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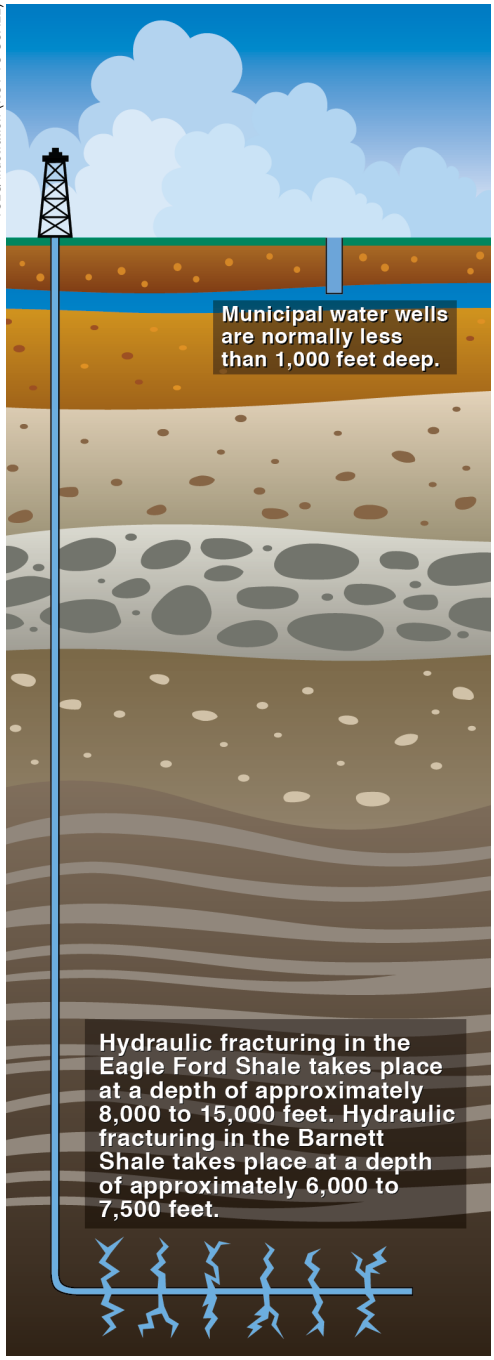
Natural OUTLOOK
PD-020/12-08 AUGUST 2012

TEXAS IN VANGUARD OF NATIONWIDE OIL AND GAS ENERGY BOOM

TCEQ illustration (NOT TO SCALE)



Billions of Dollars in Economic Impact, Many Thousands of Jobs

Hydraulic fracturing: Hydraulic fracturing treatment is the stimulation of a well by the application of hydraulic fracturing fluid under pressure for the express purpose of initiating or propagating fractures in a target geologic formation to enhance production of oil and/or natural gas.

Source: Texas Railroad Commission

OVERVIEW

For now and for the foreseeable future, Texas finds itself in the vanguard of a largely unexpected, unprecedented energy boom that has significant national impacts. Widespread use of horizontal drilling and hydraulic fracturing (fracking) is making it possible to harvest huge amounts of natural gas and oil that were thought to be too expensive to produce only a few years ago.

Experts predict that hydraulic fracturing in shale fields around the nation can produce many decades' worth of safe, clean, reliable energy. This fuel may reduce or even eliminate the need for energy from the turbulent Middle East.

This energy boom is producing billions of dollars of income and many thousands of jobs for Texans. One study concluded that in the North Texas Barnett Shale, energy production has meant $65 billion in economic impact since 2001 and supports 100,000 jobs. In the South Texas Eagle Ford Shale, according to another study, in 2011 the boom contributed $25 billion in revenue and supported 47,000 full-time jobs, a figure expected to climb to 117,000 full-time jobs by 2021.

