IAEA 60 Years
Atoms for Peace and Development

A New IAEA Safety Report on Occupational Radiation Protection in the Uranium Mining and Processing Industry

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Purpose of Talk

To outline:

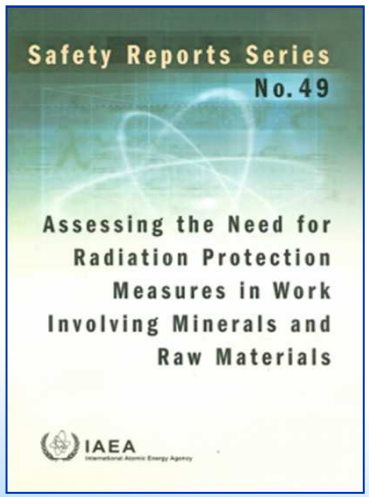
- IAEA approach for Member States
- Potential/Emerging uranium producers
- Relevant IAEA publications & Draft SR on Uranium mining and processing

The IAEA, Uranium and Safety

- IAEA has 168 Member States
- Its scope and focus is therefore international
- Major focus area is on radiation protection
- Its main focus is on assisting **regulators** to implement the requirements of the BSS (GSR Part 3)
- Both operators and regulators are involved in drafting IAEA publications
- Most of the experts are from the major uranium producing countries (e.g. Australia, Canada, USA, Kazakhstan)
- In the area of uranium mining operators play a major role in drafting publications
- Over the last 15 years IAEA has developed numerous publications related to NORM including uranium
- The Safety Reports and TECDOCS publications are geared to providing both junior operators and regulators with the information to ensure “good practice” in operation and regulation.

Typical industries

- Uranium mining and processing
- Rare earths extraction
- Thorium extraction & use
- Niobium extraction
- Non-U mining – incl. radon
- Oil and gas
- Production and use of TiO2
- Phosphate Industry
- Zircon & zirconia
- Metals production (Sn, Cu, Al, Fe, Zn, Pb)
- Burning of coal etc.
- Water treatment



IAEA guidance

- Oil and gas industry – Safety Report No.34, 2003
- Zircon and zirconia industries – No.51, 2006
- Rare earths industry – No. 68, 2011
- Titanium Dioxide and Related Industries - No. 76, 2012
- Phosphate industry – No.78, 2013
- Uranium mining & processing, Coal and Coal Ash industry and RP and NORM Residue Management in the Industrial Uses of Thorium – advanced stage of preparation.

- NORM IV, NORM V, NORM VI and NORM VII Symposia – IAEA Proceedings series
- Publications on Exposure to Radiation from Natural Sources (**https://www-ns.iaea.org/publications/norm-publications.asp)**
- Training course series No.40 – Oil and gas industries.

ORP Safety Guides

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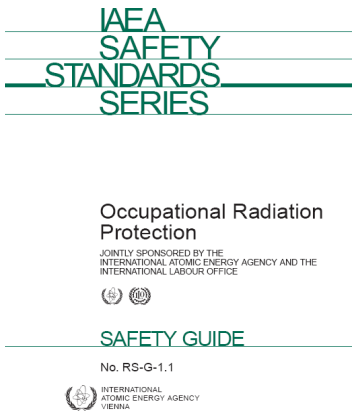
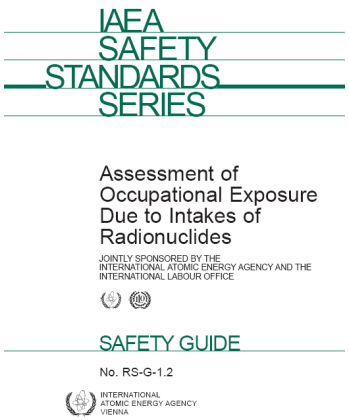
RS-G-1.1



1999

RS-G-1.2



1999

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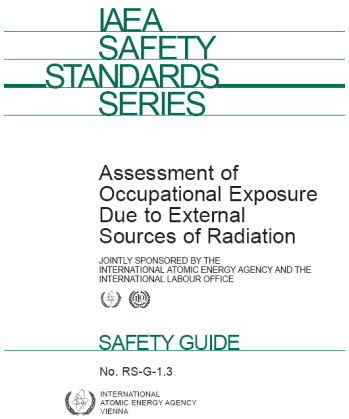

