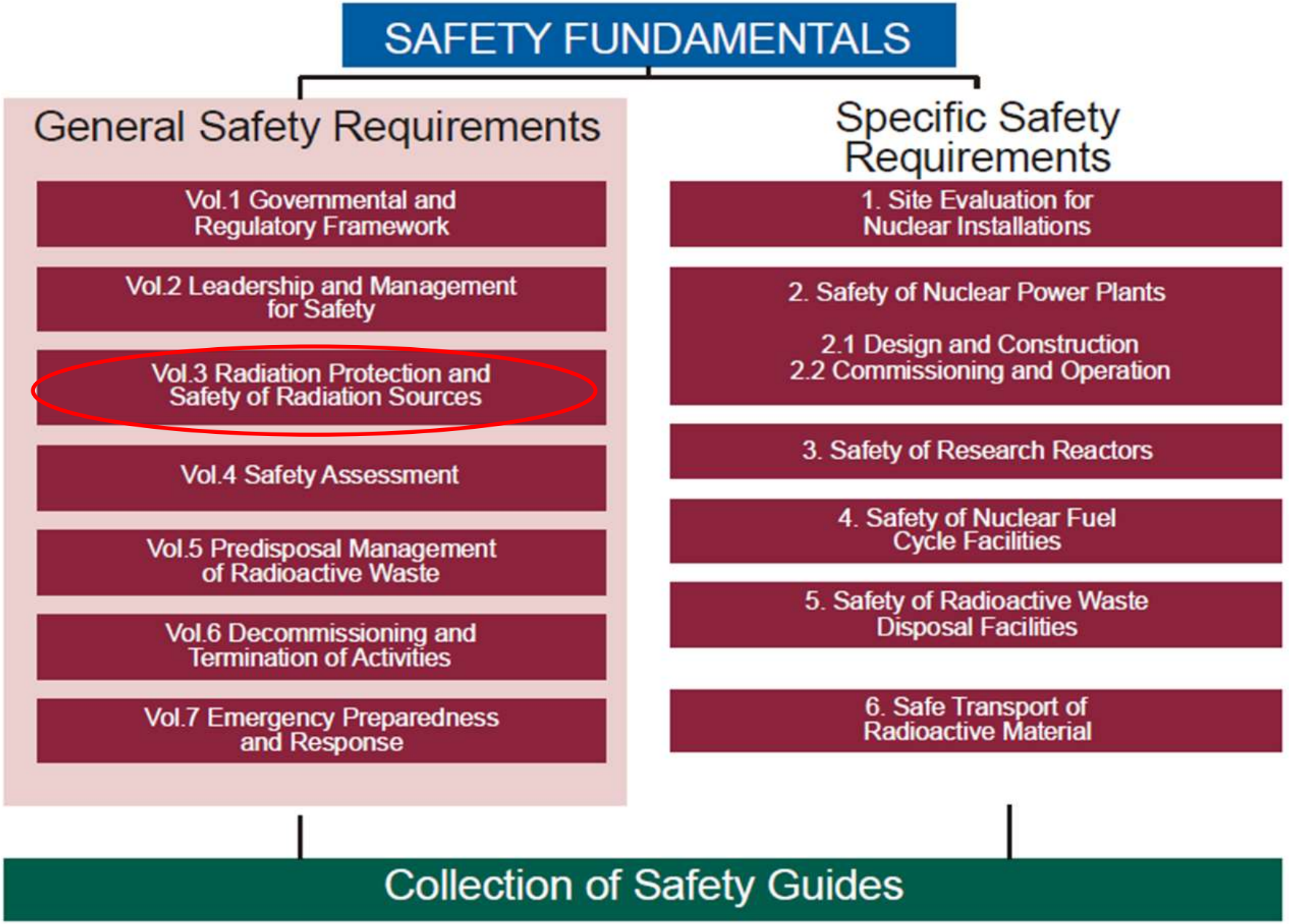
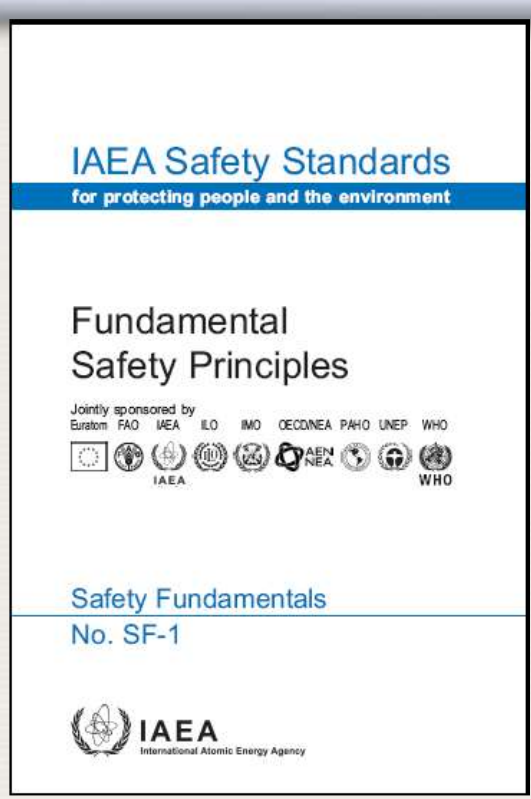

