

Aquifer Exemption Data

EPA’s interactive Aquifer Exemption map allows users to view electronically aquifers that EPA approved for exemption under the Safe Drinking Water Act Underground Injection Control regulations. This interactive map brings together data previously available only in paper form or at the state level. The map and accompanying data can be used by states, businesses, communities, and others to view exempted aquifers in the United States. The map provides accompanying aquifer exemption information like depths of injection, local geology, and injected fluid characteristics. This data can assist with Underground Injection Control permit applications and approvals.

Background on Aquifer Exemptions

An aquifer is an underground body of rock that provides or could provide ground water to support people’s water needs. EPA exempts aquifers or portions of an aquifer if the aquifer does not currently serve as a source of drinking water and will not serve as a source of drinking water in the future, based on certain criteria. Aquifer exemptions allow these underground sources of water to be used by energy, mining and other companies for oil or mineral extraction or disposal purposes in compliance with EPA’s Underground Injection Control requirements. Figure 1 shows simplified scenarios where a well owner/operator or a state might request EPA to approve an aquifer exemption.

The process begins when EPA receives information about the aquifer proposed for exemption from a state agency or well owner or operator. EPA approves the aquifer exemption request if it meets the necessary criteria, including a demonstration that fluids will not migrate outside of the exemption the boundary. Injection of fluids can begin only after EPA approves an aquifer exemption and an Underground Injection Control permit is granted.

Summary of Data on Aquifer Exemptions in the US

There are almost 6,500 aquifer exemptions in the United States. The majority are located in Texas, Montana, Wyoming, Colorado, California, and Indian country, as shown in Figure 2.

