

**AAPG Annual Meeting
March 10-13, 2002
Houston, Texas**

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Sand Injectites: Controls on their Formation and Reservoir Character - an Assessment of Reserve Potential

Sand injectites: controls on their formation and reservoir character - an assessment of reserve potential

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The character and origin of injectite reservoirs is presented together with an assessment of their reserve potential. Failure to recognise the characteristics of sand injectites, both from borehole and seismic data, has recently been rectified in the North Sea where several major deep-water clastic oilfields are recognised as largely of injectite origin. 3-D and 3-D converted-wave seismic data provide good quality images of reservoir geometries that crosscut depositional stratigraphy and develop complex connected reservoirs above horizons originally interpreted as top reservoir. Many characteristics of sand injectites are counter to traditional exploration targets and their seismic character may even have been confused with processing anomalies! Injectites form when sand is remobilised by sediment fluidisation, typically within the first 500m of burial. The grade of sediment remobilised varies but decameter-scale dikes and sills, similar in geometry to igneous intrusions, commonly form high quality reservoirs. Injectite reservoirs usually show evidence of several phases of fluidisation and the mechanism by which fluidisation occurs may vary. In all cases, fluidisation is caused by the sudden release of overpressure built-up in a sand body and the process of equilibration of the overpressure to the hydrostatic gradient as fluidised sediment is injected upward. Remobilisation by fluidisation causes grains to be repacked that often gives injectites distinctive petrographic character, bulk density and acoustic velocity with respect to depositional strata. These physical variations produce distinctive seismic character that aids mapping of reservoir distribution.