

IAEA Technical Meeting Amman, Jordan

Uranium Exploration and Mining Methods

IAEA Guidance on Radiation Safety Aspects in the Uranium Production Cycle



IAEA

International Atomic Energy Agency

Overview

- IAEA Statute and Mandate.
- Hierarchy of IAEA guidance and documentation.
- The International Safety Standards.
- TECDOCS.
- Publications specific to uranium (NORM).
- IAEA Glossary.

The IAEA Statute

Functions – peaceful uses of atomic energy

- Promote research, development, practical application
- Exchange of scientific and technical information
- Exchange and training of scientists and experts
- Establish and administer safeguards
- Establish facilities, plant and equipment
- ***Develop safety standards and provide for their application***

International Safety Standards – the IAEA’s mandate

The Agency is authorized.....

- To establish or adopt,

in consultation and, where appropriate, in collaboration with the competent organs of the United Nations and with the specialized agencies concerned,

standards of safety for protection of health and minimization of danger to life and property and to provide for the application of these standards.....

(IAEA Statute 1956 as amended)

Co-sponsorship of Standards

IAEA Safety Standards

for protecting people and the environment

Fundamental Safety Principles

Jointly sponsored by

Euratom FAO IAEA ILO IMO OECD/NEA PAHO UNEP WHO



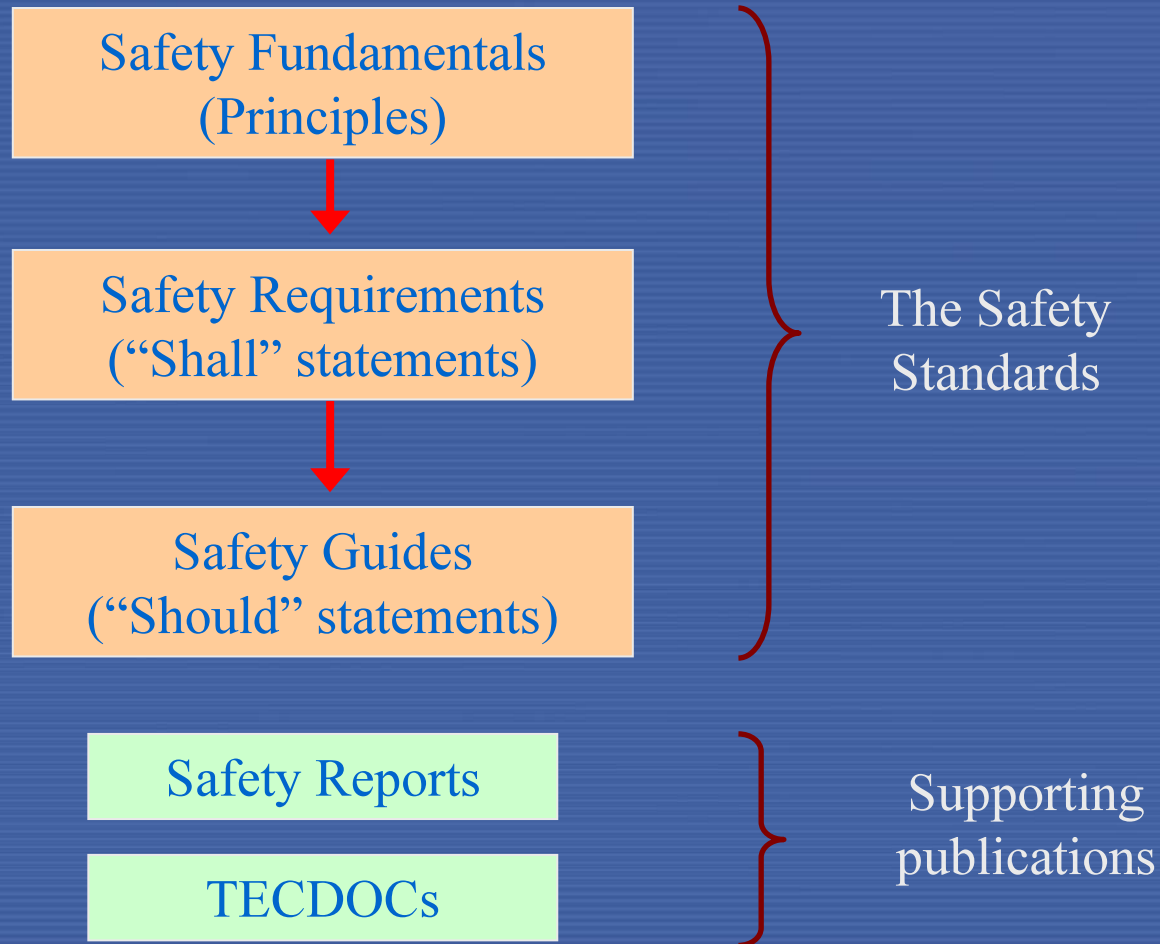
Safety Fundamentals

No. SF-1



Euratom
FAO
IAEA
ILO
IMO
OECD/NEA
PAHO
UNEP
WHO

Hierarchy of the Safety Standards



IAEA Safety Standards Structure

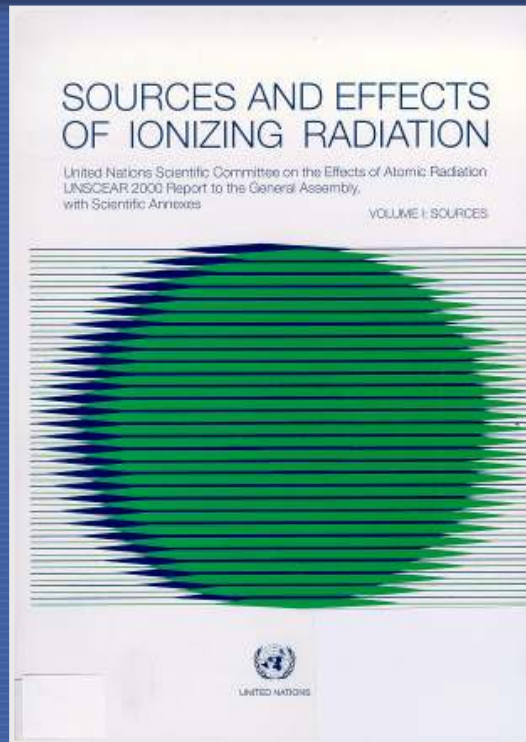


IAEA Safety Fundamentals – the 10 Principles

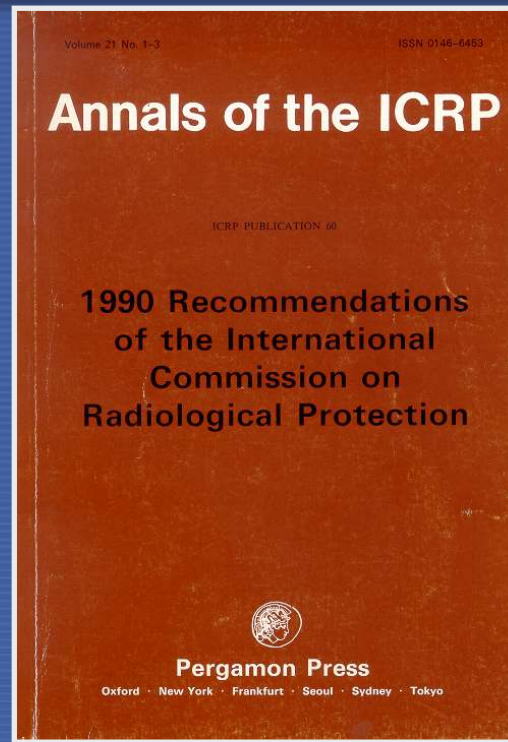
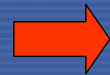
1. Operator is responsible for safety
2. Legal & governmental infrastructure, independent regulatory body
3. Justification, limitation of risk
4. ALARA
5. Protect all populations, incl. distant populations, future generations
– **includes waste minimization and reuse / recycling**
6. Graded regulatory approach commensurate with risk
7. Regular safety assessment, apply lessons learned
8. Accident prevention
9. Emergency preparedness and response
10. Intervention must produce net benefit



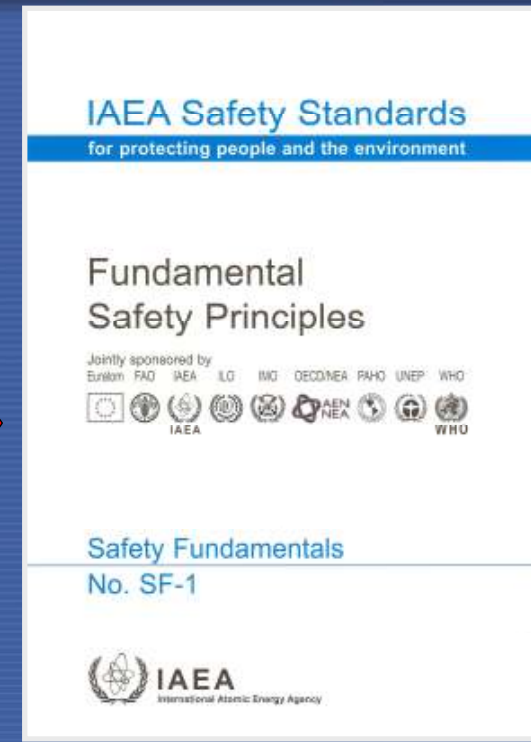
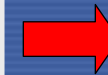
Standards Development Process



