

The IAEA Safety Standards: Existing Exposure Situations

**Control of Public Exposure in Compliance with the
International Basic Safety Standards**

**Cape Town, South Africa
5-7 May 2016**

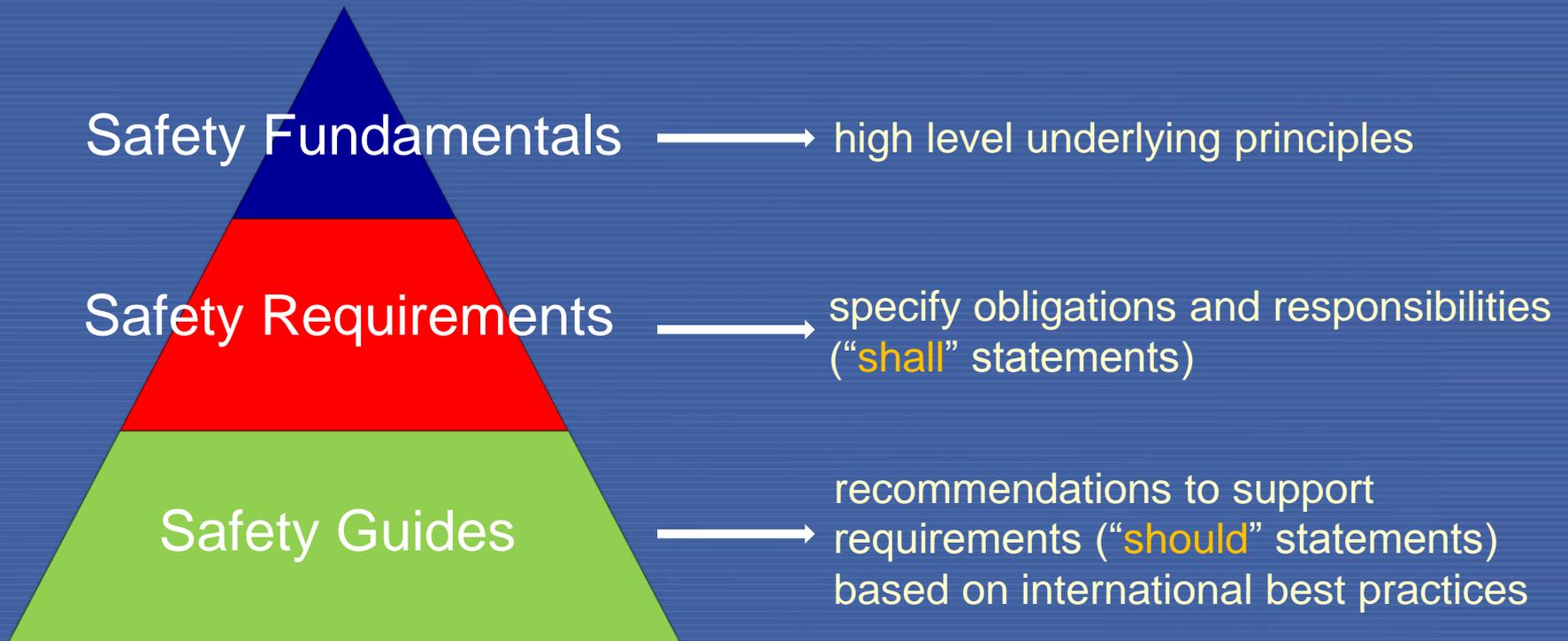
Tony Colgan
Head, Radiation Protection Unit



