

The role of research and development for safe and efficient uranium mining

Geological and other scientific research guides technologies for mining uranium in South Australia. Research increases productivity, reduces processing costs and lowers environmental impact of mining.

How does research improve uranium mining?

The uranium industry relies on scientific research to understand the geology of uranium deposits, and applies this knowledge to develop innovative and cost-effective mining technologies. New tools must be proven reliable and economic, and are well-communicated so that the community can make informed decisions about uranium mining.

Research also stimulates new initiatives and investments in the uranium industry.

How is uranium recovered at Olympic Dam?

The conventional approach takes place at Olympic Dam through underground mining of mineral ores. Extracted ore is collected from the mine as solid rock which is then crushed and ground (a process known as milling), and copper and uranium are removed by froth flotation. Next, acid leaching in tanks is used to concentrate uranium. While this step is very efficient, it is expensive and intensive.

What is In Situ Leaching (ISL), and why is it used at Beverly and Four Miles?

In Situ Leaching of uranium is emerging as a cheaper alternative to conventional uranium mining, and is in use at Beverly and Four Miles. At these sites, the uranium ore is located in permeable sands. The uranium is dissolved out of these sands by circulating a sulphuric acid leaching solution through an enclosed underground aquifer. The dissolved uranium in solution is then pumped to the surface, and recovered by conversion to a solid material.

Why isn't In Situ Leaching suitable for all uranium deposits?

In Situ Leaching is not suitable for all deposits, and can only take place under strict geological conditions and when reliable scientific information is available. The geology of the deposit must be known, the movement of fluids through rock pores and fractures must be understood, and chemical interactions between minerals and the liquid solvent must be predictable.

In Situ Leaching is only applicable to uranium deposits confined between impermeable rock formations: this is to ensure that groundwater does not become contaminated by leaching solution. Sensors are used at mine sites to monitor the underground movement of leaching solution and dissolution of uranium.

A current research focus is to discover low cost reagents with minimal negative environmental impact for *In Situ* Leaching.

How does the research sector contribute to the uranium industry in South Australia?

South Australia's three main universities – The University of Adelaide, Flinders University and University of South Australia – all have expertise in earth sciences, chemical sciences and resource engineering.

A research network that focuses on generating scientific evidence to improve uranium mining has been established at the University of Adelaide. The *ARC Research Hub for Australian Copper-Uranium* involves key industry, university and government partners in South Australia and nationally.