UNSCEAR
Data on sources
and effects of
radiation



ICRP
Recommendations for
protection

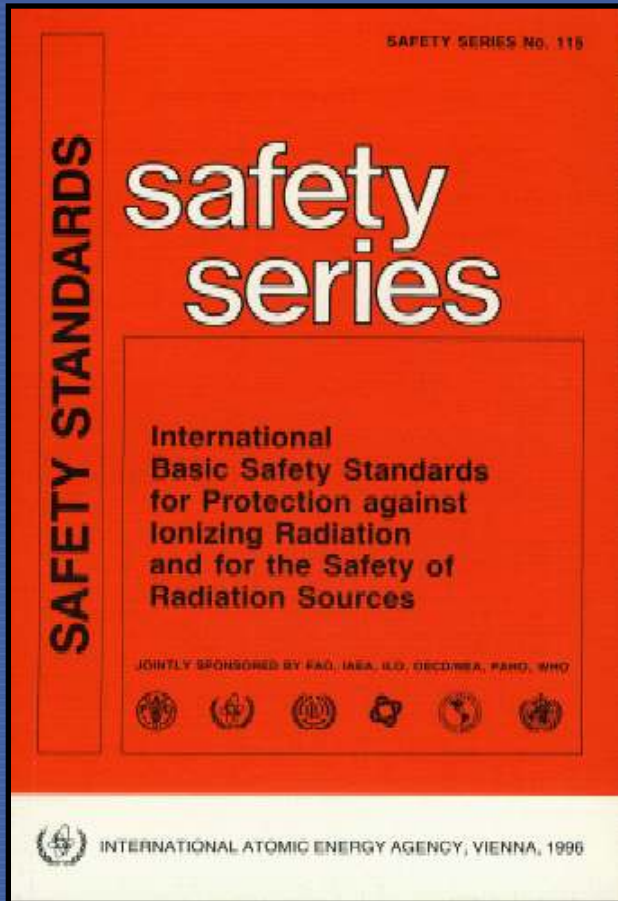


IAEA + other
intergovernmental
bodies

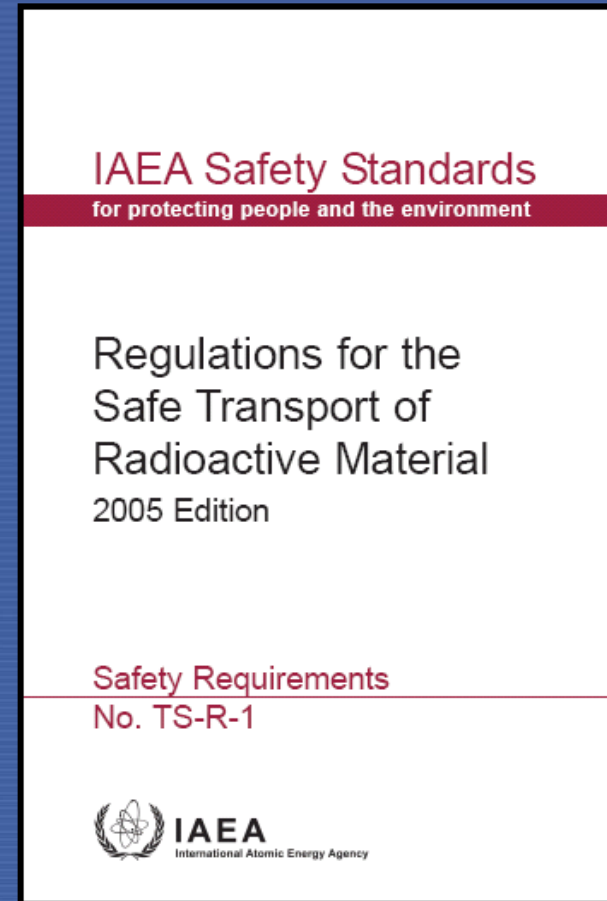
Regulatory style
Standards



Safety Requirements Containing Specific References to Natural Sources (includes uranium)



The “BSS”



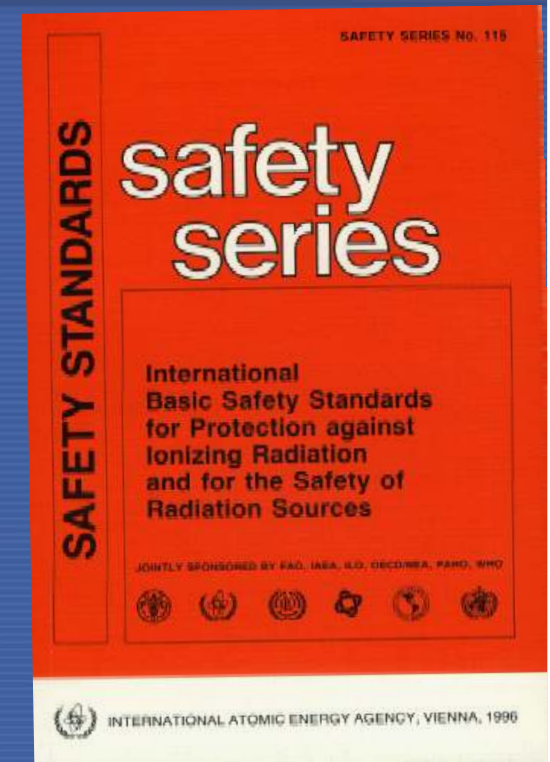
The “Transport Regulations”

The International Safety Standards

- The IAEA Safety Standards reflect **international consensus**
- This consensus is necessary to promote a **common approach for ensuring safety**

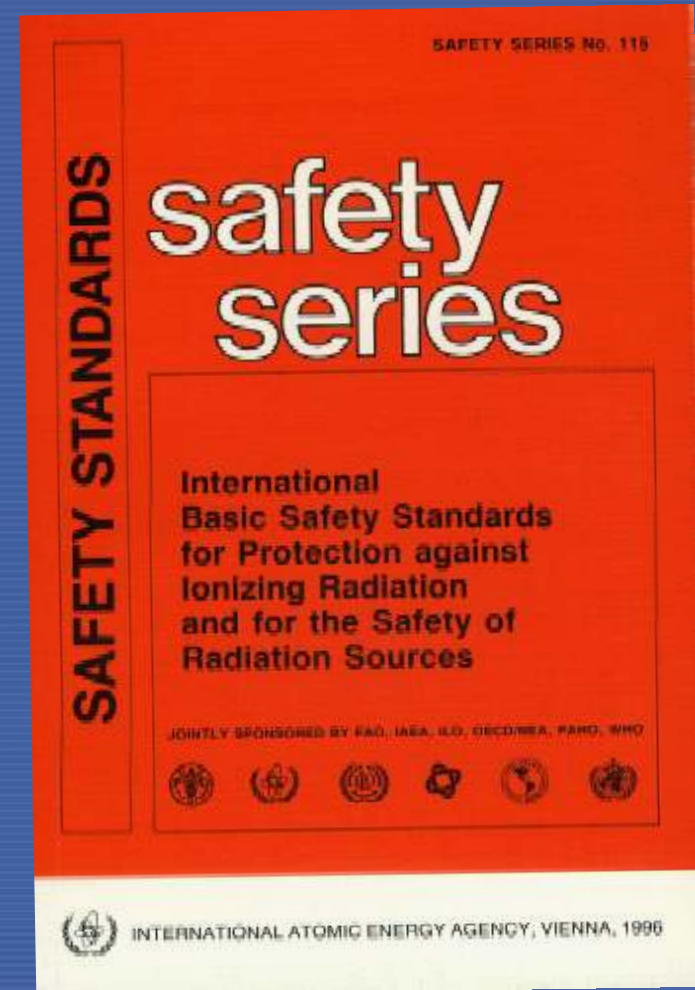
The International Basic Safety Standards (BSS)

- Cosponsored by FAO, IAEA, ILO, OECD/NEA, PAHO, WHO
- General requirements for protection against exposures to both **natural** and **artificial** radionuclides
- Covers **practices** and **interventions**
- No specific requirements for NORM, but
 - **Certain NORM activities** are considered to be practices to which the BSS apply (**includes uranium production**).