Although the regulation of oil and gas production in Texas falls primarily under the Railroad Commission, the Texas Commission on Environmental Quality and its predecessor agencies have had air-emission regulations in place for parts of oil and gas facilities since the early 1970s. Today the TCEQ continues to play an important role in these activities, primarily in the areas of air quality, surface water management and water quality, and waste management.

Overall, the vast increase in oil and gas production in the country has raised the issue of regulation at the federal level. The EPA has recently issued new requirements for hydraulic fracturing and has proposed other pending regulations for the natural gas production sector. The EPA's specific focus on the minimization of air emissions from hydraulically fractured natural gas wells includes proposed requirements for flaring and green completions (a process that prevents the escape of natural gas during fracking).

These requirements, if finalized, will likely have a significant impact on the ancillary businesses that serve the oil and gas industry. For example, the new EPA requirements will increase the need for the design and construction of flares, vapor recovery units, and reduced-emission completion equipment. The requirements will also drive the need for pipeline infrastructure development in new areas of South Texas to serve the increasing number of wells being drilled in that area.

THE BARNETT SHALE

The Barnett Shale encompasses more than 5,000 square miles in 24 counties to the west, northwest, and southwest of the DFW area. Substantial development began in approximately 2001, and production remains strong to this day. The area has produced more than 9 trillion cubic feet of natural gas.

In the Barnett Shale, development took place in urban and rapidly developing suburban areas. Several years ago some residents began expressing concerns about potential air-quality issues caused by oil and gas activities. In response, the TCEQ performed massive air-quality studies, established a state-of-the-art ambient air monitoring network, instituted new investigation procedures, and—to better respond to citizen complaints—increased the number of local investigators.

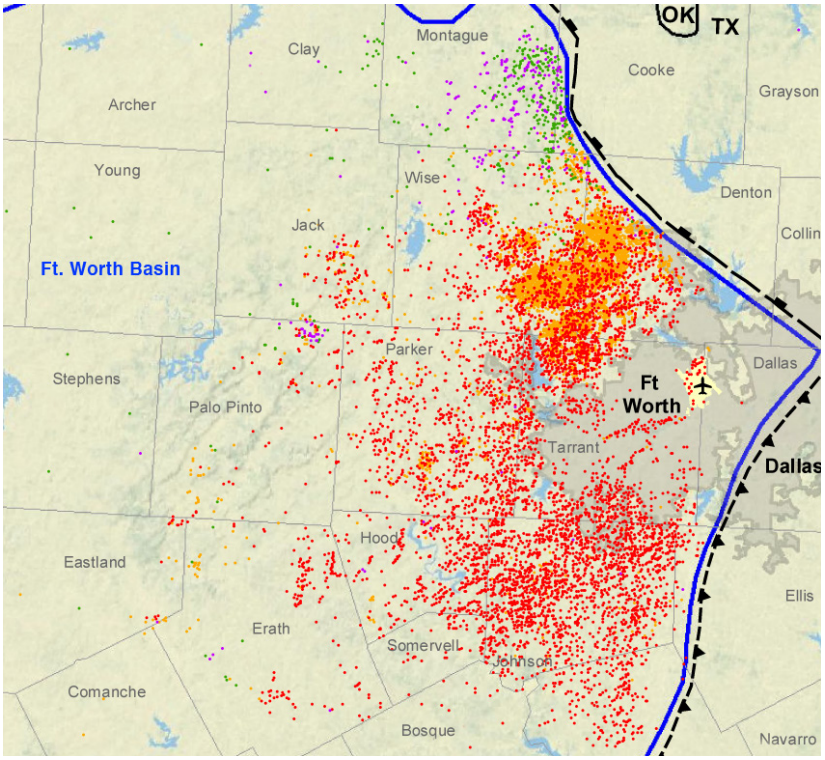
The TCEQ now operates seven automated gas-chromatograph monitors in the area that post their results publicly on the TCEQ website, with another four to come online in the near future. None of those ambient monitors have shown any levels of concern for any chemicals.

