AAPG International Conference: October 24-27, 2004; Cancun, Mexico

Oil-Fill History of Two Reservoirs with an Upper Waste Zone – Implications for Production

James Underschultz[1], *Anthony Gartrell*[2], *Luke Johnson*[2], *and Mark Brincat*[2]. *(1) CSIRO Petroleum (ARRC), 26 Dick Perry Ave, Technology Park, Kensington, Perth, WA 6151, Australia, phone: 61-8-6436-8747, fax: 61-8-6436-8555, james.underschultz@csiro.au, (2) Geofluid Dynamics, CSIRO Petroleum, P.O. Box 1130, Bentley, WA, Perth, 6102, Australia*

The Griffin oil field is located in Cretaceous sands of a fault bounded structural trap in the Barrow sub-basin on the North West Shelf of Australia. The Gidgealpa oil field is located in Jurassic sands of a relatively unfaulted structural dome in the onshore Eromanga Basin of southeast Australia. They both represent a highly permeable clean sandstone reservoir capped by facies of mixed reservoir quality that make up a waste zone before reaching the top seal with consistently low permeability and high seal capacity.

Effective exploitation strategy requires an understanding the upper waste zone. Both fields were examined using a workflow that incorporates hydrodynamics, GOI (grains with oil inclusions), and mercury injection capillary pressure. In both fields, various facies in the waste zone have higher oil water contacts and lower oil saturation than the clean reservoir due to variable reservoir quality and corresponding capillary pressure effects. The virgin reservoir pressure data indicate that some waste zone sands are in hydraulic communication with the clean reservoir sand but others are not. This coupled with GOI data on the oil inclusions suggest that sandy portions of the reservoir filled in a patchy manor with most of the lower quality muddy zones and the odd reservoir quality sand in the waste zone remaining water saturated. With continued post oil charge compaction, many parts of the waste zone became hydraulically isolated, taking on separate pressure characteristics. Muddy low permeability zones separating sandy portions of the waste zone, remain water saturated to present day.