

## Impact on US Oilfield Upstream Activity from the Coronavirus

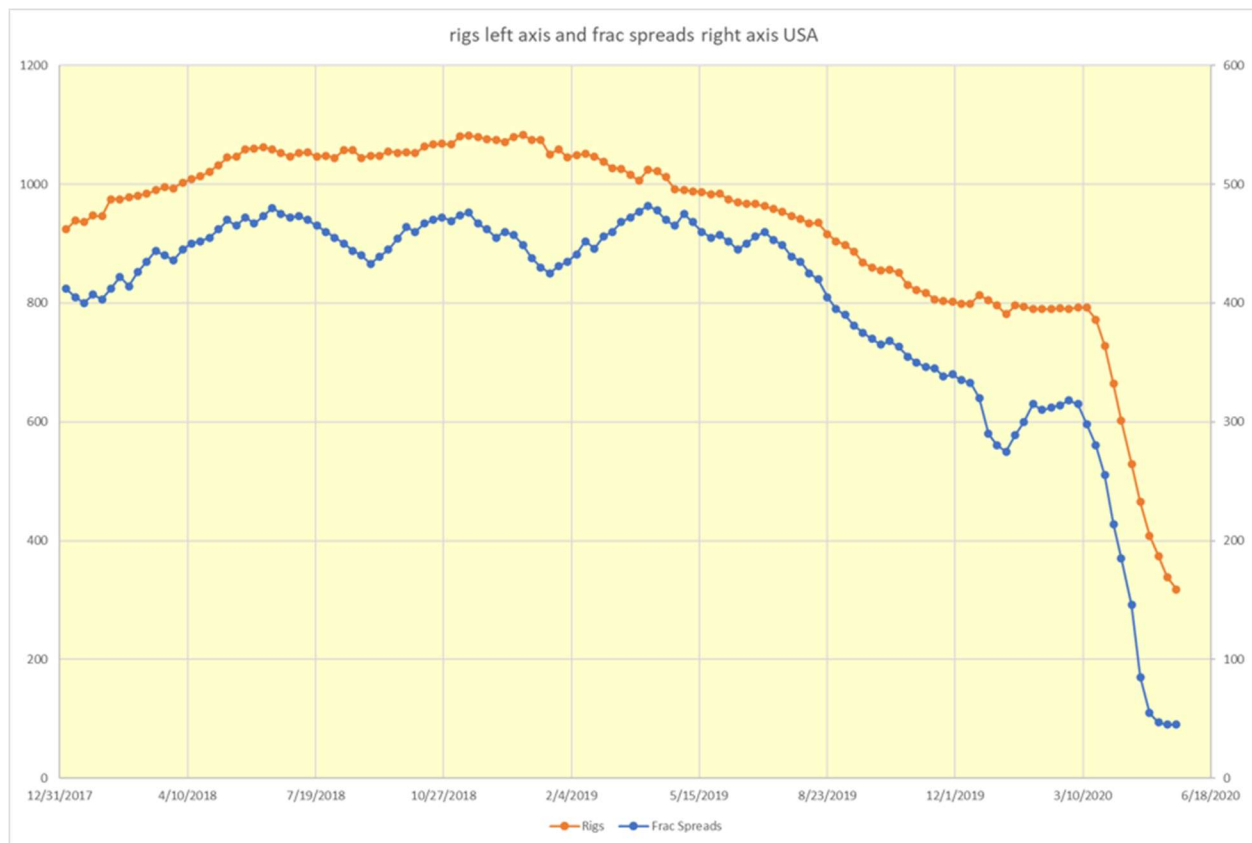
If you are already familiar with the oilfield industry in general, you can skip the first two paragraphs. There has been a lot of news about the *price* of oil, and what it means for the economy. For those of us who are personally involved in the upstream side of the industry, it has been obvious to us for some time now that this has had enormous impacts on the companies and people who are most closely associated with it, but this may not be as obvious to people outside of this specialized niche. The oil and gas industry is traditionally divided up into 3 sections: Upstream, Midstream, and Downstream. In very short form, these are defined as:

- Upstream: Every action and activity associated with finding, and then getting oil or gas out of the ground
- Midstream: Moving that raw crude oil or natural gas from a wellhead, to a refinery or gas plant by pipeline, barge, truck, tanker, etc.
- Downstream: Refining oil into something people actually want to buy, or purifying natural gas for use, then distributing and selling it to whoever wants it.

Most of the people who work in the upstream side of the business are employed in the drilling and completion of new wells. A constant stream of new wells is required to start up new high productivity wells to replace older wells which have depleted (used up) the oil or gas which they were drilled into. Unfortunately due to the economic effects of the Coronavirus, the need and usage of oil in particular has dropped very substantially. Exact figures are hard to come by (it's surprisingly hard to figure out how much oil is produced and consumed without months or even years of lead time) but the general consensus is that the world demand for oil has fallen somewhere around 30% since mid/late March when the effects of the virus began to be noticed on a large scale worldwide. This means that there has effectively no need to drill and complete new wells since that time.