THE EAGLE FORD SHALE

The Eagle Ford Shale is a rapidly developing oil and gas production area that comprises approximately 23 counties in South Texas, stretching from Laredo to Bryan–College Station.

The Eagle Ford Shale development is different than the Barnett Shale in several important ways. The Eagle Ford production is taking place largely in sparsely populated areas and is yielding large quantities of oil and condensate in addition to natural gas. Furthermore, concerns in the Eagle Ford run more to concerns about water, production waste,

Oil and Gas Wells in the Barnett Shale

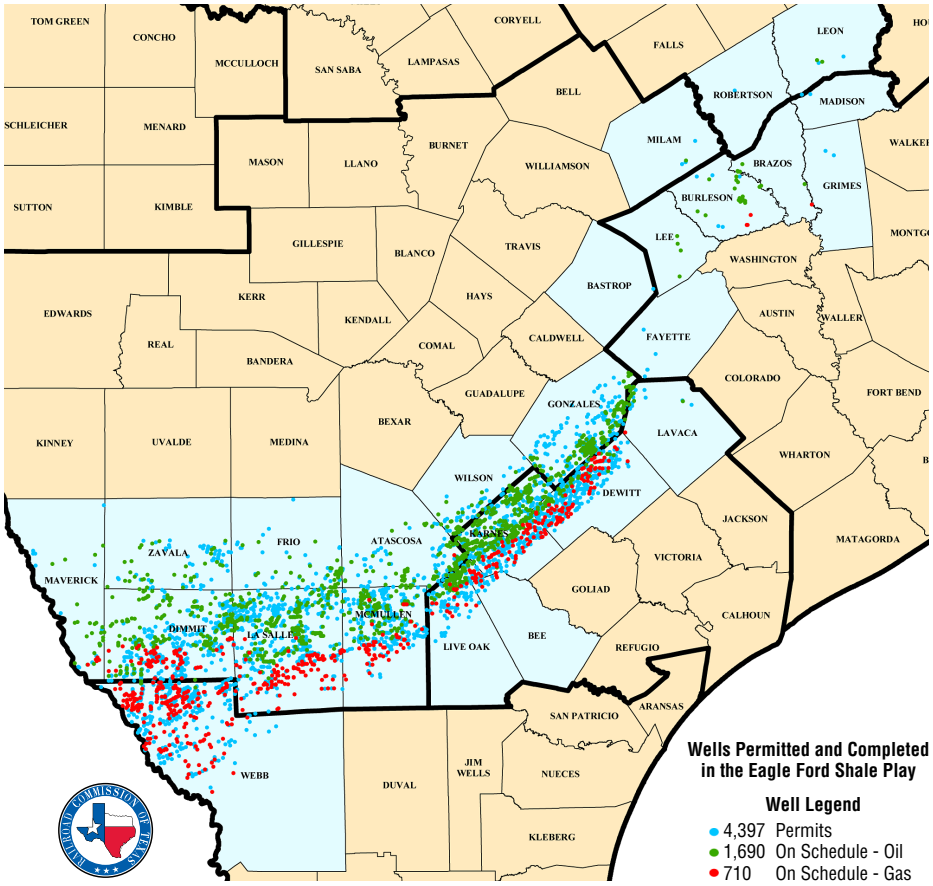


Source: U.S. Energy Information Administration, based on data from the HPDI, the USGS, and Pollastro et al. (2007)
Updated May 31, 2011

Surface Locations of Barnett Shale Wells (Well Count)
- Gas, Horizontal (10,860)
- Gas, Vertical (4,317)
- Oil, Horizontal (315)
- Oil, Vertical (364)

Major Tectonic Features
- Thrust Fault (Triangles on upper plate)
- Reverse Fault (Rectangles on upthrown block)
- Urban Areas
- Limit of Barnett Shale in Ft. Worth Basin

Oil and Gas Wells in the Eagle Ford Shale



Source: Texas Railroad Commission
Updated July 3, 2012

Wells Permitted and Completed in the Eagle Ford Shale Play

Well Legend
- 4,397 Permits
- 1,690 On Schedule - Oil
- 710 On Schedule - Gas

Note: There are 4,397 permitted locations representing pending oil or gas wells, where either the operator has not yet filed completion paperwork with the Railroad Commission, or the completed well has not yet been set up with a commission identification number.

and problems brought on by the rapidly expanding workforce.

