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Revision of the International Basic Safety Standards - Building on ICRP's Philosophy -

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International Atomic Energy Agency

Topics

- Historical view
- Current revision
  - General requirements for governments, Infrastructure
  - Planned exposure situation
    - ✓ *Justification*
    - ✓ *Medical exposure*
    - ✓ *Non-medical exposure*
  - Occupational exposure
    - ✓ *dose limits for the lens of the eyes*
  - Emergency exposure situation
    - ✓ *Workers*
  - Existing exposure situation
    - ✓ *Radon*
- Conclusions on further development of standards

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Historical view

- The IAEA Board of Governors approved the Agency's Health and Safety Measures on 31 March 1960.
- Footnote 1 to the Agency's Health and Safety Measures (INFCIRC/18) stated that 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 ICRP.
- This statement about being based on the recommendations of the ICRP is made in the introduction to the 1962, 1967, 1977 edition of the BSS, and in the preface to the 1996 edition.
- ICRP recommendations were taken up in the successive editions.

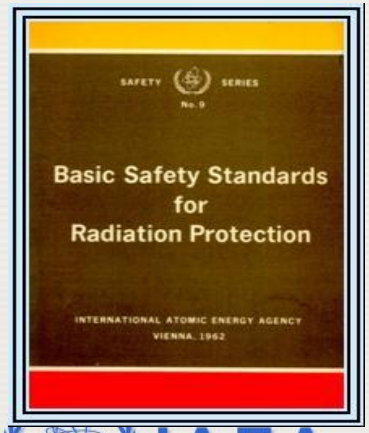
Historical view

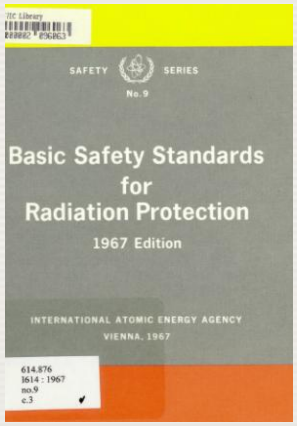
ICRP recommendations

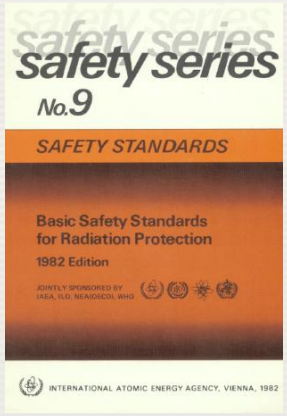
- 1954
- 1958 (“Publication 1”)
- 1966 (Publication 9)
- 1977 (Publication 26)
- 1990 (Publication 60)
- 2007 (Publication 103)

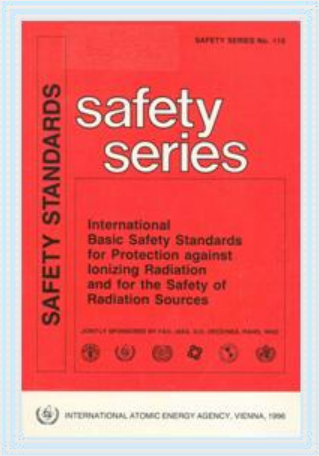
IAEA Basic Safety Standards

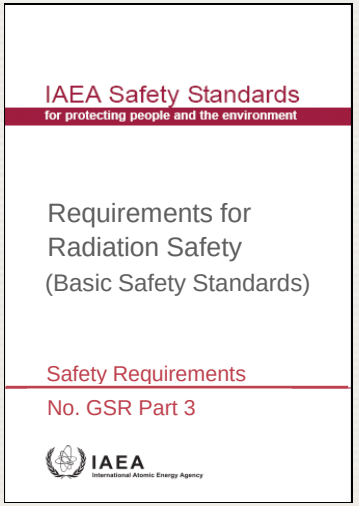
- 1962
- 1967
- 1982
- 1996
- 2011











Involvement of interested parties and cosponsors

- **BSS Secretariat**
  - Coordinated the review and revision of the BSS
  - EC, FAO, ILO, NEA/OECD, PAHO, UNEP, WHO

- **Technical Meetings**
  - 2007 – structure of BSS, content

  adoption of the three exposure situations, decision to structure the BSS along the same lines as the ICRP (but different from the EU BSS)