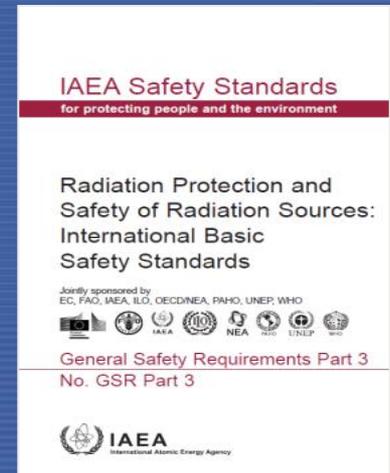
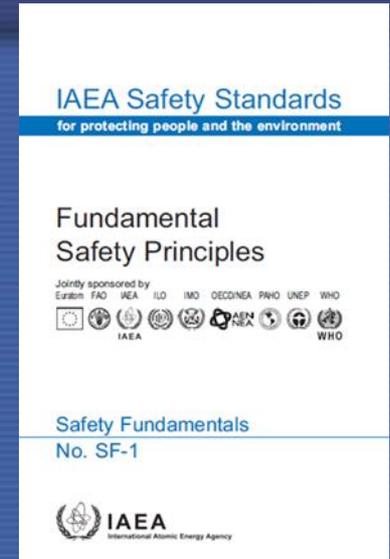
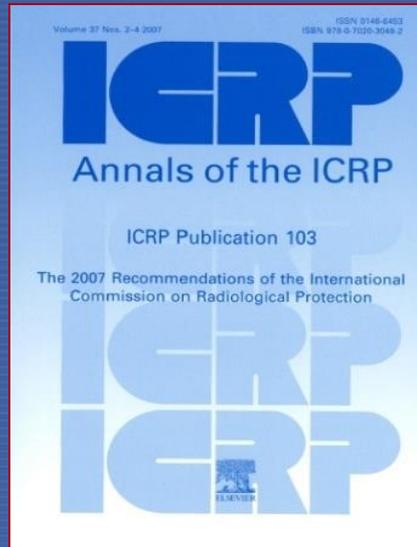
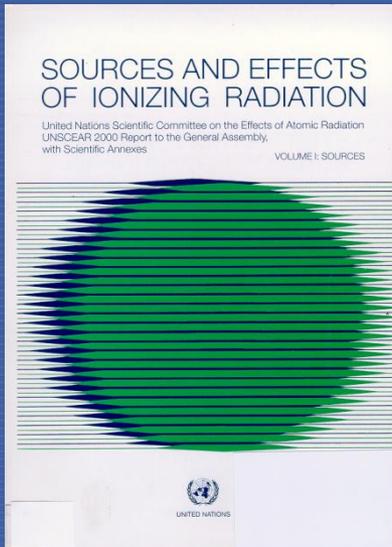
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International Atomic Energy Agency

IAEA Safety Standards



IAEA Safety Standards



Basis for the IAEA Basic Safety Standards

The Agency's basic safety standards will be drawn up in accordance with the provisions of Article III. A. 6 of the Statute and will be based, to the extent possible, on the recommendations of the International Commission on Radiological Protection (ICRP).

Source: IAEA Board of Governors, INFCIRC/18 (31 May 1960)

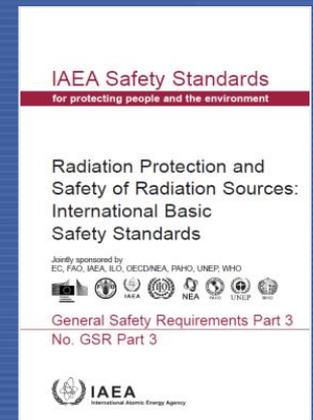
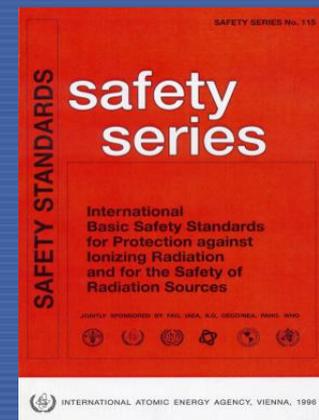
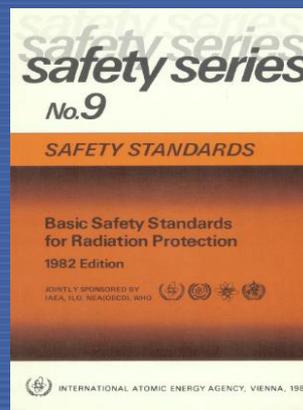
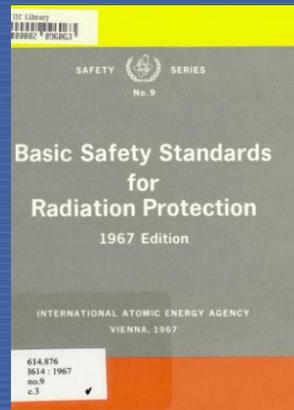
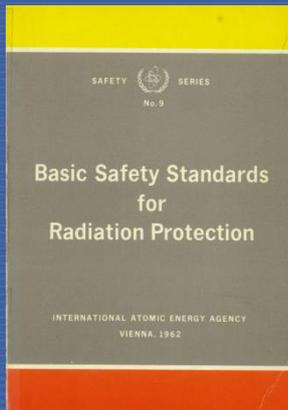
Basic Safety Standards

ICRP recommendations

- 1958 (“Publication 1”)
- 1966 (Publication 9)
- 1977 (Publication 26)
- 1990 (Publication 60)
- 2007 (Publication 103)

IAEA Basic Safety Standards

- 1962
- 1967
- 1982
- 1996
- 2011 – Interim edition



International Basic Safety Standards



IAEA Board of Governors September 2011

During the Board's consideration of measures to strengthen nuclear safety and security, **the body approved** the revised IAEA Safety Standards on the Safety of Nuclear Power Plants: Design (Safety Standards Series No. NS-R-1), as well as **a revision of IAEA Safety Series No. 115, or Draft Safety Requirements: Radiation Protection and Safety of Radiation Sources: International Basic Safety Standards.**

http://www-pub.iaea.org/MTCD/Publications/PDF/p1531interim_web.pdf



Exposure Situations



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



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 subject to regulatory control, or were regulated but not in accordance with the International BSS



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.

