

Yellowcake coming out of filter press.

(Photo: Orano)

Uranium leaching

How yellowcake is made

When uranium is taken from the earth, the ore or rock typically contains only about 0.1% uranium. Traditionally, to extract it, the ore is first dug from the ground and crushed. The crushed ore is then ground in water to produce a slurry that has the same consistency as beach sand or even talcum powder mixed with water. This slurry is typically mixed with sulphuric acid to dissolve the uranium, leaving the remaining rock particles and most other minerals undissolved; these are called tailings.

Another mining method is called in situ leaching, which involves extracting the uranium directly from the ore without interfering much with the ground. Nearly half the world's production now comes from this type of mining. In situ leaching works by adding acid or alkali plus an oxidizer to groundwater and injecting it into the uranium ore, where it circulates, dissolving the uranium. The solution containing the dissolved uranium is then pumped to the surface for further processing.

Both of these mining methods produce a liquid with uranium dissolved in it. When required, any leftover tailings are filtered out. The uranium is precipitated from the liquid, filtered and dried to produce a uranium oxide concentrate, which is then sealed in drums. This powdery concentrate can be bright yellow (this is why it is known as 'yellowcake') or, if dried at high temperatures, dark green.

Once yellowcake is further processed and, in most cases, enriched, it can be made into nuclear fuel. Yellowcake is produced by all countries in which uranium is mined. It is only mildly radioactive.

— By Laura Gil