



# What's wrong with uranium mining?

*The nuclear industry would like the public to think that it is environmentally friendly. In reality uranium mining poses a serious threat to the environment, workers, indigenous culture, the wider community and future generations.*

## Toxic from start to end

Uranium processing requires vast water resources and has serious long-term environmental impacts. Olympic Dam uranium mine in South Australia uses up to 42 million litres of water per day from the Great Artesian Basin and renders it contaminated. Large quantities of ore must be processed to produce the yellow cake commercially used and radioactive waste and mining tailings are created.

Greenhouse gases are emitted throughout the nuclear chain from mining, milling, transporting and reprocessing uranium for use in weapons and nuclear power.

## Uranium and long-lived radioactivity

Uranium is the heaviest of all minerals. The percentage of uranium to ore is quite small in commercially mined uranium, averaging 0.3% in Australia but as high as 15% in Canada. The ore is, therefore, milled to concentrate the

uranium, resulting in a marketable product, uranium oxide (U3O8), also known as called 'yellowcake' because of its colour.

Because yellowcake contains the three commercially useful isotopes, it is radioactive.

Uranium isotopes remain radioactive for millions of years: U238 has a half-life (the time it takes for it to lose half its radioactivity) of 4.5 billion years, U235:

704 million years, and U234: 245,000 years. Radon is a radioactive gas released from uranium decay.

## Mining

In Australia three kinds of mining process are used to extract uranium: underground (as used at Olympic Dam), surface (open pit, as used at Mary Kathleen), or solution/in-situ leach, (as used at Beverley).

### Underground Mining

Tunnel mining poses risks to both human health and environment. Besides the risk of collapse and poor or dangerous air quality in underground operations, uranium mines present a dangerous scenario for workers due to exposure to radon gas and uranium dust. Subsidence, pot holes, fissure or other surface openings occur and disruption and contamination of groundwater and acid mine drainage also occur.

### Open cut mining

The most environmentally visible of the types of mining used for uranium, open cut entails digging massive pits into the surface of the earth, clearing and extracting everything in its location. Open cut mining also allows more dust and particles to escape into the local atmosphere, although being outdoors may reduce the exposure to radon gas of workers. Open cut mines are notoriously difficult to rehabilitate due to the sheer quantity of earth removed.

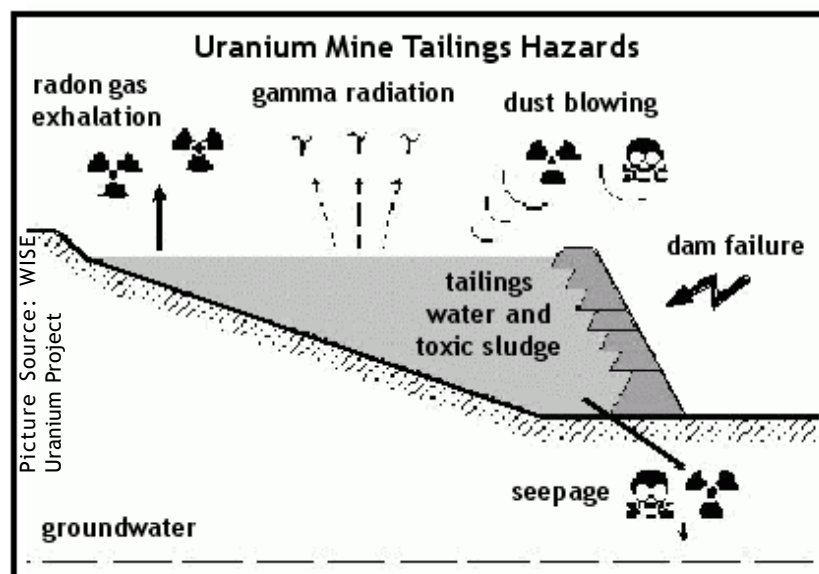
### In-situ leach mining

A contentious type of uranium mining, in-situ leach (ISL) involves injecting huge quantities of water and sulphuric acid into the deposit or the aquifer in which the uranium occurs, and sucking the resulting slurry out for separation. The potential for ground and surface water contamination is far greater than other types of mining. The pumping

process may also release large quantities of radon gas into the atmosphere.

### Milling and Tailings: turning mining sites into radioactive waste dumps

After ore extraction, uranium must be separated from the other minerals in the matrix. This is done by crushing and leaching the rock using water and sulfuric acid.