SAFETY FUNDAMENTALS
General Safety Requirements
Vol.1 Governmental and Regulatory Framework
Vol.2 Leadership and Management for Safety
Vol.3 Radiation Protection and Safety of Radiation Sources
Vol.4 Safety Assessment
Vol.5 Predisposal Management of Radioactive Waste
Vol.6 Decommissioning and Termination of Activities
Vol.7 Emergency Preparedness and Response
Specific Safety Requirements
1. Site Evaluation for Nuclear Installations
2. Safety of Nuclear Power Plants
2.1 Design and Construction
2.2 Commissioning and Operation
3. Safety of Research Reactors
4. Safety of Nuclear Fuel Cycle Facilities
5. Safety of Radioactive Waste Disposal Facilities
6. Safe Transport of Radioactive Material
Collection of Safety Guides

Safety Fundamentals: 10 Safety Principles

1 **Responsibility** for safety
2 Role of **government**
3 Leadership and **management** for safety
4 **Justification** of facilities and activities
5 **Optimization** of protection
6 **Limitation** of risks to individuals
7 Protection of present and **future generations**
8 **Prevention of accidents**
9 **Emergency preparedness and response**
10 Protective actions to **reduce existing or unregulated** radiation risks



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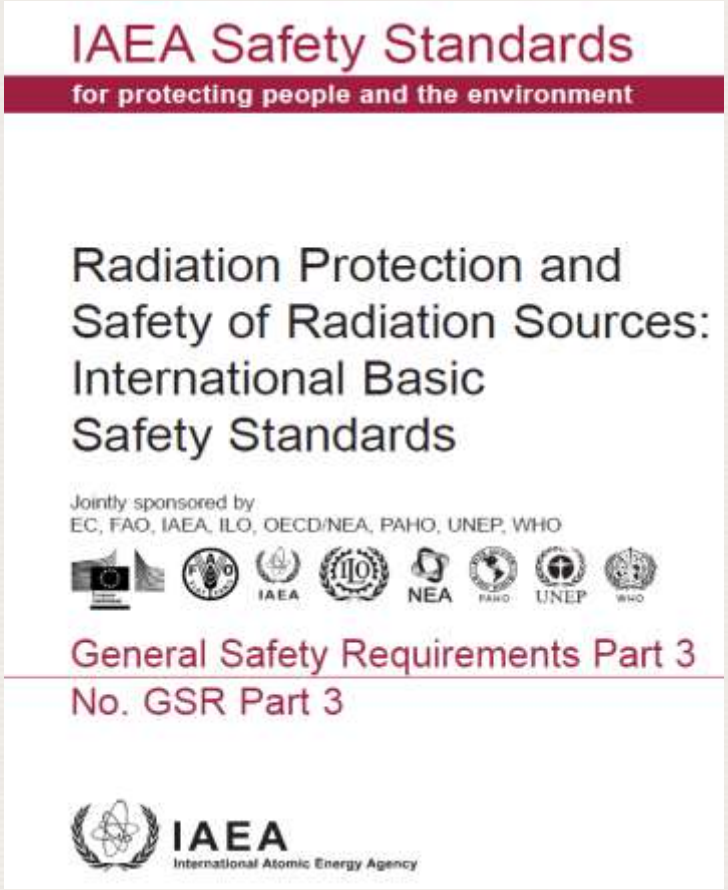
IAEA Basic Safety Standards (BSS)

