Hydraulic Fracturing FAQs

ConocoPhillips

2018

What is hydraulic fracturing?

Hydraulic fracturing, also known as **fracking**, is a completion method, which means that it occurs after the well is constructed and the well integrity is confirmed. It is not a method for drilling or constructing a well.

Why is it important?

Hydraulic fracturing is essential to produce oil and natural gas that is otherwise trapped in low-permeability rock formations. It significantly improves the recovery from the reservoir by stimulating the movement of oil and natural gas. Since the late 1940s, more than 2 million wells have been fractured worldwide. When used in conjunction with horizontal drilling, an advanced drilling technology, hydraulic fracturing makes it possible to develop vast unconventional resources.

How does it work?

To reach a hydrocarbon formation thousands of feet below the surface and freshwater resources, the hole (wellbore) is drilled in successive sections through the rock layers. Once the desired length of each wellbore section has been drilled, the drilling assembly is removed, and steel casing is inserted and cemented in place. As the well is constructed, concentric layers of steel casing and cement form the barrier to protect groundwater resources from the contents that will later flow inside the well. Next, only the section of casing within the hydrocarbon formation is perforated at the desired location.

The well is now ready for the fracking process. This process involves pumping fluid through the perforations. The fracturing fluid itself exerts pressure against the rock, creating tiny cracks, or fractures, in the reservoir deep underground. The fluid is predominantly water, proppants (grains of sand) and a small fraction of chemical additives.

Once fluid injection stops, pressure begins to dissipate, and the fractures previously held open by the fluid pressure begin to close. Proppants then act as tiny wedges to hold open these narrow fractures, about half the width of a human hair, creating pathways for oil, natural gas and fracturing fluids to flow more easily to the well. A plug is set inside the casing to isolate the stimulated section of the well. The entire perforate-inject-plug cycle is then repeated at regular intervals along the targeted section of the reservoir. Finally, the plugs are drilled out, allowing the oil, natural gas and fluids to flow into the well casing and up to the surface.

The hydrocarbon and frack fluid mixture is separated at the surface, and the fracturing fluid (also known as flowback water) is collected in tanks or lined pits. The fracturing fluids are then recycled for further fracking operations or disposed of according to government-approved methods.

Is it safe?

Yes. Well operations, including those involving horizontal drilling and fracking, are low risk activities that we manage responsibly. We are confident in our ability to safely and responsibly develop oil and natural gas resources by using proven practices. We follow a set of principles that incorporate established industry standards and are designed to meet or exceed regulatory requirements. These demand diligent focus on every activity, from community consultations about exploration to final site restoration.

Where does hydraulic fracturing take place?

Fracking takes place in hydrocarbon-bearing formations that are typically thousands of feet below the surface.

When does it occur?

Hydraulic fracturing operations generally occur over a three- to five-day period. The entire well construction process (including hydraulic fracturing) takes about two to three months, compared to the 20- to 30-year productive life of a typical well.

How is groundwater protected?

Protection of groundwater is important through every stage of oil and natural gas development. Below the surface, well integrity is crucial to isolate and protect potable groundwater from fracking and flowback fluids during completion operations and from oil, natural gas and water produced from the reservoir over the well life. Proper well design, construction and monitoring are necessary to ensure groundwater is protected.

To ensure well integrity, the entire system is pressure tested before the fracking process begins. Personnel at the well site continually monitor fluid injection rates and pressures throughout the hydraulic fracturing process. This data can also be transmitted via satellite to remote operation centers for off-site monitoring.

Beyond the mechanical safeguards of the well itself, groundwater is protected by physical factors. Hydraulic fracturing typically occurs thousands of feet below freshwater aquifers and often more than a mile below the earth's surface. Multiple layers of permeable and impermeable rock separate the targeted hydrocarbon formation from the aquifers, providing natural geologic barriers to the upward migration of fluids.

Is it regulated?

Local, state, federal and national laws and regulations currently govern fracking operations. These rules include well permitting, well materials and construction, air emissions, flowback and produced water disposal, storm water management, and chemical record keeping and reporting.