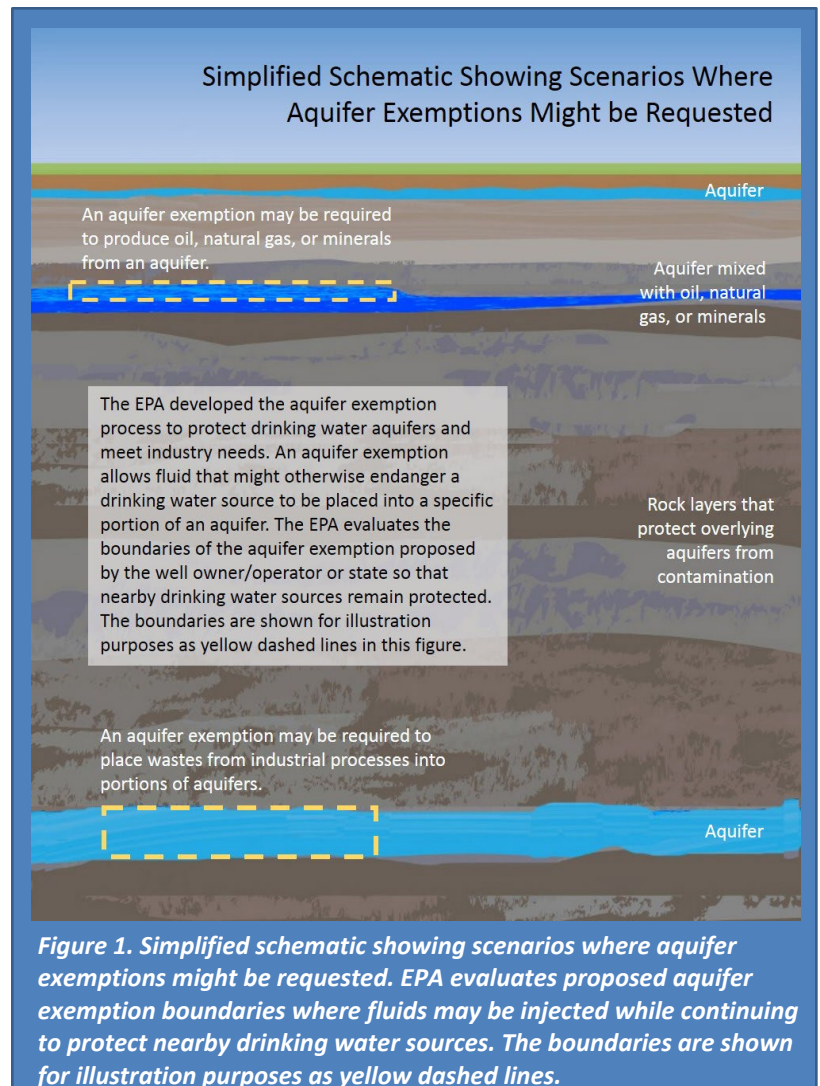




Figure 2. EPA approved almost 6,500 aquifer exemptions as of November 2021. The map shows a point for the center of each aquifer exemption or a county outline for those exemptions with imprecise locational information. Points are color coded by the class of injection proposed to inject into the exempted aquifer.

Injection Well Classes Associated with Aquifer Exemptions

There are six classes of injection wells under EPA's regulations. Class I wells are for the injection of industrial and municipal waste fluids. Class II wells are for the injection of fluids related to oil and gas operations, such as enhanced recovery (Class IIR) or disposal of production wastes (Class IID). Class III wells inject fluids that assist in extraction of minerals such as uranium and salts. Class IV wells, for certain hazardous or radioactive waste injection, are banned except under limited circumstances as part of an EPA or state-authorized ground water cleanup. Class V wells are for injection activities not covered by the other well classes. Class VI wells inject carbon dioxide into deep rock formations for the purpose of long-term storage.

Operators or states typically describe the injection activity proposed for an aquifer when requesting an exemption from EPA. Aquifer exemptions requested as of November 2021 are usually associated with three of the six classes of injection wells regulated by EPA's Underground Injection Control Program. Most aquifer exemptions (about 98 percent) are associated with Class II wells. Almost one-third of aquifer exemptions associated with Class II wells are for enhanced oil or gas recovery (Class IIR) and about one-fourth are for disposal of wastewater (Class IID). The remainder of these aquifer exemptions are not associated with specific Class II activities such as enhanced recovery or disposal, although they may be used for recovery or disposal (or both); those aquifer exemptions are designated as Class II rather than Class IID or Class IIR. About one percent of aquifer exemptions are associated with Class I industrial wastewater disposal wells, and another one percent are associated with Class III mining wells. The remainder are associated with Class V wells, which are used to inject other non-hazardous fluids.

Aquifer Exemption Depth

The aquifer exemption depth map shows the depth, in feet, to the exempted aquifer from the land surface or its elevation below mean sea level. Some aquifer exemptions are shallow, while others are thousands of feet below the surface (far below drinking water aquifers). It is also important to note that the depth reported is the shallowest depth of the exempted aquifer. About five percent of aquifer exemptions are 500 feet or less below the surface; most are between 1,000 and 9,000 feet deep. Some are over 10,000 feet deep. For comparison, the depths of private drinking water wells measured across the United States ranged from six feet to 1,500 feet below ground surface with an average depth of 172 feet.¹ The depths of public drinking water well depths ranged from fifteen to 3,534 feet, with an average depth of 577 feet, below ground surface.²

In some cases, there is more than one exempted aquifer at the same location, but at different depths and in different geologic formations. The aquifer exemptions may have overlapping two-dimensional boundaries at the surface, but they are separate aquifer exemptions. Information on overlapping aquifer exemption boundaries is listed in the pop-up boxes by clicking the left and right arrows at the top of the box, as shown in Figure 3. Depths of the aquifer exemptions are measured as feet below ground surface in the majority of exemptions. In some aquifer exemptions located in California, Louisiana, Oklahoma, and Texas, depth is measured as feet relative to mean sea level. Feet mean sea level can either be positive or negative depending on whether the elevation is above mean sea level (positive) or below mean sea level (negative). The two scales for measuring depth are shown separately in the legend.