1999

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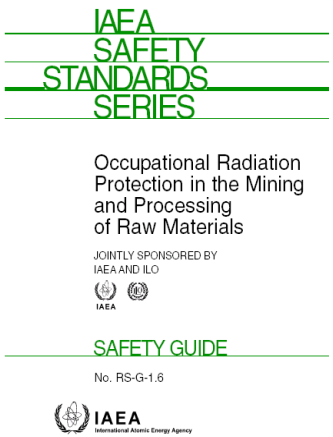
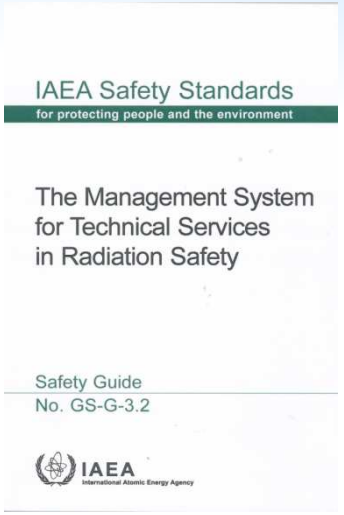


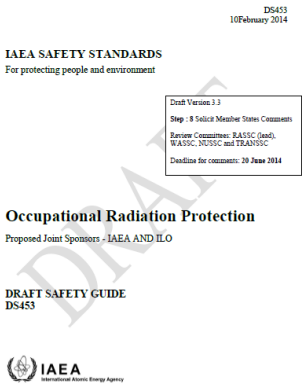
2004

GS-G-3.2



2008

- Co-sponsored by IAEA and ILO
- Specific to NORM industries
- Guidance on:
  - Regulatory approach
  - Dose calculations
  - Radiation protection programme



DS 453-Combine, revise and supersede five safety guides

Uranium Exploration and Mining Activities

- Exploration for uranium ores has been carried out in almost every country in the world over the past 100 years.
- Mining operations carried out specifically for extracting uranium ores has occurred for the last 200 years in at least 60 countries.
- The combination of experienced uranium mining operators and regulators are limited to a few well developed countries
- Recent activities have focused on numerous countries outside the major uranium producer regions
- The uranium exploration “boom” woke up a lot of regulators in developing countries
- Numerous Member State regulators particularly in Africa were requesting IAEA assistance

Issues and Observations in Emerging Uranium States

- Lack of experience, resources and independence
- Lack of understanding of the graded approach to regulation
- Complain that there are too many publications
- Often remark that Agency publications are complex and dense

What do they want from the SR?

- They want simple, clear guidance,
- Must cover all types of operations,
- Lifecycle approach,
- They want examples, flowcharts and checklists,
- Put the detail into the appendices
- They also want examples of simpler alternatives to “state of the art” solutions implemented in the major uranium producing countries.

U-Project: 2012 (EB)

- **Enhancing Radiation Protection of Workers in Uranium Mining**
- To enhance radiation protection of workers in uranium mining sector
- To assist the uranium production Member States in controlling radiation exposure of worker in uranium mining
- To promote the further development of uranium production

Activities

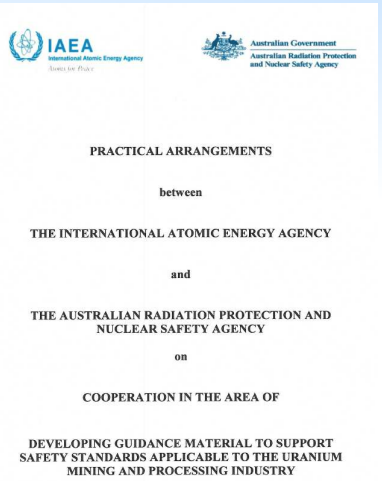
- Development of an information exchange system for occupational exposure in uranium mining
- ORP data collection from related countries; a database with ALARA analysis function- UMEX
- Harmonization of radiation monitoring for ORP of worker in uranium mining
- International workshops (Canada in 2014, Australia in 2015, South Africa in 2016)

Deliverables

- Methodology for acquiring and validating relevant ORP data for uranium mining.
- Web-based database interface for detailed operational and feedback information on ORP for direct use by local end-users in relevant groups.
- Methodology for analysis and effective dissemination of relevant ORP data.
- SR on the analyses of the information for radiation monitoring in uranium mining and processing.