Nowhere has the effect been felt more immediately, or with more dramatic effect than in the shale oil industry of the United States. The reasons are obvious. Wells there can be drilled very quickly - in 5 days or less in some places, and 7-10 days in many others. The completion process, closely associated with fracturing takes place as soon as it can be scheduled afterwards, and the well produces considerable amounts of oil immediately. The total time from the decision to drill a well, to the time that oil is available for sale is usually less than 90 days. This is called time to first oil. By contrast, in many other areas the time to complete this process is measured in months, or years. Deep water offshore projects, or projects in remote locations often have a time to first oil of 3-5 years 1,000 to 1,700 days, or 10 to 20 times as long as a shale oil project. Furthermore projects of these sorts typically have long time scale financing, construction, and contractual obligations which make them extraordinarily difficult and costly to stop. Once you decide to start a major project of this sort it's generally seen through to completion, without regard to changes in commodity prices in the meantime.

The flip side of having shale oil projects which can very quickly be started up to create new production is that they are also very stopped, and that's exactly what has happened this spring.



Using the Baker rig count and the Primary Vision Frac spread tracker, I compiled the graph above for the last couple of years in the US. In 2018 and 2019, you can see that in general, the number of rigs working is somewhere in the range of 800 to 1,100, and the number of frac spreads working is somewhere in the range of 300 to 450. Not all rigs working in the US are on horizontal shale oil and gas, but between 90% and 95% of them are. A rig on the count is a single rig, used to drill wells. A frac spread (or fleet) on the other hand is, as the name suggests an entire convoy of people and equipment. A typical frac fleet will have somewhere around 2 dozen pumps, each of which is large enough to require a separate truck to haul it around to location. This is the 'core' of the fracturing fleet, but there are also separate control systems, piping, sand storage and transport equipment, and of course the vast quantities of sand and water that are used by the pumps to create and keep the fractures open.

This process is complex and expensive, and accounts for the absolute majority of the cost of making a new oil or gas well in a shale. The table to the right is a week by week snapshot of the data in the chart above, demonstrating how quickly activity has fallen off. Out of the 45 or so frac spreads that are working today, around 25 of them are working in the N.E. of the U.S. where the primary objective is to produce natural gas. The price and demand for natural gas has been relatively stable, and thus so has the number of wells being drilled and fractured.

If you check out the Baker rig count below:

and work the math out, by taking the number of rigs and fracturing spreads working in February and early March as 'normal' this means that under 'normal' conditions about 700 rigs were drilling horizontal oil shale wells in the US at that time, and around 290 fracturing fleets were following these rigs around to make the holes they drilled into productive wells. the other 100 or so rigs were drilling for natural gas, or drilling wells that were not horizontal (crazy, I know but that business still exists) The number of rigs drilling for oil in the oil shales of the US has fallen

from a somewhat stable number of 700, to somewhere around 225, for a drop of just over 2/3rds (67%), and it's clearly still falling. The drop in fracturing fleets on the other hand has been much faster, and more abrupt, from around 290 in oil directed work to around 30. This is a drop of not quite **90%**. That's monumental. The rigs working hasn't fallen as fast because the cost to drill the well (put the hole in the ground) is not actually that large a part of the total cost of making the well productive in most areas. The divergence means that more DUC's (Drilled Uncompleted Wells) will accumulate for the various operating companies employing the rigs.

The other major data source that I used for this article so far has been Primary Vision's frac spread counter. This company does a variety of research in the oil and gas industry in all segments (upstream, midstream and downstream) and I would highly encourage you to check them out.

What this all adds up to is that the business model for companies that had made it their objective to make money drilling and completing new oil shale wells is broken, and unlikely to re-emerge in it's old form. The other thing it means is that the people who were employed in conducting this work have mostly been laid off, roughly in proportion to the fall off in activity, so it's created an enormous number of unemployed folks. I can't tell you exactly how the business of producing oil in the US will emerge from this current situation, but I thought it might be useful to illustrate to anyone who would like to know just where we stand right now as an industry.

For myself personally, I have been involved in a small way in the completion of a lot of these wells over the last few years, and learned a lot about them. I fully expect that in this next phase of my career, that we will learn about how to manage them for their best productivity throughout their lives as productive

Date	Frac Spreads	Rigs
2/7/2020	310	790
2/14/2020	312	790
2/21/2020	314	791
2/28/2020	318	790
3/6/2020	315	793
3/13/2020	298	792
3/20/2020	280	772
3/27/2020	255	728
4/3/2020	214	664
4/9/2020	185	602
4/17/2020	146	529
4/24/2020	85	465
5/1/2020	55	408
5/8/2020	47	374
5/15/2020	45	339
5/22/2020	45	318

wells. This has happened before, and there are some known issues to watch out for and correct, as well as some uncertainties that may come up. See some of the earlier discussions on linked in to learn about some of them in more detail or contact me at [egagen@epgsolutions.com](mailto:egagen@epgsolutions.com) Have a great week and stay safe!