Aquifer Exemption Boundaries

The boundary of an aquifer exemption contains the portion of the aquifer that may be affected by the injection activity. Aquifer exemption boundaries are determined in a variety of ways. Some aquifer exemptions are defined as a radius (typically $\frac{1}{4}$ or $\frac{1}{2}$ mile) around the well associated with the exemption and are circular. Others are defined by one or more grids in the Public Land Survey System and are squares or combinations of squares. Exemption boundaries can also be irregularly shaped and follow the dimensions of an aquifer, oil or gas field, or mining area. The exemption areas range in size from thousands of square feet to more than a thousand square miles. About 36% percent of exemption areas are $\frac{1}{4}$ mile radius around the injection well or smaller. Note that, for 445 aquifer exemptions in Texas, only the point represented by the well's location is identified.

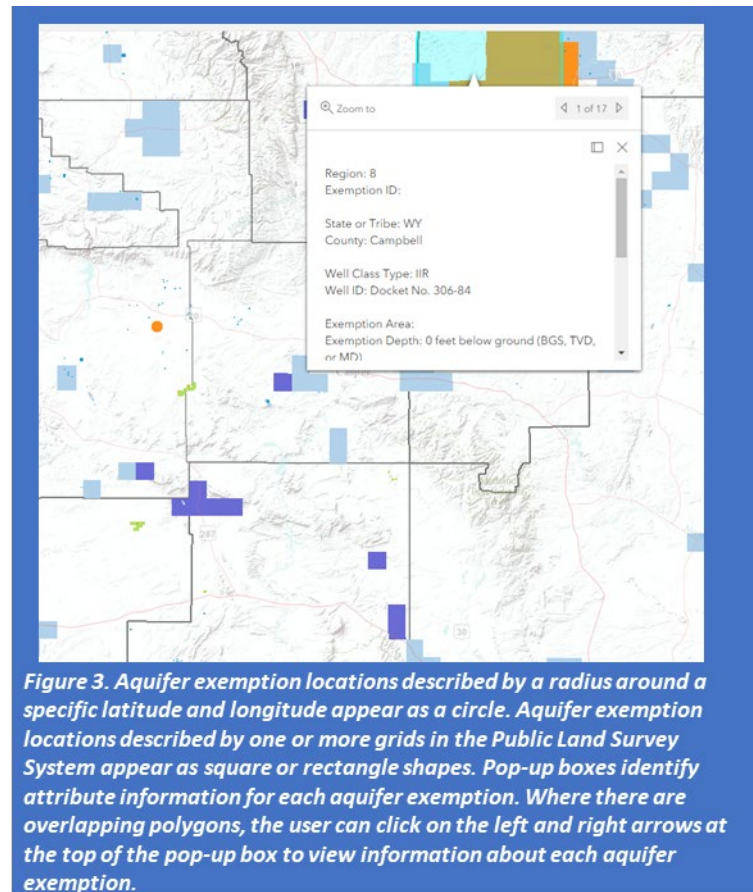


Figure 3. Aquifer exemption locations described by a radius around a specific latitude and longitude appear as a circle. Aquifer exemption locations described by one or more grids in the Public Land Survey System appear as square or rectangle shapes. Pop-up boxes identify attribute information for each aquifer exemption. Where there are overlapping polygons, the user can click on the left and right arrows at the top of the pop-up box to view information about each aquifer exemption.

¹DeSimone, LA, Hamilton, PA, Gilliom, RJ. 2009. Data from *Quality of water from domestic wells in principal aquifers of the United States, 1991-2004*. US Geological Survey.

²Toccalino, PL, Hopple, JA. 2010. Data from *The quality of our Nation's waters—Quality of water from public-supply wells in the United States, 1993-2007*. US Geological Survey.



For More Information

For additional information on aquifer exemptions, including the requirements at 40 CFR 146.4, see <https://www.epa.gov/uic/aquifer-exemptions-underground-injection-control-program>.

For additional information on the UIC Program, see <https://www.epa.gov/uic>.

To download the geospatial file and related materials, visit <https://www.epa.gov/uic/aquifer-exemptions-map>.

For information on specific aquifer exemptions, contact the EPA Regional Office that approved the aquifer exemption; contact information is available at <https://www.epa.gov/uic>.

To contact EPA with questions or comments about aquifer exemptions, please visit <https://www.epa.gov/uic/forms/contact-us-about-underground-injection-control>.