

Once *In Situ* Uranium Mining Is Complete at a Site, Is the Mine Operator Required to Clean Up the Affected Groundwater ?

Yes. Prior to the start of *in situ* mining, an operator is required to determine the pre-mining quality of the groundwater within and away from the uranium-mineralized zone. After mining is complete, the mine operator must restore the groundwater within the uranium-mineralized zone to its pre-mining quality (based on 26 separate constituents). This is typically accomplished by pumping groundwater from the mined zone to the surface and treating it using reverse osmosis. The treated water is then re-injected into the mined zone and the process is repeated.

If a mine operator is unable to restore groundwater quality in the mined zone to its pre-mining level for all 26 constituents, the operator may request to leave this groundwater at the final quality level that they have achieved. Before the Texas Commission on Environmental Quality (TCEQ) approves such an action, several factors are considered. These factors include:

- Suitable uses of the groundwater at its present quality;
- Suitable uses of the groundwater prior to mining;
- Possible future uses of the groundwater;
- The extent of the groundwater restoration efforts;
- The harmful effects of the groundwater at its present quality level; and,
- The amount of energy, water, or other natural resources that would be needed to completely restore the groundwater to pre-mining quality.

Any such approval by the TCEQ is subject to public participation, including public notice, public comment, and in some cases, a contested case hearing. The TCEQ has approved 58 uranium production areas that have returned groundwater in the mined zone to pre-mining quality for most of the 26 constituents. Constituents for which approved groundwater concentrations were not reduced to pre-mining levels varied from site to site and included ammonia, arsenic, calcium, magnesium, manganese, molybdenum, selenium, radium 226, uranium, sulfate, and alkalinity. In each case, operators of these sites were allowed to leave the groundwater at the elevated levels after the TCEQ determined that the groundwater was suitable for its pre-mining purposes.

References:

- TCEQ Source Material Recovery and By-Product Material Disposal, <https://www.tceq.texas.gov/permitting/radmat/uranium/uranium.html>
- TCEQ In Situ Leach and Conventional Uranium-Recovery Methods, <https://www.tceq.texas.gov/permitting/radmat/uranium/process.html>
- TCEQ Regulations for Class III Wells, [http://texreg.sos.state.tx.us/public/readtac\\$ext.ViewTAC?tac_view=5&ti=30&pt=1&ch=331&sch=E&rl=Y](http://texreg.sos.state.tx.us/public/readtac$ext.ViewTAC?tac_view=5&ti=30&pt=1&ch=331&sch=E&rl=Y)
- TCEQ Regulations for Class III Well Production Area Development, [http://texreg.sos.state.tx.us/public/readtac\\$ext.ViewTAC?tac_view=5&ti=30&pt=1&ch=331&sch=F&rl=Y](http://texreg.sos.state.tx.us/public/readtac$ext.ViewTAC?tac_view=5&ti=30&pt=1&ch=331&sch=F&rl=Y)

- U.S. Environmental Protection Agency Class III Injection Wells for Solution Mining, <https://www.epa.gov/uic/class-iii-injection-wells-solution-mining>
- U.S. Nuclear Regulatory Commission (NRC) NUREG 1569: Standard Review Plan for In Situ Leach Uranium Extraction License Applications, <http://www.nrc.gov/reading-rm/doc-collections/nuregs/staff/sr1569/sr1569.pdf>
- U.S. NRC NUREG 6870: Consideration of Geochemical Issues in Groundwater Restoration at Uranium In-Situ Leach Mining Facilities, <http://www.nrc.gov/reading-rm/doc-collections/nuregs/contract/cr6870/cr6870.pdf>
- Texas A&M AgriLife Extension Service (TAES) *Drinking Water Problems: Radionuclides* (B-6192), <http://www.agrilifebookstore.org/default.asp>
- American Institute of Mining, Metallurgical, and Petroleum Engineers, Inc., South Texas Minerals Section: South Texas Uranium Seminar, Corpus Christi, 1978, Whittington, Dick and Taylor, W.R., Texas Department of Water Resources, Chapter 2, Regulations and Restoration of In Situ Uranium Mining in Texas.
- Murry, David, TCEQ Underground Injection Control (UIC) Team, personal communication, June, 2009.

For additional Frequently Asked Questions (FAQs) related to groundwater quantity, groundwater quality, septic systems, water wells, administrative entities, and publications, visit the Texas Groundwater Protection Committee's FAQ webpage at <http://tgpc.state.tx.us/frequently-asked-questions-faqs/>.