The International Basic Safety Standards (BSS)

- Is now in revision to include the new developments (ICRP; recent IAEA documents)



Naturally Occurring Radioactive Material (NORM)

Definition of NORM in Safety Glossary (version 1.2):



Radioactive material containing no significant amounts of radionuclides other than naturally occurring radionuclides

*Material designated in national law or by a regulatory body as being **subject to regulatory control** because of its radioactivity*

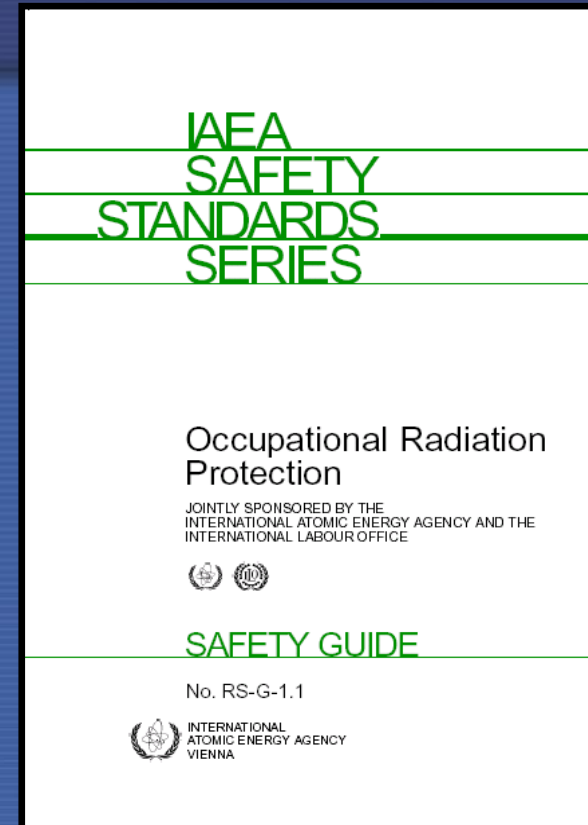
TENORM:

- Not defined in the Safety Glossary
- It does not serve any useful purpose for radiation protection
- Its use is discouraged

Safety Guide RS-G-1.1

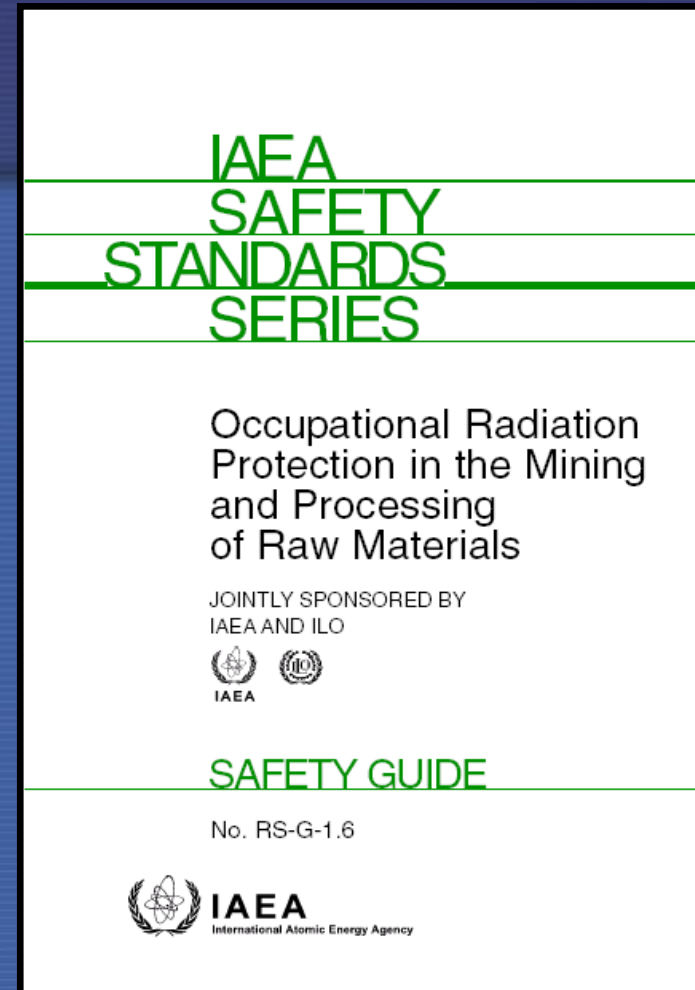
Occupational Protection

- Cosponsored by IAEA & ILO
- Guidance for occupational exposure to both **natural** and **artificial** radionuclides
- Specific guidance for **exemption** of activities involving occupational exposure to NORM (following ICRP75)
 - **criterion: 1–2 mSv per year**



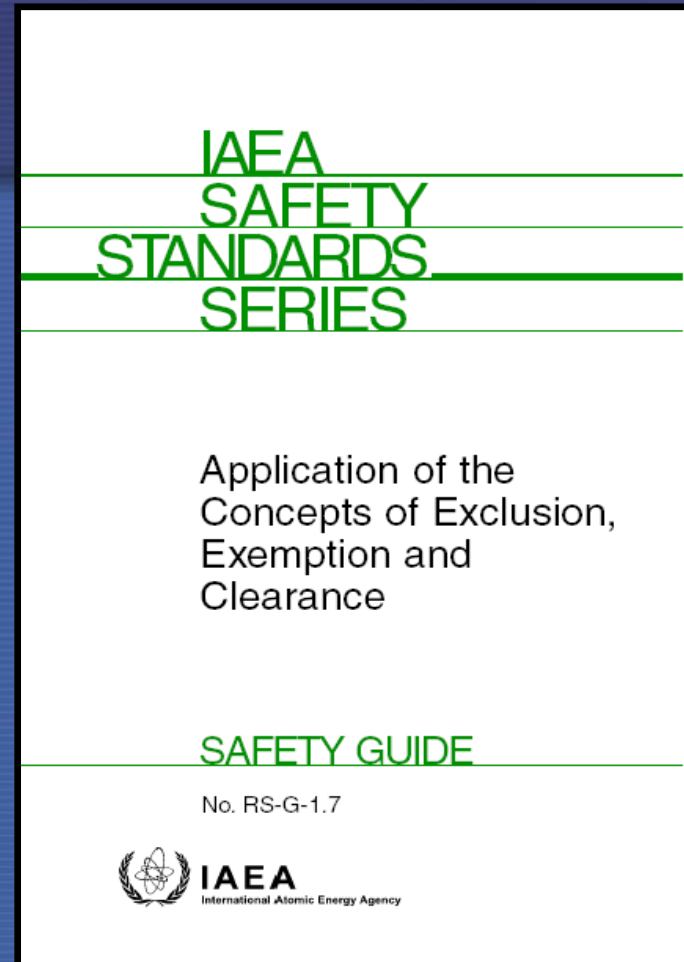
Safety Guide RS-G-1.6 Occupational Exposure: Mining & Minerals Processing

