

## What is an Injection Well ?

An Injection Well is a well used for emplacement of fluids underground. Injection wells range from a few feet to over 10,000 feet in depth. The design of such wells ranges from very low technology constructions such as a shallow dug well or natural sinkhole with surface modifications, to highly engineered designs with multiple casings, cement, and other components for downhole fluid and pressure control, monitoring, and overall environmental protection.

Injection wells are used in many industrial and resource management activities. Some of the most common of these activities include production and refining of petroleum and other mineral resources, chemical manufacturing, electric power generation, air conditioning and heating, food processing, drinking water treatment, commercial waste management, environmental remediation, and aquifer storage and recovery. When properly sited, constructed, and operated, injection wells can effectively maintain environmental safety in each of these activities.

According to rules adopted by the U.S. Environmental Protection Agency (EPA) and states in response to the Safe Drinking Water Act (SDWA) of 1976, no injection well may be allowed to endanger an Underground Source of Drinking Water (USDW). Such wells must be permitted or otherwise authorized with the necessary terms and conditions to ensure USDW protection.

Federal and state rules define six classes of injection wells. The principle factors used to define each well class includes the type of activity and source or general nature of the fluids associated with that activity; a secondary factor in defining well class is the depth of injection relative to USDWs.

**Class I wells** are used to inject industrial and municipal waste water safely below USDWs; these wells may be permitted to include hazardous and radioactive waste water in the injected fluids.

**Class II wells** are associated with injection related to the exploration and production of oil and gas and the storage of hydrocarbons.

**Class III wells** are used for injection for production of minerals such as uranium, sulfur, and brine.

**Class IV wells** inject hazardous or radioactive waste into or above USDWs, and therefore have a general prohibition on their construction and use.

**Class V wells** comprising the majority of injection wells, are mostly shallow wells not in other defined well classes, and inject nonhazardous fluids generally into or above USDWs. Common uses of Class V wells include remediation of groundwater contamination, air conditioning and heating, stormwater management, and aquifer storage and recovery.

**Class VI wells** are used for injection of carbon dioxide (CO<sub>2</sub>) below USDWs for long-term geologic storage (geologic sequestration).

Under state law (Chapter 27, Texas Water Code), responsibility for regulation of injection wells is divided between the Railroad Commission of Texas (RRC) and the Texas

Commission on Environmental Quality (TCEQ). The RRC's responsibility includes Class II, Class III for production of brine, Class V for geothermal energy production, and Class VI in areas of historic or potential oil, gas, or geothermal resource production. TCEQ is responsible for all other injection wells, including Class I, Class III for production of uranium and sulfur, Class IV, most of Class V, and Class VI in areas without historic or potential oil, gas, or geothermal resource production.

References:

- For RRC Injection and Disposal Wells Frequently Asked Questions (FAQs), go to <http://www.rrc.texas.gov/about-us/resource-center/faqs/oil-gas-faqs/faq-injection-and-disposal-wells/>.
- The RRC's Injection/Disposal Well Permitting, Testing, and Monitoring Manual can be found at <http://www.rrc.texas.gov/oil-gas/publications-and-notices/manuals/injectiondisposal-well-manual/>.
- Information regarding the Texas Commission on Environmental Quality (TCEQ) Underground Injection Control Permits and Registrations can be found at [https://www.tceq.texas.gov/permitting/waste\\_permits/uic\\_permits/uic.html](https://www.tceq.texas.gov/permitting/waste_permits/uic_permits/uic.html).
- TCEQ's Oil & Gas Facilities: Compliance Resources webpage (<http://www.tceq.texas.gov/assistance/industry/oilgas.html>) covers regulations on air, water, and waste related to the oil and gas industry in Texas. This webpage also includes links to other resources such as TCEQ publication RG-482, *Common Environmental Requirements for Regulated Oil and Gas Operations*, which discusses TCEQ regulations for upstream oil and gas sites, as well as the appropriate regulatory contacts for various oil and gas activities in Texas.
- The U.S. Environmental Protection Agency (EPA) Protecting Underground Sources of Drinking Water from Underground Injection (UIC) website is <https://www.epa.gov/uic>.
- Drawings of the different UIC well types can be found on each of their individual webpages (Class I – VI) at [https://www.epa.gov/uic/general-information-about-injection-wells#how\\_protect](https://www.epa.gov/uic/general-information-about-injection-wells#how_protect).
- The U.S. EPA SDWA website is <http://www.epa.gov/lawsregs/laws/sdwa.html>.
- The Ground Water Protection Council website providing information and links relating to wells, underground injection practices, and groundwater protection is <http://www.gwpc.org>.
- The Texas Groundwater Protection Committee (TGPC) Oil, Gas, and Mining webpage (<http://tgpc.state.tx.us/oil-gas-mining/>) has additional information and links on this subject.

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