  - 2009 – radon (following ICRP statement on radon)
    - Involvement of Member States and international organizations

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Technical Meeting on Radon

"Newest Recommendations on Health Effects from Radon - The Impact on Regulatory Requirements" - 15-16 December 2009

- Radon exposure in workplaces may be planned or existing exposure situation, depending on nature of exposure (consistent with ICRP approach)
- Reference level for dwellings also applies to buildings with high public occupancy
- Reference levels based on measured radon concentration rather than dose (practical application)
- Allow flexibility in setting higher reference level provided 10 mSv annual dose is not exceeded (exceptional circumstances only)
- Radiation protection requirements set on the basis of a nominal risk co-efficient for a population of all ages that includes smokers, ex-smokers and non-smokers.

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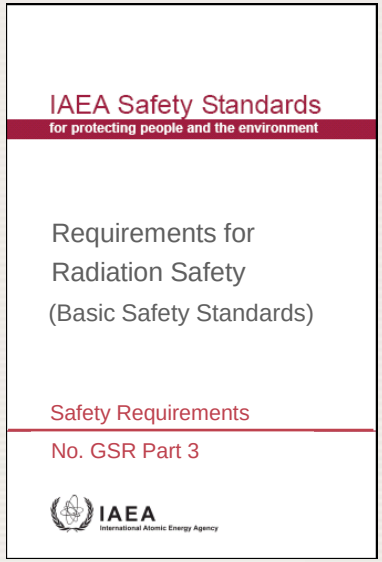
Basic Safety Standards



Three exposure situations

- Planned exposure situations
- Existing exposure situations
- Emergency exposure situations

Three categories of exposure

- Occupational exposure
- Medical exposure
- Public exposure

Protection and Safety requirements of the BSS apply to all facilities and activities

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Structured responsibility in BSS

Government *To establish and maintain a legal, regulatory and organizational framework*

Regulatory body *To establish or adopt regulations and guides*

Principal parties *To keep the prime responsibility for protection and safety*

Other parties *Specified responsibility for protection and safety*

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Principal parties e.g. registrants and licensees, employers
Other parties e.g. suppliers, experts, workers

Requirements on Government, Infrastructure

ICRP Publication 103

The infrastructure for radiological protection and safety (Section 6.6.1)

- Infrastructure includes at least
  - Legal framework
    - Must provide for regulation …
  - Regulatory authority
    - Must be responsible for regulatory control and enforcement of regulations
  - Operating management
    - Prime responsibility
  - Employees

ICRP consistent with GSR Part 1 & revised BSS

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Planned Exposure Situations

Fundamental principles of radiation protection

- Justification
  - Net benefit exceeds radiation detriment
  - Only justified practices to be authorized
  - Non-medical exposure
    - Responsibility for justification decision
    - Input to the decision of justification
      - RP is one part of broader decision process
- Optimization
  - Constraints for risk and dose
  - Responsibility for setting dose constraints
- Dose limitation
  - Equivalent dose for the lens of the eye

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Justification of medical exposures

Evolution of ICRP recommendations

1990 – ICRP 60	Should be dealt with in the same way as justification of any other practice But adds that each procedure is subject to a separate decision, so that there is an opportunity to apply a further, case-by-case, justification for each procedure. Especially for complex investigations and for therapy.
1996 – BSS 115	ICRP 60 approach was used
1996 – ICRP 73	A more complex approach introduced - 3 levels •Justification of a practice •Generic justification of a defined procedure •Justification of a procedure for an individual patient
2007 – ICRP 103 – ICRP 105	ICRP 73 approach is maintained – medical exposure of patients calls for a different and more detailed approach to the process of justification
2011 – New BSS	

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Justification of medical exposures *in BSS 2011*

- Follows ICRP 73 (103,105) recommendations

- But **in addition**
  - More clearly assigns responsibilities
    - Level 2
      - Health Authority
      - Professional bodies
    - Level 3
      - Referring medical practitioner
      - Radiological medical practitioner

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Justification of medical exposures
Asymptomatic individuals

Target: Intended early detection of disease

- Not really addressed by ICRP
- Not part of a health screening programme
- “Cutting-edge” research versus “entrepreneurial” medicine
  - Self-presenting patients

