Can Refracturing Provide An Avenue For Raising Production?

Refracturing is an extremely hot topic right now. The process involves returning to previously fractured wells and conducting the process again, after a period of production, to restimulate and improve overall well performance. According to Schlumberger, refracturing attempts to bypass near-wellbore damage and re-establish good connectivity with the reservoir. Additionally, refracturing attempts to tap portions of the reservoir that have higher pore pressures. It is widely thought a successful refracture can restore well productivity to rates close to, or even higher than, initial production.

Considering today’s economics and the costs associated with drilling and completing new wells, refracturing is pretty appealing for many operators. Once an operator decides refracturing is the right fit to improve production, the question becomes where to start.

Michael B. Smith from NSI Technologies taught a training course titled “Refracturing Candidate Selection & Design” at the 2016 Society of Petroleum Engineers Hydraulic Fracturing Technology Conference. Smith is known for his contributions to fracturing technology over the past 30 years and has published a book on the subject. He presented an interesting perspective on refracturing well selection and design. The course began with the question: Why refrac in the first place?

The simple answer is underperformance, and wells underperform for a variety of reasons. Smith asserts that underperformance may be related to the completion, the rock, or production. An operator may have missed pay with his initial completion, had an inadequate fracture length or poor conductivity, or fluid may have caused formation damage. At the same time, the rock may have poor permeability, low pressure, or multiphase flow. During production, proppant crushing, natural fractures, and fines/scale buildup all can be issues related to poor well performance.

After sharing multiple examples of these situations, Smith asserted that the only reason one would want to refracture a well was if the original hydraulic fracture was done incorrectly. He encouraged participants to ask what went wrong the first time. Was there excessive overflush? Was the proppant not strong enough? Are the productive fractures too far apart? Was there insufficient fracture length? Smith advises that if an operator cannot determine what went wrong the first time, he shouldn’t refracture that well.

Smith also states that refracturing is not a new process. In the 1970s, around one-third of all fracs done by industry were refracs. During the 1980s and ‘90s, interest in the process wasn’t as high. However, refracturing now has come to the forefront of industry discussions, conferences, and even technology columnists.

Smith discussed three types of refracturing candidates. First, the operator may have a poorly producing well in a good area. This may be an older well or a well that is producing poorly compared with offset and newer wells in the same field. He says to be cautious of candidates that are newer wells in a good area. These wells may have fracture interference, or depletion is occurring from offset wells. Smith suggests operators ask what makes the well “poor” when determining whether it is a candidate for restimulation.

A well that has had good productivity, but is in decline may be another good candidate for refracturing.

Once a candidate well has been selected, perforations are key in designing the refracture treatment. It’s important to establish whether new perfs can be added and whether untreated original perf clusters exist. Once this is established, Smith says it is important to consider the goals of restimulation when designing the treatment. A few examples of questions Smith suggests one should ask are: Is the process designed to repair overflush? Is it intended to improve frac length? Do natural fractures need to be re-energized?

If one is repairing overflush, Smith advises using a ball sealer or particle diversion to isolate perforations between fracture stages, and then pumping a small slickwater or slickwater/linear gel hybrid frac. To improve frac length, a ball sealer or particle diversion with a slickwater frac should be considered. If the goal is to re-energize natural fractures, Smith encourages operators to consider a ball sealer or particle diversion and pumping slickwater using 100-mesh proppant.

Smith says that when selecting and designing a refracture treatment, it is important to recognize that each well is different and that the “cookie cutter” approach to refrac design ultimately won’t work. Factors that have been key in successful refracs include enlarged frac geometry, improved pay coverage, increased conductivity, and re-energizing natural fissures and fractures. Factors in failed fracs include low pressure or depleted wells, questionable mechanical integrity, or inability to access better parts of the formation.

A refracture treatment absolutely can improve productivity in individual wells suffering from low production. However, careful consideration of individual candidate wells and tailoring the refrac design to suit the needs of each candidate are paramount.

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