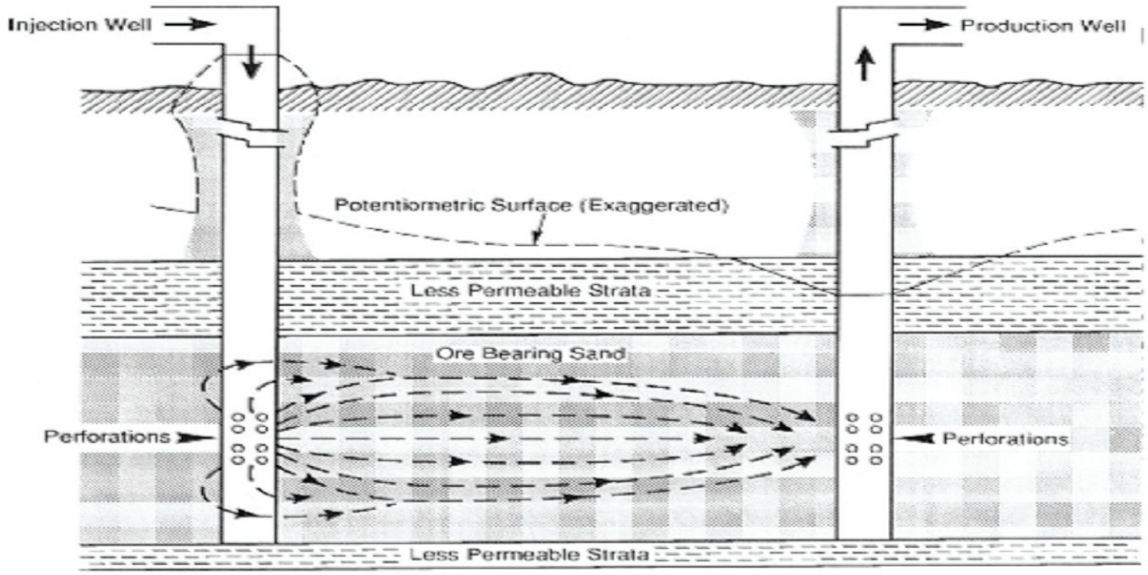
In-Situ Leach Uranium Mining

IN THE UNITED STATES, IN-SITU LEACH (ISL) MINING accounts for most uranium production. ISL involves injecting chemicals, called "lixiviant" into an aquifer that contains uranium ore bodies. The chemicals used are typically sulfuric acid or ammonium carbonate. Under natural conditions, these ore bodies are localized and the radiation and heavy metals associated with them remain confined in small portions of an aquifer. Because under natural conditions the toxic substances associated with uranium ore bodies are locally confined, their host aquifers can be – and often are – used as drinking water sources. When lixiviant is injected into an aquifer, it creates a chemical reaction with the uranium, causing it to spread over large areas of an aquifer. The uranium plume is brought to the surface with a series of "production wells" and processed for shipment to enrichment facilities. In the US the production life of a well field is roughly 1 to 3 years.[1] However, groundwater restoration efforts can last for decades.



ISL Process NRC 1997

PERMITTING PROCESS

ISL licenses are issued by the Nuclear Regulatory Commission (NRC) or through agreement states. The NRC does not directly regulate the mining in Texas, Colorado, and Utah, as they have entered into agreements with the NRC which allow them to license and inspect by-product, source, or special nuclear materials used or possessed within their borders.[2] In all cases, ISL uranium mines must obtain an aquifer "exemption" permit to degrade the quality of groundwater resources, and an underground injection control permit from a state regulatory agency or the EPA in order to pollute the groundwater during the mining operation. Exempted aquifers are exempted from the Safe Drinking Water Act and cannot be used as a future underground source of drinking water.

WATER POLLUTION

Groundwater restoration is an extremely difficult process and no commercial ISL mine in the U.S. has ever restored groundwater to pre-mining condition. Any ISL operation risks the spreading of mobilized uranium and its byproducts outside the mining area, potentially polluting adjacent drinking water sources. Some contaminants, such as radium, cannot be easily controlled. During the mining process and subsequent attempts to restore the aquifer, large volumes of wastewater are produced and may be stored in evaporation ponds on the mine site. These ponds can leak, contaminating ground water and soils, or can cause problems for wildlife. Liquid can also be disposed of by spraying it on the ground, called "land application", or injecting it into wells deep underground.

ISL Evaporation Pond
Photo: U.S. EPA

ENDNOTES

1 World Nuclear Association. In-Situ Leachjng Mining of Uranium. Dec 2009. http://www.world-nuclear.org/info/inf27.html

2 U.S. Nuclear Regulatory Commission. Locations of Uranium Recovery Facilities. http://www.nrc.gov/info-finder/materials/uranium/

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EARTHWORKS • 1612 K St., NW, Suite 808
Washington, D.C., USA 20006 • www.earthworksaction.org
info@earthworksaction.org • 202.887.1872