Case Study: GeoFracture

US$250,000+ and 1+ Days NPT Potential Savings in USA Onshore Well by Avoiding Image Logs

GeoFracture

Client

Major E&P

Unconventional, Onshore, USA

Challenge

Reducing formation evaluation costs in horizontal drilling program to identify the natural fracture network for smart completions in the tight potentially fractured carbonates.

Solution

To detect and evaluate open fractures, the GeoFracture service was deployed in conjunction with the G8 advanced gas service for fluid characterization. Additionally, elemental analysis was performed on cuttings using the GeoROX service.

Results

The GeoFracture service identified both resistive and conductive fractures while micro fractures or matrix permeability indicators correlated with porous intervals. The GeoROX service was able to identify resistive (healed) fractures by increased lead content. Reduced strontium content was found to be indicative of increased porosity, open fracture density and matrix permeability. The G8 hydrocarbon quantity and composition was utilized to confirm porosity and reservoir fluid type.

Value

The improved fracture identification of both healed and open fractures from surface measurements meant that the operator now has the potential of saving wireline image log costs. Formation evaluation costs on horizontal wells can be reduced by >$250,000* by utilizing advanced surface logging evaluation program. Downhole tool risk is also reduced, potentially offering greater savings.

*Saving based on the cost of image logs and associated rig time.

Services used

GeoFracture G8 DualFidStar™ GeoROX

Evaluate development wells in a cost effective manner for smart completions.

To understand the physical and geochemical properties of the formation traditionally requires a suite of downhole formation evaluation tools, which are uneconomical to run on all wells.

Surface logging measurements offer a low risk and more cost effective means for formation evaluation.

The GeoFracture service was able to identify the depth and the frequency of open natural, micro fractures/matrix permeability and drilling induced fractures occurring in the well in near real-time in a lateral well, drilled in tight carbonates. The GeoFracture service was combined with GeoROX elemental characterization from cuttings to identify concentrations of specific elements such as; strontium in low porosity rock, increase in lead corresponding to resistive fractures and decreased magnesium content in conductive and open fractures. The G8 Advanced Gas C1-C8 measurements with recycled gas corrections were used to identify hydrocarbon bearing intervals linked to porosity which was validated by wireline logs.

The results of the integrated analysis of GeoFracture, G8 and GeoROX services demonstrated cost effective alternatives to downhole formation evaluation programs.

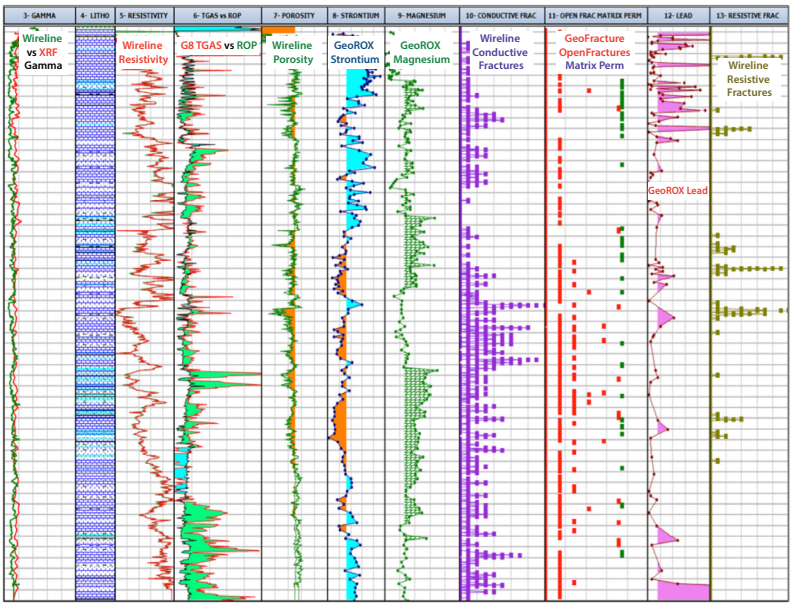

Figure 1. Integrated data set showcasing GeoFracture Matrix Permeability and Open Fractures (track 11), Conductive and Resistive Fractures from image log (tracks 10, 13), G8 Gas vs ROP (track 6), GeoRox Strontium, Magnesium, Lead (tracks 8, 9, 12) and Porosity from wireline (track 7). Matrix Perm (or micro fractures) correlate with better porosity and lower Strontium content. Increased frequency of Conductive fractures correlates with lower Magnesium content. Matrix permeability or Open Fractures from GeoFracture detection correlate with Conductive Fractures from Image Logs. Resistive Fractures correlate with an increase in Lead content.

Contact Sales & Marketing for more information at marketing@geolog.com