

The “Cossack Pioneer” Oil Fields: New Subsurface Insights after Eleven Years on Production

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At end-2001, the “Cossack Pioneer” oil fields, situated on Australia’s North-West Shelf, had produced more than half the then-booked reserves, while continuing to produce with little or no water-cut and minimal decline. An upward revision of reserves was clearly indicated, but seismic mapping consistently gave field sizes too small, and performance data were too immature to predict reserves.

The Wanaea, Cossack, Lambert and Hermes oil fields are produced via the “Cossack Pioneer” FPSO. Production commenced in 1995, and totals 321 MMbbl at end-2005. Light oils are reservoired in turbidite sands of the Tithonian Angel Formation, whose high permeabilities allow for individual well productivities of up to 40,000 bbl/d.

An intensive subsurface study was undertaken to better understand the size and recovery efficiency of each field, in order to update field development plans towards a realistic end-of-field-life. Work began with seismic data quality, which has been notoriously problematic at reservoir level. The Demeter high-density 3-D survey was acquired in 2003, providing much-improved bandwidth and multiple suppression. This allowed more confident mapping of the fields, leading to: significant STOIIIP gains; field structures less compartmentalised than previously mapped; and decreased incentive for appraisal drilling to reduce uncertainty.

Furthermore, a number of development drilling opportunities emerged. Subsequent data gathering (5 new wells, interventions, developing water-cuts), combined with updated static and dynamic modelling/history matching, confirmed highly efficient sweep of the reservoirs. Recovery factors of 50-80% were indicated – far higher than previous estimates.