

## **Present-Day Stress Field of the Northern Perth Basin, Australia**

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The Perth Basin is a north-south trending rift basin formed during the Late Carboniferous to Early Permian and is dominated by north-south striking normal faults. Present-day stress orientations in the northern Perth Basin have been inferred from borehole breakouts and drilling-induced tensile fractures (DITFs) observed in Formation MicroImage logs from nine wells. The nine wells exhibit an approximate east-west maximum horizontal stress (SHmax) orientation, which is consistent with stress field modelling of the Indo-Australian Plate using large-scale tectonic forces. Previous breakout interpretation from dipmeter logs indicates a number of anomalous north-south SHmax orientations. However, the higher quality image logs indicate a very consistent east-west SHmax orientation, perpendicular to the dominant structural trend of the basin. Pressure tests conducted during drilling operations indicate that the minimum horizontal stress (Shmin) is greater than 18.5 MPa/km.

The vertical stress was calculated from density logs to be approximately 22 MPa/km. The high magnitude of Shmin indicates either a strike-slip fault stress regime or reverse fault stress regime. While drilling through a highly fractured sandstone formation, a substantial amount of fluid was lost through one large fracture. The fracture is sub-vertical and is either open or easily reactivated within the present-day stress field. The orientation of the fracture and the presence of significant numbers of DITFs both suggest either a strike-slip fault stress regime or one transitional between strike-slip and reverse fault stress regimes ( $SH_{max} > S_v \approx SH_{min}$ ). Thus, the dominant structural trend of the basin is not optimally oriented within the present-day stress field.