



What is Horizontal Drilling?

Horizontal drilling, or directional drilling, is the process of drilling sideways from a vertical well to expose more shale in the wellbore or to reach additional pockets of natural gas or oil. First, a wellbore is drilled vertically thousands of feet down into the shale, below the deepest fresh water aquifer (porous rock that can hold or transport groundwater). A downhole drilling motor then makes a 90-degree turn, which takes about a quarter of a mile to make the turn, and continues into the shale laterally for up to 10,000 feet.

Why is horizontal drilling important?

Combined with hydraulic fracturing, horizontal drilling allows the extraction of natural gas from shale deposits. Without the combination of these two technologies, this natural gas is not accessible. The combination of horizontal drilling and hydraulic is also being used extensively in oil wells and has also greatly increased the production of associated natural gas (the natural gas that is produced along with crude oil). Horizontal drilling and hydraulic fracturing have provided the United States with 100 years of natural gas.

How long has horizontal drilling been used?

Horizontal drilling is a well-developed technology that has been used for decades. The first true horizontal well was drilled in 1929, although it was not economical to drill horizontal wells until the 1980s. By the time the first horizontal well was drilled in the Barnett Shale in 2002, there had been tens of thousands drilled in the United States and in dozens of countries around the world.

How do you prevent water contamination due to horizontal drilling?

First, a vertical drill bores a hole down to at least 50-200 feet below the deepest fresh water aquifer. Operators then insert a thick steel tube known as surface casing to pump cement into the hole, followed by water. The water forces the cement through the end of the casing and then back up the hole around the outside of the casing, where it hardens to form a barrier between the hole and any groundwater.

The pipe and bit are lowered again to drill even deeper – up to ten thousand feet deeper – to the kickoff point. Then the downhole drilling motor starts drilling at a curve, going about a quarter of a mile before it becomes fully horizontal. Production casing is inserted and more cement is pumped into the hole before any hydraulic fracturing takes place.

All told, seven layers of steel casing and cement protect groundwater from natural gas and oil wells. The probability of contamination is extremely low, and even if a crack did somehow form, linking the water table and the natural gas well, water would flow into the well and “kill” the well. Operators would see the problem and would take steps to correct it immediately.