- Cosponsored by IAEA and ILO
- Specific to NORM industries
- Guidance on:
 - Regulatory approach
 - Dose calculation
 - Radiation protection programme



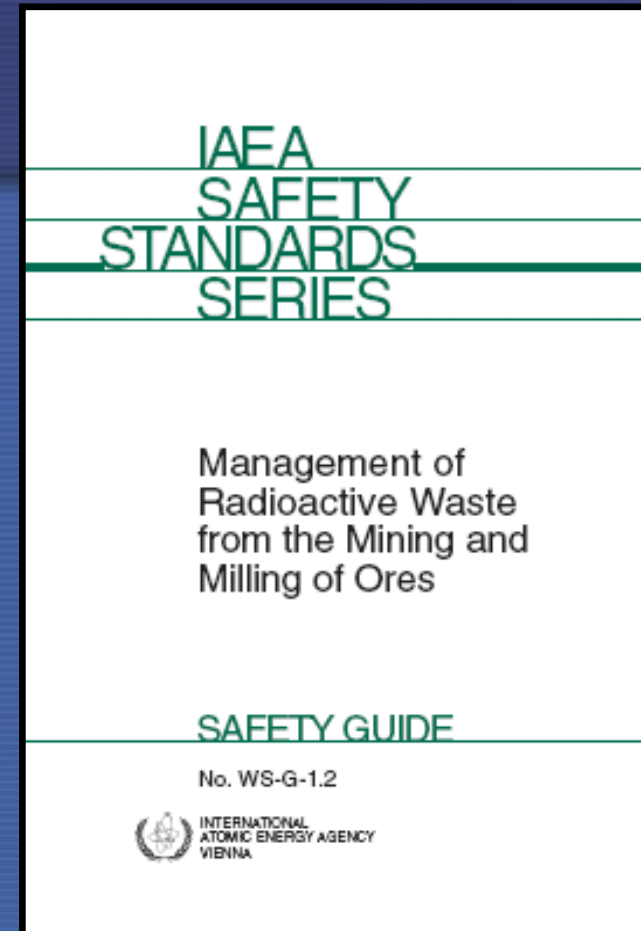
Safety Guide RS-G-1.7 Exclusion, Exemption, Clearance

- Applies to both **natural** and **artificial** radionuclides
- Activity concentrations in materials for defining the **scope of regulatory control** including **clearance** of materials