- **Represents international consensus on Radiation Protection**
  - Based on ICRP 103 (2007)
- **Defines responsibilities**
  - Government and regulatory body
  - Operator
- **Defines exposure situations**
- **Radiation protection principles**
  - Justification, Optimization, Limitation
- **Radiological criteria**
  - Public in all exposure situations
  - Workers



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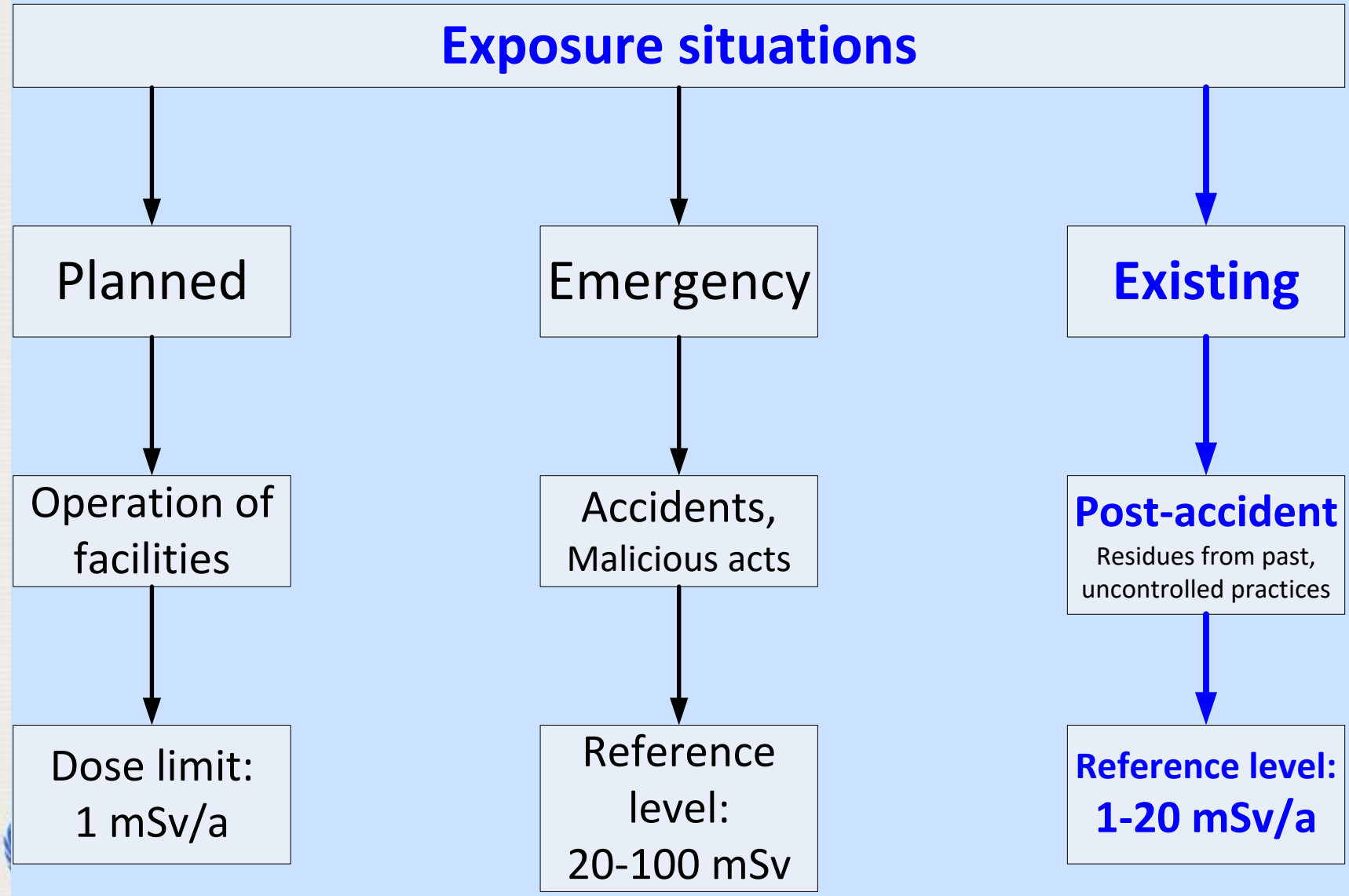
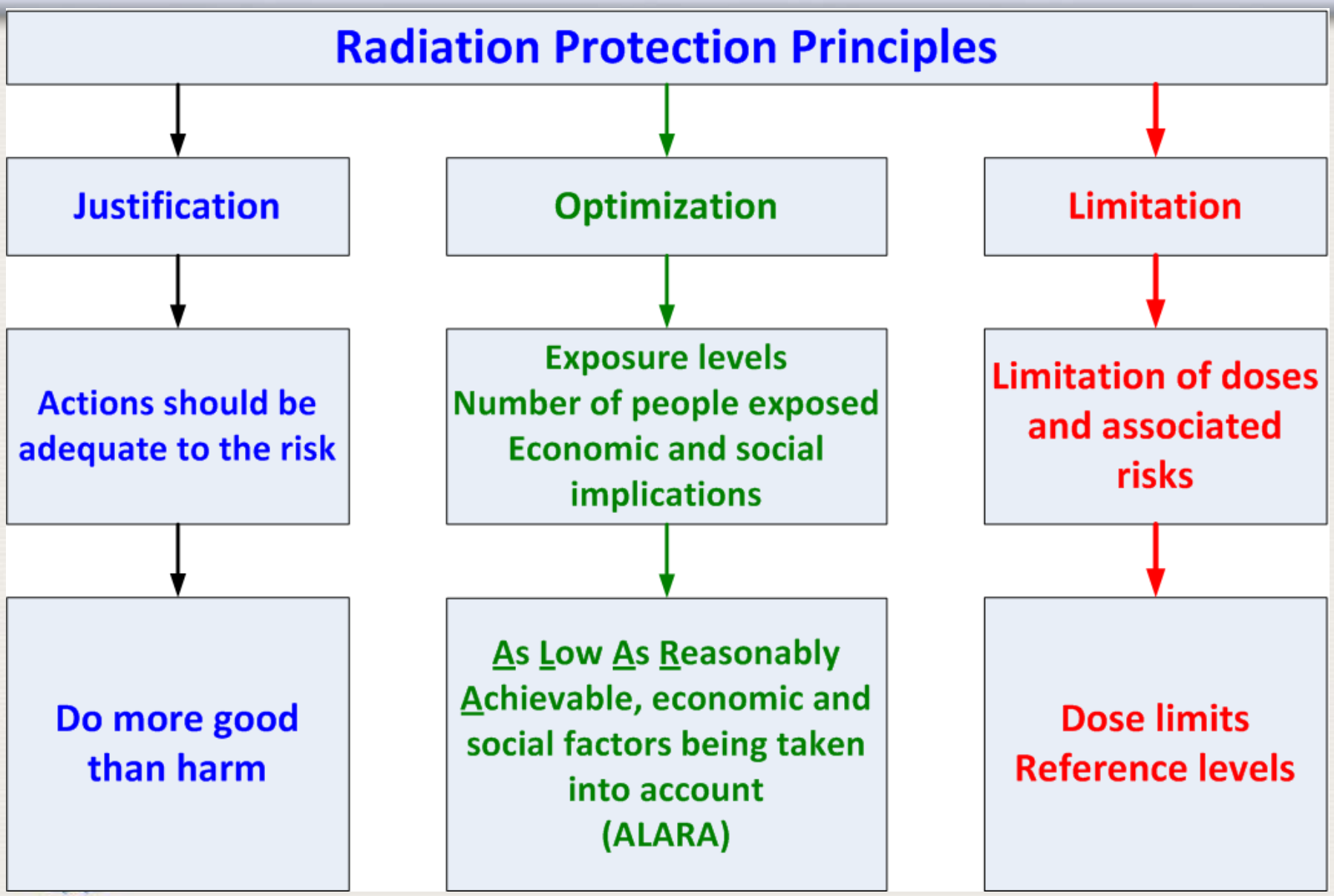
System of Radiation Protection

