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Optical Multi-component Borehole Seismic Systems Continue to Deliver Unique Permanent Downhole Data

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SUMMARY

Fiber optic seismic sensors for permanent monitoring applications have continued to deliver unique, continuous multi-component seismic data from deep, high pressure/temperature wells for the last decade. Designed for long term deployment, these sensors optimize sensitivity, 3-component performance and reliability. The all-optical sensors achieve high fidelity borehole seismic sensing without the need for downhole electronics, and satisfy the requirement for ongoing monitoring for many years in hostile environments.

First installed in 2002, applications have over the years included both VSP imaging and microseismic monitoring. The high sensitivity, multi-component sensors enable 3-C processing for imaging purposes and deliver directional fidelity for microseismic event location and characterization. Typically installed simultaneously in a well completion with other optical sensing technologies, such as pressure/temperature gauges and DTS, the all-optical, multi-parameter systems enable efficient integration of production and reservoir monitoring in the same well. Recent case studies demonstrate the robust nature of the technology to deliver high quality microseismic data in onshore HPHT gas storage and offshore injection wells.

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