Principles of Radiation Protection



Justification Any decision that alters the radiation exposure situation should do more good than harm.

- new sources/uses of radiation
- actions to reduce radiation exposure



Optimization The process of determining what level of protection and safety would result in the magnitude of individual doses, the number of individuals (workers and members of the public) subject to exposure and the likelihood of exposure being “as low as reasonably achievable, economic and social factors being taken into account” (ALARA).



Dose limitation Dose limits are set to ensure that no individual faces an unacceptable risk in normal circumstances.

Principle of Justification

Any decision that alters the radiation exposure situation should do more good than harm

- Justification goes beyond the scope of radiological protection to include consideration of economic, societal and environmental factors
- Justification decisions should not be made in isolation – consult with other interested parties (e.g. public, manufacturers, consumer organizations etc.)
- Decisions on justification require value judgements to be made
- Applications not involving use of ionizing radiation – important consideration but not decisive
- Practices involving small doses still need to be justified

Principle of Optimization

The likelihood of incurring exposure, the number of people exposed and the magnitude of their individual doses should all be kept as low as reasonably achievable, taking into account economic and social factors

- Optimization is strongly linked to justification
- Optimization is about questioning whether or not the best has been done under the prevailing circumstances
- Most expensive option is not necessarily the optimized solution
- Option that gives the lowest dose is not necessarily the optimized solution

Controlling Radiation Exposure

Exposure Situation	Occupational (workers)	Medical (patients)	Public
Planned	Dose limits Dose constraints	Diagnostic reference levels	Dose limits Dose constraints
Existing	Reference levels*	N.A.	Reference levels
Emergency	Reference levels	N.A.	Reference levels

* Remediation activities are managed as a planned exposure situation and dose limits apply to occupational exposure (GSR Part 3 para. 5.26)

General Approach to Existing Exposure Situations (ICRP)

- Evaluate the exposure situation – where, when and how are people exposed
- Identify the possible corrective actions
- Select the best protective action(s) under the prevailing circumstances, prioritizing the protection of those receiving the highest exposures
- Implement the selected actions
- Evaluate the effectiveness of the actions taken.

AS TIME GOES BY, GREATER ATTENTION IS GIVEN TO PREVENTING EXPOSURE RATHER THAN MITIGATION



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Requirements in the BSS (1)

Requirement 47: Responsibilities of the government specific to existing exposure situations

The government shall ensure that existing exposure situations **that have been identified** are evaluated to determine which occupational exposures and public exposures are of concern from the point of view of radiation protection

- Government establishes the legal and regulatory framework, including assigning responsibilities
- Regulatory body (or other relevant authority) defines reference levels
- Regulatory body (or other relevant authority) implements the protection strategy and evaluates its effectiveness
- Regulatory body (or other relevant authority) responsible for stakeholder issues

Requirements in the BSS (2)

Requirement 48: Justification for protective actions and optimization of protection and safety

The government and the regulatory body or other relevant authority shall ensure that remedial actions and protective actions are justified and that the protection and safety is optimized.

- Protective actions must do more 'good' than 'harm' – sometimes the best option is to do **NOTHING**
- Form, scale and duration of actions must be optimized
- Take all reasonable steps to prevent doses remaining above the **reference level – set within the range 1-20 mSv** - depending on the feasibility of control and the experience in managing similar situations in the past

Requirements in the BSS (3)

Requirement 49: Responsibilities for remediation of areas with residual radioactive material

The government shall ensure that provision is made for identifying those persons or organizations responsible for areas with residual radioactive material, for establishing and implementing remediation programmes and post-remediation control measures, if appropriate, and for putting in place an appropriate strategy for radioactive waste management.

- Action plan needs to be developed by the contractor and approved by the regulatory body
- Radiation doses received by workers are controlled as in a planned exposure situation
- Additional doses received by members of the public need to be justified
- Ongoing monitoring programme needs to be established
- A public information plan must be in place
- A mechanism must exist for 'interested parties' to be involved in the planning, implementation and verification of the remedial actions

Key Questions

- How are justification decisions made
 - what constitutes 'good'?
 - what constitutes 'harm'?
 - how do we balance radiation and non-radiation risks?
- What is the appropriate value of reference level to choose within the range of 1-20 mSv
 - how do we choose the starting point?
 - how to we choose the long term target?
 - when do we say 'enough is enough'?
- What is the role of the public in the decision-making process?

Thank you for your attention



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