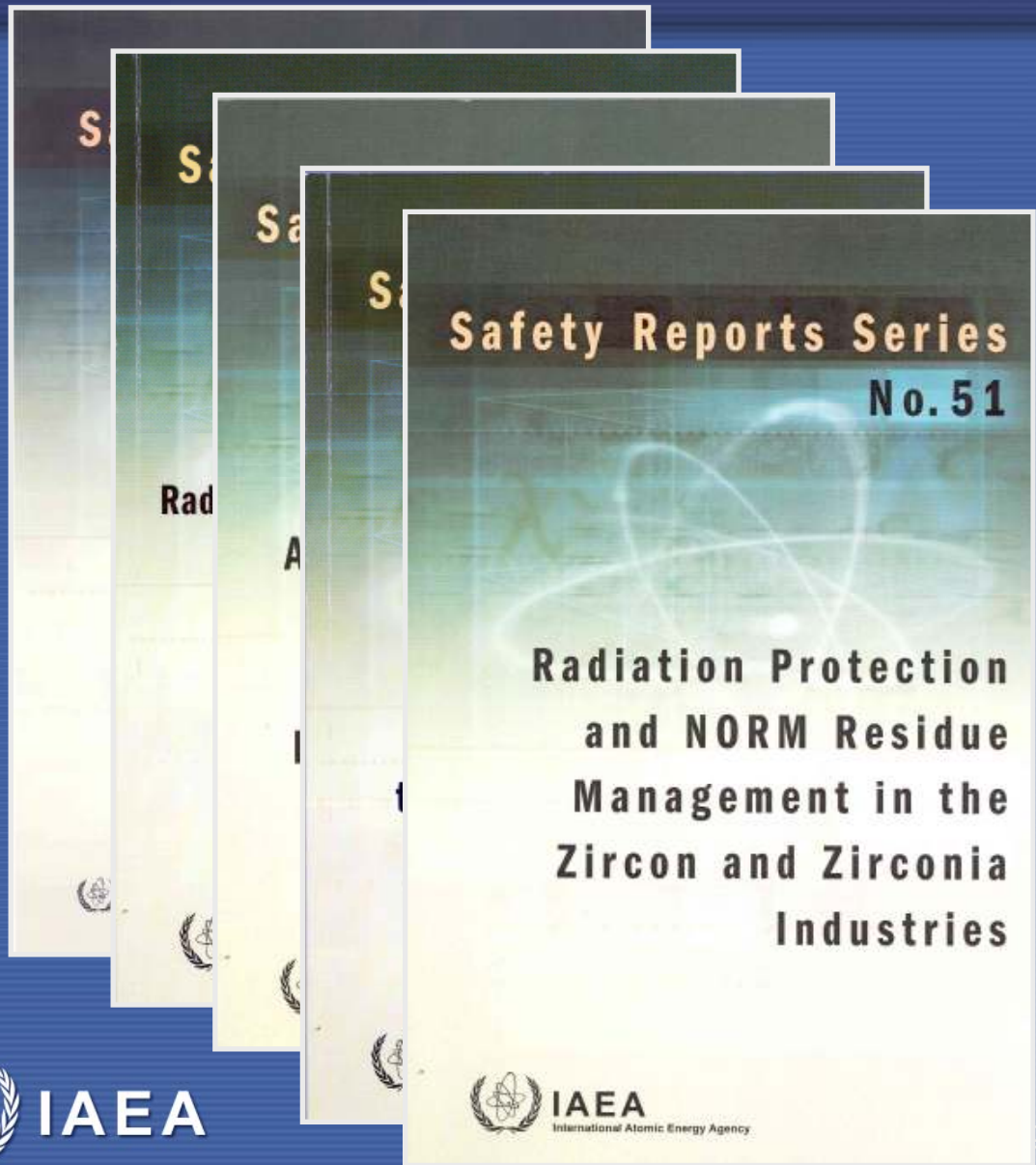


Safety Guide WS-G-1.2 Radioactive Waste Management: Mining & Minerals Processing

- Applies mainly to uranium mining and milling
- Currently being revised to apply more generally to NORM residues



Safety Reports Concerning Exposure to Natural Sources



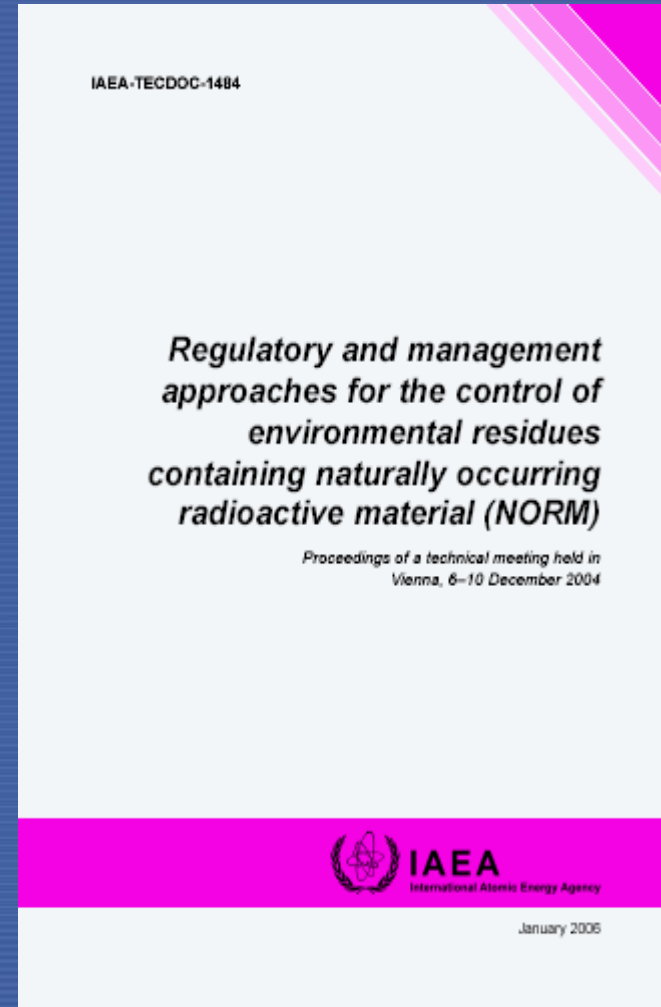
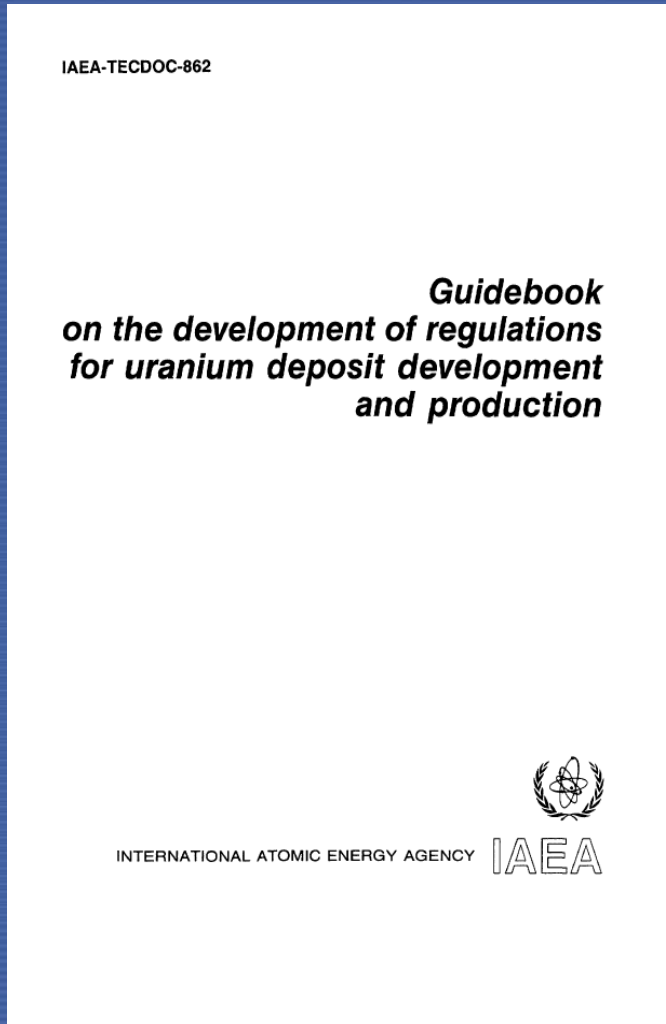
Under development:

- Phosphate industry
- TiO₂ pigment production
- Monazite and rare earths extraction
- Industrial uses of thorium
- etc.

TECDOCS and Reports

- Focus on practical Issues.
- Provide many examples of case studies.
- Examples from many countries on their approach to common problems.
- Significant number of documents focus primarily on safety in uranium production.

