

Protecting underground sources of drinking water and public health

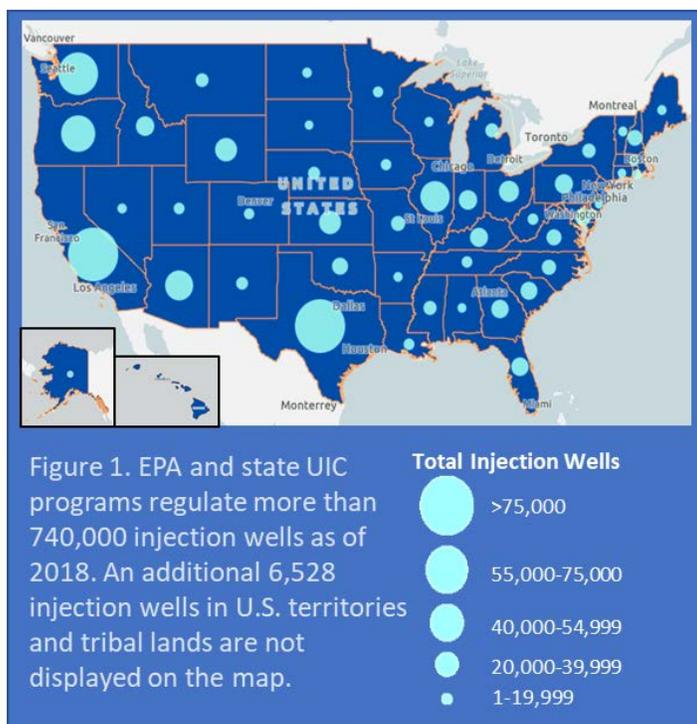
Storage or disposal of water and fluids may be managed by injecting them underground using injection wells. Injection wells are regulated by the Underground Injection Control (UIC) program in order to protect underground sources of drinking water.

The UIC program may be implemented by the United States Environmental Protection Agency (EPA) or by states, territories, or tribes with EPA-approved primary permitting and enforcement authority. Activities performed by the UIC program include maintaining well inventory, permitting injection wells, performing inspections, and ensuring compliance with permit requirements. When operators manage wells in a way that does not meet the applicable UIC requirements, the program alerts operators to issues and may assist operators in returning the wells to compliance or take enforcement action.

Types of Injection Wells

More than 740,000 injection wells were regulated by the UIC program in 2018. Injection wells are found in all fifty states, territories, and tribal lands. Figure 1 shows the relative numbers of injection wells by state.

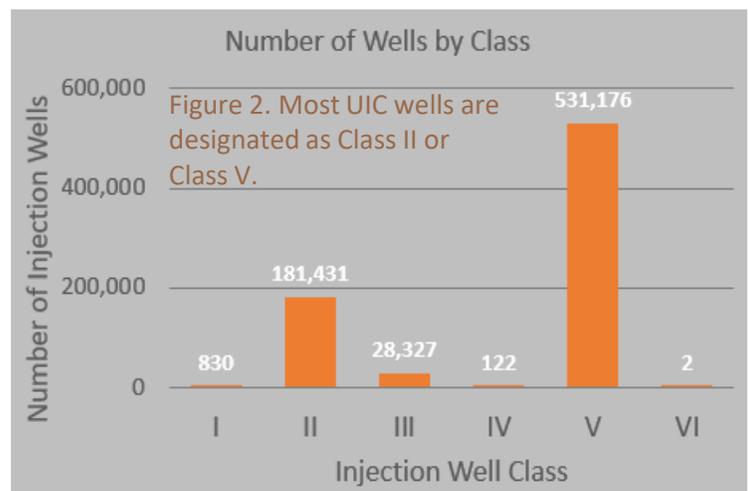
The UIC program classifies injection wells based on the type of fluids the well receives, the purpose of the



injection, and where the fluid is injected relative to underground sources of drinking water. Figure 2 shows the number of wells by well class for 2018.

- **Class I** wells are used to inject hazardous and non-hazardous waste into deep, confined rock formations below all underground sources of drinking water. The fluids may include municipal, industrial, or radioactive wastes.
- **Class II** wells are used to inject fluids related to oil and gas production.¹ The majority of Class II wells are used to enhance recovery of oil and gas or dispose of wastewater co-produced with oil and gas into rock formations. Class II wells represented approximately 25% of wells in 2018.
- **Class III** wells are used to inject fluids to aid in the extraction of minerals such as uranium, salt, copper, and sulfur.
- **Class IV** wells are allowed in limited circumstances for injection of groundwater treated as part of environmental cleanup. Class IV wells are used to inject hazardous and radioactive wastes into or above underground sources of drinking water.
- **Class V** wells are used to inject fluids that are not classified as Class I, II, III, IV, and VI. Fluids injected into Class V wells include stormwater and a wide variety of other fluids. The construction of many Class V wells is simple compared to Class I, II, III, and VI wells. Many Class V wells may be little more than a shallow dug well with a soil bottom. A minority of Class V wells are constructed to be higher technology, especially if the wells inject into deep rock formations. Figure 3 shows both simple and more complex Class V wells. Class V wells represented over 70% of wells in 2018.
- **Class VI** wells are used to inject carbon dioxide deep underground for long-term storage.

¹ Class II wells do not include fluids injected for purposes of hydraulic fracturing except where diesel fuels are used.



