

## THE OCCURRENCE AND DETECTION OF GEOPRESSURE IN THE MALAY BASIN

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Geopressure occurs in the subsurface when some of the compressional forces exerted on a rock are supported by fluids within the rock. This results in the formation pressure at a particular depth being greater than the hydrostatic pressure of a column of water equivalent to that depth. In the Malay Basin geopressure has been detected in two thirds of the exploration wells drilled by EPMI. The onset of geopressure is, to some degree, stratigraphically controlled, occurring in progressively older rock units from north-west to south-east and from the centre to the flanks of the basin.

It is EPMI's policy to drill exploration wells such that the pressure exerted by the column of drilling fluid is approximately 250 psi greater than the formation pressure. To maintain this overbalanced condition, pre-spud prediction and instantaneous detection of subsurface geopressure is essential. Prior to drilling, the onset of geopressure can be predicted by seismic velocity analysis and by stratigraphic correlation with nearby wells. During drilling, rate of bit penetration and exponents derived from this parameter can be used to detect entry into a geopressured zone. If the well "kicks", an underbalanced situation exists and the formation pressure can be calculated from surface pressures when the well is shut in. Interpretation of drill cuttings and the gas content, temperature and salinity of drill fluids aid in the detection of geopressure, but these parameters are not instantaneously available as they can only be obtained by circulating drilling fluids from the bit to the surface. Subsequent to drilling, interpretation of geopressure can be made from analysis of electric log response, and direct measurement of pressure can be made by wireline test techniques and production testing.

In an effort to provide a wider range of instantaneous detection parameters, research is being directed towards developing measurement-while-drilling systems, which are as yet unavailable in Southeast Asia. In the meantime, geopressure prediction and detection in the Malay Basin is a team effort between seismic interpreters, drilling engineers, wellsite geologists and mud logging personnel.

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