Regulation



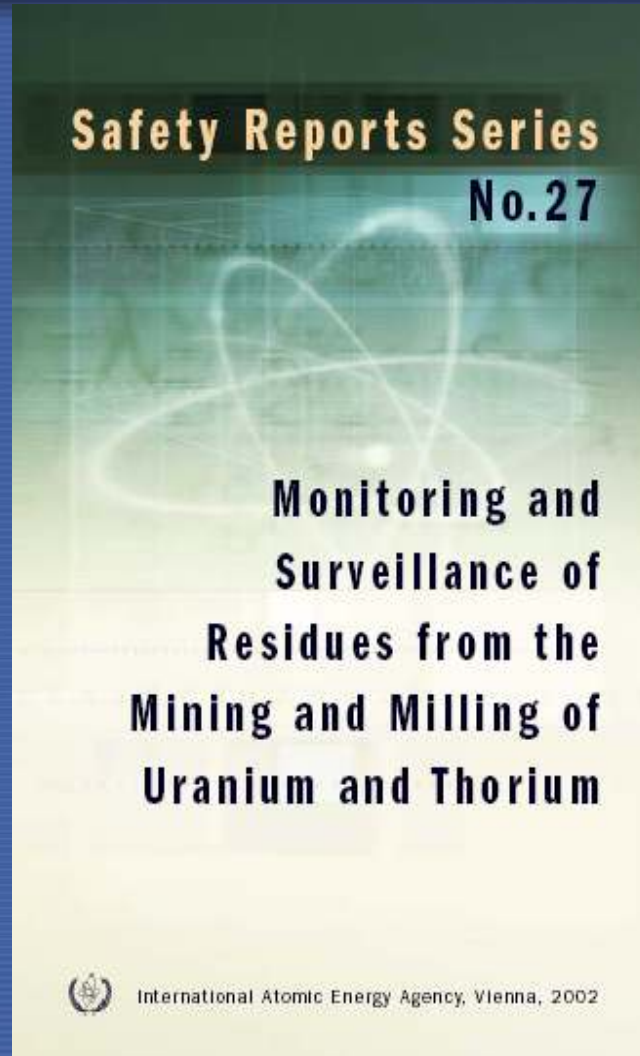
EIA

- IAEA (1997) ENVIRONMENTAL IMPACT ASSESSMENT FOR URANIUM MINE, MILL AND IN SITU LEACH PROJECTS. IAEA-TECDOC-979.
- IAEA (2005) GUIDEBOOK ON ENVIRONMENTAL IMPACT ASSESSMENT FOR IN SITU LEACH MINING PROJECTS.
- IAEA (2001) IMPACT OF NEW ENVIRONMENTAL AND SAFETY REGULATIONS ON URANIUM EXPLORATION, MINING, MILLING AND MANAGEMENT OF ITS WASTE. IAEA-TECDOC-1244

Operation

IAEA (1998) Guidebook On Good Practice In The Management Of Uranium Mining And Mill Operations And The Preparation For Their Closure. IAEA-TECDOC-1059.

Monitoring of Residues



Effluent Treatment

IAEA (2002) TECHNOLOGIES FOR THE TREATMENT OF EFFLUENTS FROM URANIUM MINES, MILLS AND TAILINGS. IAEA-TECDOC-1296.

Tailings

- IAEA (2004) The Long Term Stabilization of Uranium Mill Tailings. IAEA-TECDOC-1403.

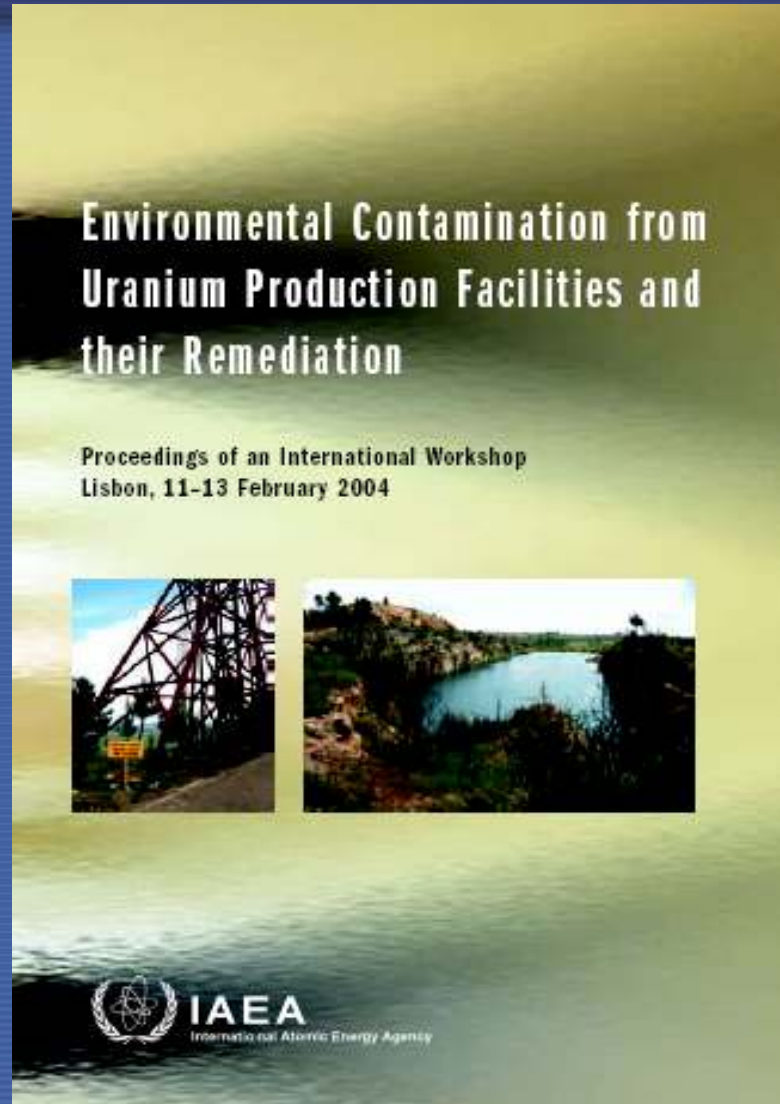
Decommissioning and Closure

- IAEA (1994) Planning and Management of Uranium Mine and Mill Closures. Proceedings of a Technical Committee meeting held in Libérée, Czech Republic, 3-6 May 1994. IAEA-TECDOC-824.
- IAEA (1997) Closeout Of Uranium Mines And Mills: A Review Of Current Practices. IAEA-TECDOC-939.
- IAEA (1998) Guidebook on Good Practice in the Management of Uranium Mining and Mill Operations and The Preparation for Their Closure. IAEA-TECDOC-1059.

