

What is the significance of a DUC?

You may think that Ducks are tasty, or that they are peaceful to watch at the park, but this discussion is about DUC's – Drilled Un-Completed Wells. Historically, there was no word for, or designation of a well as a DUC. It did not require any particular tracking or effort to learn about. The process for most wells was to drill them, then shortly afterwards the same rig, or a specialized completion rig would come in and conduct the completion (perforating, running production tubing and/or artificial lift, installing a wellhead, and placing the well on production. If you really want an activity forecast scroll straight to the end of this article

- Why is there an inventory of DUC's?
- What does it mean when the number of DUC's is going up or down?
- Where are we now?
- What does it mean for oil prices and upstream field activity?

Why is there an inventory of DUC's?

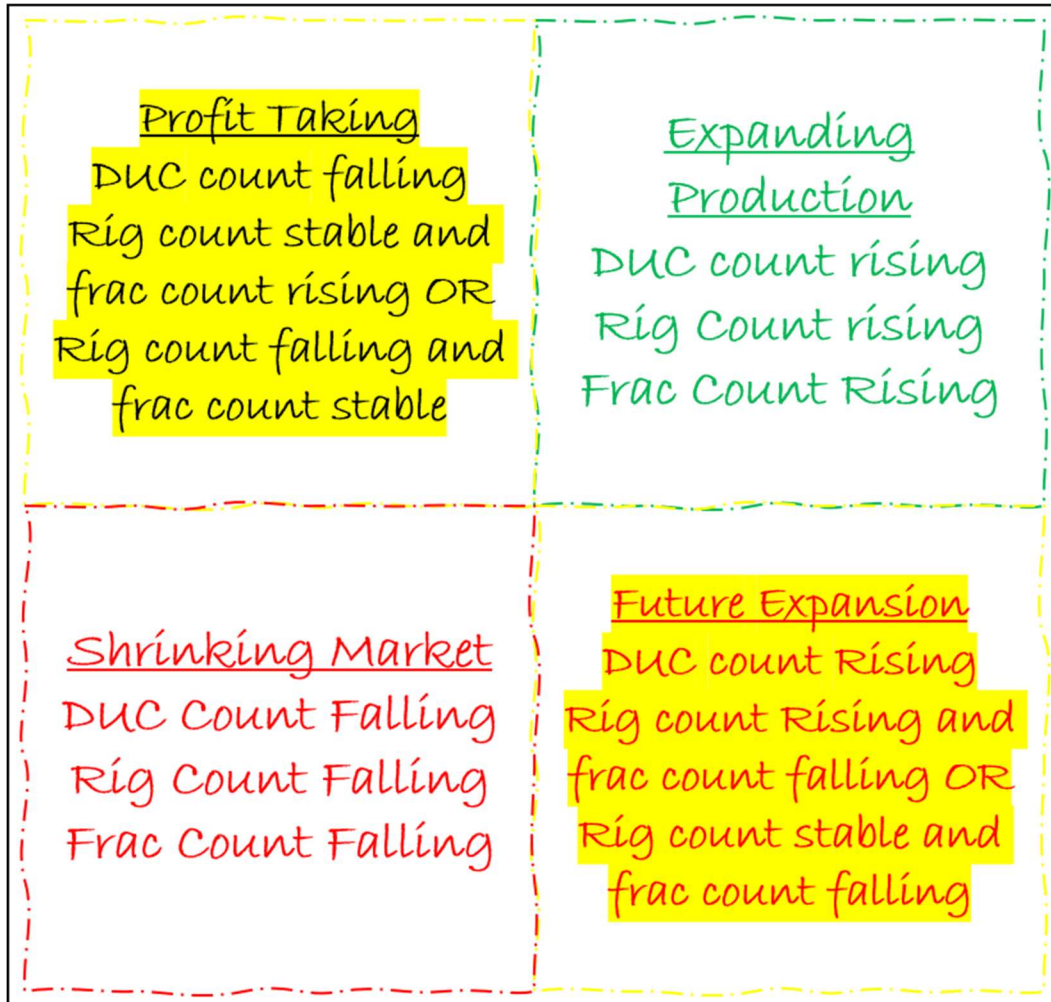
This process has changed with the introduction of large scale exploitation of oil and gas shale wells. In traditional operations, the preponderance or even vast majority of the time effort and money required to move from a map with an X on it, and a producing well have been in the drilling portion of the process. In shale oil and gas wells, the drilling process (making a hole in the ground and casing it) is often reasonably rapid and efficient by comparison to the completion process. The completion process either by plug and perf, or by sliding sleeves, or other methods typically takes more time, and costs more money than the process of drilling the well does. A second critical factor is that shale resources cover a large geographic area. If it is possible, field development is usually done with multiple wellheads clustered at a single location, where the downhole locations of the wells spread out to gain access to a large area of productive rock around the wellsite. This economizes on access roads, pipelines, tank batteries, separators, etc. which can be installed one time for a group of wells one time instead of for each well individually. It also means that each stage of well work is completed in series, rather than in parallel. For multiple wells in multiple locations, each of them will have road access, pre-drill work, drilling, then completion work done one after another without regard for the degree of progress on another well. These wells are having their work done in parallel. When all the wells are in one location, all the work of one type must be completed before the next type of work can start.