- ***Three exposed groups***
  - Workers
  - Patients
  - General public
- ***Three Exposure Situations***
  - Planned exposures
  - Emergency
  - Existing exposures
- ***Three Radiation Protection Principles***
  - Justification
  - Limitation
  - Optimization

Three exposure situations for *Public exposure*



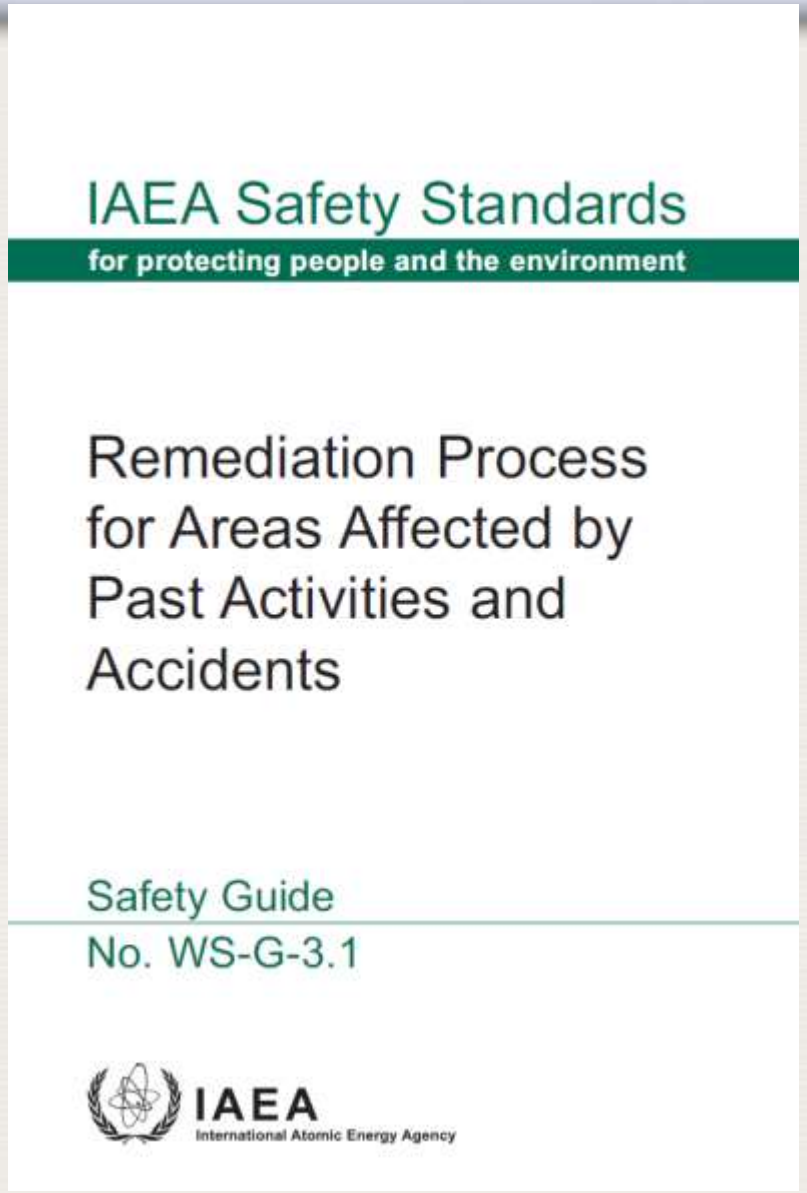
Radiation Protection Principles



Remediation of Affected Areas

2007

Currently being updated



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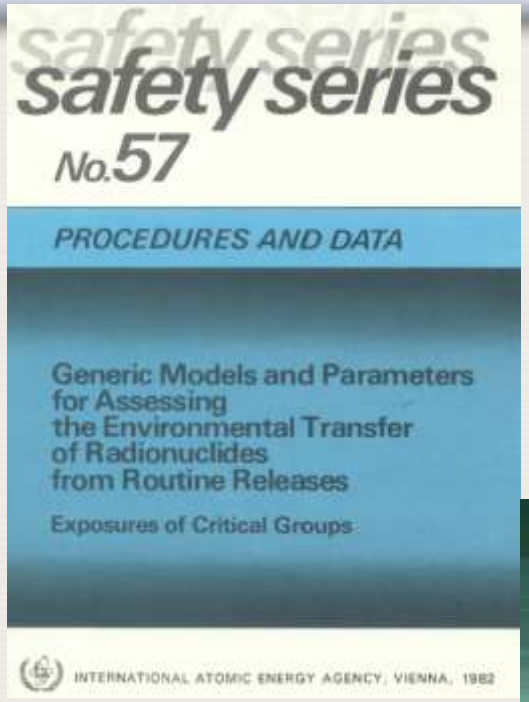
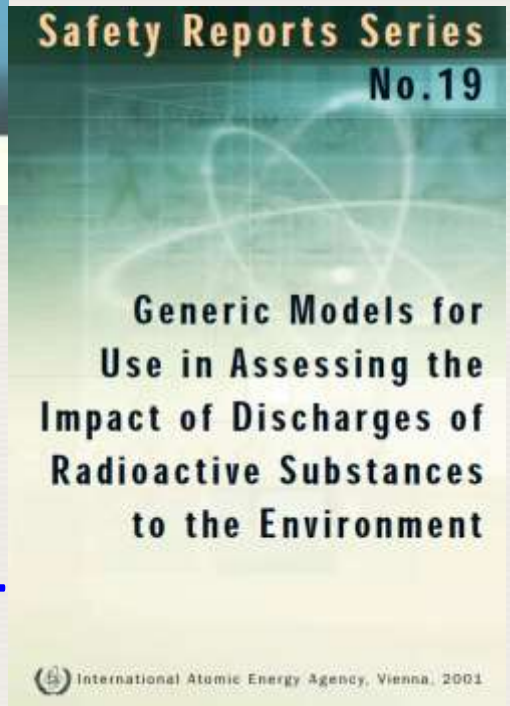
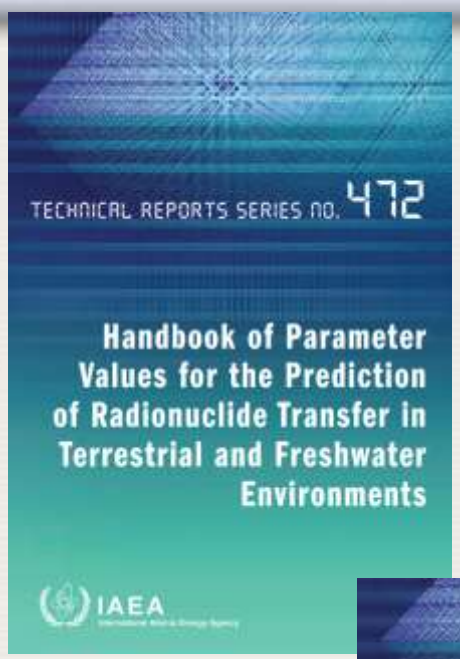
