

PDC Mountaineer Improves Production more than 50% with Optimized Completion Designs

Sonic scanner acoustic scanning data and Mangrove design increase reservoir-to-wellbore connectivity in Marcellus Shale while reducing time, costs, and risk

CHALLENGE

Improve productivity and operational efficiency in horizontal wells by optimizing the placement of perforation and hydraulic fracturing treatments.

SOLUTION

Use Sonic Scanner* acoustic scanning platform and the Mangrove* engineered stimulation design in the Petrel* platform to engineer precise staging and perforating designs.

RESULTS

Significantly enhanced stimulation coverage across the length of the laterals, increasing production by more than 50% and eliminating screenouts. PDC Mountaineer (PDCM) now plans to use Sonic Scanner platform logs in conjunction with the Mangrove engineered design on all future Marcellus development.

“Schlumberger has provided us with a unique and affordable approach to optimize our recoverable reserves in the Marcellus Shale. PDCM will not complete any of our lateral Marcellus wells without first running this service and evaluating the results.”

Dewey Gerdom
CEO, PDC Mountaineer, LLC



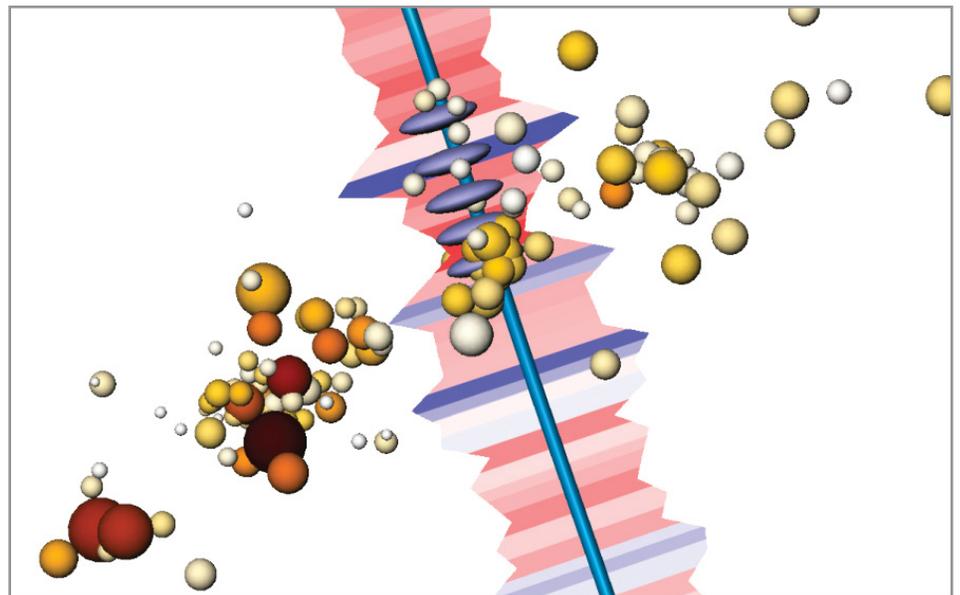
PDCM wanted to optimize horizontal well completions and productivity

To complete its Marcellus Shale horizontal wells simply and cost-effectively, PDC Mountaineer, like most operators, typically uses geometric perforation designs. With this technique, perforation clusters are placed at equidistant points along the lateral. However, microseismic monitoring showed that this type of stage selection often distributed hydraulic fracturing treatments unevenly. The fracture treatments propagated to the lowest-stress zones, leaving the majority of perforations understimulated. To gain a deeper understanding of the reservoir and improve reserve recovery, PDCM partnered with Schlumberger to identify low-stress intervals, develop more effective completion designs, and ultimately improve well economics.

Sonic Scanner platform and Mangrove engineered design optimized completions

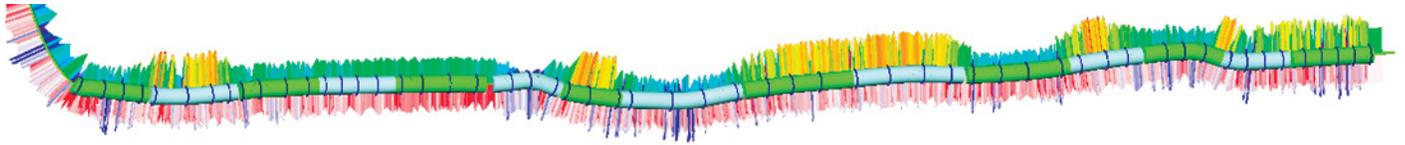
Schlumberger deployed its Sonic Scanner acoustic scanning tool on wireline to map the mechanical rock properties. The advanced borehole acoustic measurements were loaded into the Petrel software platform and interpreted using the Mangrove engineered stimulation design. Once processed, the critical well information, including in situ stress, lithology, and Young's modulus, enabled PDCM and Schlumberger to engineer custom staging and perforating designs. This ensured more consistent stimulation along the entire lateral, resulting in lower breakdown and treating pressures.