This becomes a most obvious issue on wellsites with very large numbers of wells. For example on a site where there will be 8 wells, if each of them takes 10 days to drill, the rig will be at the location for 80 days in total. As a result, the first well drilled will sit 'idle' for 70 days at a minimum before the rig leaves after having left. There is another factor – fracturing spreads are the critical cost in completion operations. Furthermore they also have a lot of logistical constraints due to the large volume of sand and water which must be gathered and brought to the wellsite for their use. Ideally as an operator, it is most efficient not to contract for a fracturing fleet until all the logistical requirements are understood and procured, and a sufficient volume of wells to work on has been accumulated for a long run of continuous operations. This can be accomplished either by holding an inventory of wells requiring completion on a continuous basis, or by alternating the activities of the company in the region between focusing on drilling a batch of wells, and then completing them all. Both ideas have merit, and are used

in different places at different times. The essential idea is that DUC's are work in progress – not yet finished, but with substantial investment already made.

What does it mean when the number of DUC's is going up or down?

By itself a rise or fall in DUC counts doesn't have a significant meaning unless it's simultaneously linked to a historic record of the number of rigs drilling them, and the number of wells being fractured over time. Together, the information is really useful. There are basically 4 different things which can be going on in a market where the DUC count is a useful indicator, and they are all transient conditions – none of them can last forever:



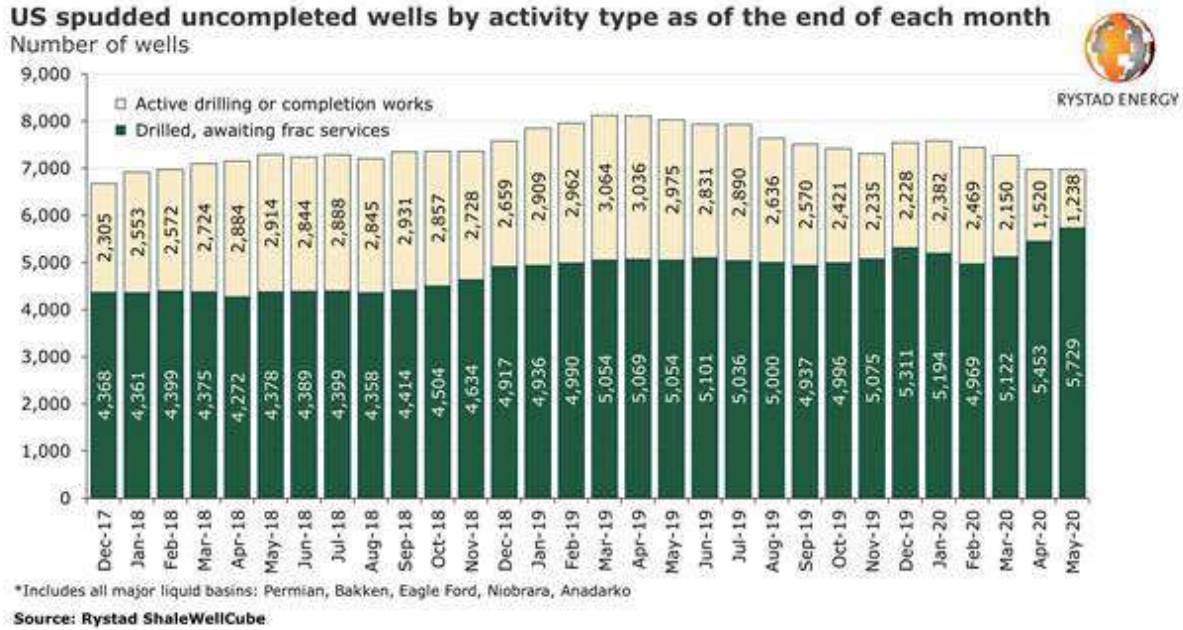
Expansion is simple enough – everything is getting more and bigger – production, wells drilled, wells fractured, and as a result the number of DUC's is going up too – a certain 'minimum inventory' level is required to efficiently and reliably feed the operation that places new wells on production. Since lots of wells are going on production, lots of wells are going to be 'in progress' between drilling and completion – they are DUC's. The opposite is a Shrinking market where all indicators are going down. In a profit taking market, the number of new wells being drilled drops, by comparison with the number of wells being completed. In this case the DUC count goes down, because the completions operations are 'catching up' with the drilling operations and there is less work in progress in between. In a market

which is preparing for future expansion, the number of DUC's is rising, but as opposed to an expanding market, it's not because there is more of everything – there are more holes in the ground, but they aren't getting completed as fast as they are getting drilled.

