

Is it the completion or the reservoir... or both? The impact of reservoir quality on the completion and productivity of the Viking Formation in West Central Saskatchewan

Joe Recsky*, WestFire Energy Ltd, Calgary, Alberta, Canada

jrecsky@westfireenergy.com

Tristan Rugg, WestFire Energy Ltd, Calgary, Alberta, Canada

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Industry's early Viking horizontal drilling and production results in west central Saskatchewan were marginal to mixed. Technical care and patience in applying the scientific method necessitates a deliberate approach to drilling these geologically-complex reservoirs. A review of a large number of industry cores led to a 14 vertical Viking core hole program in west central Saskatchewan in 2010/2011. From a review of the rock data, it was apparent where the thickest net pay and higher reservoir quality existed. However, numerous challenges were encountered during early horizontal operations including reservoir rubble-ization, swelling clays, fines migration and wax precipitation in the horizontal section.

Many early horizontal wells encountered good to excellent reservoir for appreciable intervals in the horizontal section. However, productivity seldom matched the quality of the reservoir found in the drill cuttings. More recent horizontal wells exhibit similar reservoir quality to the earlier wells. However, through advancement of multi-stage fracturing technology, recent wells have outperformed earlier wells in the area. The difference is directly attributable to improvements in completion and production practices as a result of distilling the geological data collected during drilling operations.

The creation of internally generated Well Plots and Reservoir Quality Plots for Viking horizontal wells assists in more accurately predicting initial productivity. A Well Plot consists of an offset vertical well, horizontal well path, ROP, gas readings and gamma ray in a manner that facilitates fracture-port placement. A Reservoir Quality Plot consists of a consistent qualitative reservoir quality description at 25m to 50m intervals that focuses solely on percentage of sand/chert and grain size of each component. Initial productivity can then be compared to the Well and Reservoir Quality Plots to determine if expectations have been met and, if not, where remedial work may be required.

Landing on a consistent drilling, completion and production scenario has overcome many of the early challenges and has begun to unlock the true potential of the vast Viking oil reservoirs of west central Saskatchewan.

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