

How Has the Process of *In Situ* Uranium Mining Changed Since It Was First Applied ?

The process of leaching uranium from the ground has changed in two ways since it was first applied. First, acidic leaching solutions originally used in the process have been replaced by alkaline leaching solutions. Second, ammonium carbonate in the leaching solutions has been replaced by sodium carbonate. Acid leaching solutions, which were used in the late 1960's to the early 1980's, were efficient in leaching uranium, but they also leached other minerals from the uranium mineralized zone. Alkaline leaching solutions on the other hand, preferentially leach uranium from the uranium mineralized zone, resulting in less leaching of other constituents. Currently in the United States, all *in situ* uranium production is performed with alkaline leaching chemistry using carbon dioxide or sodium carbonate and oxygen (USDoE, 1995), which is safer for the environment. Once uranium is leached from the uranium mineralized zone, it tends to precipitate out of solution unless it combines with a compound that will keep it in solution. Such compounds are called complexing agents. Originally, ammonium carbonate was commonly used as a complexing agent, but it was problematic because the ammonia was difficult to remove once mining was complete, thus adversely affecting the water quality within the uranium mineralized zone. Sodium carbonate is now used as a complexing agent.

References:

- Uranium Mining Pollution Near the King Ranch, <http://www.txpeer.org/toxictour/uri.html>.
- Mudd, Gavin, 1998, An Environmental Critique of In Situ Leach Mining: *The Case Against Uranium Solution Mining*, <http://users.monash.edu.au/~gmudd/files/1998-07-InSituLeach-UMining.pdf>.
- USDoE, 1995, Decommissioning of US Uranium Production Facilities, USDOE Energy Information Administration; Office of Coal, Nuclear, Electric and Alternative Fuels, DOE/EIA-0592, 71 pages.
- Tweeton & Peterson, 1981, Selection of Lixivliants for "In-Situ Leach Mining" in "In-Situ Mining Research" Proceedings: Bureau of Mines Technical Transfer Seminar, Denver, Colorado, August 5, 1981, Information Circular 8852, 8 pages.

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