

Uranium Mining: Health, Safety and Risk Management

Uranium is naturally radioactive. Health and environmental concerns can be ameliorated through strict monitoring and procedures at mine sites.

How much radiation is emitted from uranium?

In South Australia, a low level of radioactivity (few parts per million) is found in naturally-occurring uranium ores and mining tailings (the materials left over after uranium is mined).

The level of radiation in the populated areas near Australian uranium mines is monitored, and it is well below the limits prescribed by law.

After uranium milling and chemical extraction, the concentrated uranium product known as *yellowcake* (uranium oxide, U_3O_8) has higher radioactivity levels and therefore requires specific handling, storage and transportation protocols.

Does uranium present a risk to those working at mine sites?

The health of men and women who work at uranium mines is monitored very carefully. Precautions taken include:

- Forced ventilation systems in underground mines to ensure that exposure to radon gas is as low as possible and does not exceed established safety levels.
- Dust control, as dust may contain radioactive constituents and emit radon gas.
- Use of radiation detection equipment in all mines and plants, often including personal dose badges.
- Imposition of strict personal hygiene standards for workers handling uranium oxide.

The total effective dose of radiation for monitored uranium mining workers in Australia is only 2.5 mSv per year (with a maximum allowed of 10 mSv). These values are well below the limit of 20 mSv per year set for nuclear industry employees and uranium miners.

What about old mining sites – are they safe?

Conventional uranium mine sites are rehabilitated once mining activities have ceased. Mining tailings are amalgamated in one location – back underground, in the mining pit or in a tailings dam – and covered by clay and topsoil to resist erosion. This allows vegetation cover to be established, and returns radiation levels near those of the original ore body.

Does uranium in groundwater present a risk?

Sites where In Situ Leaching (see Fact Sheet 5) has been used to recover uranium require extra steps to ensure safety. Here the focus is on ensuring that the groundwater is restored to a quality standard determined before the start of the operation. Sometimes that standard was very low to start with: at the Beverley and Honeymoon sites in South Australia, the original groundwater is of too low a quality for any permitted use.

Upon decommissioning, In Situ Leaching wells are sealed or capped, process facilities removed, any evaporation pond revegetated, and the land can revert to its previous uses. No major accidents related to In Situ Leaching have been recorded in Australia.

What is radiation?

Radiation is energy that travels through space.

Uranium is known as a radioactive material because it naturally breaks down to release radiation. Uranium breakdown also releases the radioactive gas radon.

Other radioactive materials include thorium, radon and a form of potassium.

How is radiation exposure measured?

The unit for measuring radiation exposure is the Sievert, often used in the form of the milliSievert (mSv).

At high to very high radiation exposure levels (100-10,000 mSv) serious health problems and death result.

At low exposure (10-20mSv and below), no discernable effects are seen.

Australians are exposed to around 3mSv of radiation per year through normal life.