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MONOBORE DRILLING

Drilling companies continue to shave costs with efficient well designs



BY DAN LARSON • FOR ENERGY PIPELINE

FOR EVERY NEW OIL OR NATURAL GAS WELL TO BE DRILLED, engineers are faced with a host of decisions that ultimately determine if the well will return the money invested

in it and become a valuable asset on the company's books.

And while few professionals in any business easily own up to bad decisions,

drilling and completions engineers, and the geologists, financial experts and logistics staff that support them, know that any number of their decisions can result in a well that is a winner versus one that produces poorly and fails to return the investment.

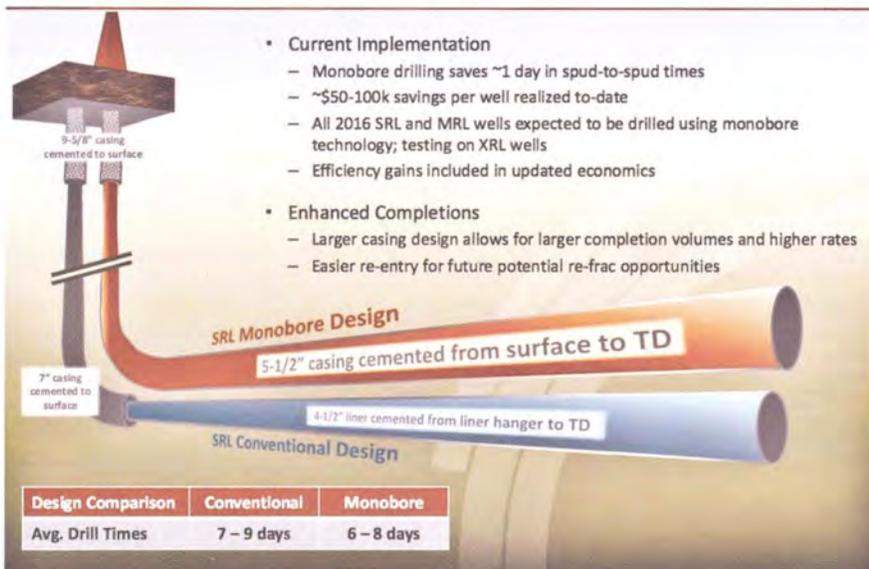
One of the early decisions to be considered is whether the well will be conventionally drilled and completed, or in some situations, if a monobore well is the better option.

The design of a typical well involves drilling a series of progressive smaller diameter holes as the well goes deeper. At each stage, casing of progressively smaller diameter is pushed into the hole to a specified depth and cemented in place.

At shallow depths, casing protects groundwater; the deeper it is used to isolate the well from formations with different pressure gradients, that are unstable or could otherwise contaminate the well.

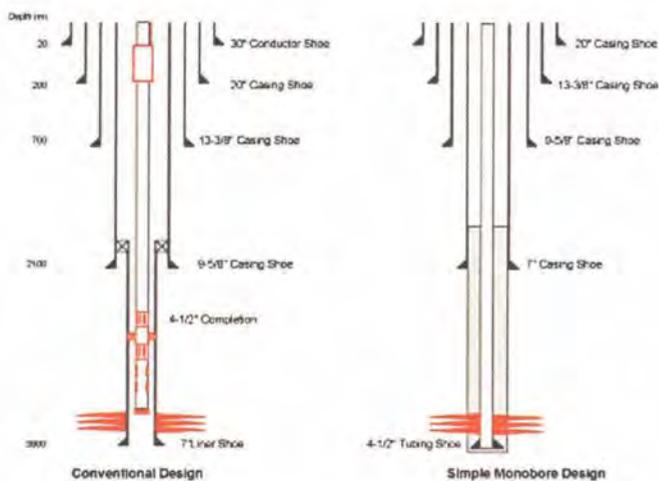
Drilling and completing such a conventional well involves use of complex wellheads, drill bits, drilling mud formulas and downhole equipment among other things.

Monobore Drilling Gains To-Date



6/2/16

Source: PDC Energy 15



An alternative that has proven successful in oil fields around the world reduces the number of concentric, progressively smaller tubes by eliminating the intermediate casing liner in favor of a single diameter pipe extending from the tip of the production zone back to above the production zone.

Referred to as a monobore well, this design reduces the need for some equipment and materials, and as a result, the supply and logistics needed for a conventional well.

With a larger diameter production string, the well can produce greater volumes of fluid or gas. In proven fields, a larger production pipe can reduce the number of wells needed to efficiently produce, according to a report on OilPro, an online forum serving the oil and gas industry.

Likewise, because monobore wells are less complex than conventional wells, they can be drilled and completed faster and can be less expensive to operate long term.

According to a paper published by the Society of Petroleum Engineers earlier this year, companies drilling into the DJ Basin's Niobrara formation have found monobore wells reduced expenses by reducing drilling time compared to conventional wells.

The paper, "Drilling in the Niobrara Unconventional Shale Play with a Single Drilling Assembly," describes the techniques, drilling assemblies and drilling fluid formulas that allow for faster drill-to-depth and lower costs.

According to an article on SPE's PetroWiki online resource, a monobore well also makes periodic maintenance of the well easier and less expensive since the uniform diameter allows access to the production liner without disturbing the completion or pulling the production tubing.

DJ Basin operator PDC Energy in a report to investors says that it has "almost fully transitioned to monobore well design." The change has resulted in savings of between \$50,000-\$100,000 daily drilling costs for a standard 4,200-foot lateral well. Overall, the cost of that well is brought down to \$2.5 million as a result, PDC reports.

Longer lateral wells save even more and PDC expects that all of its standard-reach and mid-reach laterals, about two-thirds of the company's 2016 well projects, will be monobore. The company says it is also considering monobore technology for some extra-long laterals of 9,000-plus feet or more.

Oil and gas drilling expert John Turley defined a monobore well and where and when it is used. "Monobore completion utilizes a single,

large size of completion casing or tubing for production. The larger bore precludes the need for production packers and tubing making it a lower-risk, less-expensive choice when designing a well."

A monobore well "caters to higher production rates so fewer wells are needed to develop a field," he said.

"No doubt, it is a proven technology and is very applicable to contemporary horizontal wells in shale plays such as the Niobrara," Turley concluded.

A recognized expert in petroleum drilling, Turley earned distinction with publication of a book on the cause of the 2010 Deepwater Horizon disaster in the Gulf of Mexico that one reviewer called a "must read" for anyone who wants to understand the blow-out and the resulting oil spill.

Published in 2012, Turley's book, "The Simple Truth: BP's Macondo Blowout," is a narrative nonfiction book that he says provides insight into what led up to the massive explosion and fire that destroyed the Deepwater Horizon and resulted in an oil spill called the worst in history.

A Colorado resident, Turley's 26-year career at Marathon Oil was primarily in offshore operations, including drilling design management, technology and production. A Colorado School of Mines grad, Turley is a SPE distinguished lecturer, having presented for the past two years across the US and internationally. ♠

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