“When we've used the Schlumberger Sonic Scanner tool to identify and place the staged intervals based on like-rock completion, we have never screened out,” said Jacob Caplan, Senior Completions Engineer, PDC Mountaineer. “We've also had a better handle on the breakdown pressures to be expected, further reducing our risk of screening out. The screenout rate was 35% when we didn't use Sonic Scanner tool, and on average, each screenout costs PDCM USD 300,000.”



Microseismic monitoring clearly shows that the fracture initiates in the lowest-stress interval (in red), and treatments tend to understimulate higher-stress intervals (in pink and blue).

CASE STUDY: Mangrove engineering design increases reservoir-to-wellbore connectivity, Marcellus Shale



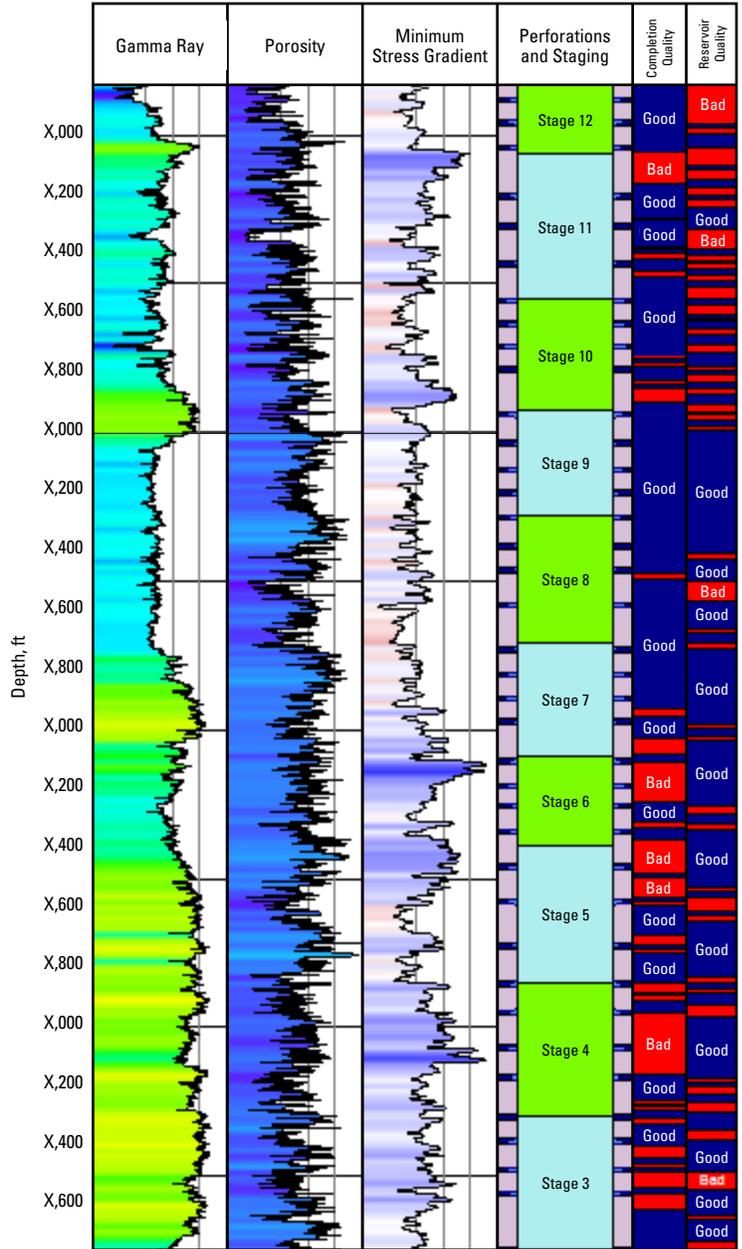
The Petrel platform displays the logs obtained in the lateral in a 3D environment. This perspective enables engineers to make better decisions when designing the completion.

Production increased more than 50%, leading PDCM to use the Mangrove design in all future wells

The Flow Scanner* horizontal and deviated well production logging system showed significantly higher flow rates from wells that were completed following a Mangrove engineered design than from offset wells completed with conventional geometric perforating designs.

“Based on the total number of wells PDCM has producing in the Marcellus, I believe the minimum increase we could expect from utilizing this methodology is 50%–60%,” said Caplan.

After the success of the pilot wells, PDCM decided to use this technique to help maximize ROI for all future horizontal wells in the Marcellus Shale. The Mangrove engineered design has been used in subsequent PDCM wells with similar results. Recently, PDCM used the Mangrove design to automatically select intervals, significantly reducing interpretation time.



Production improvement was directly attributed to the identification and selection of optimal perforation locations based on property logs.

www.slb.com/mangrove

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