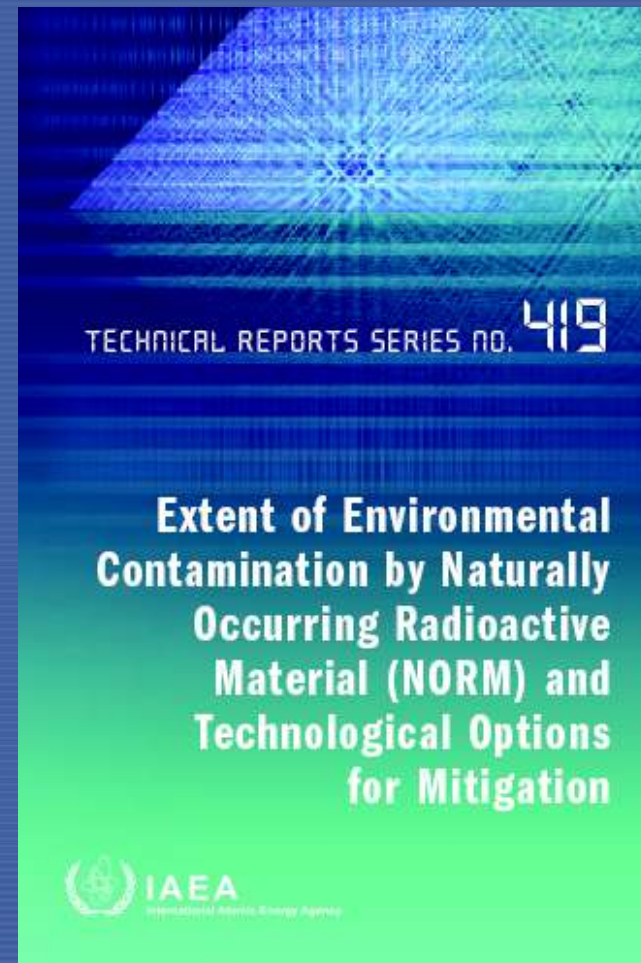
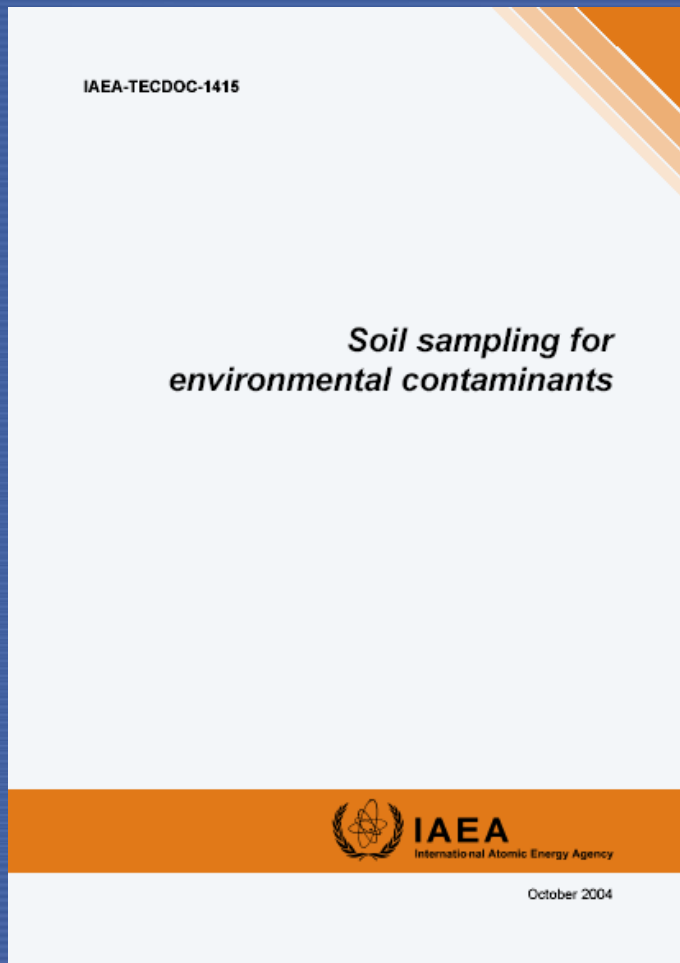
Remediation

- IAEA (1998) CHARACTERIZATION OF RADIOACTIVELY CONTAMINATED SITES FOR REMEDIATION PURPOSES. IAEA-TECDOC-1017.
- IAEA (2000) SITE CHARACTERISATION TECHNIQUES used in ENVIRONMENTAL RESTORATION ACTIVITIES. IAEA TECDOC 1148.
- IAEA (1999) COMPLIANCE MONITORING FOR REMEDIATED SITES. IAEA-TECDOC-1118.

Remediation



Remediation



IAEA Glossary

IAEA Safety Glossary

Terminology Used in Nuclear Safety
and Radiation Protection
2007 Edition



IAEA Glossary

The IAEA glossary provides for:

- A consistent global understanding and harmonisation of terminology.
- Is particularly useful for regulators drafting new regulations.

Conclusions

- IAEA produces standards for Radiation Safety.
- In addition there is a wide range of supporting materials at various levels.
- Documentation is drawn up by consensus of Member States and experts as well as IAEA staff.
- Almost all documents are freely available as pdf's.

Web Links

IAEA Publications

- <http://www.iaea.org/Publications/index.html>

Uranium Production Cycle

- http://www.iaea.org/OurWork/ST/NE/NEFW/nfcms_rawmaterials_publications.html

NORM

- http://www-ns.iaea.org/tech-areas/rw_ppss/exposure-to-natural-radiation.htm

Thank You