Technical documents for application of the Safety Standards

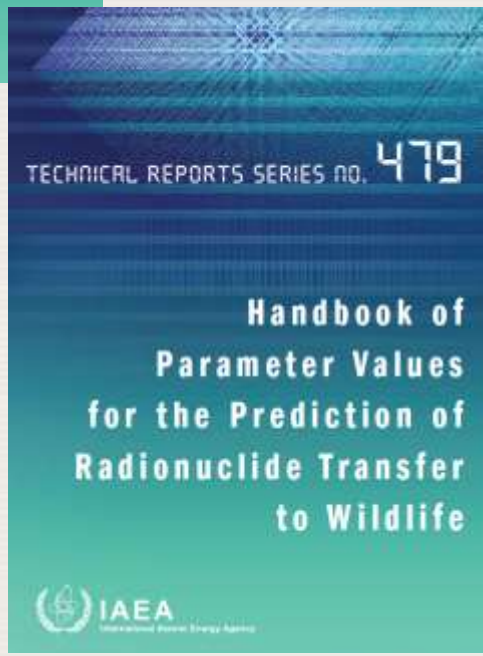


1982



2001





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Summary

- **Radiation Protection System**
  - Internationally agreed
  - Based on science
  - Includes all relevant exposure situations
  - Implemented in many Member States
- **Implementation within National Responsibilities**
  - Guidance provides by IAEA Safety Standards
- **Embedded in International Conventions**

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Thank you!

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