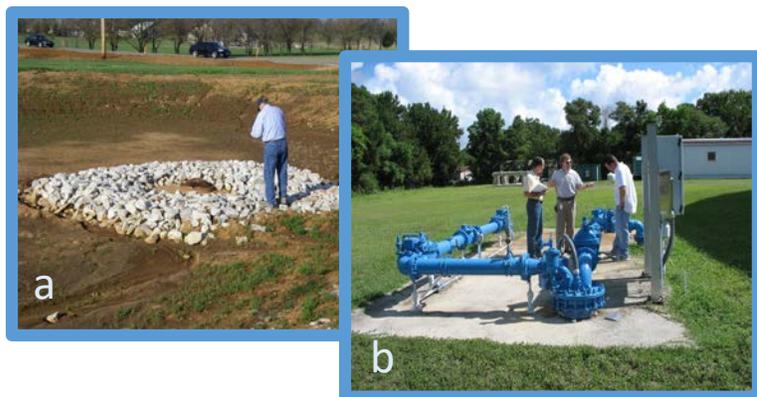


Figure 3. Inspectors visit injection wells to ensure protection of drinking water. (a) Class V stormwater well (b) Class V aquifer storage and recovery well

Operators Receive Approval to Inject

In order to operate an injection well, operators must receive approval through the UIC program. Some operators receive approval by submitting information that describes the operation such as well class, location, operating status, and operator contact information to the UIC program. Other operators need approval through a permit that identifies specific operating conditions in order to inject. All wells must be operated according to applicable UIC requirements.

The UIC program collects inventory data on all wells authorized to inject (Figure 1) and the number of permits issued each year. Figure 4 shows the proportions of permits issued in 2018 by well class. The UIC program issued over 8,600 permits in 2018, which authorized more than 14,000 wells to inject.

Permits Issued by Well Class

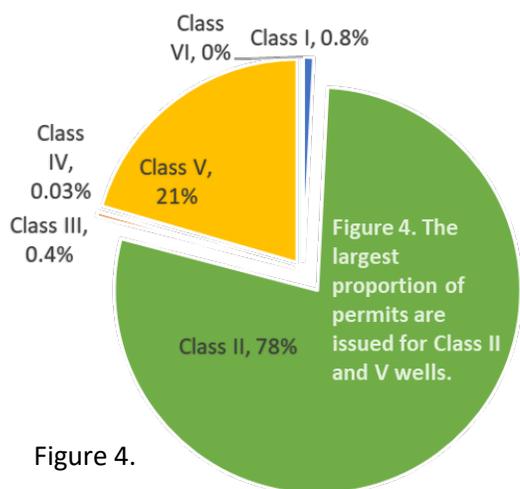


Figure 4. The largest proportion of permits are issued for Class II and V wells.

Compliance is Key to Protection

The UIC program works with injection well operators throughout the life of the well to confirm their practices do not contaminate drinking water. The program conducts inspections to verify compliance with the UIC

permit or applicable requirements. The program verifies the following during an inspection:

- Proper well construction,
- No leaks from the well into the environment,
- Monitoring, recordkeeping, and reporting are conducted by the operator,
- Any required operating conditions are followed, and
- Proper well closure when operations end.

Almost 90,000 injection wells were inspected in 2018. Figure 5 indicates inspections performed by well class.

Despite the greatest number of wells being Class V, the largest number of inspections were performed on Class II wells. Class II wells tend to be technologically sophisticated wells while many Class V wells are simply constructed and rely on gravity to move fluids into the ground. Simple Class V wells may be inspected a few times over their operating life while Class II wells may be inspected annually or every few years.

Injection Wells Inspected by Class

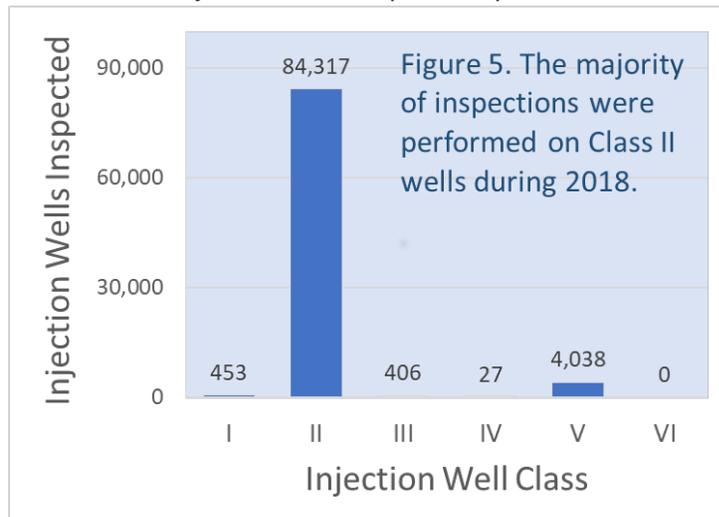


Figure 5. The majority of inspections were performed on Class II wells during 2018.

Inspections are only one way that programs deter noncompliance. Programs also evaluate periodic monitoring reports submitted by operators and discuss potential issues with operators.

If a well is found to be out of compliance with applicable requirements in its permit or UIC regulations, the program will identify specific actions that an operator must take to address the issues. The UIC program may assist the operator in returning the well to compliance. Assistance may include discussing options or providing information to the operator. In some cases, enforcement may be necessary to return a well to compliance. Enforcement may include administrative or judicial processes. The UIC program reported violations at around 21,000 wells in 2018.

For more information on the UIC program, please visit epa.gov/uic or email safewater@epa.gov.