- BSS 2011- justification
  - Referring medical practitioner/Radiological medical practitioner
  - Professional body guidelines
  - Informed re benefits, risks and limitations

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Non-medical imaging
ICRP

1969 Publication 15

Generally deprecated - e.g. “anti-crime” fluoroscopy & customs exams
If permitted, then under the supervision of a radiologist

1971 Statement

As above plus: Hijackings – Security-screening of airline passengers may be justified

1977 Publication 26

In addition to the above:

- Examinations for occupational, medico-legal or insurance purposes included as medical procedures
- Advantages for various parties needed to be considered in the justification

1990 Publication 60

- Nothing specific
- Occupational, medico-legal or insurance purposes no longer included in medical exposure

1996 – BSS 115

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Non-medical imaging
ICRP

1996 Publication 73

- Medical exposure now included the exposure of individuals for screening and medico-legal purposes
- Justification for these needs special consideration

2007 Publication 103

- Medical exposure no longer includes medico-legal
- Certain exposures deemed to be unjustified:

  Occupational, health insurance, or legal purposes undertaken without reference to clinical indications

  But caveats:

  Unless the examination is expected to provide useful information on the health of the individual examined, or in support of important criminal investigations.

  And noting that:

  Clinical evaluation of the images would be expected

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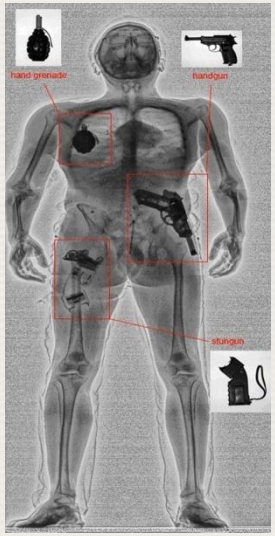
2011 – New BSS

Non-medical imaging
Conclusions

- ICRP recommendations were not comprehensive and were lacking consistency
  - Nothing on security screening
- There was a need to “size” the problem
  - 2 categories
- There was a need to develop a consistent and comprehensive approach, using the ICRP RP principles
  - Justification
  - Optimization
  - Limitation



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Non-medical imaging
BSS 2011

Category 1 – human imaging that:

- Takes place in a medical radiation facility
- Using medical radiological equipment
- Performed by radiology personnel
- With the image reported by a radiologist/doctor

for:

- *Obtaining legal evidence*
- *Insurance purposes*
- *Employment purposes*
- *Immigration purposes*
- *Age determination*
- *Assessing physiological suitability/status*
- *Detection of drugs within a person*

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Non-medical imaging
BSS 2011

Category 2 – human imaging that:

- Takes place in a non-medical facility, often in a public place
- Using specialised inspection imaging equipment
- Performed by non-radiology personnel
- With the image viewed by a non-medical person

for:

- *Detection of concealed weapons:*
  - *Airline passengers; persons crossing a national border; visitors to prisons, court houses, public buildings, etc; prisoners within a prison*
- *Theft detection*
- *Screening cargo containers and vehicles*

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Emergency exposure situations

Changes to make consistent with ICRP

- Publication 103: 2007 Recommendations of the ICRP
- Publication 109: Application of the Commission's Recommendations for the Protection of People in Emergency Exposure Situations
    - Adopt ICRP reference levels
        - Generic criteria /
    - Emergency workers
    - Transition to an existing exposure situation

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Emergency exposure situation
Exposure of workers

Emergency workers = Workers (ILO)

20 mSv/a averaged over 5 years, max 50 mSv/a

Caveats:

- Life saving activities (<500 mSv/a)
- Prevent severe deterministic effects (<500 mSv/a)
- Avert large collective dose (<100 mSv/a)

> 50 mSv/a voluntarily !!! (ILO)

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Existing exposure situations
Radon

- Adoption of ICRP maximum **reference levels**, emphasis on public health aspects through building codes for new construction, criteria for limiting doses from building materials (controlling radon exposure through controlling Ra-226 in building materials);

- Lack of agreement (different approaches?) on how to deal with workplaces where concentrations cannot be reduced, some TG81 concepts incorporated in Safety Guide (DS421)

Existing exposure situations
Radon

The concept of a 1000 Bq/m^3 'entry point' for applying occupational protection requirements is NOT accepted

- Only point of disagreement with ICRP Statement on Radon
- Consistent with application of reference levels (ICRP 103)
- Strong support from Member States for wording in BSS
- Same approach adopted in safety guide "Protection of the Public to Indoor Exposure to Natural Sources of Radiation" (DS421)

DS421
To be sent to RASSC in December 2011
To be sent to Member States in early 2012 (?)

