

Case Study: Production Monitoring

Location: Eagle Ford Shale



Multiphase flowmeters reduced greenhouse gas emissions by 75% for Ensign Natural Resources in Eagle Ford Shale



Aligns with United Nations Sustainable Development Goal 13



Emissions reduction:
Reduced vented methane emissions by 75%

The switch from test separators to the Vx Spectra* surface multiphase flowmeter delivered real-time monitoring with equivalent accuracy—as well as outsized cost savings. Elimination of pneumatic valves cut vented methane emissions by 75% while simplifying well pad architecture.

The objective

Ensign Natural Resources is a major operator in the Eagle Ford Shale, with more than 600 active oil and gas wells spread over the equivalent of 207 mi² [536 km²]. Like many companies operating in unconventional fields, Ensign was looking for more innovative and cost-effective ways to reduce well pad emissions and lower capex cost on new wells.

Ensign typically configures its wells in pads, with three to six wells per pad. To process the multiphase flow, Ensign previously used one separator per well, resulting in multiple separators on each well pad, with all the accompanying labor and parts costs. At the same time, the dump valves on its pneumatic devices were emitting methane—a situation at odds with its stated environmental, safety, and governance (ESG) principles.

The solution

Multiphase flowmeters were an ideal solution, because they promised to eliminate the need for so many separators, along with the accompanying sources of vented methane. To prove the value of its solutions, SLB recommended a head-to-head comparison between the Vx Spectra flowmeter and the test separators, to see

how closely the flowmeters matched the test separator readings. The main benefit of the Vx Spectra flowmeter is that it provides a continuous, dynamic view of well behavior by looking at each phase independently and measuring the entire production of the well, accurately measuring flow rates over a large range of gas volume fractions with no need for separation.

The flowmeter includes a venturi section, a high-performance fraction meter with advanced full-gamma spectroscopy, and a three-phase flow model to capture multiphase flow dynamics at high frequency while enabling real-time monitoring. The Vx Spectra flowmeter supports an intelligent pad architecture that consists of one flowmeter per well and a production manifold that enables commingling of the production to a single flowline connected to the inlet manifold of the production facility.



Four Vx Spectra flowmeters being tested head-to-head against a test separator.

The results

Over the course of the trial, the Vx Spectra flowmeter performed within the uncertainty range specified by the customer (Figure 1). Even as the test was under way, the flowmeter helped identify production bias errors in real time to enable remediation. The flowmeter also

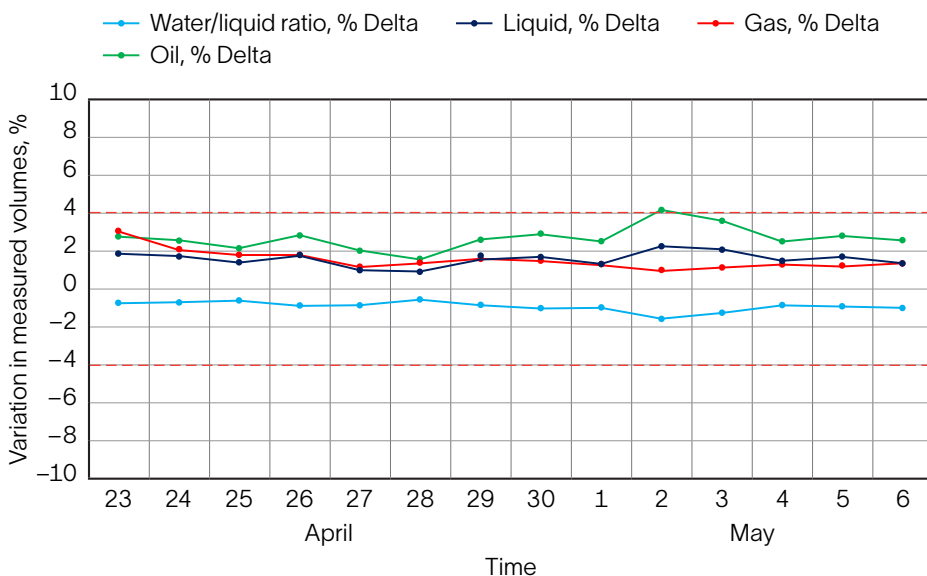


Figure 1. This chart shows the difference in the Vx Spectra flowmeter readings when compared with the test separator. Notice that the differences are between ±4%, which was well within the operator's target range.

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detected slugging behavior that would not have been identified using the test separator method.

The successful trial enabled Ensign's move to a new pad architecture. Instead of using test separators at each well, it now uses a Vx Spectra flowmeter for real-time monitoring of each well's individual performance and retains a single test separator per well pad for production allocation. According to Ensign, the

Vx Spectra flowmeters now installed on its wells continue to provide "overall good agreement" with the test separators.

