Answers in the analysis

Reservoir analytics – the location of informative patterns in well data – is distinguishing a new generation of US shale exploration. With a data library of more than 100,000 wells, reservoir services company NUTECH Energy is utilising analytics to paint a better picture of the geological makeup of North American shale plays.

Assessing the textural nature of shale basins through data pattern detection, reservoir analytics is becoming a touchstone of US shale development as the oil and gas industry hones its understanding of unconventional plays. As the dust settles around the initial excitement surrounding shale development, companies are increasingly emphasising production optimisation. The next frontier will lie in fully comprehending the minute mechanics of how a reservoir behaves once a well undergoes hydraulic fracturing treatments.

LAYER BY LAYER: Despite their lucrative potential, shale formations are geologically temperamental compared with their conventional counterparts. Not all shales are created equal and the challenge faced today is determining how to optimise one's developmental strategy using existing reservoir analytics to ensure maximum production.

"Shale plays in west Texas act like an accordion across the basin where multiple shale formations are stacked one atop the other and there is a lot of fluctuation of thickness and variability both horizontally and vertically, making it harder to access a greater daily return when producing," Allen Howard, president and CEO of NUTECH Energy, told TOGY. "Fracking completions, as they have been developed thus far, only allow companies to produce a small amount of the potential hydrocarbons from any given reservoir, often releasing only 5 percent of the hydrocarbons in place."

IN TANDEM: NUTECH Energy released its Reservoir Intelligence analytics system as a method to continuously communicate reservoir data so that operators can develop models that respond to their activities. This allows companies to manage reservoir variability and needed shifts in well drilling and development execution plans. "Over the past five years, operators have prioritised initial reservoir understanding and well execution," Howard said. "After the initial reservoir assessment is concluded and operators move into execution, I rarely see

the two used in concert." With Reservoir Intelligence, operators can effectively produce oil and natural gas from shale resource plays as they will be able to tailor their activities to how the reservoir is behaving after drilling has commenced.

The Reservoir Intelligence system comprises three parts: NULOOK, which uses conventional open-hole well logs to assess porosity through an analytic system using algorithms to calculate rock pore sizes and distribution; NUSTIM, which takes this information and applies it to an eight-step procedure through which existing well and reservoir data is joined together to form a predictive model for how a well will behave when put into production; and NUVIEW, taking this analysis a step further by creating a field-wide, three-dimensional model that can help calculate original oil in place and establish in-field development plans.

MAXIMUM SHALE IMPACT: With shale reservoirs spanning as much as 400 square kilometres, the potential returns on maximising production are not to be taken lightly. For example, the Midland Basin in west Texas holds 90 million-160 million barrels for every square mile (2.59 square kilometres). "Determining the volume of hydrocarbons present in the formation is not hard, but determining how it varies is," according to Howard. "Operators will run engineering strategies and quantify the volume of hydrocarbons in any given shale play over a company's acreage. However, if you have a quantity of hydrocarbons in place, follow the right engineering strategies and subsequently execute them correctly, then you should be able to produce a pre-determined daily amount of oil or gas out of that volume," he concluded. ∎

NUTECH Energy has completed regional studies of the Delaware Basin, the Wolfcamp formation in west Texas, the Eagle Ford shale play in south Texas and the Utica Basin in the northeastern US, among others. It has analysed 8,000 wells in the Wolfcamp shale, 1,500 in the Eagle Ford and completed 256 three-dimensional reservoir characterisation studies.

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