This process uses enormous amounts of water which is contaminated with acid, unwanted minerals and leftover uranium, and contains long lived decay products which continue to pose a risk to health and environment. It is left on site in tailings dams, in an attempt to minimise dust and because there is no safe means of disposal. The sludge that tailing water covers is 85% as radioactive as the uranium extracted and it continues to release radon.

Tailings dams all over the world have had leakage problems and there are many documented instances of increased exposure to radiation in people living downstream from these tailings dams through consuming contaminated water, fish and crops. In 2004 Olympic Dam uranium mine reported a leak from their tailings dams system that had gone unnoticed for several years. Local wildlife have been also been killed by drinking the tailings water, particularly water birds.

## Site Remediation

Uranium mines remain dangerous after closure. One enduring problem globally is the clean up and maintenance of sites. Communities are often left to foot the bill. US state agency representatives estimated in 2004 that an open pit copper mine in New Mexico would cost more than US\$800m to clean up. In their July 2005 half-yearly report, Energy Resources Australia (ERA), operators of the NT's Ranger mine, revealed that they had put aside just \$41m to remediate the Ranger mine site which is surrounded by Kakadu National Park. Their own company estimates that it will cost closer to \$176m to clean up the site when the mine closes in 2008, the rest may have to be met by the state. In its 2006 budget, the federal government allocated \$7m for the ongoing clean up of contamination from mines in the NT that were closed in the 1960s.

## The human cost

Workers and the community are exposed to serious health risks at all stages of the nuclear chain from mining to transport, use and disposal.

## Risks to miners

Workers are at risk from radiation exposure through inhalation or ingestion of radioactive dust or direct contamination from the mine. Over the years, the permitted levels of radiation exposure for workers and the public have dropped dramatically as research, particularly from radiation biologists, indicates harmful effects still exist at much lower exposure levels.

In 1934, the permitted dose for workers was set at 500 millisieverts per year. Today, the total permissible dose for nuclear workers in Europe is recommended to be limited to 5mSv and just 0.1mSv for members of the public.

Mining companies and nuclear agencies say that yellowcake is safe, however, former workers who handled yellowcake in Canada are documented as having high rates of cancer. The village of Deline, for instance, is called a "village of widows" today as a result of the high death rate from cancers of the male population who worked in the local uranium mines in the 60s and 70s.

## Accidents happen

In March 2004 workers at ERA's Ranger mine in the Northern Territory were accidentally poisoned with

radioactive water, the extent of which they only discovered after reading the newspapers, not from their employers. Workers drank and bathed in the radioactive water. A Commonwealth-appointed scientist Arthur Johnston commented to media that ERA had become complacent about radiation dangers at the Ranger mine and did not provide enough protection for workers. The company was found guilty and fined by the NT courts.

## Global impacts

The health and environmental effects are felt in many mining communities worldwide. Recent reports from China indicate

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*When Mary Kathleen mine in Queensland closed in 1982, it had produced about 3500 times more rock waste than it turned into yellowcake and left a massive conical hole 4km wide at the top and 250m deep. Shortages in the MK remediation fund meant that they took shortcuts when sealing in tailings. Instead of using clay, they used a combination of clay and radioactive rock from the mine site itself.*

*In 2004, State Member for Mt Isa, Tony McGrady expressed concern that people were swimming in Mary Kathleen tailings dam, risking radiation contamination.*

that there are both serious health impacts on communities living near uranium mines and grave consequences for workers who speak out on the issue. Navajo homelands in the US are a notable example former mining communities where residents now experience high lung cancer rates. Over half of the groundwater is contaminated by defunct uranium mines. The effect on the community has been so dire that in 2005 the Navajo elders signed the first ever tribal law banning uranium mining (SRIC 2005).

## Human rights and indigenous Australia

Globally, the nuclear industry has a history of developing uranium mines, nuclear tests, and waste dumps on indigenous peoples' lands against their wishes. Australia is no different. Australian Aboriginal opposition to uranium mining has been well documented since the release of the Fox Inquiry in the 1980's. Unfortunately, lack of infrastructure and investment in remote areas, has allowed mining companies to pressure indigenous communities to permit mining on their sacred lands, in exchange for basic services like school and hospitals. Royalties are often an enticement in areas where poverty and lack of services prevail due government neglect. These conflicts can cause rifts in the community. No community should be forced to have a uranium mine or waste dump to ensure their basic rights to health, education and a future for their children.

***The nuclear chain begins in Australia with the toxic hazards of uranium mining. The only sensible solution is to stop it where it starts - and to leave uranium in the ground.***



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