Practical Arrangements

- June 2015: Practical Arrangements between the IAEA and the ARPANSA on Cooperation in the area of developing guidance material for U-mining & Processing Industry
- Scope:
  - Organisation of IWs in Australia and other potential venues with participation of RBs and industry
  - Organisation of CS meetings to develop a SR on existing procedures in the U-mining & processing
  - Coordination of EMs to supplement the development of SR
  - Participation in conferences relevant to RP in U-mining
- Valid for a period of 3 years and extendable



IAEA International Atomic Energy Agency

Australian Government
Australian Radiation Protection and Nuclear Safety Agency

PRACTICAL ARRANGEMENTS

between

THE INTERNATIONAL ATOMIC ENERGY AGENCY

and

THE AUSTRALIAN RADIATION PROTECTION AND NUCLEAR SAFETY AGENCY

on

COOPERATION IN THE AREA OF

DEVELOPING GUIDANCE MATERIAL TO SUPPORT SAFETY STANDARDS APPLICABLE TO THE URANIUM MINING AND PROCESSING INDUSTRY

Safety Report (version 5)

- ORP in Uranium Mining and Processing Industry
- **Introduction**
  - Background, Objective, Scope and Structure
- **Overview of the U-Industry and General Radiation Protection Aspects**
  - World Uranium Production, Worldwide Occupational exposure, Uranium mining and processing stages & techniques
  - Exploration, Underground mines, Surface mines, In-situ leaching mines & processing, Heap recovery, Processing, Non-conventional uranium extraction, Tailing facilities, transport and decommissioning

Safety Report (version 5)

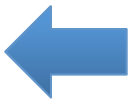
- **General Radiation Protection Considerations in Uranium Mining and Processing**
  - Application of the International Standards, Scope of Regulation, Basic radiation protection principles, Graded approach, Specific aspects of radionuclides in the uranium series
- **General Methodology for Control**
  - Occupational Health and Safety considerations, Hierarchy of control, RP principles, exposure pathways (exposure to gamma, inhalation of radon and progeny, inhalation of LLRD, ingestion, injection, absorption

Safety Report (version 5)

- **Monitoring and dose assessment**
  - Requirements, General dose considerations, gamma, surface monitoring, radon & thoron, progeny detectors, measurement methods, LLRD monitoring, internal dosimetry
- **Radiation Protection Programs**
  - *Exploration, Underground mines, Surface mines, In-situ leaching mines & processing, Heap recovery, Processing, Non-conventional uranium extraction, Tailing facilities, transport and decommissioning*
  - Process description, design & operation, principle exposure pathways, control mechanisms, monitoring and dose assessment

Safety Report (version 5)

- **Annexes**
  - Survey of UMEX
  - External exposure to Gamma
  - Radon and radon progeny
  - Inhalation of LLRD
  - Surface contamination



- Introduction
- Control measures
- Monitoring & dosimetry

  - To be finalized before the end of the year
  - Safety report- no approval from the Safety Standards committees is needed

Acknowledgement

International experts team

- Frank Harris (Rio Tinto), Gillian Hirth (ARPANSA), Keith Baldry (EPA), Martin Lepage & Dale Huffman (AREVA), John Takala,(Cameco), Douglas Chambers (SENES), Steven Brown (US), Manas Iskakov, (Kazatomprom), Shaun Guy (Austria), Barendra Kumar Rana (India), Ian Marshman, Langer Heinrich Uranium, Namibia), Wilcot Speelman (NNR, South Africa), Per Nilsson (Sweden)

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Thank you!