

Fact Sheet on Uranium Mining 3

HOW IS URANIUM MINED?

Uranium is found in rock. Natural uranium is contained in uranium ore in small concentrations of only fractions of a percent. For instance, the ore extracted from the Australian Olympic Dam Mine has a concentration of 0.05 %. Most reserves have uranium with a concentration of between 0.1 bis 0.2 %.

There is one exception: in Canadian Saskatchewan ore is mined that contains more than 20 % uranium. Nevertheless, extraction there has been prevented since 2006 due to flooding. The question of whether mining can continue there is contingent on what the ecological and health effects of the flood are. ¹

There are two methods of extracting uranium: conventional open-pit or underground mining, or a chemical process of In-Situ-Leaching (ISL).

Conventional Methods

Depending on the depth in the ground of the seam of rock containing uranium, the deposit is either mined using surface (open-cast or open-pit) or sub-surface (underground) mining. The uranium ore is extracted through mechanical means such as blasting, drilling, pneumatic drilling, picks and shovels, and then transported to the surface.

After mining, the ore is ground to a fine powder in a uranium mill. Due to the very low concentration of uranium in the rock, immense amounts of rock have to be moved and processed in order to get a few kilograms of natural uranium. This results in enormous heaps. For instance, with a concentration of 0.1% of uranium 1000 tonnes of radioactive waste have to be dumped onto heaps to get just one tonne of natural uranium.

In a second stage of the process, the pulverised uranium ore is treated with a strong acid or leach. This procedure separates about 90% of the uranium from the surrounding rock. The remaining 10% and the resulting slurry (Tailings) are waste products that are collected in large tanks.

After drying, a yellow-brownish powder - so-called „yellowcake“ – is the result, containing a uranium concentration of approx. 80%. „Yellow cake“ is the first intermediate stage between uranium and the fuel

¹ Karl-W. Koch (Hg.): Störfall Atomkraft; Bad Homburg, 2010



nuclear power plant or for a nuclear bomb. Two tonnes of uranium ore will give about one kilogram of „yellow cake“. ²³

In-situ-Leaching (ISL)

This method also produces „yellowcake“. It is different from the conventional method in that it uses a chemical process to separate the uranium in the earth's crust from the surrounding rock. The uranium solution is then pumped to the surface.

The chemical solution is injected into a drilled hole into the rock at the periphery of the uranium deposit. This liquid loosens the uranium from the rock and binds it; in other words, the uranium is „flushed“ out of the rock. This solution, now supplemented with uranium, is then brought up to the surface through another borehole.

The ISL-method can be used without mining enormous quantities of rock. It also has less impact on the environment and health than the conventional method. And it is cheaper.

However, groundwater currents around the uranium deposit cannot be calculated with 100% accuracy. Those currents can also change their direction. Not all of the contaminated liquid is pumped out. The rock reacts to the chemical solution unpredictably. All this means that there is a risk that the groundwater will become contaminated. This would be irreparable and have immeasurable consequences.

Although in-situ-leaching does not create heaps, the toxic and radioactive solution extracted from the uranium is collected on the surface and directed into evaporation ponds. Carcinogenic radon gas, among other substances, is emitted from these ponds into the environment.

ISL is particularly used for deposits of a low uranium concentration as well as during exploration and development of new deposits.⁴

² Fact Sheet by Uranium Watch of November 2007: www.ccamu.ca

³ www.nukingthecclimate.com; Background information, part 2 – Uranium Mining

⁴ *ibid.*