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Existing exposure situations
Radon

Requirement 50: Public exposure due to radon indoors

The government shall provide information on levels of radon indoors and the associated health risks and, if appropriate, shall establish and implement an action plan for controlling public exposure due to radon indoors.

Key components

- Information requirements apply regardless of national situation
- Measurement program is required (not specifically a national radon survey)
- Action plan is required if high concentrations are identified/present

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Dose limitation

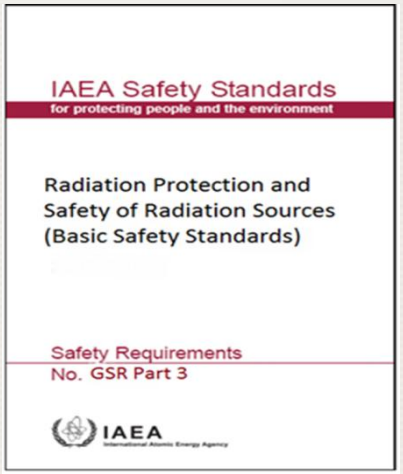
Equivalent dose limits for the lens of the eyes

Proposed and published by ICRP Main Commission in April 2011

Occupational exposure	150 mSv/a	→	20 mSv/a *(100 mSv in 5a)*
			(50 mSv in a single year)
	50 mSv/a	→	20 mSv/a
			(apprentices and students)
Public exposure	15 mSv/a	→	15 mSv/a

Challenges/opportunities:

- Ensuring an appropriate implementation into regulatory control
- Identifying proper dosimetric approaches to control the exposure of the lens of the eyes
- Evaluating the limits for the members of the public



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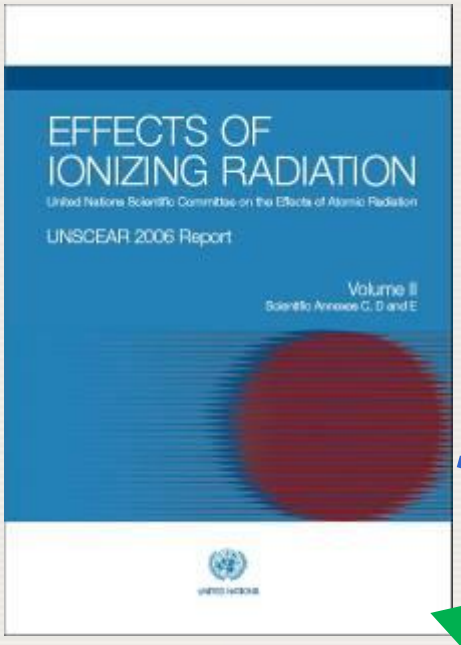
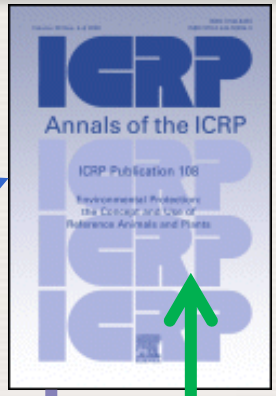
Frame of future cooperation



UNSCEAR
Scientific basis

effects
risks



ICRP
Protection philosophy,
principles and units

recommendations

levels
trends

ILO convention 115:
occupational
radiation protection

FAO/WHO
Codex Alimentarius Commission
(food contamination guides)

UN transport regulations for
radioactive material

IAEA, WHO, ILO, FAO etc.
-Safety standards
-Protection programmes

implemented by
Member States

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Basic Safety Standards 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.**

Acknowledgement

The approval of the high level Safety Standards ‘BSS 2011’ was only possible with the active engagement of the technical officers in the IAEA secretariat and the excellent cooperation with all representatives of cosponsoring organizations, experts from Member States and other stakeholders.
I would like to thank all.

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Thank you for your attention

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