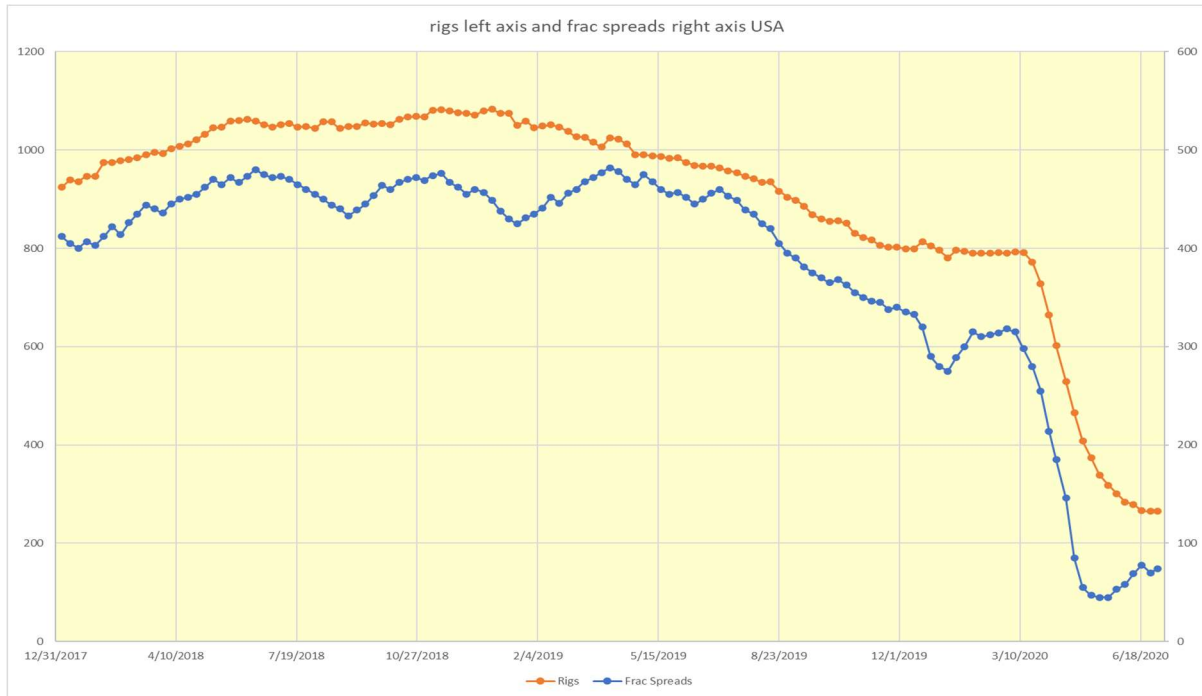
Where are we now?

At the time of this writing in early July of 2020, the market looks like this:

<https://www.oilfieldtechnology.com/special-reports/16062020/rystad-energy-us-fraccing-slowdown-creates-duc-well-backlog/>



One can argue about the absolute number of DUC's – there are various methods to count them, but remember our basic kind of analysis doesn't require us to know the absolute number to be useful – it only needs to know if it's rising or falling, and from this chart it is clear that in 2020 we have seen an upsurge in wells awaiting fracturing DUC's) and a fall in wells currently being drilled and completed. An updated chart using the same sources from the activity tracking discussion that we had on 5/28/20 <https://epgsolutionsco.com/news> "Impact on US Oilfield Upstream Activity from the Coronavirus" indicates that rig activity has fallen, but that fracturing activity has fallen faster, and by a larger amount



What does it mean for oil prices and upstream field activity?

Over the course of the first half of 2020 we have had two things taking place simultaneously in our box chart – a Shrinking Market (everything has gone down relative to where it was at the end of 2019) and the seeds of a Future Expansion. As a general rule of thumb, it takes 2 rigs working to keep 1 frac crew working, and since roughly the start of April 2020 the ratio has been 3 or more rigs working for every 1 frac crew working. This means a DUC build due to a lack of completion activity. The result? Oil and gas prices can reliably expected to stay low for an extended period of time. There are plenty of wells available to be placed on production in a short period of time if an opportunity for Profit Taking appears to an operator with a lot of DUC's, they can complete some of them in relatively short order. The only way that would be turned around in the short term would be a supply shock (major loss of production in some other region) or a sudden unexpected demand rebound. Oil and gas prices can expect to stay in a relatively tight range because there is a very high flexibility of industry to adjust supply to demand for the time being.