Good ‘Seismic’ Vibrations in Fahud

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Fahud, PDO's largest field, produces oil from the Natih fractured carbonates. Most production is from shallow layers via gas oil gravity drainage. Waterflooding is planned to tap the large remaining reserves from deeper layers. Waterfloods in potentially fractured reservoirs is challenging and an accurate subsurface model is critical for success. 3D seismic covering the Fahud Jebel (acquired in 1994) is noisy over the crest of the field due to acquisition problems associated with gaps in coverage, coarse sampling, and absorption/scattering of energy in the weathered near surface layers.

An integrated project team covering acquisition, processing, interpretation, and reservoir geophysics was set up in 2002 to justify, plan, and execute a new 3D survey. A 2003 field pilot was executed to evaluate source & receiver coupling, lateral sampling, and statics control requirements. The pilot concluded that Vibroseis data quality is generally better than dynamite data, receiver coupling is not a limitation, and that the critical factor for data quality is source & receiver sampling and good statics control.

The 2004 3D seismic survey resulted in a nominal coverage at target that is 16 times higher than the 1994 acquisition. The key success factors for operational and HSE goals were early planning, Digital Elevation Maps of the Jebel, and the use of professional mountaineers. Preliminary results indicate that the new seismic data is superior to the 1994 data, particularly under the Jebel.