Financial incentive was a major driver in assessing the Vx Spectra flowmeter, and the new equipment provided a 50% reduction in capex per well at the well pad. Savings were also realized by simplifying the pipeline infrastructure at the pads. Overall, the flowmeter reduced the investment costs needed for ancillaries

(space, power, manifolds, etc.) and reduced vented methane emissions by 75%. Additionally, the number of potential leak paths for fugitive methane was minimized. In every respect, the Vx Spectra flowmeter provided a far better value for Ensign as it drills new wells.

Technical details

For more information, read SPE-196129-MS.

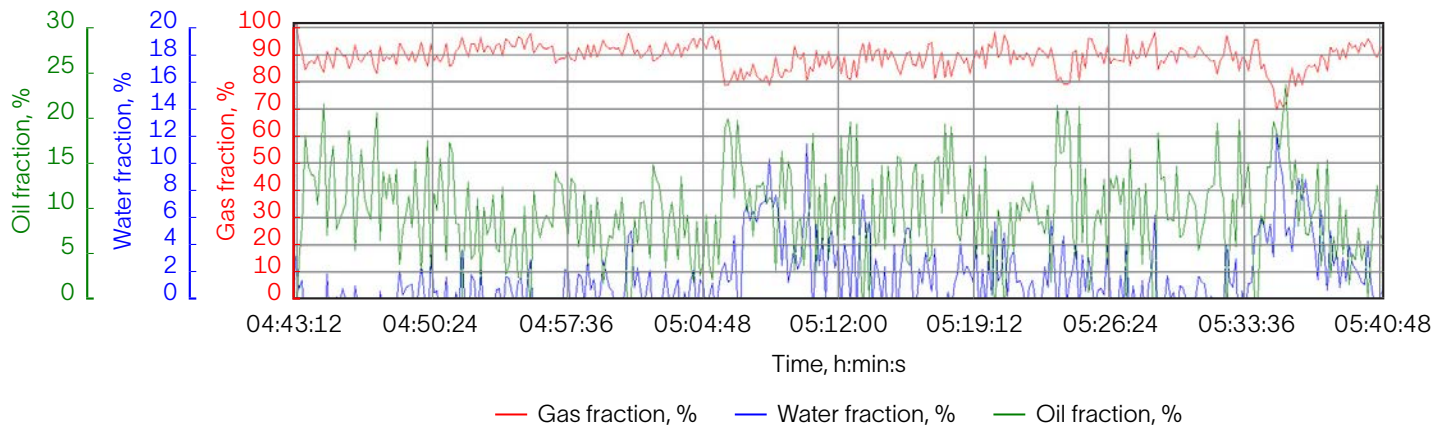


Figure 2. Vx Spectra flowmeter postprocessor display showing oil, water, and gas fractions (holdup) at line conditions over a 1-h period.

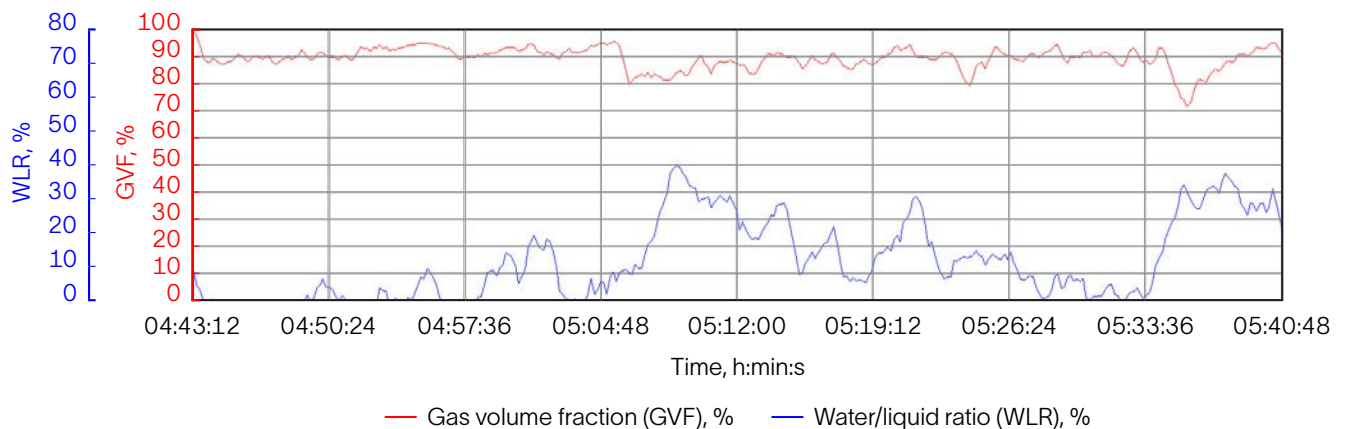


Figure 3. Vx Spectra flowmeter postprocessor display showing GVF and WLR over the same period as in Figure 2.