



What are Saltwater Disposal Wells?

Oil and natural gas are found in rock formations, along with natural saltwater or brine. When the oil and gas are produced, the brine comes up with it. This brine, or flowback water, may then be used in a variety of ways:

Waterflooding. A common method used in mature oil fields, operators inject the brine back into the formation it came from to create pressure that helps bring up more oil.

Frac'ing. Operators can mix some of the brine with other water and use it to fracture tight rock formations, including shales, to release trapped gas.

Recycling. Operators can recycle some of the remaining fluid by using membranes, evaporation or distillation, but the equipment must operate continuously for the process to be economically feasible. Of course, this works best in areas where there are a number of producing wells.

Disposal wells. Even after recycling, some saltwater remains, so disposal must take place. The brine is injected into a licensed disposal well which is naturally sealed above and below by impermeable rock formations. The Railroad Commission of Texas licenses these saltwater disposal wells or SWDs. This is the most common way to handle brine water in the Barnett Shale.

What other substances are in this fluid?

Most injected fluid is just the brine found naturally in rock formations, but in the process of drilling, completion and production, other substances (such as small amounts of drilling mud, fracture fluids, well treatment fluids) may be mixed in.

How do I know my water isn't being contaminated by saltwater disposal?

There are approximately 50,000 permitted SWDs in Texas. The Railroad Commission of Texas (RRC or Railroad Commission), the agency that licenses SWDs, confirms that there have been no known instances of groundwater contamination as a result of brine disposal activities in the Barnett Shale since production started in 1997.

Who regulates disposal wells?

The U.S. Environmental Protection Agency awarded the Railroad Commission primary enforcement responsibility over oil and gas injection and disposal wells in the state of Texas. The agency's Technical Permitting Section-Underground Injection Control Program requires operators to follow national guidelines under the federal Safe Drinking Water Act for surface and groundwater protection. The permitting process



includes notice to the public, hearing opportunities and a review of the area geology.

How are saltwater disposal wells constructed?

Construction standards demand three layers of casing:

1. Surface casing. This is cement-encased steel pipe reaching from the surface to below the deepest level of usable groundwater as determined by the Texas Department of Environmental Quality and the Railroad Commission of Texas.
2. Production casing. A pipe permanently cemented in the wellbore to the well's total depth.
3. Injection tubing string and packer. Injection tubing is pipe run inside the production casing to just above the injection formation. Water is pumped down through the injection tubing and into small holes at the bottom of the production casing where the brine is released into the underground formation. A packer is located at the end of the tubing string and provides a seal between the production casing and the injection tubing to insure that the injected water can only go into the injection formation.

In the Barnett Shale, SWDs are drilled into the Ellenburger formation to depths of almost 2 miles. This contrasts to Barnett Shale natural gas wells, which are drilled to depths of approximately 7,000 to 8,000 feet, and fresh water wells, which are usually no deeper than a few hundred feet.

How does the Railroad Commission monitor these wells?

Inspections. The RRC inspects commercial disposal wells at least once per year, and schedules inspections of non-commercial disposal wells based on several factors including location and compliance record.

Testing. Each SWD is required to undergo a mechanical integrity test (MIT) to show there are no leaks before it is used, and must be retested at least once every five years. Wells that fail MITs must be shut in immediately and repaired, or they must be plugged within 60 to 90 days.

Reports. Every month, operators must report average injection rates and volumes. If there is a significant pressure change or if other data indicates a leak, an operator must notify the RRC district office within 24 hours. If there is a problem, the RRC requires wells to be shut in and repaired.