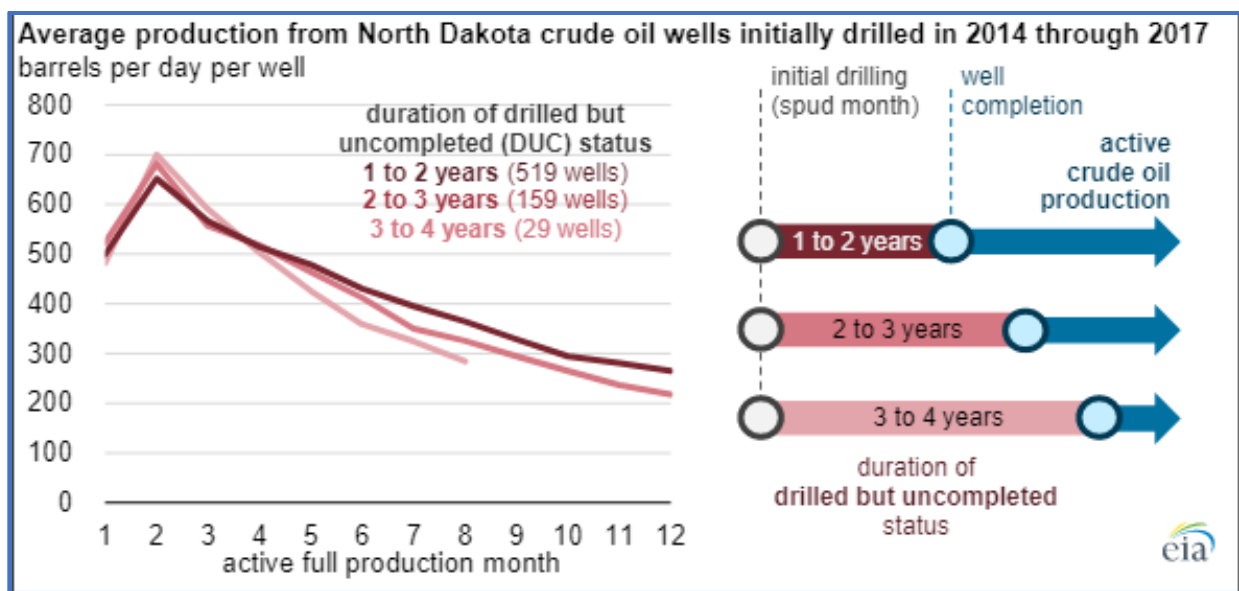


## Geriatric DUCs: "I'm Not Dead Yet!"

Investors and operators are now required to consider a portfolio of aging wells that have been drilled, but uncompleted ("DUCs"). Delaying a completion of a previously drilled well, by as many as four years, has "little effect" on the initial production level, according to a new study by US Energy Information Administration (EIA).

