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The Goodwyn Field: An Integrated Approach To Optimal Field Development

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The Goodwyn Gas Field is located some 130 km offshore of Western Australia in a water depth of 130 m and is currently under development. First production commenced in February 1995 with production buildup to 70,000 stb/d of condensate and 0.6 Bcf/d of raw gas. The gas is trapped within pre-rift fluvio-deltaic reservoirs of the Triassic Mungaroo Formation in a large rotated fault block on the northwestern edge of the Dampier Sub-basin. The reservoir units range in thickness between 30 and 80 meters and dip gently below the overlying Cretaceous shale seal. The gas column has a maximum height of 100 m and the field extends over more than 100 km².

The target production levels and ultimate recovery are based on the optimisation of the development plans and gas recycling along strike in the individual reservoir units. The success of the development plan depends on an accurate model of the reservoir architecture. Prior to the first phase of development drilling, only four wells had penetrated the primary reservoir units. Successful development planning required the recognition and management of subsurface uncertainties with this model such that eventual gas and condensate recovery could be maximised.

Integration between seismic interpretation, stochastic reservoir modelling and reservoir engineering proved essential to achieve these objectives. A detailed evaluation of the reservoir stratigraphy, employing sedimentology, high resolution seismic and high resolution palynology, provided the framework for the 3D stochastic reservoir modelling. The modelling converted the information into a number of geological concepts which were then used to generate dynamic reservoir simulations under different aquifer strengths and development options. The location of the various development wells was then designed to be optimal on a risked basis to ensure that the target production levels and ultimate recovery be achieved taking account of risks and uncertainties.

Seven development wells have been drilled and although these wells have shown that there is more variability than originally envisaged, the broad framework of the reservoir model remains. The recognition and management of the reservoir uncertainties across the disciplines has allowed all wells drilled to date to have been optimally located ensuring successful development.