As it did in the Barnett Shale, the TCEQ has conducted proactive outreach efforts in the Eagle Ford Shale to educate and address concerns. For instance, the TCEQ met with nine county judges in South Texas to become familiar with their concerns. It held numerous workshops around South Texas to educate local governments and other groups regarding the Railroad Commission's and the TCEQ's respective jurisdictions. The TCEQ also held a workshop to educate small producers on air authorization issues.

The more rural nature of the Eagle Ford Shale, as well as the information gained from the Barnett Shale monitoring, calls for a different approach to evaluating air-quality concerns and impacts. The TCEQ is currently evaluating potential air-monitoring needs and resources to adequately address any concerns regarding the impact of these operations on the overall air quality of the area.

Water use is another issue in the Eagle Ford Shale. According to the Railroad Commission, the amount of water used in hydraulic fracturing is relatively small when compared to other water uses such as agriculture, manufacturing, and municipal water supply. Hydraulic fracturing and total mining water use continue to represent less than 1 percent of statewide water use, although percentages can be larger in some localized areas.

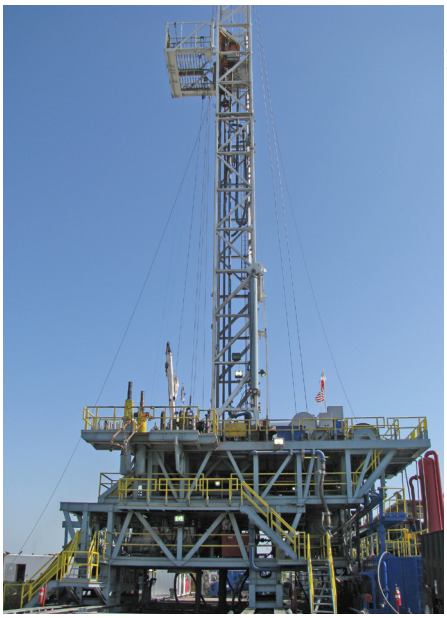
Groundwater, including that used for oil and gas production in South Texas, is regulated by local groundwater conservation districts, not the TCEQ.

The Texas Water Code requires the Texas Groundwater Protection Committee (established by the Legislature in 1989) to compile and publish a joint groundwater monitoring and contamination report that contains a description of each case of groundwater contamination documented during the previous calendar year. Despite thousands of documented cases of groundwater contamination, not one case has been attributed to hydraulic fracturing.

Surface water is also used for oil and gas production activities in the Eagle Ford Shale. Surface water use is regulated by the TCEQ through the state's well-established water-rights system, which does allow water to be used for mining purposes.

Another water source, reclaimed wastewater, is also being examined for potential use in oil and gas production activities. The TCEQ has issued several authorizations allowing water to be used for this purpose.

The rapid growth of RV parks that house oil and gas workers has created an unexpected issue for the TCEQ as well. The agency is working with counties, municipalities, and park owners to ensure that water and waste regulations are being followed.



TCEQ photo

A diesel/electric drilling rig that can be used to drill horizontal well bores. The rig uses diesel engines to produce electricity to operate the rig, lowering air emissions.

CONCLUSION

In cooperation with the Railroad Commission and other agencies, the TCEQ continues to work within its jurisdiction to ensure that oil and gas production is protective of human health and the environment, while at the same time allowing this potential energy revolution to mature to its full potential.

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