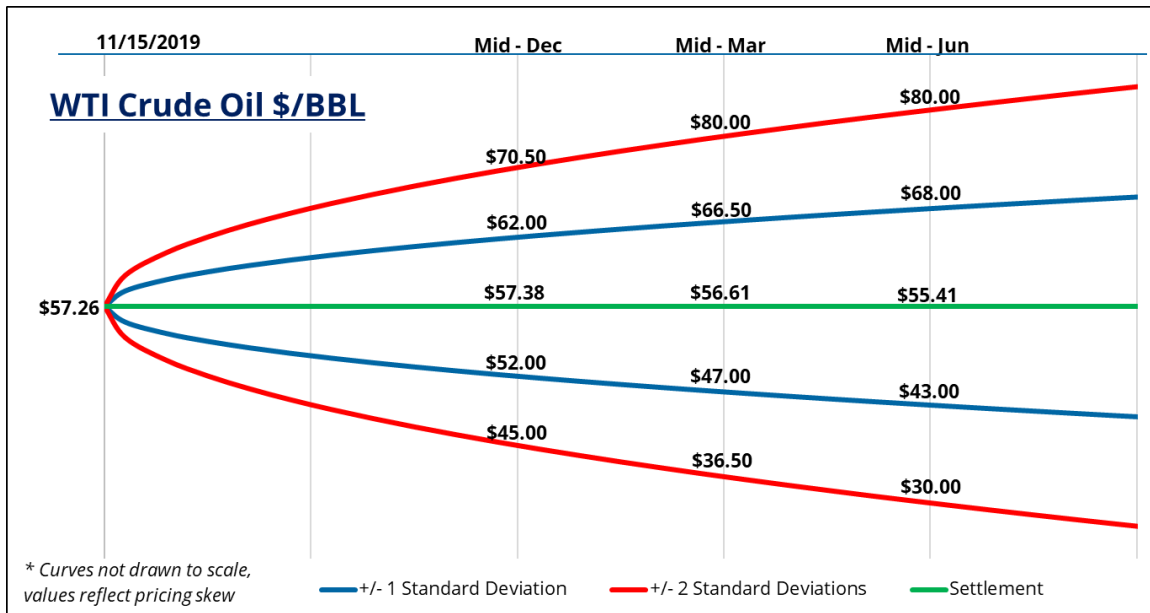
The study tested the assumption that long-delayed completions mean a well is not worth the cost. [1] "Some people say you cannot fracture a well drilled more than a year ago," but the data says otherwise, said Jozef Lieskovsky, a senior analyst for the EIA who co-authored the report. [2]



Most of the wells were completed in 2018 and 2019, so the fracturing technology used was of the same era, Lieskovsky said. What the EIA found was that the average initial production for the oldest wells (3-4 years old) peaked at a slightly higher level than the youngest ones (1-2 years old). However, over time it appears the wells in the 1-2 year group slightly outperformed the older ones.

## WTI Crude Oil Outlook

The price distribution below shows the crude oil spot price on November 15, 2019, as well as the predicted crude oil prices based on option and futures markets. The blue lines are within one standard deviation ( $\sigma$ ) of the mean, and the red lines are within two standard deviations.



Based on November 15, 2019 prices, the markets indicate that in mid-December there is a 68% chance that oil prices will be between \$52.00 and \$62.00 per barrel. Likewise, there is about a 95% chance that prices will be between \$45.00 and \$70.50. By mid-March 2020, the one standard deviation ( $2\sigma$ ) price range is \$47.00 to \$66.50 per barrel, and the two standard deviation ( $2\sigma$ ) range is \$36.50 to \$80.00 per barrel. In other words, there is a 95% probability that the expected price of oil will be between approximately \$36 and \$80 per barrel, and a 97.5% probability it will not be above \$80 per barrel.

## Natural Gas Outlook

We can do the same thing for natural gas, which is currently trading at \$2.66 per MMBTU on the Henry Hub. Although more affected by seasonal factors than crude oil, in mid-December 2019, the one standard deviation ( $1\sigma$ ) price range is \$2.30 to \$3.50 per barrel (68% probability) and the two standard deviation ( $2\sigma$ ) range is \$1.90 to \$5.00 per MMBTU (95% probability).

## Key Takeaways

Remember, these option analyses deal in expected probabilities, not certain outcomes—but that doesn't make it any less useful. If someone asks you longingly if oil will be at \$100 again soon, you now can respond with "there is about a 97.5% probability that oil prices aren't expected to get above \$80 by mid-March 2020, so I wouldn't count on it."

[1] Journal of Petroleum Technology (JPT), Stephen Rassenfoss, September 11, 2019; <https://pubs.spe.org/en/jpt/jpt-article-detail/?art=5944>

[2] U.S. Energy Information Administration, September 10, 2019, "Time between drilling and first production has little effect on oil well production"; <https://www.eia.gov/todayinenergy/detail.php?id=41253&src=email>