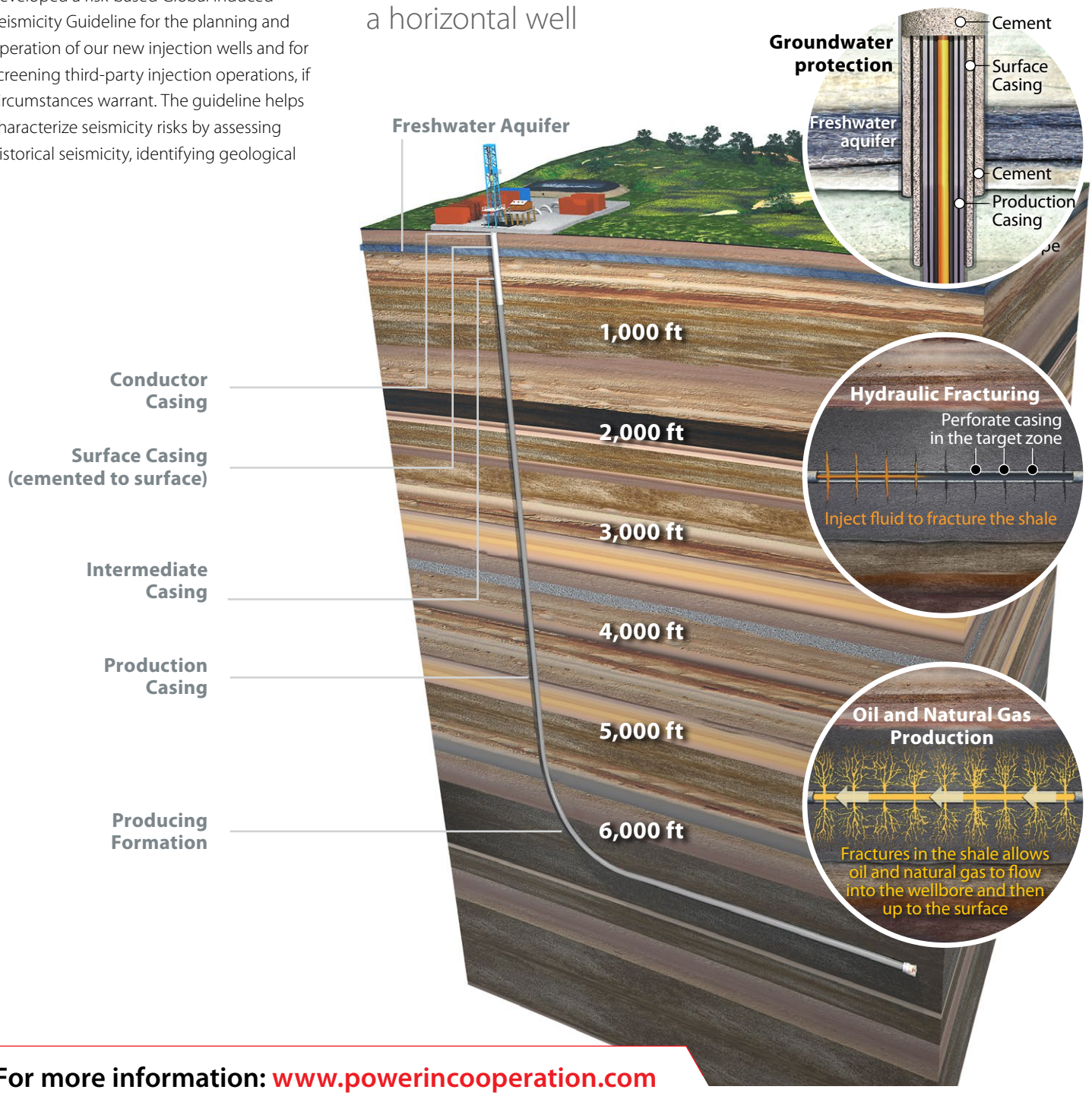
Hydraulic Fracturing FAQs

ConocoPhillips

Does fracking cause earthquakes?

Some studies have linked increased seismicity rates to the disposal of produced water in saltwater disposal (SWD) wells, while other studies have assessed the potential linkage between hydraulic fracturing and increased seismicity rates. In 2016, ConocoPhillips developed a risk-based Global Induced Seismicity Guideline for the planning and operation of our new injection wells and for screening third-party injection operations, if circumstances warrant. The guideline helps characterize seismicity risks by assessing historical seismicity, identifying geological faults of concern, assessing actual or proposed injection operating conditions, and considering proximity to people and population centers. It also provides possible monitoring, management and response planning options if the assessed risk is elevated. We are working with our peers and academic researchers to better understand and document if, where and how fluid injection and hydraulic fracturing may contribute to the phenomenon of increased rates of seismicity over background trends.

Steps of drilling and fracturing a horizontal well



For more information: www.powerincooperation.com