IAEA TRAINING COURSE ON OCCUPATIONAL RADIATION PROTECTION IN THE MINING AND PROCESSING OF URANIUM
Content

• Scope
• Background
• Participation rules
• Logistics
• Objectives
Scope (Structure)

- This is a framed course with the Safety Report on ORP in the Mining and Processing of Uranium (SR-100)

- Introduces;
  - General industry information (uranium mining & processing)
  - Radiation Protection Management
  - Monitoring & Dose Assessment
  - Specific pathways
    - Gamma
    - Radon and radon progeny
    - Long lived radioactive dust (LLRD)
    - Surface contamination
    - Ingestion, wound contamination and absorption
Scope

• Case studies
  • Exploration
  • Underground mining
  • Surface mining
  • In-Situ Leach (ISL) mining
  • Heap Leaching
  • Processing
  • Non-conventional uranium extraction
  • High grade ore mining and processing
  • Uranium Tailings facilities
  • Transport
  • Decommissioning
In the last 60 years uranium has become the world’s most important nuclear fuels.

Uranium is mined and concentrated in a similar manner to many other metals.

It is more abundant than gold, silver or mercury, has about the same abundance as tin and is slightly less abundant than cobalt, lead or molybdenum.

Natural uranium is the dominant fuel for global nuclear power programmes.
Conventional mines (underground or open pit mines) are usually associated with a **mill** where the ore is crushed, ground and then leached to dissolve the uranium and separate it from the host ore.

At the mill of a conventional mine or the treatment plant of an ISL operation, the uranium which is now in solution is then separated by ion exchange before being precipitated, dried and packed.

The product, uranium oxide concentrates are also referred to as **yellowcake** and **mixed uranium oxides** (either $U_3O_8$ and/or $UO_4$).
Background

• Uranium can be recovered as a **by-product** from phosphate fertilizer production and **from the mining of other minerals** including copper and gold when the ores contain economically exploitable quantities of uranium. In such situations, the treatment process to recover uranium may be more complex.

• During uranium mining and processing, workers may be **exposed externally** to gamma rays emitted from the ores, process materials, products and tailings, and **internally** exposed from the inhalation of long lived radioactive dust (LLRD), radon and radon decay products (RDP), and through ingestion, wound contamination and absorption of contamination.

• Depending on the mineralogy of the ore, various processes including either sulphuric acid or alkaline (carbonate) leach are employed to liberate the uranium from the host ore.
Objectives

- The objective is to provide detailed information that will assist regulatory bodies and industry operators in implementing a graded approach to the protection of workers against exposures associated with uranium mining and processing.

- **Main goal is**

  - To create a common understanding between various stakeholders (e.g. regulators; operators; workers; their representatives; and health, safety and environmental professionals) of the radiological aspects of the various processes
References

• Occupational Radiation Protection in the Uranium Mining and Processing Industry, Safety Reports Series No. 100, IAEA, Vienna
Thank you!